Demand Side Management
2008 Annual Report

June 25, 2009

FINAL AUDITED REPORT

uniongas
A Spectra Energy Company

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1. Introduction

Since 1997 Union Gas has consistently delivered cost effective Demand Side Management (DSM) programs. Over the past eleven years Union has delivered approximately 614 million m^3 of natural gas savings and over $1 billion in net Total Resource Cost (TRC) benefits.

Union's 2007-2009 DSM Plan was approved by the Ontario Energy Board (OEB) on January 26, 2007 in the EB-2006-0021 proceeding. In 2007 Union's DSM budget was $17.0 million. This increased by 10%, to $18.7 million in 2008, as outlined in the OEB's Decision with Reasons dated August 25, 2006. Included in the 2008 budget for 2008 were $1.1 million for Market Transformation programs and $1.43 million for programs targeted to low income customers.

The TRC target for 2008 was calculated using the formula established in Phase 1 of the DSM Generic Proceeding. For 2008 it was the simple average of $188 million and the actual 2007 audited TRC value increased by 1.5 times the budget escalation factor (15%). The 2008 TRC Target of $180.1 million was filed with the Board in the 2007 Annual DSM report

The primary purpose of this annual report is to describe Union's energy efficiency initiatives and summarize the 2008 DSM portfolio results. This annual report plays an important role in documenting 2008 program results in comparison to the plan, and demonstrates Union's success in achieving even greater energy savings than it has in previous years. A secondary purpose for the report is to summarize the outcomes of the evaluation research undertaken in 2008. The report also discloses Union's 2009 TRC target.

In 2008, Union's DSM portfolio generated net TRC benefits of $262.7 million and conserved 73.2 million m^3 of natural gas savings. Program spending in 2008 totalled $20.2 million. The Shared Savings Mechanism (SSM) earned Union an incentive of $8.696 million for 2008. The Market Transformation activities, measured by the OEB approved scorecard metrics, generated an incentive of $0.5 million.

2. Planning and Evaluation Overview

Union's 2007-2009 DSM Plan was designed to create an effective framework for achieving the company's DSM objectives. Union has emerged as a leader in the cultural shift towards energy efficiency and conservation. The three-year, OEB approved plan focused primarily on delivering natural gas savings and customer benefits but also allowed Union to drive market change through its Market Transformation portfolio.

In 2008, Union continued to broaden the scope and reach of its DSM programs by incorporating novel delivery methods such as partnering with school boards to distribute Energy Savings Kits (ESKs). Union also scaled back programs that were not deemed cost effective. All measures were screened for cost effectiveness using the Total Resource Cost (TRC) test as outlined in the Decision with Reasons and detailed in section 2.1 below.

The evaluation of the 2008 DSM year is based upon two sets of planning input assumptions.

1. For the m^3 savings, TRC results and the Shared Savings Mechanism (SSM) incentive, the planning input assumptions used in this evaluation report are those filed by Union on November 10, 2008 and approved by the Board on January 27, 2009.

2. For the Lost Revenue Adjustment Mechanism (LRAM) section of the annual report, the m^3 savings have been calculated using the most current input assumptions available at the time the annual report was completed. These input assumptions were recommended by the auditor.

Appendix A summarizes the input assumptions agreed to in consultation with the Evaluation and Audit Committee (EAC) and approved by the Board on January 27, 2009. Within Appendix A there are two sets of input assumptions. The first set, titled SSM, are used to determine the TRC calculations throughout the majority of this report and are noted in (1) above. The second set, titled LRAM, are used to calculate m^3 savings for LRAM and reflect the Navigant Input Assumptions approved by the OEB for 2010 planning purposes and results of the 2008 evaluation research.

2.1. Cost Effectiveness Screening

All DSM measures are screened using the TRC test, which measures the benefits and costs of DSM investments from a societal perspective. The TRC benefit/cost test assumes a value of zero for environmental benefits and other externalities.

Benefits include the value of avoided use of natural gas, electricity and water resources as well as incentives for participants. Savings benefits are calculated over the life of the measure and discounted to calculate the net present value[1]. Costs include equipment purchases and installation costs for participants and program costs for the utility. Some of the benefits and costs net out to

[1] A discount rate of 10% is used to calculate the net present value.

zero – incentives, for example, are a benefit to participants and a cost to the utility. All TRC results reported are net of free rider calculations.[2]

Measures delivered through Union's DSM portfolio (with the exception of Market Transformation) must yield a benefit-cost ratio of 1.0 or more. Programs are evaluated annually to ensure they pass the cost effectiveness screening.

The OEB set the methodology used in calculating the avoided costs to screen for cost effectiveness in the Phase 1 Decision of the DSM Generic Proceeding. The OEB-approved avoided cost methodology for Enbridge Gas Distribution in the EB-2005-0001/EB-2005-0437 proceeding is also used by Union. However, the costs applied in the calculations are specific to Union's franchise area and gas supply management policies and practices. The 2008 Union Gas Avoided Costs were included in the filing of the 2007 Union Gas DSM Annual Report. The 2009 Avoided costs are outlined in Appendix G.

2.2. Monitoring and Tracking

Effective and reliable tracking is essential to accurately report on program results. Union has a complete tracking system, supported by data checks at various points in the monitoring process. In 2008 Union implemented phase I of its update of DSMt, an internally developed tracking and reporting system. The primary benefits of this first phase of the system redesign are a reduction in manual reporting, greater data accuracy and efficiency and an increase in audit controls.

A flowchart outlining Union's program tracking process is included in Appendix F.

2.3. 2008 Program Evaluation & Verification

The two broad categories of evaluation activity are impact evaluation and process evaluation. Impact evaluations focus on participation and savings resulting from DSM programs. Process evaluations focus on the effectiveness of program design and delivery to assess why effects occurred. Union has historically focused on impact evaluation and this is the primary focus of the 2008 report.

A summary of the verification studies undertaken in 2008 is provided in the Verification and Evaluation section (section 9) of this report.

2.4. 2008 Evaluation Priorities

Union committed to completing an evaluation of the input assumptions on all measures included in the 2007-2009 DSM plan. Approximately a third of the measures were to be evaluated in each of the three years. Union consulted with members of the Evaluation and Audit Committee (EAC) to select the measure evaluation research priorities for 2008. Following selection, Union contracted several DSM Evaluation Consulting firms to complete the 2008 evaluation work which included:

[2] Free riders are program participants who would have installed the energy efficient measure without the influence of Union's DSM program.

Name of Study	Consulting Firm
Energy Star for New Homes deemed savings for version III and version IV	Bowser Technical Inc.
Analysis of 2006 Ontario Building Code impacts on current Union Gas measures	Caneta Research Inc.
Low flow Pre-rinse spray nozzle free rider	PA Consulting Group
Low flow Pre-rinse spray nozzle deemed savings	Energy Profiles Limited
Boiler efficiency base case study	SeeLine Group Ltd.

The impacts of the Ontario Building Code and the Energy Star for New Homes analysis studies were incorporated in the filing of 2008 SSM input assumptions, approved by the Board in January 2009.

A summary of the results from both the free-rider and deemed savings low-flow pre-rinse spray nozzles evaluation research studies is provided in Appendix I and Appendix J. The results of the pre-rinse spray nozzle free study are reflected in the input assumptions used to calculate LRAM. (Appendix A). The deemed savings pre-rinse spray nozzle study was utilized by Navigant in formulating the OEB approved input assumptions for 2010 planning purposes. The results of the Navigant study were used to calculate LRAM (Appendix A).

The results of the boiler base case efficiency study were recommended by ECONorthwest as the best available information to be utilized in determining whether custom boiler projects should qualify for LRAM purposes. The results of the study will be utilized in discussions with the EAC to develop the base case efficiency for custom boiler projects for 2009. A summary of the boiler efficiency base case study and SeeLine's recommendation are also provided in Appendix K.

2.5. 2008 Annual Report Audit

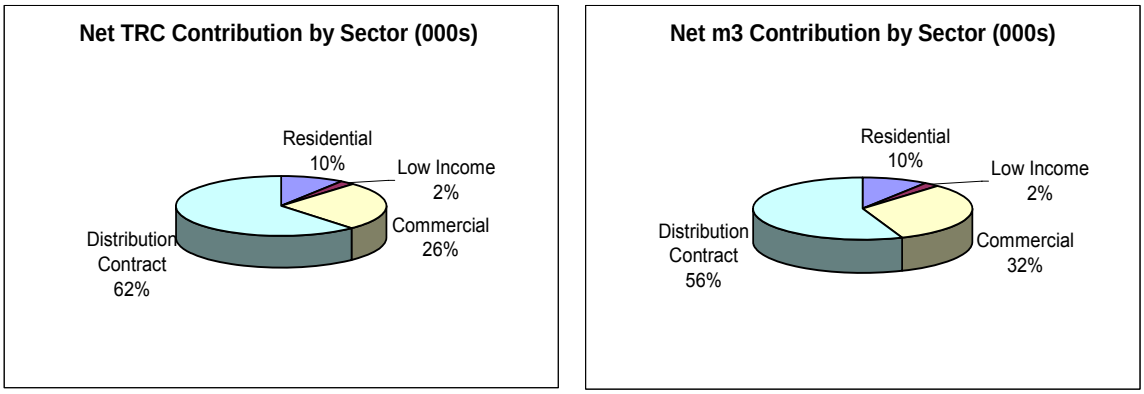
This annual DSM report is subject to an independent external audit. ECONorthwest was awarded the contract to audit 2008 results. The goals of the audit are to confirm to DSM stakeholders that claimed savings are correct and that Shared Savings Mechanism incentive (SSM), Lost Revenue Adjustment Mechanism (LRAM), and Market Transformation incentive calculations are appropriate.

The auditor will be required to express an opinion on the appropriateness of claimed TRC, SSM, LRAM and Demand Side Management Variance Account (DSMVA) based on their review of Union Annual Report. The auditor will provide a final opinion that the TRC Savings and amounts recoverable for SSM, LRAM and DSMVA are correctly calculated using reasonable assumptions.

3. Overall 2008 DSM Program Results

In 2008, Union's DSM program generated net TRC benefits of $262.7 million and 73.2 million m^3 in natural gas savings. Program spending in 2008 totalled just under $20.3 million, including $1.1 million for Market Transformation. The Distribution Contract market delivered the largest portion of savings in 2008 as well as the highest TRC value per dollar spent, followed by the Commercial, Residential and Low Income markets respectively.

Figure 3.1 - % Distribution by Sector



Union's TRC target for 2008 as filed in the 2007 Evaluation Report was established as $180.1 million. In an effort to achieve this target, Union focused on a balance of programs in each sector. Table 3.1 summarizes Union's overall DSM results for 2008. Appendix B compares actual results to the program plan for each measure.

Table 3.1 - Overall 2008 Program Results by Sector

2008 DSM Program Results	Residential	Low Income	Commercial	Distribution Contract	Market Transformation	Other Direct Program Costs	Indirect Program Costs	Actual 2008 Results	2008 Plan	Variance
Net TRC (000s)	$ 25,949	$5,949	$ 71,428	$ 166,246	$ (347)	$ 4,772	$ 1,700	$ 262,754	$ 253,303	$ 9,451
Natural Gas Savings (m3 000s)	7,188	1,575	23,661	40,828				73,252	100,124	(26,872)
Participants	405,992	35,699	85,158	189				527,038	647,252	(120,214)
Expenditures* (000s)	$ 3,044	$1,445	$ 4,332	$ 3,869	$ 1,097	$ 4,772	$ 1,700	$ 20,259	$ 18,700	$ 1,559
TRC / Dollar Spent	$ 8.53	$ 4.12	$ 16.49	$ 42.97				$ 12.97	$ 13.55	$ (0.58)

*Expenditures include program and incentive costs

DSM initiatives for 2008 were delivered through the sector-specific programs outlined in Table 3.2. These programs are designed to achieve savings in the areas of space heating, water heating, and the building envelope, as well as process-related energy applications. Union targets each customer sector with specific DSM programs.

Table 3.2 - Sector Programs

Sector	Programs
Residential	New Home Construction, Home Retrofit
Residential - Low Income	Helping Homes Conserve
Commercial	New Building Construction; Building Retrofit, Audit Programs
Distribution Contract	Custom Projects and Audit Programs
Market Transformation	Drain Water Heat Recovery

Table 3.3 details the breakdown of overall savings results by sector and by program.

Table 3.3 –Detailed 2008 Sector and Program Results

Sector	Program	Natural Gas Savings (m3 000s)	Participants	Program Costs (000s)	Program TRC
Residential	New Home Construction	1,299	1,343	$ 118	$ 446
	Home Retrofit	5,889	404,649	$ 1,309	$ 25,503
	Total Residential	**7,188**	**405,992**	**1,428**	**25,949**
Low Income	Low Income	1,575	35,699	$ 494	$ 5,949
	Total Low Income	**1,575**	**35,699**	**$ 494**	**$ 5,949**
Commercial	New Building Construction	5,216	751	$ 115	$ 15,881
	Building Retrofit	18,445	84,407	$ 565	$ 55,547
	Total Commercial	**23,661**	**85,158**	**$ 680**	**$ 71,428**
Distribution Contract	Distribution Contract	40,828	189	$ 664	$ 166,246
	Total Distribution Contract	**40,828**	**189**	**$ 664**	**$ 166,246**
	Market Transformation			**$ 347**	**$ (347)**
	Total Program Results	**73,252**	**527,038**	**$ 3,612**	**$ 269,226**

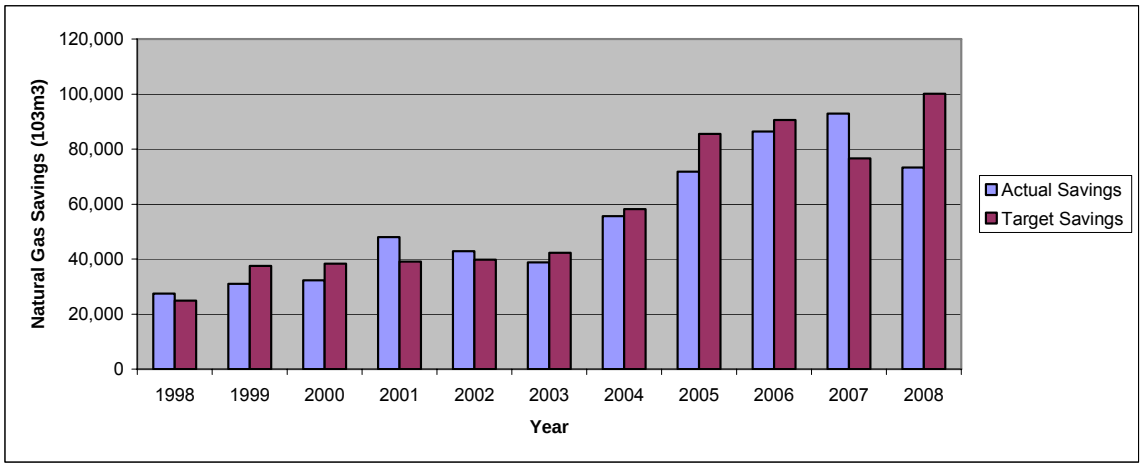
	Other Direct Program Costs
Salaries	$ 3,050
Research & Evaluation	$ 1,578
Administration	$ 144
Total Other Direct Program Costs	**$ 4,772**

	Indirect Program Costs (000s)
Overhead	$ 1,700
Total Indirect Program Costs	**$ 1,700**

	Total Costs (000s)	Net TRC (000s)
TOTAL 2008 PROGRAM RESULTS	**$ 10,084**	**$ 262,754**

Figure 3.2 demonstrates that Union's 2008 total natural gas savings across all programs was 73.3 million m^3. While Union drove significant program results into the distribution contract market, the change in the free rider rate from 30% in 2007 to 56% in 2008 had the significant impact, reducing claimed savings by approximately 23 million m3 – a 17% loss.

Figure 3.2 Historical Savings Results



The 2008 Board approved budget of $18.7 million was 10% higher than the $17 million budget approved in 2007. In 2008 Union spent over $20.2 million on DSM, including over $1.4 million on Low Income programs and nearly $1.1 million on Market Transformation. A breakdown of 2008 actual expenditures by sector, compared to 2008 planned and 2007 actual expenditures, is shown in Table 3.4

Table 3.4 - Overall 2008 Direct DSM Program Costs

DSM Program Sector Costs	Incentives (000s)	Program Costs (000s)	2008 Total (000s)	2008 Plan (000s)	2007 Total (000s)	2006 Total (000s)
Residential	$ 1,616	$ 1,428	$ 3,044	$ 2,433	$ 3,321	$ 3,163
Low Income	$ 951	$ 494	$ 1,445	$ 1,430	$ -	$ -
Commercial	$ 3,652	$ 680	$ 4,332	$ 3,440	$ 3,255	$ 3,090
Distribution Contract	$ 3,205	$ 664	$ 3,869	$ 3,898	$ 2,540	$ 3,500
Market Transformation	$ 750	$ 347	$ 1,097	$ 1,100	$ 770	$ -
Total Program Sector Costs			**$ 13,787**	**$ 12,302**	**$ 9,886**	**$ 9,753**
Other Direct Program Costs			$ 4,772	$ 4,698	$ 4,545	$ 1,429
Indirect Program Costs			$ 1,700	$ 1,700	$ 1,700	$ 1,700
Total Spending			**$ 20,259**	**$ 18,700**	**$ 16,131**	**$ 12,882**

The DSMVA was designed to "true-up" the variance between the spending estimate built into rates for the year and the actual spending in that year. In the Decision with Reasons, the Board determined that the utility shall be reimbursed up to a maximum of 15% of its DSM budget for a given year. All additional funding must be utilized on incremental program expenses including market transformation programs.

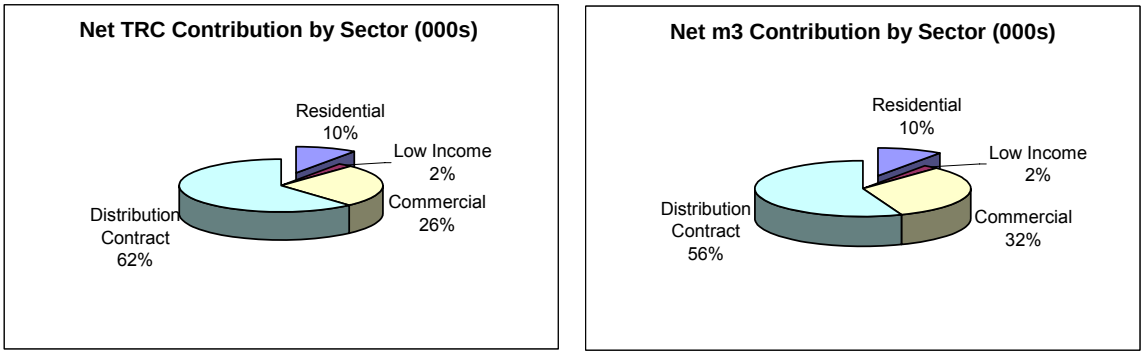
A breakdown of spending by program is contained in Appendix C. Specific details on program savings, participants[3], and costs by sector are outlined in the next three sections of this report.

[3] Participant counts are the number of measures installed for each program.

4. Residential Market

Residential programs accounted for 10% of all DSM savings in 2008, contributing almost 7.2 million m^3 of savings, and a net TRC of close to $26 million. Direct program spending in the residential market was $3 million.

Figure 4.1 - % Distribution by Sector



The residential sector delivered natural gas savings through the New Home Construction, Home Retrofit and Low Income programs in 2008. Table 4.1 summarizes the New Home Construction and Home Retrofit results for 2008. The Low Income results appear in Section 5.

Table 4.1 - 2008 Residential Program Results

2008 Residential Results Summary	New Home Construction	Home Retrofit	Actual 2008 Results	2008 Plan	Variance Actual vs Plan
Net Program TRC (000s)	$ 446	$ 25,503	$ 25,949	$ 33,756	$ (7,807)
Natural Gas Savings (m3 000s)	1,299	5,889	7,188	8,344	(1,156)
Participants	1,343	404,649	405,992	533,768	(127,776)
Expenditures* (000s)	$ 253	$ 2,791	$ 3,044	$ 2,433	$ 610
TRC/$ Spent	$ 1.77	$ 9.14	$ 8.53	$ 13.87	$ (5.35)

*Expenditures include program and incentive costs

In 2008, Summit Blue Consulting conducted a deemed savings study for Energy Savings Kits (ESKs) and a free rider study for the residential home retrofit market. The results negatively impacted the Net TRC generated per unit for each of the residential home retrofit measures. Therefore, significantly more participants were required to generate the same level of Net TRC and m3 savings. A total of 96,000 ESKs were distributed in 2008 vs 68,000 in 2007. The impact is a lower TRC/$ Spent.

4.1. 2008 Residential Program Framework

Residential programs are designed to achieve savings in home heating, water heating and the building envelope in both new buildings and retrofit applications. These programs are marketed to residential M1 and R01 customers and are delivered through a variety of channels. Existing trade allies and partnership relationships are utilized as well as direct-to-customer promotions designed to cost-effectively promote energy efficiency within Union's residential customer base.

This section outlines the programs available to residential customers in 2008, including program changes, existing initiatives and delivery methods employed.

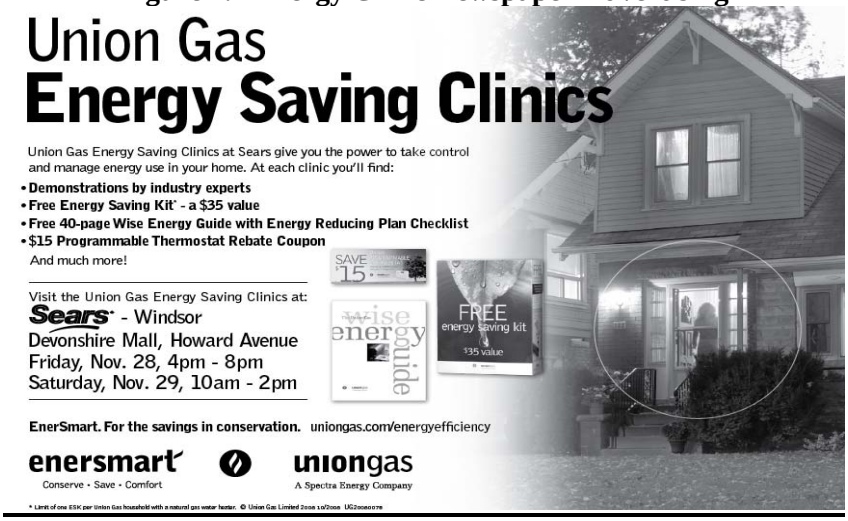
4.1.1. New Initiatives in 2008

Direct Energy Partnership
Union Gas launched an ESK partnership program with Direct Energy in May 2008 to drive energy efficiency into the retrofit market. This strategy was geared to reach customers less likely to receive an ESK through existing delivery channels. Through the partnership, Union provided Direct Energy with co-branded kits that were installed/distributed by their sales force. Direct Energy received $15 for every installation that was completed. A key component of the delivery strategy was that a showerhead bag test was performed prior to the installation of the new energy-saving showerhead and the results were tracked accordingly.

ESK School Board Partnership
In the fall of 2008 Union Gas partnered with the Windsor Essex Catholic District School Board to promote energy conservation with staff and students. In partnership with the school board Union distributed a letter offering an ESK to all staff and students. A press release was also issued announcing the partnership and promoting the ESKs. This partnership not only created awareness of the energy saving measures but also educated young people about the importance of energy conservation. Approximately 4,000 energy saving kits were distributed through this partnership.

Energy Clinics
In Q3 2008 Union launched Energy Clinics in select Sears mall locations within Union's franchise area. The clinics included live weatherization demonstrations, conducted by industry experts, to promote draft proofing and air sealing during the heating season. The clinics also provided customers with free energy conservation tools, such as ESKs, programmable thermostat rebate coupons and Union Gas Wise Energy Guides. The clinic dates and locations were promoted through bill inserts, the Union website and local newspapers (see Figure 4.2). In addition the clinic dates were communicated to local politicians and received significant free press from the local media.

Figure 4.2 Energy Clinic Newspaper Advertising



4.1.2. Existing Initiatives

A number of existing residential initiatives continued in 2008.

ENERGY STAR® for New Homes (ESNH)
Union continued to provide a $100 incentive to builders for the successful completion and labelling of an ENERGY STAR® New Home (ESNH).

Through a partnership with EnerQuality Corporation, Union participated as a member on the Policy and Procedures Advisory Council (PPAC). Through this involvement Union assisted in developing the marketing strategy for ESNH. Union also introduced the offer to builders, communicating the value of the ESNH program in new construction.

The ESNH program was re-designed in 2008 to make the process easier and more transparent for builders. The new process included:

- Completion of a "Sign-Up Form" to register for the program
- Inclusion in Union's monthly tracking and reporting process through:
    - Standardized Union Gas invoice
    - Monthly "Builder Certificate" outlining the number of eligible ENERGY STAR homes built, based on EnerQuality's records

The program was promoted exclusively through Union's Residential Account Managers (RAM's) and was supported by a comprehensive marketing package outlining the program details and process to follow.

Programmable Thermostat
Union promoted a $15 on-bill rebate (Figure 4.3) for the purchase and installation of a programmable thermostat to its customers. This $15 rebate, offered in the form of a coupon, was distributed through a number of channels in 2008:

- Bill inserts distributed to the entire Union residential customer base
- ESK packaging
- Home Depot stores
- Home Hardware stores
- Direct mail to targeted conversion customers
- HVAC dealers
- Union Gas Website

Figure 4.3 – Programmable Thermostat

Homeowners submitting an application to convert to natural gas space heating were also specifically targeted for this offer. They received a welcome letter which included a section on energy efficiency along with a coupon to promote the purchase of a programmable thermostat.

Again in 2008, coupons were provided to Home Depot as a form of promotion to their customers. Residential Account Managers (RAM's) maintained and monitored coupon inventory levels and refilled stock. In order to receive the on-bill rebate customers had to submit their active Union Gas account number on the completed coupon, along with a copy of the bill of sale and the original UPC symbol. Only coupon participants who indicated they were replacing a manual set-back thermostat were counted as a participant in the program. Customers who indicated they were replacing a programmable thermostat received the on-bill rebate in 2008 but were not counted as a participant of the program. 84.7% of programmable thermostat participants replaced a non-programmable thermostat and therefore qualified as valid participants in the program.

Energy Savings Kit (ESK)

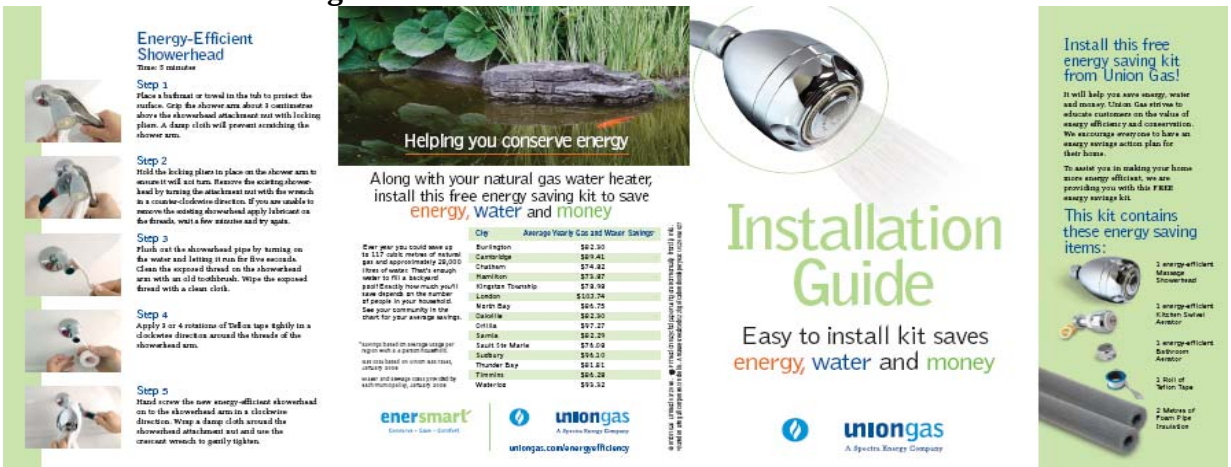
ESKs have been distributed to Union's customers since 2004. ESKs are pre-packaged measures designed to reduce a customer's energy demand and water consumption, as well as educate consumers on the efficient use of energy. In 2008 an ESK consisted of:

- Pipe wrap - 2m
- Energy efficient showerhead (1.25 GPM)
- Energy efficient kitchen aerator (1.50 GPM)
- Energy efficient bathroom aerator (1.50 GPM)
- 1 roll of Teflon tape for ease of showerhead installation
- ESK Installation Guide
- $15 Programmable Thermostat

In 2008 Union introduced a 1.25 gallon per minute (GPM) showerhead as a component of the ESK offering. This was a significant difference from the 2.0 GPM unit offered in prior years. The 1.25 GPM showerheads are not sold at retail outlets in Ontario and were manufactured as a special order for Union. The aesthetics of the showerhead were also changed from a white plastic casing to a chrome casing to improve consumer impressions of the quality of the unit.

As in 2007, the kits also included a detailed installation manual to assist the customer through the installation process. The installation guide was redesigned in 2008 (See Figure 4.4).

Figure 4.4 – 2008 ESK Installation Guide



Union Gas delivered ESKs to franchise customers through a variety of delivery methods. The delivery methods and their results are shown in Table 4.2

Table 4.2– 2008 ESK Summary of Delivery by Segment

Residential Account Managers	Home Depot	Website Orders/ Depots.	School Board	Direct Energy Distr.	HVAC Program Install	HVAC Program – Dist.	Direct Energy Install	TOTAL
42,255	35,418	9,784	3,941	2,473	1,403	1,367	111	96,752

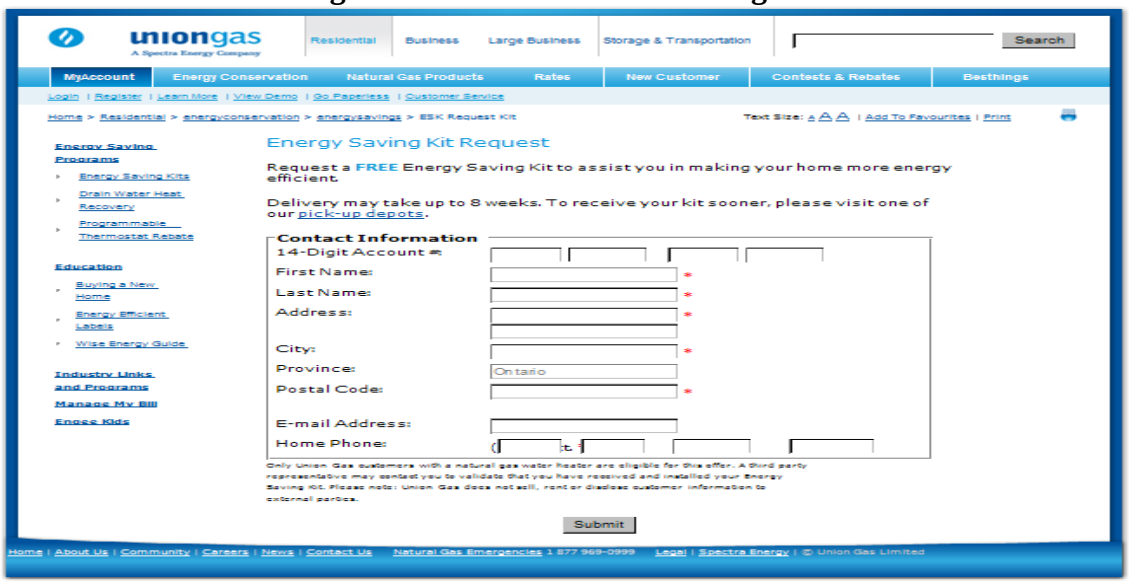
In 2008 a total of 96,752 ESK kits were distributed in Union's franchise area. This is 45,000 more than were distributed in 2007 – an increase of 66%.

The largest delivery method for ESKs in 2008 was through the Residential Account Manager's (RAM's) who set-up and monitored the ESK depots. The RAMs also initiated partnerships with municipalities, school boards, HVAC partners and banner retailers.

Targeted events at Home Depot stores in Union's franchise area were another important delivery method. Union held events at 13 Home Depot stores over two weekends in May and October. The ESK distribution events were supported through Union Gas channels including on-bill messaging and Union's website, as well as targeted newspaper advertising. Each store had at least one Union Gas employee present, to qualify customers, distribute ESKs and provide energy saving advice. Approximately 35,000 ESKs were distributed during this promotion. This was an increase of approximately 50% when compared to the same events in 2007.

A new delivery method for ESK's in 2008 was the creation of an online order form at www.uniongas.com/eskorder (see Figure 4.5). Customers filled out their mailing address and account information and Union arranged for an ESK kit to be delivered to their home. Prior to shipment, the order was verified by Union's DSM tracking team to ensure there was no address duplication or receipt of a kit in a previous year.

Figure 4.5: Online ESK Ordering Site



HVAC Partnership Initiative
The HVAC partnership was designed to influence energy conservation decisions at the point of purchase. The incentive was paid directly to the HVAC partners for the promotion, sale and installation of an energy efficient measure. For 2008 the following incentives were available to qualified HVAC partners;

- $15 for the installation of an energy saving kit
- $25 for the sale and installation of a high efficiency natural gas furnace. (Note: the furnace incentive was only available to HVAC partners who were willing to promote and install the ESK.)
- $15 for the sale and installation of a programmable thermostat.

In 2008, HVAC partners installed 1,400 Energy Savings Kits. Those partners participating in the ESK installation program also qualified to apply for incentives for installations of High Efficiency furnaces and Programmable Thermostats. Only sales to customers replacing a manual thermostat were counted as valid participants in the Programmable Thermostat program.

4.1.3. Initiatives Exited in 2007

In 2007 Union Gas began reducing the focus on High Efficiency furnaces due to an expected change in regulation in 2010 requiring all furnaces sold in Canada to be high efficiency. This phase-out continued throughout 2008. This has prepared HVAC partners for the eventual removal of the program and encourages their participation in other residential energy conservation measures.

4.1.4. Education and Awareness Efforts

In 2008 Union Gas continued to supply and distribute educational materials to inform customers about energy efficiency. Education and awareness continued to be a priority and Union marketed energy efficiency to customers through a variety of media:

- Interactive website
- Wise Energy Guides (WEG)
- InTouch monthly bill inserts
- Bi-Annual Residential HVAC Newsletter
- Energy Conservation Marketing ESK Events
- Energy Clinics

Residential Energy Efficient Website
The Union Gas corporate website was re-designed and launched in July 2008. The site has received a complete overhaul. Its focus and messaging have shifted to promote environmental stewardship and energy efficiency.

The residential section (www.uniongas.com/energyefficiency) of the site was revised to include a dedicated Energy Conservation menu heading. Sub-segments beneath the heading include:

(a) Energy Saving Programs: Information and links to Union's different conservation programs (e.g. Energy Saving Kits (ESK), Drain Water Heat Recovery (DWHR) and Programmable Thermostat Rebate).

(b) Education: Information and links on buying a new home, energy efficient labels and a downloadable Wise Energy Guide.
(c) Industry Links and Programs: Information on Union's major partners/stakeholders as well as links to conservation-related programs, both gas and non-gas focused, in the Ontario market place.
(d) Manage My Bill: 12 easy steps to help customers reduce their energy consumption and save money on their utility bill.
(e) Engee Kids: Child-friendly section explaining natural gas, its use and how to conserve it.

The revised website was created to showcase Union's commitment to conservation, in addition to making it more user-friendly. It also provides customers with energy efficiency tips and program offers to help them save energy and money.

Additional features to the site include:

- Online videos (ESK, DWHR & Programmable Thermostat)
- Downloadable programmable thermostat rebate coupon
- Downloadable educational materials
- Comparison tools on energy costs
- Listing of upcoming ESK events held by Union Gas
- Listing of ESK depots across Union's territory that customers can visit in order to pick-up a free kit
- Online order form for customers to request an ESK and have it delivered to their home
- A "one stop shop" with links and information on different conservation rebate programs offered in the province

Wise Energy Guide (WEG)
In 2008 Union continued with the distribution of the Wise Energy Guide (WEG) at ESK events. Included in the guide is information on a wide variety of energy related issues and an easy-to-use checklist to help get customers focused on energy efficiency in the home

InTouch Monthly Newsletter
Union continued to distribute monthly InTouch Newsletters in 2008. (See Figure 4.6) These newsletters are Union Gas bill inserts that include an educational message on residential energy efficiency in each issue.

Figure 4.6 – InTouch Monthly Newsletter

Bi-Annual Residential HVAC Newsletter
Union developed a spring and fall newsletter targeting residential HVAC contractors. The

newsletters contained information on Union's energy efficiency programs, such as ESKs, high efficiency furnaces and programmable thermostats. The newsletter also highlighted the Government of Ontario and Government of Canada ecoENERGY Retrofit grants in addition to the Ontario Power Authority's cool savings rebate program.

HVAC Dedicated Webpage

In the fall of 2008 Union Gas launched a section of the website dedicated to its HVAC partners. One goal of this initiative is to drive further energy conservation messages and measures in the existing and retrofit markets. (See Figure 4.7).

Figure 4.7 – HVAC Webpage: www.uniongas.com/hvac

4.2. 2008 Residential Program Results

The Residential New Home Construction and Home Retrofit programs accounted for 10% of DSM savings in 2008, contributing 7.2 million m^3 with a net program TRC of $26 million. As outlined in Table 4.3, 82% of total m^3 savings came from the Home Retrofit program.

Table 4.3 – 2008 Residential Results by Program

Program	Natural Gas Savings (m3 000s)	% of Total	Program Net TRC (000s)	% of Total
New Home Construction	1,299	18.1%	$ 446	1.7%
Home Retrofit	5,889	81.9%	$ 25,503	98.3%
Total	**7,188**	**100.0%**	**$ 25,949**	**100.0%**

As shown in Table 4.4, ESKs contributed the majority of savings in 2008.

Table 4.4 - Major Residential Savings Drivers in 2008

Initiative	2008 TRC* (000s)	2008 Natural Gas Savings (m3 000s)	2007 Natural Gas Savings (000s)	2006 Natural Gas Savings (000s)
Energy Savings Kit	$ 23,947	4,625	6,359	5,746
Programmable Thermostat	$ 1,903	682	3,670	1,428
High Efficiency Furnace	$ 963	583	2,968	1,959
Energy Star for New Homes	$ 564	1,299	308	-
Total	**$ 27,377**	**7,188**	**13,305**	**9,133**

*Program costs not included

Union annually commissions studies, based on ESK program delivery type, to determine if homeowners install the ESK measures. Adjustment factors applied to 2008 results reflect that only those participants who install the ESK measures, and keep them installed, are included in the savings calculations. The results of these 2008 verification studies are outlined in the Verification and Evaluation section (section 9) of this report.

4.3. 2008 Residential Program Costs

Direct program spending in the residential market was over $3 million in 2008, 36% higher than the 2007 spend of $2.2 million. Table 4.5 summarizes the direct expenditures by residential program in 2008.

Table 4.5 – 2008 Residential Program Direct Expenditures

Program	Incentives (000s)	Program Costs (000s)	Total Costs (000s)
New Home Construction	$ 134	$ 118	$ 253
Home Retrofit	$ 1,482	$ 1,309	$ 2,791
Total	**$ 1,616**	**$ 1,428**	**$ 3,044**

The primary reason for the increase in spending was the additional 28,000 ESK's distributed in 2008 totalling 96,000 vs 68,000 distributed in 2007. The updated input assumptions for residential measures decreased the TRC generated per unit, thereby increasing the number of ESK's Union distributed to meet the planned TRC objectives.

The overall residential program TRC per dollar spent for 2008 was $8.53. This was significantly lower than the 2007 TRC per dollar spending of $16.39.

4.4. Lessons Learned

1. Difficulty in identifying positive TRC measures for Home Retrofit Market

The residential sector has few measures which generate positive TRC results and the cost of delivering programs continues to rise in relation to the TRC earned. Both the continual downward pressure on achievable savings and the stricter codes and standards for appliances are diminishing measure opportunities for the retrofit market. This underscores a need to continually identify new technologies and/or strategies which generate positive TRC results for incorporation into the residential program portfolio.

2. Education

Education programs to reach the residential sector do not in themselves generate TRC. In an effort to offer this service to Union's customer base and empower them to manage their energy costs in 2008, Union partnered existing TRC positive measures with educational events such as Energy Clinics. Union will continue to develop creative methods to energy conservation education more effective.

3. HVAC Partnership

In 2008, the HVAC partnership program was altered in order to provide Union's HVAC partners with the option of either installing a showerhead for $25 or distributing an ESK for $10 as part of their service or sales calls. This dual approach resulted in a significant increase in distribution of ESK's through this channel. Providing additional opportunities to existing channels will help ensure the continued success of these programs.

4. Technology

Union introduced electronic ordering for both HVAC partners and customers to streamline the ESK process. In conjunction with the commitment to a more electronic support platform, Union also introduced an HVAC web site and Gas Facts email address to assist with communications. Union will continue to utilize technology as a means of promoting energy efficiency measures.

5. Low Income – Helping Homes Conserve DSM Programs

Union's DSM plan earmarked $1.4 million in 2008 for programs targeted to low income customers. Since the Helping Homes Conserve program launched in the fall of 2006 it has contributed to 2.5 million m3 savings, and a net TRC of approximately $12 million. Table 5.1 summarizes the Helping Homes Conserve program results. In 2008, the program contributed nearly 1.6 million m3 of savings with a net program TRC of $5.9 million.

Table 5.1 - 2008 Low Income Program Results

2008 Low Income Results Summary	Actual 2008 Results	2008 Plan	Variance Actual vs Plan
Net Program TRC (000s)	$ 5,949	$ 6,387	$ (438)
Natural Gas Savings (m3 000s)	1,575	1,688	(114)
Participants	35,699	41,000	(5,301)
Expenditures* (000s)	$ 1,445	$ 1,430	$ 15
TRC/$ Spent	$ 4.12	$ 4.47	$ (0.35)

*Expenditures include program and incentive costs

5.1. Low Income Program Framework

The Helping Homes Conserve program is designed to reduce the energy burden facing low-income households. This section outlines the measures available to the low-income residential market including a new home weatherization initiative designed to address broader building issues.

5.1.1. New initiatives in 2008

Home Weatherization

In November of 2008, Union Gas launched a Low Income Weatherization program in the Hamilton franchise area. This program was designed to decrease the energy burden faced by Union's low income customers by offering them building envelope upgrades including attic insulation, basement insulation and draft-proofing measures.

Program Participant

Wall Insulation

Draft-proofing

A target of weatherizing 25 privately-owned homes over the course of two months was established. Union partnered with a local not-for-profit organization, Environment Hamilton, to assist in identifying eligible customers for this program. One of the municipally designated "at-risk" communities in Hamilton was selected for this program. Environment Hamilton's close relationship with various community members allowed them to call on these residents to educate them on the benefits of participating in this program. Through their outreach efforts a target list of interested community members was built.

This list was then passed on to Greensaver, Union's delivery agent partner. Greensaver called on all interested participants and pre-qualified them over the phone. If the customer's home seemed like a viable program participant, a blower-door test audit was scheduled. The audit revealed which measures, if any, proved to be cost-effective for the home. Any measure deemed cost-effective was installed. Once all work was completed, a final blower-door test was performed to calculate the actual savings achieved. Union was successful in completing 15 retrofits, as detailed in Table 5.2.

Table 5.2 Low Income Weatherization Program Results

Measure	Number of Homes Installed In
Wall Insulation	15
Attic Insulation	6
Draft proofing	1

Average Cost/m3 of gas saved based on actuals: $1.92
Average (m3) savings per square feet: $1.84

Union also attempted a second weatherization program in Thunder Bay in partnership with Green Communities. However this program did not gain any real traction as it was launched close to year end. However, although only one retrofit was completed, many valuable lessons were learned about the program's process in another community.

The 15 projects in Hamilton were not completed for DSM tracking until early in 2009. Therefore, the TRC claims for these first 15 homes will be recorded in 2009. Direct program spending, including the costs associated with launching the program and the incentives paid to contractors, totalled $150,000 in 2008. A total low income program direct expenditure summary is provided in section 5.3 - 2008 Low Income Program Costs.

5.1.2. Existing Initiatives – Helping Homes Conserve

Union continued to provide the basic measure low income program Helping Homes Conserve (HHC), which offers low income customers the free installation of energy-efficient showerheads, pipe wrap, and a programmable thermostat. Bathroom and kitchen aerators are left behind for self-installation. Union continued offering the program in Hamilton and expanded into Windsor and Sudbury.

This program was targeted at customers who had an income at 125%, or below, the Statistics Canada pre-tax, post-transfer Low-Income Cut-Off (LICO).

To qualify for the program, customers had to meet the following criteria:

- Pay their own Union Gas bill
- Live in a low-rise dwelling (3 stories or less)
- Have a gas-fired water heater (for energy-efficient showerhead & aerator)
- Have a gas-fired furnace (for programmable thermostats)

Union's main approach to market was through a targeted neighbourhood strategy. A target list of low income customers was developed through third party postal code data that identified neighbourhoods with a high propensity of low income residents. These postal codes were then scrubbed against Union's internal customer data and target lists were created. To ensure the privacy of customers, customer names were never used on any marketing materials and were never supplied to Union's third-party installation contractor, Annron Services Ltd. Instead homes were always identified by address only.

The identified customers were sent a direct mail package educating them on the program benefits and notifying them that a technician would be visiting their neighbourhood in the next few weeks. Customers then received a notification flyer two to three days prior to a technician's visit to remind them that personnel would be in the neighbourhood performing installations. Technicians would then visit the homes offering customers installations and/or booking an installation for a more convenient time. Once the installation was completed, the customer would sign an acknowledgement form and receive a programmable thermostat instruction sheet and education guide tailored to low income customers. If a customer wasn't home, a door-hanger would be left behind to let them know a representative from Union had visited and to encourage them to call the toll-free number provided to book an appointment.

5.1.3. Education and Awareness

In 2007 Union recognized that there was a need not only to provide conservation programs directed at low income customers, but also to educate customers on the direct benefits of energy-efficient behaviour. Union also learned that there was a lack of awareness amongst low income customers and stakeholders on conservation programs available to them. To address these issues, Union added an education and awareness component to their HHC program.

Education Guide

An education guide was developed to speak to a low income audience by including low-cost and no-cost tips for reducing home energy use. The guide included energy tips for home heating, water heating, windows, doors & weather stripping, appliances and equipment, cooling and lighting. Every customer who participated in the HHC program received an Education Guide with their installation.

Social Service Agency Partnerships

Social service agencies are critical partners for the HHC program as they have extensive knowledge, experience and understanding of low income issues, the neighbourhoods and needs of the residents. They also have trusted relationships with numerous low-income customers. To bring further awareness of Union's program to low income customers, Union partnered with various social service agencies in the program communities to help deliver its message and build awareness of the program. Union partnered with the following agencies:

- Hamilton
  - Housing Help Centre

    - Neighbour to Neighbour
- Windsor
    - Downtown Mission
- Sudbury
    - The Red Cross, Housing Division
    - The Social Planning Council of Sudbury

These partners helped tremendously by distributing Union's program brochures, speaking to their clients about the program and hosting education clinics for their clients.

Education Clinics

In partnership with social service agency partners, Union hosted education clinics in Hamilton, Windsor and Sudbury. The clinics were half-hour workshops that discussed low-cost and no-cost conservation tips for the home, followed by a free BBQ lunch to thank the participants. Customers were also informed about the HHC program and an area was set-up for customers to book an appointment for an installation.

Local municipal representatives and media were invited to the events to generate further awareness of this program within the community. (See Figure 5.1)

Figure 5.1 Sudbury Mayor Rodriguez addressing the crowd

5.2. 2008 Helping Homes Conserve Program Results

The Helping Homes Conserve program contributed to nearly 1.6 million m^3 of savings with a net program TRC of over $5.9 million. Over 7,600 low income customers participated in the Helping Homes Conserve program in 2008. (See details in Table 5.2)

Table 5.2 Helping Homes Conserve Participant Summary

Measure	2008 Actual Participants	2008 Planned Participants	2007 Participants	2006 Participants
Energy-efficient Showerhead	7,888	9,000	7,338	14
Kitchen Aerator	7,694	9,000	6,363	21
Bathroom Aerator	7,694	9,000	6,519	20
Pipe Insulation (2m)	7,291	9,000	6,442	28
Programmable Thermostat	5,132	5,000	1,590	17

In comparison to 2007 there was a 223% increase in the number of programmable thermostat participants. TRC results by measure for the low income program are identified in Appendix B

5.3. 2008 Low Income Program Costs

Direct program spending in the low income market was just over $1.4 million, on target with the planned expenditure of $1.4 million outlined in Section 3 of this report. Table 5.3 summarizes the direct expenditure for 2008.

Table 5.3 Helping Homes Conserve Direct Expenditures

Helping Homes Conserve Program	Incentives $(000's)	Program Costs $(000's)	Total Direct Costs $(000's)
ESK's & Thermostat	$831	$464	$1,295
Weatherization	$120	$30	$150
Total	$951	$494	$1,445

5.4. Lessons Learned

1. Neighbourhood blitzing is an effective delivery strategy for basic measures

Delivering the HHC program primarily through a neighbourhood blitzing approach to market has proven to be an effective and efficient means of delivery to a large number of low income customers. There is a tremendous need in Union's franchise area for similar programs. Union's current barriers to expansion are limitations in budget and a lack of workers in the field to perform installations (mainly gas-fitters).

2. Supplemental Heating

Union encountered many customers in their weatherization program that were setting their thermostat at 17 and 18 degrees Celsius due to financial restrictions. Often these customers were using supplemental heating devices, such as space heaters and electric blankets, to try to remain comfortable with minimal furnace use.

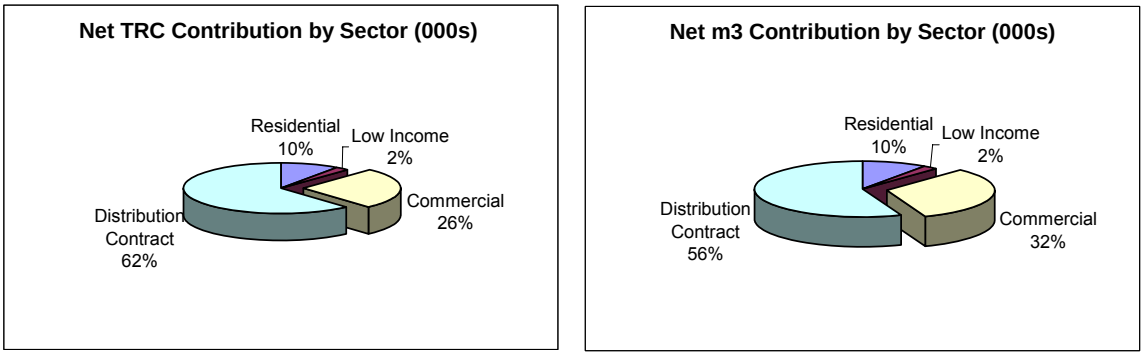
3. Housing Stock

Union expected to upgrade customers' insulation at a similar price point to other utility weatherization programs in the GTA. Once audits commenced, it was clear that many of the target homes were constructed in the early 1900's with virtually no insulation. These homes had the potential for significant m^3 savings, however at a much higher cost. Union must be aware of potential fluctuations in retrofit costs when setting their budget for 2009 and beyond.

6. Commercial Market

Commercial energy efficiency programs accounted for 26% of DSM savings in 2008, totalling over 23.7 million m^3 in natural gas savings with a net program TRC of $71.43 million. Direct program spending in the commercial market was just over $4.3 million.

Figure 6.1 – % Distribution by Sector



In 2008, Union continued to offer commercial programs in the New Build Construction and Building Retrofit markets. Commercial savings driven through the building retrofit market represented 73% of sector savings in 2008. Table 6.1 summarizes the commercial market program results for 2008.

Table 6.1 - 2008 Commercial Program Results

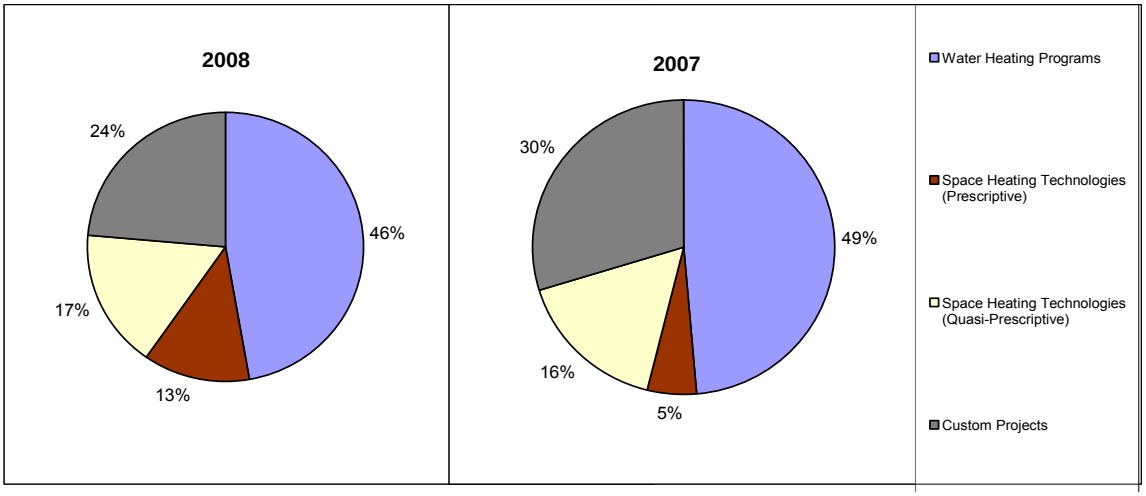
2008 Commercial Results Summary	New Building Construction	Building Retrofit	Actual 2008 Results	2008 Plan	Variance
Net Program TRC (000s)	$ 15,881	$ 55,547	$ 71,428	$ 79,749	$ (8,321)
Natural Gas Savings (m3 000s)	5,216	18,445	$ 23,661	27,314	(3,654)
Participants	751	84,407	85,158	72,484	12,674
Expenditures* (000s)	$ 733	$ 3,600	$ 4,332	$ 3,440	$ 892
TRC/$ Spent	$ 21.7	$ 15.4	$ 16.5	$ 23.2	$ (6.7)

*Expenditures include program and incentive costs

The three measures that delivered the largest savings in 2008 were custom projects, pre-rinse spray nozzles and hot water conservation. Custom projects represented the largest portion of savings with 5.5 million m^3 or 24% percent of the overall commercial result.

The 2008 TRC results in the Commercial sector were 26% higher than in 2007. One reason for this was the increased take-up of pre-rinse spray nozzles - in 2008 Union delivered 2,443 more units than in 2007. Figure 6.2 compares the commercial sector program results for 2008 and 2007.

Figure 6.2 – 2008 & 2007 - % Contribution by Commercial Program Grouping



6.1. Commercial Program Framework

Commercial programs are designed to achieve savings in the areas of space heating, water heating, and ventilation systems. They span nine customer segments – office, institutional, retail, multi-family, food service, hotel/motel, warehouse, recreational and small agricultural within the commercial M2, R01 and R10 rate classes. Industrial general service customers in the M2 and R10 rate classes are also included in the commercial programs targeting space-heating, water-heating and other process related loads.

Union's Account Managers market the programs directly to end use customers and trade allies. Their objective is to increase the adoption of energy efficiency technologies and processes by cost effectively promoting energy efficiency to Union's commercial customer base.

This section outlines the programs available to commercial customers in 2008. It covers the, incentives paid, program changes in 2008, existing program and the delivery methods utilized.

6.1.1. Commercial Program – 2008 Incentives

A portfolio of energy efficient technologies was available to commercial customers in 2008 through the New Building Construction and Building Retrofit programs. Table 6.2 outlines the incentive levels for technologies supported in 2008. With the exception of infrared heaters and programmable thermostats, the incentives remained relatively unchanged from 2007 levels.

Table 6.2 Financial Incentives for 2008 Programs

Technology	2008 Incentive per Unit
Energy Recovery Ventilators	$250-$1,000
Condensing Boilers	$500-$3,000
Rooftop Units	$500
Infrared Heaters	$150
Heat Recovery Ventilators	$250
Condensing Water Heaters	$1,000
High Efficiency Furnaces	$100
Programmable Thermostats	$40
Low Flow Pre-Rinse Spray Nozzle	$100
Kitchen Ventilation	$1,000-$2,000
Custom Project Equipment Incentives	$0.05/m3 saved up to $15,000
Steam Trap Survey	50% of the cost (up to $6,000)
Feasibility Studies	30% of the cost (up to $4000)
Boiler Audit	$250

6.1.2. New Initiatives in 2008

Infrared Heater Incentive Structure

In 2007 results for the infrared heater measure did not meet expectations, tracking only 558 participants. Union reviewed the program design and delivery, successfully modifying the incentive in August 2008 to utilize a push-pull strategy. As in 2007, a $100 /unit incentive was offered directly to HVAC partners to effectively encourage the sale of infrared heaters to end use customers vs. traditional less expensive unit heaters. In addition to Union's primary approach to the market, Union added a secondary approach in 2008. A $50/unit incentive was offered to distributors to educate HVAC contractors about the energy saving benefit of infrared heating and encourage them to "push" these units in the market. This allowed Union to successfully influence each point of the value chain increasing participation to 931 units. Tracking and audit procedures were put in place to ensure each installation was unique.

Programmable Thermostat Incentives

In 2007 results for the programmable thermostat did not meet expectations, tracking only 830 (HG: 569 in BR, 261 in NBC) participants. Union reviewed the program potential and modified the incentive in the 2008 DSM Program Plan. An increase from $15 dollars per unit to $40 dollars per unit was implemented to encourage commercial building owners to replace their mercury models for energy efficient programmable thermostats. This allowed Union to successfully influence the customer and significantly increase the widespread usage of this energy saving technology. In 2008 a total of 3,307 programmable thermostats participants were tracked.

6.1.3. Existing Initiatives

The following DSM initiatives were continued for 2008 in the Commercial market. With the exception of the Design Assistance Program, these initiatives are promoted to customers in both the New Building Construction and Building Retrofit markets.

The **Energy Savings Program (ESP)** was designed to promote the adoption of high efficiency natural gas technologies to commercial channel partners as well as to end users. The program includes water heating technologies, space heating technologies as well as audit, design and custom programs

There are a wide variety of technologies (listed below) that have predictable energy savings based on the size and classification of the equipment. The energy savings for these measures are prescriptive in nature and have been accepted by the OEB in EB 2008-0385 for use by Union in calculating TRC. There is another smaller group of technologies where the energy savings can differ significantly based on the actual piece of equipment used and location of installation. In order to accurately calculate the energy savings a "quasi-tool" or spreadsheet calculation is utilized. These tools and the embedded calculations have also been accepted by the OEB for use by Union in calculating TRC. A further explanation is provided in the section titled "Quasi-Prescriptive Measures".

In order to ensure program success, Union provided incentives, technology information, and savings calculator tools in addition to support and training in order to educate and promote participation in the Energy Savings Program.

Water Heating Programs

The technologies supported in this area included:

- Energy Efficient Pre-Rinse Spray Nozzles
- Showerheads and Aerators (Hot Water Conservation Program)

Energy-Efficient Pre-rinse Spray Nozzle

In 2008 Union continued delivering the bulk of the pre-rinse spray nozzle program through a partnership developed in 2006 with Ecolab Corporation.

Ecolab Corporation has a large presence in the food service market, the primary target for this application. Union and Ecolab worked together to establish market participant targets and to develop co-branded marketing material. Ecolab's field service representatives capitalized on their long standing business relationships with food service establishments across the Union franchise area to deliver this program. Working with the targeted marketing materials provided by Union, they established considerable take-up in the program. (See Figure 6.3)

Figure 6.3 Pre-rinse Spray Nozzle Promotional Literature

In 2008, 3,349 pre-rinse spray nozzles were installed through the program, a significant increase over the 906 units installed in 2007. Ecolab representatives performed the installation of the pre-rinse spray nozzles ensuring the units were installed and working as intended.

Union marketed the benefits of energy-efficient pre-rinse spray nozzles through the following communication vehicles:

- Two direct mail pieces sent to 7000 commercial kitchens
- NEW Online submission form initiated October 15th, 2008 on Union's website (approx 182 requests received)
- Three industry trade magazine advertisements
- Redesigned sell-sheet
- Trade show participation

Hot Water Conservation (HWC)

This program was designed to reduce hot water consumption, and the corresponding natural gas required to heat the water, through the installation of energy efficient showerheads and faucet aerators. Union supplied the measures at no charge to participating agencies who installed them as a part of their maintenance program. This program targeted non-profit and social housing, hotel/motel, institutional sectors and property managers of other multi-family facilities.

In 2008, there was a significant marketing effort to promote this program in the multi-family market in core areas. Over 9,000 building owners and property managers in high density areas of Hamilton, Oakville and Burlington received direct mailers to generate interest and encourage participation in the program.

As with the residential ESK program, Union introduced a new 1.25 gpm showerhead to replace both the 2.0 and 1.5 gpm models distributed in previous years.

Follow up phone calls or site visits were made to confirm the installation of the units. Only confirmed installations were tracked as participants.

Space Heating Technologies-Prescriptive

Prescriptive space heating measures included:

- Roof Top Units
- High Efficiency Furnaces
- Enhanced Furnaces (up to 299 Mbtu/h)
- Programmable Thermostats
- Demand Commercial Kitchen Ventilation

As mentioned above, the ESP program includes technologies with predictable savings by classification sizes, which are referred to as "prescriptive" measures. In 2008 Union did not change the marketing or promotion of these measures with the exception of Demand Commercial Kitchen Ventilation (DCKV).

Demand Control Kitchen Ventilation (DCKV)

Union made demand control kitchen ventilation systems a priority prescriptive measure in 2008. Traditional ventilation systems operate at one speed only, whereas the speed of demand control kitchen ventilation systems respond to changes in cooking volume, resulting in a much more efficient application.

The prescriptive savings for DCKV were generated for three ranges of total range hood exhaust: 0 – 4999 CFM; 5000 – 9999 CFM; and 10,000 – 14,999 CFM. The midpoint of each exhaust range was used to calculate both energy savings for gas and electricity.

In 2008, Union worked closely with manufacturers and end use customers to promote the benefits of this new technology. Union co-hosted a half day training and education workshop, utilizing a well respected food service energy expert to educate key decision makers on the energy saving benefits of DCKVs and general food service energy management concepts and potential. In total, 54 participants attended the workshop including end-use customers and channel partners.

Union marketed the benefits of DCKV through the following communication vehicles:

- Two industry trade magazine advertisements
- Newsletter communication through association (ORHMA)
- Re-designed sell-sheet
- Trade show participation

As a result of these marketing and communication efforts, Union helped grow awareness and increase adoption rates for this technology.

Space Heating Technologies-Quasi-Prescriptive

Quasi-Prescriptive programs utilize a spreadsheet calculator, as described previously, include:

- Infrared Heaters
- Boilers
- Energy Recovery Ventilator (ERV)
- Heat Recovery Ventilator (HRV)

The "quasi-tool" creates a more accurate assessment of energy savings while still enabling the incentive amounts to be applied consistently across the program. This ensures these measures are aligned with the prescriptive measures in how incentives are derived and paid and how energy savings are recorded. Where a technology yields a wide range of savings and has a variety of sizes, the quasi-tool allows for bands of assumptions that are specific to the measure, size and application.

The individual savings claim for each participant is tracked separately and must pass a TRC screening test embedded in the spreadsheet. The substantiation documents outlining the savings claims for the quasi-prescriptive measures were approved by the OEB (EB-2008-0385).

Audit, Design and Custom Programs

Custom Projects

Custom projects cover opportunities where energy savings are linked to unique building specifications or design concepts, processes or new technologies that are not covered by the aforementioned programs. The delivery of this program is targeted to trade allies in the design and engineering communities, as well as key commercial customers. The program included both incentives and educational support. Custom project incentives were set at $\$0.05/m^3$ saved, up to a maximum of $15,000 per project. All custom projects must pass a TRC test for cost-effectiveness before being approved.

In 2008 commercial custom projects were classified and tracked in one of the following four segments to align with free rider research completed in the previous year:

- Commercial New Construction
- Commercial Retrofit
- Multi-family
- Agriculture

Design Assistance Program (DAP)

Union continued to offer incentives under the Design Assistance Program to channel partners in the design and engineering communities as well as key commercial customers that are responsible for the design and management of multiple facilities. A $4,000 incentive per project

was provided to eligible participants to assist with breaking down the barriers of costly modeling. This program demonstrated that energy efficient options beyond the building code are cost effective to new building developers. The DAP program was available to New Build Construction participants only.

Feasibility Studies and Boiler Audits

The feasibility study and boiler audit program promote energy efficiency audits by providing financial support to channel partners and end use customers. These audits analyze the efficiency of natural gas equipment, including a review of gas, electric and water use, if applicable. An incentive of 30% of the audit cost (up to a maximum of $4,000) was paid for feasibility studies. The incentive for boiler audits was $250 per unit audited. Audit programs do not generate TRC, therefore, no savings were attributed to the programs; however, participation rates are tracked. Boiler audits will be phased out in 2009 because there is little evidence of a direct link between the replacement of boilers and the boiler audit. Feasibility studies will continue as they have proven to help identify future project opportunities that ensure the sustainability of energy efficiency in the commercial sector.

6.1.4. Commercial Program – Delivery

Union has a highly skilled team of Commercial Account Managers that deliver commercial DSM programs to participants located throughout Union's franchise area. A significant effort was required to educate potential participants on the benefits that can result from participation in the energy efficiency programs. Union's Account Managers utilized a variety of communication methods to reach potential participants. The different approaches are discussed in the following subsections.

The Channel Approach

Union's Account Managers worked with trade allies found in the engineering, design/build, manufacturer and HVAC community. These trade allies have an influence on the technologies adopted by Union's commercial customers because they are core to the design and building of both new construction and retrofit projects. They have the ability to influence end users in a variety of ways ranging from the inclusion of energy efficient technologies in the design phase of new build and retrofit plans, to directly educating and selling upgraded efficient technologies to end users looking to replace existing equipment.

Working closely with trade allies, educating them on the benefits of higher efficiency technologies and Union's programs, the Account Managers have successfully been able to reach a far greater audience than if they had solely worked directly with end users. As a result the adoption of technologies in the commercial sector has occurred at a faster pace than it otherwise would have.

Direct to Customer

The direct-to-customer approach of delivering DSM programs involved the Account Manager working directly with the end-user educating them on programs and potential options to improve their existing energy efficiency in their plants and buildings.

The direct-to-customer approach was also used for delivery of DSM programs to National Accounts. National Accounts are defined as those customers with multiple property locations throughout Union's franchise area that are similar in design and use, including retail chains, government buildings, schools, property management firms and food service chains. Accounts Managers worked with these National Accounts to educate them on energy efficient technologies, Union's DSM initiatives and the benefits of participation in these programs.

In 2008, additional focus was placed on the direct-to-customer approach to program delivery. This proved to be a challenge because the focus in recent years was largely on the channel strategy mentioned previously. Recent research results indicated that, while the channel approach was very effective in gaining widespread acceptance of energy efficient measures, the level of Union's influence was not apparent to the end use customer, only to the channel partner. The main focus of the new communication elements for end-use consumers was to drive program awareness. The resources required to manage a direct-to-customer approach were considerable. However, early results indicated there was benefit to this approach. Therefore, the direct-to-customer approach will continue to be utilized.

The channel and direct-to-customer approach complement each other ensuring all key decision makers are influenced by and aware of Union's DSM programs. In order to continue driving DSM results in the commercial market, strong relationship building and on-going maintenance is required throughout all levels of the commercial customer chain to deliver the programs outlined above.

6.2. 2008 Commercial Programs Results

The commercial sector delivered natural gas savings of nearly 23.7 million m^3 with a net program TRC of $71.4 million through the New Building Construction and Building Retrofit markets in 2008. As shown in Table 6.3 below, the largest commercial results came from the building retrofit market which represented 73% of TRC results.

Table 6.3 - 2008 Commercial Results by Program

Commercial Programs	Natural Gas Savings (m3 000s)	% of Total	Program TRC (000s)	% of Total
New Building Construction	$ 5,216	22.0%	$ 15,881	22.2%
Building Retrofit	$ 18,445	78.0%	$ 55,547	77.8%
Total	**$ 23,661**	**100.0%**	**$ 71,428**	**100.0%**

Overall, 2008 TRC results in the commercial sector were 26% higher than in 2007. A comparison of actual TRC results versus plan by measure is contained in Appendix B.

The two initiatives that delivered the largest savings in 2008 were pre-rinse spray nozzles and custom projects. Table 6.4 outlines the savings achieved by these measures.

Table 6.4 – Major Commercial Savings Drivers in 2008

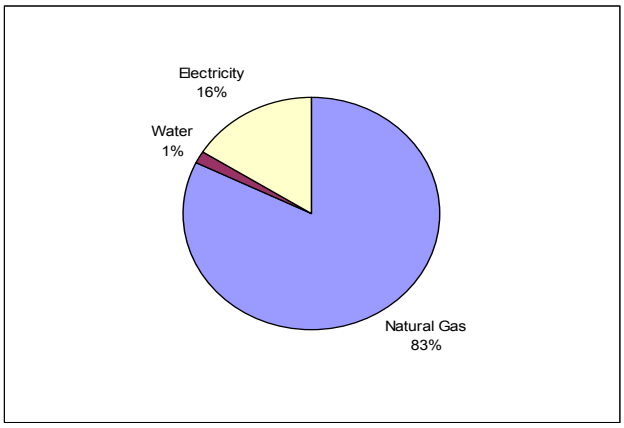
Program	2008 TRC* (000s)	2007 TRC* (000s)	2008 Participants	2007 Participants
Pre-Rinse Spray Nozzle	$ 26,527	$ 6,293	3,349	906
Custom Projects	$ 17,027	$ 16,891	322	496
Total	**$ 43,555**	**$ 23,184**	**$ 3,671**	**$ 1,402**

*Program costs not included

Pre-rinse spray nozzles represented the largest portion of savings with over $26.5 million in TRC. Over 3,300 units were distributed and confirmed installed in 2008.

The TRC for commercial custom projects increased 0.8% from 2007 actuals. Figure 6.4 displays the adjusted TRC benefits, excluding cost, by resource type as a percentage of total TRC benefits from commercial custom projects in 2008.

Figure 6.4 Commercial Custom Projects – Benefits by Resource Type



New sampling methodology was developed by Summit Blue Consulting to verify custom project savings. The new approach, implemented in 2008, ensures the accuracy not only of gas savings, but also water and electricity savings claims. The sampling methodology addressing these issues can be found in Appendix H. Jacques Whitford was contracted to complete commercial custom project paper reviews utilizing the new sampling methodology. Study details and results are provided in Section 9 – Verification and Evaluation.

As shown in Table 6.5, participation in the feasibility study and design assistance programs decreased 28% in 2008. The number of boiler audits completed also decreased when compared to 2007. This program will be completely phased out in 2009, as indicated in section 6.1.3.

Table 6.5 – Feasibility Studies and Audits

Program Participants	2008	2007	2006	2005
Feasibility Studies and DAP	114	160	135	75
Boiler Audits	63	85	34	48
Total	**177**	**245**	**169**	**123**

6.3. 2008 Commercial Program Costs

Direct commercial program expenditures in 2008 equalled $4.3 million, an increase of 28% from 2007. Table 6.6 summarizes the direct expenditures for the commercial sector in 2008.

Table 6.6 – 2008 Commercial Program Direct Expenditures

Commercial Program	Incentives (000s)	Program Costs (000s)	Total Costs (000s)
New Building Construction	$ 617	$ 115	$ 733
Building Retrofit	$ 3,035	$ 565	$ 3,600
Total	**$ 3,652**	**$ 680**	**$ 4,332**

Overall the commercial sector achieved a TRC of $16.5 for every direct dollar spent in 2008. This was slightly higher than the TRC per dollar spent of $17.3 in 2007, demonstrating every dollar spent in 2008 delivered more results than in the previous year.

6.4. Lessons Learned

1) Focused Efforts Increase Results

In 2008, a re-alignment of some resources was performed to allow Account Managers to focus on specific programs, resulting in the achievement of higher installations and adoption rates. For example, additional resources were added to promote the Hot Water Conservation in high density areas of the franchise that had previously not participated in the program to any great extent. The increased marketing and field attention produced excellent results. Union will continue to effectively manage and focus all resources to deliver DSM programs in the most optimal manner possible.

2) Balancing Channel and Direct Customer Approaches

The commercial / industrial market has over 115,000 customers across nine segments making it a challenging market to manage. An approach that works closely with both trade allies and end use customers balances the need to gain wide spread acceptance of programs with the need to demonstrate the true value Union brings to the market with its programs, education, training and incentives. Union will need to refine its approach to market, and potentially program design going forward to balance the delivery approaches in the commercial market. This will include targeting energy-intensive customers for increased access to Union's Commercial Account Managers and incentives.

3) Utilizing all key players along the Value Chain

The infrared program provided manufacturers, wholesale distributors and HVAC contractors with marketing materials and incentives to ensure everyone in the value chain was offering the infrared option to end-use customers, removing barriers to this energy-saving solution. The inclusion of distributors was a new approach for Union and proved to be very successful. A comprehensive account management approach that involves all of the key touch points along the value chain will continue to be investigated for appropriate technologies.

4) **Targeted segmented marketing is a critical success factor throughout**

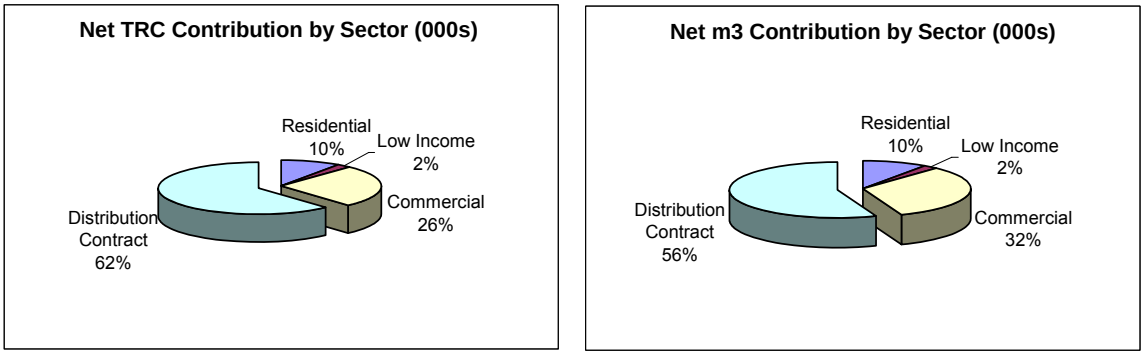
A large scale, targeted mass market direct mailer to appropriate segments is very effective as evident in the Energy Efficient Pre-Rinse Spray Nozzle program. In 2008, Union created segmentation data for the commercial sector aimed at improving marketing's ability to target

specific programs, training and technologies to appropriate end use segments. This will result in a cost efficient use of resources with the greatest likelihood of increasing the adoption of energy efficient technologies.

7. Distribution Contract Market

The EnergyWise program for the distribution contract market accounted for 62% of total TRC results in 2008, with a net program TRC of $166.2 million. Programs in this sector achieved 40.8 million m^3 in natural gas savings. Direct program expenditures were $3.9 million.

Figure 7.1 - % of Contribution by Sector



The 2008 TRC results in the distribution contract sector were 33% higher than in 2007. The overall number of participants in custom projects including boiler audits and feasibility studies increased from 300 participants in 2007 to 360 in 2008. Table7.1 summarizes the distribution contract market program results for 2008.

Table 7.1 – 2008 Distribution Contract Results

2008 Distribution Contract Results Summary	Actual 2008 Results	2008 Plan	Variance
Net Program TRC (000s)	$ 166,246	$ 140,392	$ 25,854
Natural Gas Savings (m3 000s)	40,828	62,778	(21,949)
Participants	189	-	-
Expenditures* (000s)	$ 3,869	$ 3,898	$ (30)
TRC/$ Spent	$ 43.0	$ 36.0	$ 7.0

*Expenditures include program and incentive costs

In 2008, enhancements were made to the DSM tracking and reporting system to assist with the sales cycle process. The automated tracking of feasibility studies and boiler audits will assist Account Managers with monitoring the future potential energy efficiency projects that are identified as part of the audit process. These enhancements will provide a reporting basis to allow for follow-up of potential projects, encouraging the adoption of efficient processes and technologies identified from the feasibility audits.

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7.1. Program Framework

Programs in the distribution contract market are not differentiated into new build and existing buildings as there is very little new build activity in this sector. The contract market is not a homogenous one, with most projects tied directly to unique processes or technology requirements. Each project is validated on a stand-alone basis by a comprehensive engineering review and is required to pass a TRC screening process.

The following section outlines the programs available to distribution contract participants as well as the delivery methods utilized in 2008.

The EnergyWise program was designed to achieve savings in process-specific energy applications, as well as space heating, water heating and the building envelope. This program was marketed to large volume contract-rate customers. Account Managers marketed the program directly to customers and indirectly through trade allies, channel partners, ESCO's, engineering firms, and equipment manufacturers. They worked to cost-effectively promote energy efficiency within Union's distribution contract customer base.

All projects were jointly delivered through Union's Account Managers and Technical Project Managers. Success was achieved by combining strong technical know-how with the customer knowledge derived from established account-managed relationships. This approach was critical to influencing the market and achieving successful implementation of the program.

7.1.1. Distribution Contract Program – 2008 Incentives

Table 7.2 shows the incentive guidelines for the 2008 distribution contract programs. Funding guidelines did not change from 2007 levels.

Table 7.2 – Program Incentives

Program Elements	2008 Incentive Guidelines
Equipment Incentive	10% up to $30K
Boiler Performance Testing and Steam Plant Audits	2/3 up to $20K
Engineering Analysis and Energy Audits	50% up to $10K
Steam Trap Survey	1/2 up to $6K
Education and Promotion	Up to 100%
Demonstration of New Technologies	10% up to $50K

Equipment incentives

Union's role in promoting and implementing energy efficient options continued to help companies control energy costs and remain competitive in a global environment. Equipment incentives were available for eligible energy saving technologies. The instability of the current economic climate is a threat to the industrial customer base in Union's franchise area.
With the continual focus on cost reduction, many industries lack the expertise to analyze potential energy saving opportunities. Union helped fill this gap, utilizing its knowledge and reputation, as well as incentives, to influence equipment choices.

Boiler performance testing and steam plant audits

Union incented customers up to $20,000 to conduct a boiler performance test (boiler audit) to reduce losses from steam generation systems. The program worked to support performance testing and analysis of industrial boilers, total steam plants, thermal fluid heaters, vaporizers, furnaces and special process equipment. Analysis of the testing identified and quantified energy saving opportunities, cost saving opportunities, implementation costs and payback periods as well as NOx and CO_2 impacts.

Engineering analysis and energy audits

Energy efficiency audits that included an analysis of natural gas equipment as well as electricity, compressed air, water and wastewater were incented up to $10,000. These engineering feasibility studies were used by Union to help customers formulate a priority list of energy efficiency projects geared to site-specific energy plans and budgets. Union also assisted the customer's technical staff in generating business cases to enable the customer to secure corporate capital funding for energy efficient equipment and/or process changes.

In 2008, Union conducted research in the area of Metering and Targeting (M&T) to provide insight into conservation opportunities for customers. The research project provided statistically based, predictive modelling driven by variables affecting consumption and quantified change events normally hidden within typical billing data. In cooperation with Energent the M&T service provider, Union incented two customers, who agreed to pilot the electronic monitoring systems and corresponding reporting capability. The final reports outlining the results will be available Q1, 2010.

Steam trap surveys

Steam trap surveys conducted by qualified service companies were designed to reduce losses from steam distribution systems and were incented up to $6,000. Each survey identified leaking, over-sized or under-sized, blocked and/or flooded traps, as well as the need for improvements in condensate return systems.

Education and promotion

Repeatedly customer have told Union they find significant value in the training and educational material provided by the utility. Union continued to expand investment in the following educational and promotional tools:

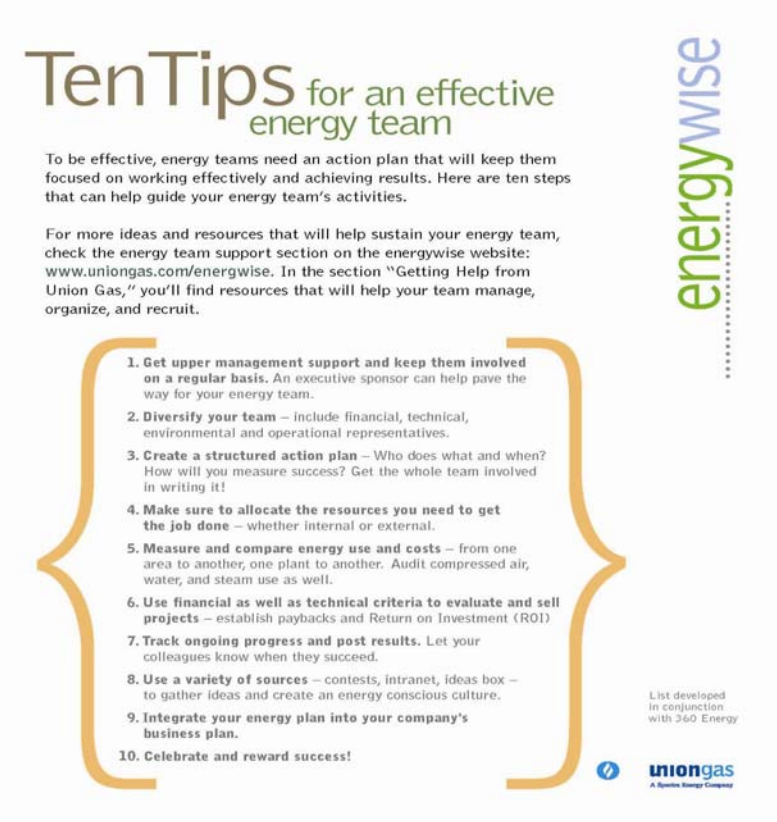
- GasWorks newsletter
- EnergyWise brochures
- Enercase reports
- Workshops to promote the efficient use of natural gas and increase the awareness of energy saving opportunities
- Sponsorship of specific educational forums
- Promotion and attendance at independent professional development groups, trade organizations and government workshops

GasWorks is a technology and energy conservation newsletter, designed to assist large users of natural gas to better manage their business. There are over 1,100 individuals on the distribution list of which 65% viewed subsequent issues in 2008. The newsletter not only provided links to Union's website but also various tools, calculators, an online library, and the "Ask an Expert" service provided by Union's technical resources.

Union created an additional 5 *EnerCase* brochures in 2008 to assist in the education of distribution contract customers and they included the following topics

- Energy Teams
- 10 Tips for an Effective Energy Team (See Figure 7.2)
- Thermal Imaging Insulation Audits
- Condensate and Flue Gas Heat Recovery
- Ventilation Heat Recovery

Figure7.2 - Sample of EnergyWise brochure



The 5 brochures were added to a growing library of EnergyWise and EnerCase brochures that include customer testimonials regarding challenges encountered and solutions Union helped provide. The brochures were successful in promoting Union's energy efficiency programs, encouraging customers to adopt energy efficient technologies, and facilitating partnerships within industry groups.

Union's web page, dedicated to the EnergyWise program, contains an application form, technology information, conversion calculations, technical presentations from customer meetings and a series of links for additional references. (See Figure 7.3.)

Figure 7.3 - Web site: uniongas.com/energywise

Union hosted several workshops throughout 2008 to promote energy conservation to distribution contract customers. These workshops were attended by over 220 delegates in total. Table 7.3 provides a summary of the delegates who attended each seminar.
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Table 7.3 2008 Seminar's hosted by Union Gas

Name of Seminar	# of Delegates
Combustion and Heat Recovery Workshops held in six cities across Ontario	129
Condensing Economizer Workshop	43
Energy Monitoring, Targeting and Reporting workshop at Ontario Hospital Association (OHA)	28
Steel Workshop	15
Sustainable Energy Plan Workshop	8

In addition, Union sponsored several tradeshows and conferences including:

- AIST Conference (Association for Iron and Steel Technology)
- Canadian Hospital Engineering Society (CHES), Excellence in Manufacturing conference
- IGUA Conference (Industrial Gas User's Association)
- Greenhouse Conference
- OAPPA (Ontario Association of Physical Plant Administrators)

Education does not stop with the training of customers. As mentioned previously Union's technical support and resources are highly valued by industrial customers. Union is committed to working closely with government efficiency, environmental and professional organizations in order to fully understand the latest trends and technologies that could support Union's clients as well as share learnings. These include:
:

- Consortium for Energy Efficiency (CEE)
    - Worked with efficiency program administrators from across the United States and Canada on developing common approaches to advancing energy efficiency
- Energy Solutions Centre (ESC)
    - Worked with energy utilities, municipal energy authorities, equipment manufacturers, and vendors to accelerate the acceptance and deployment of new energy-efficient, gas-fuelled technologies.
- Ontario Power Authority (OPA)
    - Responded to a Request for Proposal call for Program Management of the OPA's Industrial Energy Efficiency Program to reduce industrial energy consumption
- Office of Energy Efficiency (OEE)
- Canadian Industry Program for Energy Conservation (CIPEC)
- CANMET Energy Technology Centre
    - OEE, CIPEC and CANMET Energy Centre are entities of Natural Resources Canada (NGC). Union's involvement with NGC includes participation in research activities, funding of industry-specific benchmark studies, and offering

Union customers assistance in obtaining government funding for energy efficiency projects.

- Conservation Bureau
- Municipal Economic Development Coordinators

7.2. 2008 Distribution Contract Program Results

As noted in Table 7.1, 2008 was a successful year for the distribution contract EnergyWise program, generating a net program TRC of $166.2 million and close to 40.8 million in m^3 savings with direct program spending of just under $3.9 million.

The continued success of the distribution contract custom program was a result of ongoing efforts over the last several years to identify and implement multi-year projects. There was also an increase in dedicated communication and technical initiatives with customers to help them identify and implement shorter term projects.

Custom Project Analysis

All savings in the distribution contract sector are achieved exclusively through custom projects. As shown in Table 7.4, in 2008 there were 243 individual custom projects, up 38% from 2007.

Table 7.4 – Distribution Contract Custom Project Analysis

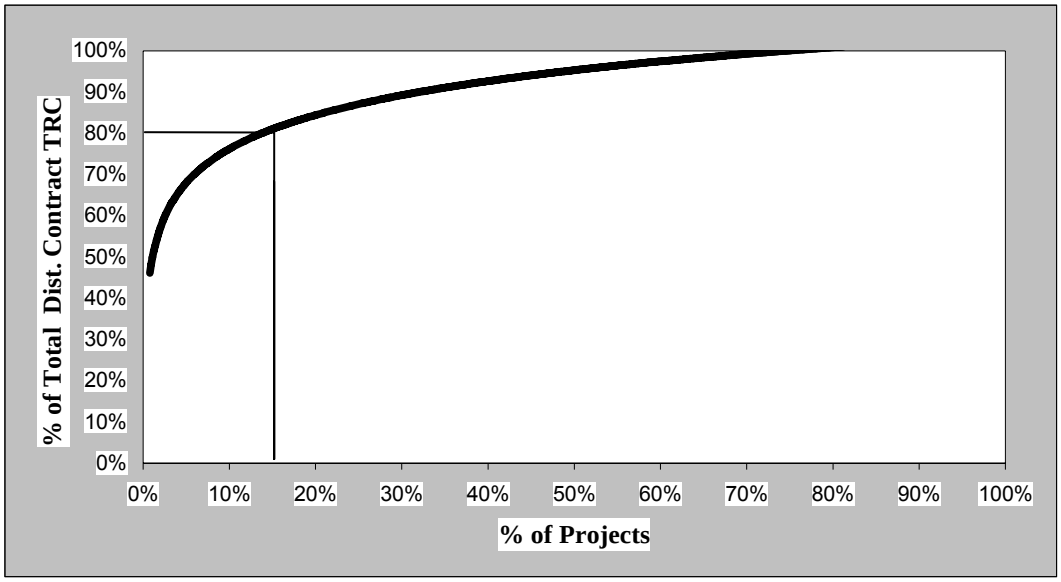
	2008	2007	2006
Total # of Projects (including audits & feasibility studies)	243	176	232
# of TRC Projects	127	97	140
Gross m3 Savings	91,034,393	81,900,581	71,996,223
Net m3 Savings	40,828,151	57,330,659	50,397,356
TRC (program costs not deducted)	166,910,230	126,953,059	97,177,472

The total gross m^3 savings also increased from 2007 actuals. The 87% increase in the industrial custom free rider rate from 30% to 56% accounted for the significant drop in net m^3 savings. This higher free rider rate reduced claimed distribution contract m^3 savings by approximately 21.8 million m^3.

As the distribution contract sector represents more than half of the savings generated within the overall DSM portfolio, it is prudent for Union to verify the results appropriately. In 2008, Union implemented new sampling methodology developed by Summit Blue Consulting, to ensure the accuracy not only of gas savings but also water and electricity savings claims. The sampling methodology addressing these issues can be found in Appendix H. Diamond Engineering was contracted to complete the distribution contract on-site custom project verification study utilizing the new sampling methodology. The details behind this study can be found in the Verification and Evaluation Section 9 of this report.

One significant project with a three-year sales cycle was completed in 2008. It contributed $75.6 million of TRC or 45.5% of the total TRC generated by distribution contract custom projects. As indicated in figure 7.4, only 15% of distribution custom projects accounted for approximately 80% of the TRC savings generated by this group of customers.

Figure 7.4 – Distribution Analysis of Custom



The average size of projects in this market increased in 2008 as more mid to large-sized projects were completed. These large, multi-year projects require significant capital investment by the customer. It is therefore logical that the customers require sizeable energy savings and reasonable payback periods in order to meet their own internal return on capital requirements to support the initial investment.

A number of these projects also had multiple utility savings, including electricity and water, which contributed to higher societal benefits and, therefore, a higher TRC. The level of effort and expertise required for these multi-year, multi-disciplinary projects was high for both the customer and Union.

Figure 7.5 Distribution Custom Projects – Benefits by Resource Type

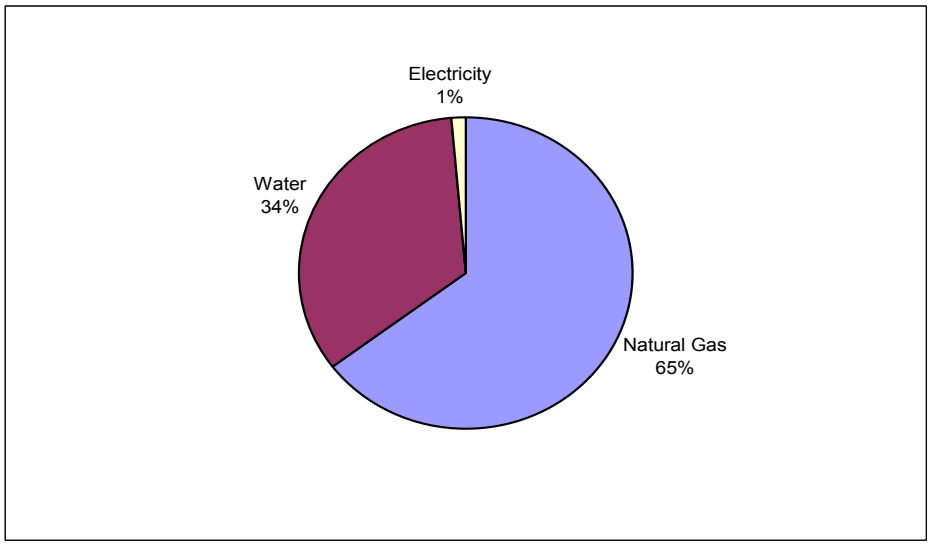


Figure 7.5 displays the adjusted TRC benefits, excluding cost, by resource type as a percentage of total TRC benefits from distribution contract custom projects in 2008.

Facility Audit Results

Facility audits continued as part of the EnergyWise program in 2008 with 112 studies completed. Table 7.5 below shows that participation in the boiler audit program decreased marginally in 2008 however, participation in the feasibility study program increased by 61%.

Table 7.5 – Facility Audit Participation

Measure	2008 Studies Completed	2007 Studies Completed	2006 Studies Completed
Feasilbity Studies	95	59	56
Boiler Audits	17	18	29
Seminars	4	2	2
Total	**116**	**79**	**87**

# of individual projects - some projects recorded more than one participant

Securing the necessary funding to complete facility efficiency upgrades is often difficult for the customer and many customers are unclear where or how to start evaluating their facility's potential for energy conservation. Feasibility studies work to effectively demonstrate the potential energy and cost savings associated with improving energy efficiency within a facility. These studies are often the basis used by the customer to build a business case that will allocate the necessary corporate funding for project implementation. Union tracking shows that 43% of the participants who received a facility audit in 2006 implemented the recommended measure/s by 2008.

7.3. Program Costs

Direct budget expenditures in 2008 totalled just under $3.9 million – 52% higher than 2007 levels.

Table 7.6 – Distribution Contract Program Expenditures

Distribution Contract Direct Costs	Incentives ($000)	Market Support ($000)	Total ($000)
2008	$ 3,205	$ 664	$ 3,869
2007	$ 2,247	$ 293	$ 2,540
2006	$ 3,322	$ 178	$ 3,500

Table 7.6 shows that the majority of the budget in 2008 went to incentives, which were required to drive higher savings results. However, the average incentive per project was consistent with previous years. The 42% increase in incentives was proportionate to the 38% increase in the number of projects.

7.4. Lessons Learned

1) Monthly communications with customers help keep energy efficiency in the forefront
Union has been able to maintain a high retention and interest in monthly energy efficiency topics since launching the Gasworks monthly newsletter. The interest in the Energywise website more than doubled from approximately 2,000 visits in 2007 to over 4,700 in 2008.

2) Decrease in Customer Invested Capital
Union has noticed a downward trend in the average capital investment per project since 2006. The effects of the high Canadian dollar and current unfavourable economic conditions have had a significant impact on the ability of customers to invest in energy efficient technologies and processes, particularly in the pulp and paper as well as manufacturing sectors. This downward trend in customer invested capital is expected to continue well into 2010. This will significantly challenge Union's ability to drive DSM as Union's budget is not sufficient to make up for this funding shortfall.

Year	# of Projects	Customer Invested Capital	Average Capital $ / Project
2006	232	$72,066,652	$310,632
2007	176	$50,242,007	$285,466
2008	243	$56,485,631	$232,451

3) Shift in Technology
Metering installations (both hardware and software) showed the largest single year increase from 2007. Many of the technologies are experiencing either steady or upward trending. The largest decrease occurred in heat recovery installations. Union will continue to monitor results to determine trends and adjust its focus accordingly.

Technology Measure	Projects Per Year and Share of Projects the Measure Represents as %			Trend
	2006	2007	2008	
Metering	8 3.45% of all projects	5 2.84% of all projects	23 9.47% of all projects	Upward
Steam Trap Repairs	10 4.31% of all projects	14 7.95% of all projects	20 8.23% of all projects	Upward
Heat Recovery	52 22.41% of all projects	4 2.27% of all projects	29 - 11.93% of all projects	Recovery upward
Boiler Controls	18 7.76% of all projects	1 0.57% of all projects	8 3.29% of all projects	Recovery upward

4) Incorporate evaluation recommendations into program design
In 2008, Union incorporated the auditor's recommendation to establish a standard list of measure lives by equipment or project type for use in custom projects. Union, as part of the 2008 input

assumptions, filed and accepted by the OEB, included a measure life table for custom project technologies. This will provide increased transparency as well as add stability to the program.

5) Research – Metering & Targeting results affect program design

There is an opportunity to create an additional program element for 2010 called Metering & Targeting (M&T) as a result of information gathered in 2008. The benefit of the M&T program is the ability to validate project savings by capturing consumption data to determine energy use before and after adoption of the new technologies or processes. The M&T research trial allowed Union Gas to examine emerging technologies and identify opportunities to expand current M&T offerings.

8. Market Transformation (Drain Water Heat Recovery)

In EB-2006-0021, Decision with Reasons, August 25, 2006, the OEB allocated a $1 million dollar budget for Market Transformation initiatives in 2007, with this amount increasing by 10% for each subsequent year of the three year plan. Market Transformation is not required to pass TRC; however, it is expected to meet clear criteria, as shown in the approved Market Transformation Scorecard for 2008 (Table 8.1). The utility is "entitled to an incentive payment of up to $0.5 million in each year of the multi-year plan based on the measured success of market transformation programs".

8.1. 2008 Market Transformation Program Framework

In 2007, Union selected Drain Water Heat Recovery (DWHR) as the Market Transformation technology focusing on the new build market. Both the EAC and Union agreed that MT initiatives should be sustained until the market has been successfully transformed by either a code change or shift in market dynamics. The new build market was once again selected as the DWHR program focus for 2008. It is a well defined and sizeable market providing a significant opportunity for increasing the technology's overall market penetration.

Residential builders were the program's primary focus. Union provided training and incentives to those builders and contractors who installed the drain water heat recovery units in their new homes. Union worked collaboratively with retailers, rental companies, HVAC partners and a DWHR manufacturer to provide effective education and program participation incentives. The program was evaluated using a scorecard approach. As in 2007, the MT scorecard tracked results against a number of different metrics to effectively measure program performance.

These metrics included:

- Number of builders enrolled in the program
- Overall number of units installed
- Both customer & builder awareness of technology
- Builders' level of promotion

The 2007 survey results established the baseline level of awareness in the marketplace. This information was used by key stakeholders in the new build sector including both builders and residential customers.

In addition, Union devised a strategy to have builders commit to purchasing and installing a specific number of DWHR units for their new residential developments. Union provided an installation allowance of $350/DWHR unit to the builder upon confirmation of installation. In order to encourage the installation of units in the typically busy fall season, additional bonuses were made available in the fourth quarter including:

- "Buy 4, get 1 free"
- $200 builder incentive for the first five rental contracts signed
- Extra $200 customer incentive in the form of an on-bill credit
- Extra $100 builder incentive increasing the allowance to $450/DWHR unit

A new retrofit component of the program was added in 2008 to encourage installation in existing homes. It was designed for delivery in partnership with retailers. The retrofit strategy included building an infrastructure in the retail market and providing homeowners with incentives for purchase and installation of DWHR units. In 2008 Union partnered with Sears Home Central which carried the units in select stores. Union supported the retrofit program and its partnership with Sears through in-store customer workshops, a co-branded poster promoting the program, a bill insert and a $450 customer rebate coupon.

8.2. 2008 Market Transformation Program Results

The MT Scorecard listed in Table 8.1 outlines the results achieved in the MT program in 2008.

Table 8.1 – 2008 Market Transformation Scorecard Results

Element	Indicator (weighting)	Metric Levels			Actual	Result	Score
		50%	100%	150%			
ULTIMATE OUTCOMES	Builder's Enrolled (25)	25	30	35	51	150%	84.75 / 70
	Units Installed New Build (45)	1000	1500	1800	1575	105%	
MARKET EFFECTS (Research)	Customer Awareness Survey (10) Baseline – 15%	17%	21%	25%	32%	150%	43 / 30
	Builder Knowledge Survey (10) Baseline – 58%	62%	70%	78%	75%	131%	
	Builder Promotion Survey (10) Baseline – 23%	29%	33%	37%	42%	150%	
Total Score							127.75/100

The score listed at the bottom right shows that overall Union exceeded its 100% target and therefore achieved the maximum MT incentive payout. Union undertook the following initiatives to promote DWHR to builders and customers resulting in a total of 1,575 installations, an increase of 74% from 2007 levels.

Promoted program and educated builders using the following:

- Union Gas website – updated dedicated builder section (www.uniongas.com/dwhr)
- Editorials in builder magazines (i.e. Green Building Architect)
- Direct mailer package targeting builders (branded envelope, builder letter, builder brochure and bonus rebate coupon)
- Builder package (branded folder, price list/info sheet, builder letter, rental program information and DWHR video on CD)
- Co-branded personalized sell sheets with various partnering builders
- Incentive Summary Sheet to explain incentives available
- Builder DWHR video

Promoted program and educated customers using the following:

- Union Gas Website – updated dedicated customer and builder sections (www.uniongas.com/dwhr)

- Co-branded Sears poster promoting retrofit program
- Customer rebate coupon
- Bill insert
- Customer DWHR video
- Customer brochure

Participated as an exhibitor in the following:

- Green Building Festival (September 9-10)
- OHBA Annual Conference (September 21-23)
- Construct Canada (December 3-5)

Advertised in the following magazines:

- Green Home (September)
- Ontario Home Builder (September/November)
- Home Builder (September/November)
- Canadian Builder Designer/Architect (October)
- Canadian Contractor (October/December)
- Canadian Homes & Cottages Trade Edition (October/November)

Facilitated the following:

- ENERGY STAR® for New Homes workshops
- Home Builder Association (HBA) meetings

8.3. 2008 Market Transformation Program Costs

Union budgeted $1.1 million for its 2008 Plan for MT activity and spent $1,096,777 (see Table 8.2). Union was able to mitigate some costs related to Builder and Contractor training sessions as a result of leveraging partnerships with EnerQuality, HBA and various individual builders.

Table 8.2: 2008 Market Transformation Expenditures

Category	Spend ($000's)	% of Total
Incentives	$750	68.4%
Program Costs	$328	29.8%
Employee Costs	$18	1.6%
TOTAL	**$1,096**	**100%**

8.4. Lessons Learned

1) DWHR continued support required:

With the installation of over 1,400 units, Union is well on its way to helping transform the marketplace with respect to DWHR. However, with the difficult current economic climate it is necessary to continue with a large-scale DWHR effort in 2009. A new MT Scorecard has been developed and filed with the OEB for 2009 with the support of Union's EAC.

2) Entry into retrofit market:

Union entered the retrofit market through a partnership with Sears Home Central, but quickly experienced difficulty with program execution. Even though customers were interested in the technology, the initial capital cost was too high to justify the purchase. Additionally, other retailers were reluctant to carry the product in-store making it difficult for Union to penetrate the market. Overall, it was decided that the retrofit market would have required more resources than originally anticipated, and therefore, was not a viable target. Union did not include a retrofit component in its 2009 plan.

9. Verification and Evaluation – 2008 Results

In order to provide assurance of the accuracy of claimed savings, Union undertakes several verification studies each year. These evaluation projects are designed to ensure that the claimed participation and installation rates for technologies delivered through Union's programs are accurate. An assessment of claimed savings obtained through custom projects is also completed.

Union also carries out related research to better understand the overall impacts and benefits that specific programs provide its customers.

9.1. Residential Verification Studies

Union undertook two verification studies for 2008 residential programs to ensure the savings claimed were accurate. These verification studies ensure accurate savings by determining the number of ESK elements that were installed and remained installed. Union uses these data to adjust the ESK savings claim. This adjustment is called an "adjustment factor" or "persistence". Union also uses the collected information to assess areas of program success and areas for potential improvement.

Table 9.1 lists the residential verification studies undertaken for 2008.

Table 9.1 – Summary of Project Audits for Residential Programs

Program	Title	Source	Objective
ESKs – Union Direct and HVAC Partnership	Final Report Following an Audit in 2009 of the Union Gas ESK- Residential Push Initiative (2008)	Beslin Communications Group Inc.	- Validate consumers' awareness of products received - Verify product installation - Gauge customer satisfaction with equipment - Determine influence of channel partners in end-users' decisions to install products - Gauge performance of channel partners in delivery of products and ESK info.
ESKs – Home Depot	Final Report Following an Audit in 2009 of the Union Gas ESK- Home Depot Initiative (2008)	Beslin Communications Group Inc.	- Validate accuracy of information tracking sent by partners claiming incentives - Verify product installation - Understand end-users' knowledge of energy efficiency, purchase motivations and general satisfaction - Determine factors affecting end-users' decisions to install - Opinions on other incentives Union Gas could offer

The results of these evaluations summarized below.

9.1.1. ESK Program Audit

In order to fully assess the impact of the ESK program on participants, Union completed a verification study. This study provided the adjustment factors used in the calculation of program savings results. The adjustment or persistence factor ensured that only those participants who installed, and kept the ESK measures installed, were included in the program savings calculations that contributed to both SSM and LRAM. The results from the verification study of the ESK program are presented in Table 9.2 and Table 9.3.

Table 9.2 - Adjustment Factors – Union Gas Direct and HVAC

ESK	Measure Verified Installed	Measure Remained Installed	Adjustment /Persistence Factor
Low Flow Showerhead	68%	98%	66.6%
Kitchen Faucet Aerators	65%	89%	57.9%
Bathroom Faucet Aerators	47%	90%	42.3%
Pipe Wrap	74%	98%	72.5%

Table 9.3 - Adjustment Factor - Home Depot

ESK	Measure Verified Installed	Measure Remained Installed	Adjustment /Persistence Factor
Low Flow Showerhead	78%	95%	74.1%
Kitchen Faucet Aerators	85%	92%	78.2%
Bathroom Faucet Aerators	71%	88%	62.5%
Pipe Wrap	72%	99%	71.3%

The higher adjustments factors for the Home Depot campaign indicate that the additional efforts made to educate consumers on the benefits and proper installation of the ESKs when they picked up the kits had a positive impact on results. Also, as a result of proactive targeted marketing for Home Depot events, Union attracted customers who were engaged by the ESK product and went to the store especially to receive a kit.

9.2. Custom Project Verification Study

Each year Union conducts a verification study of both the commercial and industrial sector custom projects. In completing this work, Union looks to validate that the claimed savings reported through the custom project process are accurate and recommend any adjustment factors to the savings if required.

In 2007 Summit Blue developed sampling methodology for the annual engineering review of custom DSM projects based, at a minimum, on the OEB's TRC guide for electric CDM requirements for sampling and incorporated the following:

- A review of verification protocols developed by a number of organizations;
- The application of industry practice as demonstrated in program evaluation; and,

- The application of appropriate assumptions for a custom project program.

Upon recommendation from the 2007 independent audit of Union's Annual Report, and in discussion with the Evaluation and Audit Committee (EAC), Union and Enbridge Gas Distribution (EGD) jointly contracted Summit Blue Consulting to develop revisions to the 2007 sampling methodology to address the following:

- Develop an approach that considers the significance of water and electricity savings;
- Adjust strata sizes to meet practical challenges in field applications, specifically census samples for the largest projects;
- Accommodate two sample assessment periods per year towards more real time evaluations.

These issues were addressed and the revised sampling method developed by Summit Blue for verification of 2008 custom projects is summarized in Appendix H.

9.2.1 Commercial Custom Project Verification Study

Summit Blue was contracted to extract a sample group for commercial custom project verification using the methodology outlined in Appendix H. The objective was to provide a sample of projects in order to verify the TRC benefits not only of natural gas but also electricity and water.

Due to differences across customers and project types, the commercial sector was stratified by segment: new construction, building renovation and multi-residential. For each segment, a sample was first drawn from the projects with the largest electricity TRC benefits, and then each stratum was filled out from projects with the largest gas TRC benefits. Water benefits were not used as a basis for sampling because they contributed only 1% of TRC. Also, their addition would have increased sample size and costs while yielding little additional information. Table 9.4 summarizes the commercial sector sample selected based on the size and strata recommended in the report.

Table 9.4 - Commercial Sector Custom Projects Selected for Verification

	Total Adjusted Benefits			
NATURAL GAS	**NATURAL GAS**	**WATER**	**ELECTRICITY**	**TRC**
BR-1 Total	$ 4,955,142	$ -	$ 147,328	$ 724,870
BR-2 Total	$ 218,151	$ -	$ 54,941	$ 257,881
MR-1 Total	$ 365,457	$ -	$ 22,124	$ 353,078
MR-2 Total	$ 77,535	$ -	$ 71,496	$ 98,977
NC-1 Total	$ 1,184,106	$ 409,203	$ 726,877	$ 2,353,686
NC-2 Total	$ 2,309,462	$ 13,863	$ 2,674,621	$ 3,197,847
Total Sample projects - 23	**4,955,142**	**423,066**	**3,697,386**	**6,986,338**
Total Commercial Custom Projects (Population) - 228	**25,013,611**	**$ 433,108**	**$ 4,928,368**	**$ 24,324,760**
% of population sampled	20%	98%	75%	29%

*Pre-audited savings claims
Summit Blue recommended a paper review study for the verification of savings results for these 23 commercial projects.

The deliverables of the paper verification studies included:

- A description of approach used to measure savings (including gas, water, and electricity savings, incremental cost and measure life, as appropriate);
- The results of telephone interviews to confirm installation and operating conditions;
- A detailed review of the methodology used by the evaluator to project the savings that would result from project implementation;
- A discussion of reasons (if applicable) for any variance between the projected and the evaluated savings;
- The evaluator's recommended adjustment factors based on the variance between the projected and evaluated savings claims;
- A report on calculation methodologies employed and recommendations for refinements for future savings calculations.

Engineering reviews were conducted by Jacques Whitford on these 23 sample projects representing over 29% of the total net TRC commercial custom project savings, plus an additional alternate project. The key contact for one of the primary projects selected for verification was not immediately available and an alternate project was selected to ensure there was sufficient electricity savings verified. Both the primary project and the alternate are included in the project verification study results.

The number of verifications completed exceeded the OEB requirement in EB-2006-0021 Decision with Reasons that "the projects selected for assessment should consist of a random selection of at least 10% of the total volume savings for all custom projects and consists of a minimum number of five projects."

The commercial project verification study resulted in recommended adjustment factors to the projected savings of .96 for natural gas, .86 for electricity and 1.03 for water.

The Audit recommended an overall adjustment factor of 0.7 for natural gas, electricity and water savings calculation for commercial custom projects. The results of the Audit recommended adjustment factor are shown in Table 9.5 below.

Table 9.5 – Commercial Custom Project Verification Study Results

Commercial			
	Claimed Savings	**Audited Savings**	
Natural Gas Savings	2,590,250	1,813,175	m3/year
Water Savings	35,663,706	24,964,594	litres/year
Electricity Savings	7,382,832	5,167,982	kWh/year
Incremental Cost	$ 18,170,481	12,719,337	

The recommended Audit adjustment factors have been applied to all commercial custom savings projects.

9.2.2 Distribution Contract Custom Project Verification Study

As described in the commercial custom project verification study above, a sample of twelve custom projects from the distribution contract sector was selected for the verification study based on the revised Summit Blue methodology outlined in Appendix H.

The sample for the industrial sector continues to be stratified based on size of projects. Projects were randomly selected from among the largest projects based on TRC benefits from gas savings and the largest based on electricity savings. In 2008 one distribution contract project represented over 90% of the overall water TRC benefits and was included as an extra sample point. Table 9.6 summarizes the industrial sectors randomly selected sample based on three strata.

Table 9.6 – Distribution Contract Custom Projects Selected for Verification

	Total Adjusted Benefits				Total Adjusted TRC VALUES
Strata Sampling Frame	**Random Sample**	**NATURAL GAS**	**WATER**	**ELECTRICITY**	**TRC**
Top Projects based on Natural Gas	**3**	**$ 31,858,284**	**$ 52,212,200**	**$ 68,112**	**$ 83,641,137**
Top Projects based on Electricity	**3**	**$ 1,567,078**	**$ -**	**$ 876,421**	**$ 2,105,220**
Remaining Distribution Contract	**6**	**$ 8,307,423**	**$ 30,519**	**$ -**	**$ 7,348,018**
Total Sample	**12**	**$ 41,732,784**	**$ 52,242,719**	**$ 944,533**	**$ 93,094,375**
Total Distribution Contract Custom Projects	**127**	**$ 116,877,920**	**$ 52,540,291**	**$ 1,099,920**	**$ 148,187,566**
% of Population Sampled		**36%**	**99%**	**86%**	**63%**

On-site verification studies were conducted by Diamond Engineering. In completing this work, the focus was to validate whether or not the claimed savings reported through the custom projects process were accurate and recommend any adjustment factors to the savings if required.

The objectives of the on-site verification studies included:

- Determination of whether savings calculations in the application were reasonable based on information available at the time made;
- Review of the assumptions used in calculations;
- Discussion of variations between projected savings and measures savings;
- Recommend adjustment factors based on the variance between the projected and evaluated savings;
- Verification that the equipment installation was completed at the site;
- Review of the confidence interval levels achieved in the results and statement of errors for calculations.

The twelve randomly-selected projects represent over 63% of the total TRC savings of all distribution contract custom projects.

The Distribution contract project verifications study resulted in recommended adjustment factors to the projected savings of 1.1 for natural gas, 0.37 for electricity and 1.22 for water.

The Audit recommended a 1.05 adjustment to natural gas savings, 2.2 for electricity and 1.22 for water. The results of the Audit adjustment factors are shown in Table 9.7 below.

Table 9.7 – Distribution Contract Custom Project Verification Study Results

Distribution Contract			
	Claimed Savings	**Audited Savings**	
Natural Gas Savings	32,562,257	34,190,370	m3/year
Water Savings	6,626,599,426	8,084,451,300	litres/year
Electricity Savings	2,738,620	6,024,964	kWh/year
Incremental Cost	$ 4,149,230	4,149,230	

The recommended Audit adjustment factors have been applied to the Distribution Contract savings projects.

10. 2008 Measures Evaluation Research

During the course of the three-year DSM framework, Union agreed to provide a review of each measure within the portfolio. This was roughly expected to translate into one-third of the measures for each year of the plan.

In 2008 based on priorities set in consultation with the Evaluation and Audit Committee, Union undertook several evaluation research projects detailed in Table 10.1

Table 10.1 – 2008 Evaluation Research Measure Priorities

Free Rider & Spillover Research	Deemed Savings Research	Base Case Research
Pre-rinse Spray Nozzles	Pre-rinse Spray Nozzles	Commercial Boilers Efficiency

The following three Evaluation reports were sent for review to the Evaluation and Audit Committee (EAC).

- Deemed savings for pre-rinse spray nozzles
- Free ridership and spillover for pre-rinse spray nozzles
- Commercial boiler base case efficiency

The final results of the Evaluation Research are reflected in Appendix I - K inclusive.

The adjustments to LRAM input assumptions based on the pre-rinse spray nozzle study results are included in Appendix A. The LRAM calculation incorporates the results from these studies.

The prioritization of measures to be evaluated in 2009 is currently under consultation with the EAC.

11. Lost Revenue Adjustment Mechanism (LRAM)

The LRAM is approved by the Ontario Energy Board to allow Union to recover the lost distribution revenues associated with DSM activity. These lost revenues are calculated for each rate class impacted by DSM energy efficiency programs using the following formula:

$$\sum(\text{Rate Class Volume Reduction} \times \text{2008 Delivery Rate}) = \text{LRAM Claimed}$$

For 2008, the year one[4] LRAM amount is $0.71 million based on 2008 delivery rates and natural gas savings of 61.8 million m^3. The 2008 LRAM statement is detailed in Table 11.1 below.

Table 11.1 - 2008 LRAM Statement

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2008 (audited) Results

Line No.	Particulars	Audited Volumes 10^3 m^3 (a)	2008 Delivery Rates $/$10^3$ m^3 (b)	Revenue Impact $ (c) = (a) x (b) x 50%
	South			
1	M1 Residential	6,477	$ 50.870	$ 164,737
2	M1 Commercial	7,101	$ 50.870	$ 180,625
3	M2 Commercial	3,103	$ 41.237	$ 63,980
4	M2 Industrial	574	$ 41.237	$ 11,841
	Industrial			
5	M4	5,610	$ 9.277	$ 26,023
6	M5	4,468	$ 16.009	$ 35,763
7	M7	1	$ 3.531	$ 2
8	T1	18,204	$ 0.819	$ 7,455
9		45,539		$ 490,426
	North			
10	Residential 01	1,361	$ 102.147	$ 69,517
11	Commercial 01	1,248	$ 95.251	$ 59,420
12	Commercial 10	1,389	$ 66.998	$ 46,532
13	Industrial 10	1,054	$ 61.471	$ 32,380
	Industrial			
14	Rate 20	1,536	$ 3.068	$ 2,357
15	Rate 100	9,725	$ 2.170	$ 10,552
16		16,313		$ 220,757
17	Total	61,852		$ 711,184

The 2008 LRAM statement has been prepared using the 2010 Navigant assumptions approved by the Board for planning purposes. These assumptions are detailed in Appendix A including the results of the pre-rinse spray nozzle free rider study. LRAM results by measure are shown in Appendix D.

[4] In EB-2006-0021 Decision with Reasons the Board ruled that the year one impact of DSM activities is equivalent to 50% of the savings in the first year in which the DSM measure is undertaken.

12. Shared Savings Mechanism (SSM)

For 2008, Union is eligible to earn an SSM incentive based on DSM program results. The SSM incentive payment has been calculated using the methodology approved by the Board in the DSM Generic Hearings. The SSM incentive is calculated using the following structure:

- For TRC savings between 0 percent and 25 percent of the TRC target, an SSM payout shall equal $900 for each 1/10 of 1 percent of target reached.
- For TRC savings between 25 percent and 50 percent of the TRC target, an SSM payout shall equal $225,000 plus $1,800 for each 1/10 of 1 percent of target reached.
- For TRC savings between 50 percent and 75 percent of the TRC target, an SSM payout shall equal $675,000 plus $6,300 for each 1/10 of 1 percent of target reached.
- For TRC savings greater than 75 percent of the TRC target, an SSM payout shall equal $2,250,000 plus $10,000 for each 1/10 of 1 percent of target reached up to the maximum SSM annual cap of $8,500,000.

For 2008, the 2007 SSM incentive cap of $8.5 million will increase annually by the Ontario CPI as determined in October of the proceeding year. For 2008, the annual SSM incentive cap increased to $8,695,500. This was reflective of the 2.3% annual increase of the Ontario CPI as determined for October 2007.

Union's net TRC calculation for 2008 is shown in Table 12.1.

Table 12.1 – 2008 Net TRC Calculation

New Home Construction	$ 564,435		
Home Retrofit	$ 26,812,314		
Residential Program Costs	$ (1,427,504)		
Total Residential TRC		**$ 25,949,245**	
Low Income	$ 6,442,930		
Low Income Program Costs	$ (494,058)		
Total Low Income TRC		**$ 5,948,872**	
New Building Construction	$ 15,996,225		
Building Retrofit	$ 56,112,244		
Commercial Program Costs	$ (680,414)		
Total Commercial TRC		**$ 71,428,055**	
Distribution Contract	$ 166,910,229		
Distribution Contract Program Costs	$ (663,760)		
Total Distribution Contract TRC		**$ 166,246,469**	
Total Market Transformation Costs		**$ (346,516)**	
Program TRC			**$ 269,226,124**
Salaries	$ (3,050,219)		
Research & Evaluation	$ (1,577,825)		
Administration	$ (143,861)		
Total Other Direct Program Costs		**$ (4,771,905)**	
Overhead	$ (1,700,000)		
Total Indirect Program Costs		**$ (1,700,000)**	
Total O&M Expenditures			**$ (6,471,905)**
Net TRC			**$ 262,754,219**

Union's TRC target for 2008 is $180,171,773 million, which results in the following SSM calculation:

SSM = {[(Net TRC – (Range End Percentage x Target TRC)) / (Payout Increment Percentage x Target TRC)] x Incremental Payout} + Base Payout
= {[(Net TRC – (75% x $180,171,773)) / (0.1 % x $180,171,773)] x $10,000} + $2,250,000
= {[($262,754,219 - $135,128,829)/$180,172] x $10,000} + $2,250,000
= $708.3531 x $10,000 + $2,250,000
= 9,333,530

***cap for 2008 SSM = $8,695,500**

The TRC breakdown by measure is included in Appendix E.

The SSM breakdown by rate class is shown in Table 12.2 below.

Table 12.2 – 2008 SSM by Rate

UNION GAS LIMITED
Shared Savings Mechanism
2008 (audited) Results

Line No.	Particulars	Amount (1) ($)
	South	
1	M1 Residential	$ 900,795
2	M1 Commercial	$ 1,128,737
3	M2 Commercial	$ 596,910
4	M2 Industrial	$ 70,942
	Industrial	
5	M4	$ 286,080
6	M5	$ 420,012
7	M7	$ 757
8	T1	$ 1,397,216
9		$ 4,801,449
	North	
10	Residential 01	$ 177,056
11	Commercial 01	$ 276,358
12	Commercial 10	$ 234,447
13	Industrial 10	$ 95,606
	Industrial	
14	Rate 20	$ 122,876
15	Rate 100	$ 2,987,707
16		$ 3,894,051
17	Total	$ 8,695,500

Notes
(1) The allocation is based on 2008 TRC achieved by rate class

13. 2009 Section

The primary purpose of this Annual Report is to review the 2008 outcomes. The secondary purpose is to establish targets for 2009. This section focuses on the items that need to be considered for 2009.

The new TRC target for 2009 is based upon the 2008 results as outlined in EB-2006-0021 Decision with Reasons.

> "Parties to this partial settlement further agree that there will be an annual TRC target. The parties agree to phase in a formula over the next three years which will set this target, as described below, by averaging the Utility's actual audited TRC results over the previous three years and applying to this figure an escalation factor equal to 1.5 times the amount by which the utility's budget is increased. The parties agree to phase in the aforementioned formula over the next three years beginning with an agreed upon target for each utility in 2007 which, for Union will be $188 million.
>
> Furthermore, the parties agree that, in the event the avoided costs used by the utility are, at a later date, updated, the actual audited results from previous years used to calculate the target will be adjusted to reflect these updated avoided costs."

Based upon the TRC target guidelines, outlined above the 2009 TRC target is calculated utilizing audited 2007 & 2008 results. The final 2009 TRC target was audited by ECONorthwest and is outlined in the following calculation.

13.1 2009 TRC Target

2007 Target	2007 Audited Results with 2009 Avoided Costs	2008 Audited Results with 2009 Avoided Costs
$ 188,000,000	$ 135,227,131	251,112,098

2009 100% Net TRC Target
$ 220,163,371

13.2 2009 Avoided Costs

The Avoided Costs for 2009 are attached in Appendix G.

Appendix A – Input Assumptions (SSM) and (LRAM)

Measure			SSM Input Assumptions							LRAM Input Assumptions		
			Equipment Life	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m3)	Water Savings (L)	Electricity Savings (kWh)	Incremental Cost	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m3)
NHC	Energy Star for New Homes		25	5%	-	1,018	-	1,450	$4,701	5%	-	0
HR	ESK	RAM CP Install-Faucet Aerator-Bath	10	33%	-	6	2,000	-	$1	33%	-	6
		RAM CP Install-Faucet Aerator-Kitchen	10	33%	-	22	7,800	-	$2	33%	-	23
		RAM CP Install-Pipe Insulation - 2 m	15	4%	-	17	-	-	$1	4%	-	18
		RAM CP Install-Showerhead - 1.25gpm	10	10%	-	40	10,700	-	$15	10%	-	63
	ESK	3rd Party Install-Faucet Aerator-Bath	10	33%	-	6	2,000	-	$1	33%	-	6
		3rd Party Install-Faucet Aerator-Kitchen	10	33%	-	22	7,800	-	$2	33%	-	23
		3rd Party Install-Pipe Insulation - 2 m	15	4%	-	17	-	-	$1	4%	-	18
		3rd Party Install-Shead-1.25 exist 2.0	10	10%	-	33	8,900	-	$15	10%	-	63
		3rd Party Install-Shead-1.25 exist 2.1-2.5	10	10%	-	47	12,400	-	$15	10%	-	63
		3rd Party Install-Shead-1.25 exist 2.6+	10	10%	-	68	17,500	-	$15	10%	-	63
	ESK	HD/SB/Cust Initiated-Faucet Aerator-Bath	10	33%	62.48%	6	2,000	-	$1	33%	62.48%	6
		HD/SB/Cust Initiated-Faucet Aerator-Kitchen	10	33%	78.20%	22	7,800	-	$2	33%	78.20%	23
		HD/SB/Cust Initiated-Pipe Insulation - 2 m	15	4%	71.28%	17	-	-	$1	4%	71.28%	18
		HD/SB/Cust Initiated-Showerhead - 1.25 gpm	10	10%	74.10%	40	10,700	-	$4	10%	74.10%	63
		HD/SB/Cust Initiated-Showerhead - 1.5 gpm	10	10%	74.10%	22	6,400	-	$4	10%	74.10%	46
	ESK	RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Bath	10	33%	42.30%	6	2,000	-	$1	33%	42.30%	6
		RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Kitchen	10	33%	57.85%	22	7,800	-	$2	33%	57.85%	23
		RAM CP/RAM Event/3rd Party Dist-Pipe Insulation - 2 m	15	4%	72.52%	17	-	-	$1	4%	72.52%	18
		RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.25 gpm	10	10%	66.64%	40	10,700	-	$4	10%	66.64%	63
		RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.5 gpm	10	10%	66.64%	22	6,400	-	$4	10%	66.64%	46
	Furnace - High Efficiency		18	82%	-	385	-	-	$650	90%	-	385
	Thermostat - Programmable		15	43%	84.70%	152	-	26	$50	43%	84.70%	53
LI	ESK	HHC-Faucet Aerator-Bath	10	1%	-	6	2,000	-	$1	1%	-	6
		HHC-Faucet Aerator-Kitchen	10	1%	-	22	7,800	-	$2	1%	-	23
		HHC-Pipe Insulation - 2 m	15	1%	-	17	-	-	$4	1%	-	18
		HHC-Showerhead-1.25 gpm existing 2.0	10	1%	-	33	8,900	-	$15	1%	-	63
		HHC-Showerhead-1.25 gpm existing 2.1 to 2.5	10	1%	-	47	12,400	-	$15	1%	-	63
		HHC-Showerhead-1.25 gpm existing 2.6+	10	1%	-	68	17,500	-	$15	1%	-	63
	Thermostat - Programmable - HHC		15	1%	-	152	-	26	$50	1%	-	53
NBC	Condensing Boiler		25	5%	-	Quasi	-	-	Quasi	5%	-	Quasi
	Custom Agriculture Comm Weather		Actual	0%	-	Actual	Actual	Actual	Actual	0%	-	Actual
	Custom Application		Actual	33%	-	Actual	Actual	Actual	Actual	33%	-	Actual
	DCKV Dinner House (10000 - 15000 cfm)		20	5%	-	10,910	-	40,334	$15,000	5%	-	18,924
	DCKV Fast Casual (< 5000 cfm)		20	5%	-	3,660	-	7,229	$5,000	5%	-	4,801
	DCKV Full Menu (5000 - 9999 cfm)		20	5%	-	5,960	-	22,855	$10,000	5%	-	11,486
	ERV		15	5%	-	Quasi	-	Quasi	Quasi	5%	-	Quasi
	HRV		15	5%	-	Quasi	-	-	Quasi	5%	-	Quasi
	Infrared Heating		15	33%	-	Quasi	-	-	Quasi	33%	-	Quasi
	Rooftop Unit		20	5%	-	1,275	-	-	$1,250	5%	-	255
BR	Condensing Boiler		25	5%	-	Quasi	-	-	Quasi	5%	-	Quasi
	Custom Application		Actual	59%	-	Actual	Actual	Actual	Actual	59%	-	Actual
	Custom Multifamily Retrofit		Actual	42%	-	Actual	Actual	Actual	Actual	42%	-	Actual
	DCKV Dinner House (10000 - 15000 cfm)		20	5%	-	17,455	-	40,929	$15,000	5%	-	18,924
	DCKV Fast Casual (< 5000 cfm)		20	5%	-	3,660	-	7,319	$5,000	5%	-	4,801
	DCKV Full Menu (5000 - 9999 cfm)		20	5%	-	9,535	-	23,180	$10,000	5%	-	11,486
	ERV		15	5%	-	Quasi	-	Quasi	Quasi	5%	-	Quasi
	Furnace - High Efficiency		18	17.5%	-	459	-	-	$650	17.5%	-	459
	Furnace Enhanced (up to 299 Mbtu/h) - NG		18	30%	-	459	-	-	$650	30%	-	459
	HRV		15	5%	-	Quasi	-	-	Quasi	5%	-	Quasi
	HWC:ESK/MFP/SHP-Faucet Aerator-Bath		10	10%	-	6	2,000	-	$1	10%	-	6
	HWC:ESK/MFP/SHP-Faucet Aerator-Kitchen		10	10%	-	22	7,800	-	$2	10%	-	23
	HWC:ESK/MFP/SHP-Shower Head - 1.25 gpm		10	10%	-	40	10,700	-	$4	10%	-	63
	HWC:ESK/MFP/SHP-Shower Head - 1.5 gpm		10	10%	-	22	6,400	-	$4	10%	-	46
	Infrared Heating		15	33%	-	Quasi	-	-	Quasi	33%	-	Quasi
	Pre-Rinse Low-Flow Spray Nozzle (SSM)		5	5%	-	3,059	544,145	-	$100			
	Pre-Rinse Low-Flow Spray Nozzle - FULL Service (LRAM)									12.4%	-	886
	Pre-Rinse Low-Flow Spray Nozzle - LIMITED Service (LRAM)									12.4%	-	190
	Pre-Rinse Low-Flow Spray Nozzle - OTHER (LRAM)									12.4%	-	200
	Rooftop Unit		20	5%	-	1,275	-	-	$1,250	5%	-	255
	Thermostat - Programmable (SSM)		15	20%	-	519	-	921	$50			
	Thermostat - Programmable (Warehouse, Ind, Rec, Agr) (LRAM)									20%	-	538
	Thermostat - Programmable (Multifamily, Food Services) (LRAM)									20%	-	223
	Thermostat - Programmable (Office, Institutional) (LRAM)									20%	-	211
	Thermostat - Programmable (Retail, Hotels/Motels) (LRAM)									20%	-	82
DCM	Custom Agriculture Ind Baseload		Actual	0%	-	Actual	Actual	Actual	Actual	0%	-	Actual
	Custom Application		Actual	56%	-	Actual	Actual	Actual	Actual	56%	-	Actual

Appendix B – 2008 Results Breakdown

Program	Measure		Actual 2008 Results		2008 Plan		Variance	
			Participants	Gross TRC	Participants	Gross TRC	Participants	Gross TRC
New Home Construction	Energy Star for New Homes		1,343	$564,435	1,300	$546,363	43	$18,072
	Total New Home Construction		**1,343**	**$564,435**	**1,300**	**$546,363**	**43**	**$18,072**
Home Retrofit	ESK	RAM CP Install-Faucet Aerator-Bath	1,403	$35,698	6,000	$152,663	-4,597	-$116,965
		RAM CP Install-Faucet Aerator-Kitchen	1,403	$137,825	6,000	$589,414	-4,597	-$451,590
		RAM CP Install-Pipe Insulation - 2 m	1,403	$68,912	6,000	$294,704	-4,597	-$225,793
		RAM CP Install-Showerhead - 1.25gpm	1,403	$268,480	6,000	$1,148,168	-4,597	-$879,688
	ESK	3rd Party Install-Faucet Aerator-Bath	111	$2,824	250	$6,361	-139	-$3,537
		3rd Party Install-Faucet Aerator-Kitchen	111	$10,904	250	$24,559	-139	-$13,655
		3rd Party Install-Pipe Insulation - 2 m	111	$5,452	250	$12,279	-139	-$6,827
		3rd Party Install-Shead-1.25 exist 2.0	8	$1,250	250	$39,077	-242	-$37,827
		3rd Party Install-Shead-1.25 exist 2.1-2.5	22	$4,957	-	-	-	-
		3rd Party Install-Shead-1.25 exist 2.6+	81	$26,501	-	-	-	-
	ESK	HD/SB/Cust Initiated-Faucet Aerator-Bath	49,143	$768,887	49,882	$780,449	-739	-$11,562
		HD/SB/Cust Initiated-Faucet Aerator-Kitchen	49,143	$3,760,826	49,882	$3,817,380	-739	-$56,554
		HD/SB/Cust Initiated-Pipe Insulation - 2 m	49,143	$1,706,990	49,882	$1,732,659	-739	-$25,669
		HD/SB/Cust Initiated-Showerhead - 1.25 gpm	47,123	$6,983,736	47,500	$7,039,608	-377	-$55,872
		HD/SB/Cust Initiated-Showerhead - 1.5 gpm	2,020	$169,868	3,188	$268,088	-1,168	-$98,221
	ESK	RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Bath	46,095	$478,288	73,715	$764,878	-27,620	-$286,589
		RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Kitchen	46,095	$2,593,514	73,715	$4,147,541	-27,620	-$1,554,027
		RAM CP/RAM Event/3rd Party Dist-Pipe Insulation - 2 m	46,095	$1,629,740	73,715	$2,606,276	-27,620	-$976,536
		RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.25 gpm	31,696	$4,213,020	53,649	$7,131,005	-21,953	-$2,917,984
		RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.5 gpm	14,337	$1,079,067	20,066	$1,510,257	-5,729	-$431,190
	Furnace - High Efficiency		8,407	$962,764	7,216	$826,372	1,191	$136,393
	Thermostat - Programmable		9,296	$1,902,811	5,058	$1,248,388	4,238	$654,423
	Total Home Retrofit		**404,649**	**$26,812,314**	**532,468**	**$34,140,127**	**-127,819**	**-$7,327,813**
	Total Residential		405,992	$27,376,749	533,768	$34,686,490	-127,776	-$7,309,741
	Residential Sector Costs			-$1,427,504		-$930,648		
	Net Residential TRC			**$25,949,245**		**$33,755,842**		**-$7,806,597**
Low Income	ESK	HHC-Faucet Aerator-Bath	7,694	$289,264	9,000	$338,365	-1,306	-$49,100
		HHC-Faucet Aerator-Kitchen	7,694	$1,116,817	9,000	$1,306,388	-1,306	-$189,571
		HHC-Pipe Insulation - 2 m	7,291	$347,652	9,000	$429,141	-1,709	-$81,489
		HHC-Showerhead-1.25 gpm existing 2.0	537	$92,332	250	$42,985	287	$49,347
		HHC-Showerhead-1.25 gpm existing 2.1 to 2.5	2,219	$549,966	3,000	$743,532	-781	-$193,566
		HHC-Showerhead-1.25 gpm existing 2.6+	5,132	$1,846,925	5,750	$2,069,333	-618	-$222,408
	Thermostat - Programmable - HHC		5,132	$2,199,974	5,000	$2,143,389	132	$56,585
	Total Low Income		**35,699**	**$6,442,930**	**41,000**	**$7,073,133**	**-5,301**	**-$630,203**
	Total Low Income		35,699	$6,442,930	41,000	$7,073,133	-5,301	-$630,203
	Low Income Sector Costs			-$494,058		-$686,000		
	Net Low Income TRC			**$5,948,872**		**$6,387,133**		**-$438,261**
New Building Construction	Condensing Boiler		40	$776,901	56	$1,104,111	-16	-$327,210
	Custom Agriculture Comm Weather		4	$247,751	-	-	-	-
	Custom Application		104	$12,190,570	-	$8,500,000	-	$3,690,570
	DCKV Dinner House (10000 - 15000 cfm)		1	$53,037	4	$212,148	-3	-$159,111
	DCKV Fast Casual (< 5000 cfm)		5	$64,863	8	$103,781	-3	-$38,918
	DCKV Full Menu (5000 - 9999 cfm)		3	$83,670	20	$557,800	-17	-$474,130
	ERV		43	$852,793	112	$1,823,995	-69	-$971,202
	Infrared Heating		342	$1,088,764	75	$187,327	267	$901,437
	HRV		10	$31,289	50	$285,909	-40	-$254,620
	Rooftop Unit		199	$606,588	85	$259,095	114	$347,492
	Total New Building Construction		**751**	**$15,996,225**	**410**	**$13,034,167**	**341**	**$2,962,058**

Program	Measure	Actual 2008 Results		2008 Plan		Variance	
		Participants	Gross TRC	Participants	Gross TRC	Participants	Gross TRC
Building Retrofit	Condensing Boiler	278	$6,499,127	279	$5,520,552	-1	$978,575
	Custom Application	112	$ 2,417,532	-	$8,000,000	-	-$5,582,468
	Custom Multifamily Retrofit	102	$ 2,171,478	-	$5,500,000	-	-$3,328,522
	DCKV Dinner House (10000 - 15000 cfm)	2	$150,476	1	$75,238	1	$75,238
	DCKV Fast Casual (< 5000 cfm)	1	$13,042	3	$39,126	-2	-$26,084
	DCKV Full Menu (5000 - 9999 cfm)	8	$320,133	10	$400,167	-2	-$80,033
	ERV	148	$971,687	151	$2,462,393	-3	-$1,490,706
	Furnace - High Efficiency	117	$84,757	100	$72,442	17	$12,315
	Furnace Enhanced (up to 299 Mbtu/h) - NG	23	$14,223	10	$6,184	13	$8,039
	HRV	40	$78,077	95	$540,051	-55	-$461,974
	HWC:ESK/MFP/SHP-Faucet Aerator-Bath	30,655	$1,047,735	22,000	$751,922	8,655	$295,813
	HWC:ESK/MFP/SHP-Faucet Aerator-Kitchen	22,118	$2,918,656	20,000	$2,639,168	2,118	$279,488
	HWC:ESK/MFP/SHP-Shower Head - 1.25 gpm	10,611	$2,135,584	5,000	$1,006,307	5,611	$1,129,278
	HWC:ESK/MFP/SHP-Shower Head - 1.5 gpm	12,316	$1,413,188	15,400	$1,767,058	-3,084	-$353,871
	Infrared Heating	589	$1,640,767	750	$1,873,275	-161	-$232,508
	Pre-Rinse Low-Flow Spray Nozzle	3,349	$26,527,479	3,000	$23,763,044	349	$2,764,434
	Rooftop Unit	631	$1,923,401	275	$838,249	356	$1,085,152
	Thermostat - Programmable	3,307	$ 5,784,900	5,000	$8,746,446	-1,693	-$2,961,547
	Total Building Retrofit	**84,407**	**$56,112,244**	**72,074**	**$64,001,623**	**12,333**	**-$7,889,380**
	Total Commercial	85,158	$72,108,469	72,484	$77,035,791	12,674	-$4,927,322
	Commercial Sector Costs		-$680,414		-$287,071		
	Net Commercial TRC		**$71,428,055**		**$76,748,720**		**-$5,320,665**
Distribution Contract Markets	Custom Agriculture Ind Baseload	17	$ 3,213,239	-	$5,915,304	-	-$2,702,065
	Custom Application	172	$ 163,696,990	-	$135,000,000	-	$28,696,990
	Total Distribution Contract Markets	**189**	**$166,910,229**	**-**	**$140,915,304**	**-**	**$25,994,925**
	Total Distribution Contract	189	$166,910,229	-	$140,915,304	-	$25,994,925
	Distribution Contract Program Costs		-$663,760		-$523,000		
	Net Distribution Contract TRC		**$166,246,469**		**$140,392,304**		**$25,854,165**
	Total TRC		$269,572,640		$257,283,999		$12,288,642
	Market Transformation		-$346,516		-$582,500		$235,984
	Salaries		-$3,050,219		-$3,200,744		$150,525
	Research & Evaluation		-$1,577,825		-$1,410,000		-$167,825
	Administration		-$143,861		-$87,500		-$56,361
	Overhead		-$1,700,000		-$1,700,000		$0
	Overall Net TRC for 2008		**$262,754,219**		**$250,303,255**		**$12,450,965**

Appendix C – 2008 DSM Spending by Program

Sector	Program	Program Costs	Incentive Costs	Total
Residential	*New Home Construction	$ 118,386	$ 134,300	$ 244,243
	*Home Retrofit	$ 1,309,118	$ 1,481,880	$ 2,697,717
	Total Residential	**$ 1,427,504**	**$ 1,616,180**	**$ 3,043,684**
Low Income	Low Income	$ 494,058	$ 951,211	$ 1,445,269
	Total Low Income	**$ 494,058**	**$ 951,211**	**$ 1,445,269**
Commercial	*New Building Construction	$ 115,465	$ 617,471	$ 699,235
	*Building Retrofit	$ 564,949	$ 3,034,591	$ 3,434,649
	Total Commercial	**$ 680,414**	**$ 3,652,062**	**$ 4,332,476**
Distribution Contract	Distribution Contract	$ 663,760	$ 3,205,029	$ 3,861,209
	Total Distribution Contract	**$ 663,760**	**$ 3,205,029**	**$ 3,868,789**
Market Transformation	DWHR	$ 346,516	$ 750,261	$ 1,096,777
	Total Market Transformation	**$ 346,516**	**$ 750,261**	**$ 1,096,777**
Total Program Sector Costs		**$ 3,612,252**	**$ 10,174,743**	**$ 13,786,995**
Other Direct Program Costs	Salaries			$ 3,050,219
	Research & Evaluation			$ 1,577,825
	Administration			$ 143,861
Indirect Program Costs	**Overhead			$ 1,700,000
Total 2008 DSM Spending				**$ 20,258,900**

* Program costs allocate between new and retrofit markets based on percentage of incentives paid in each program

** Built into rates

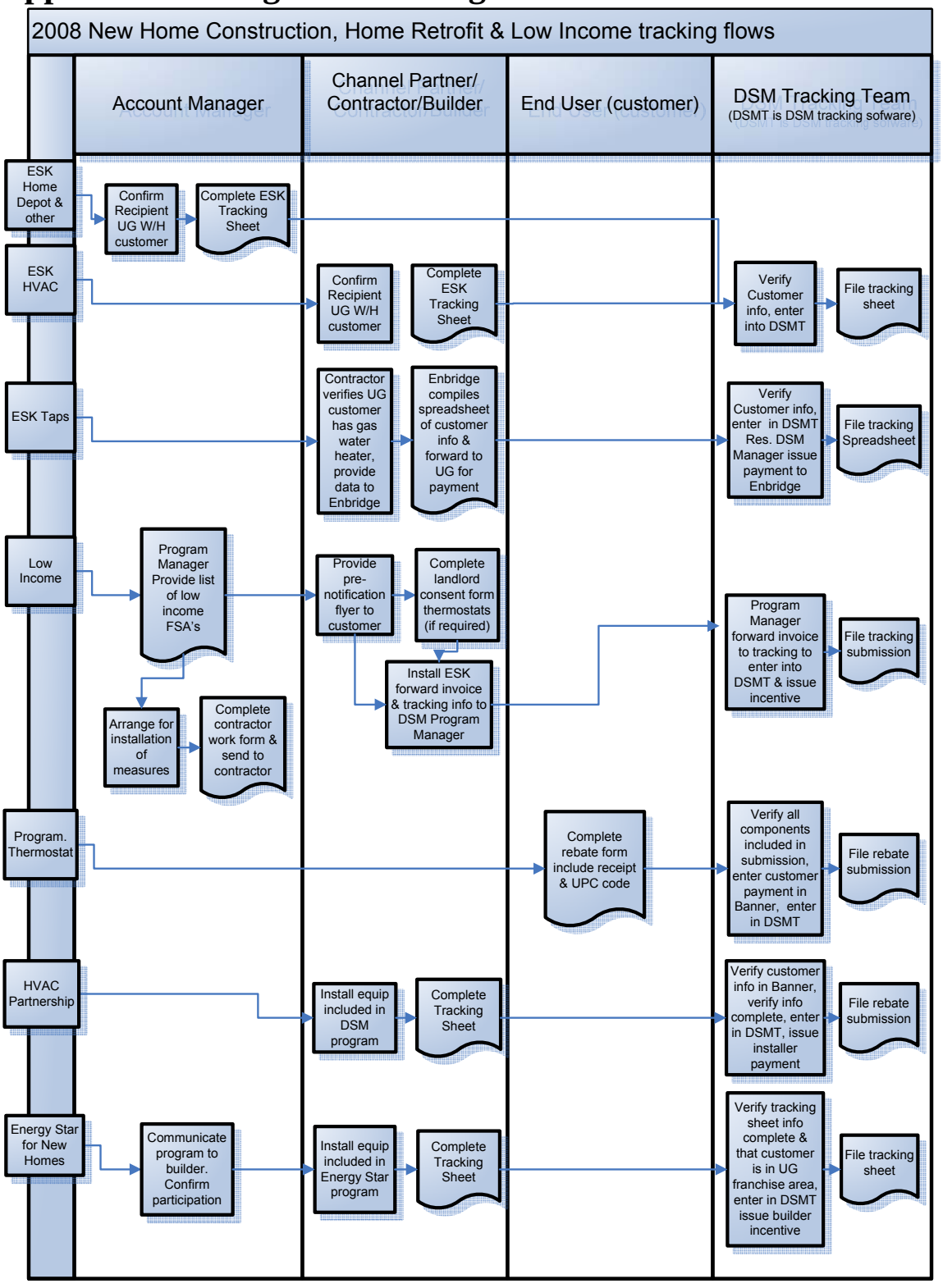
Appendix D – 2008 LRAM Results by Measure

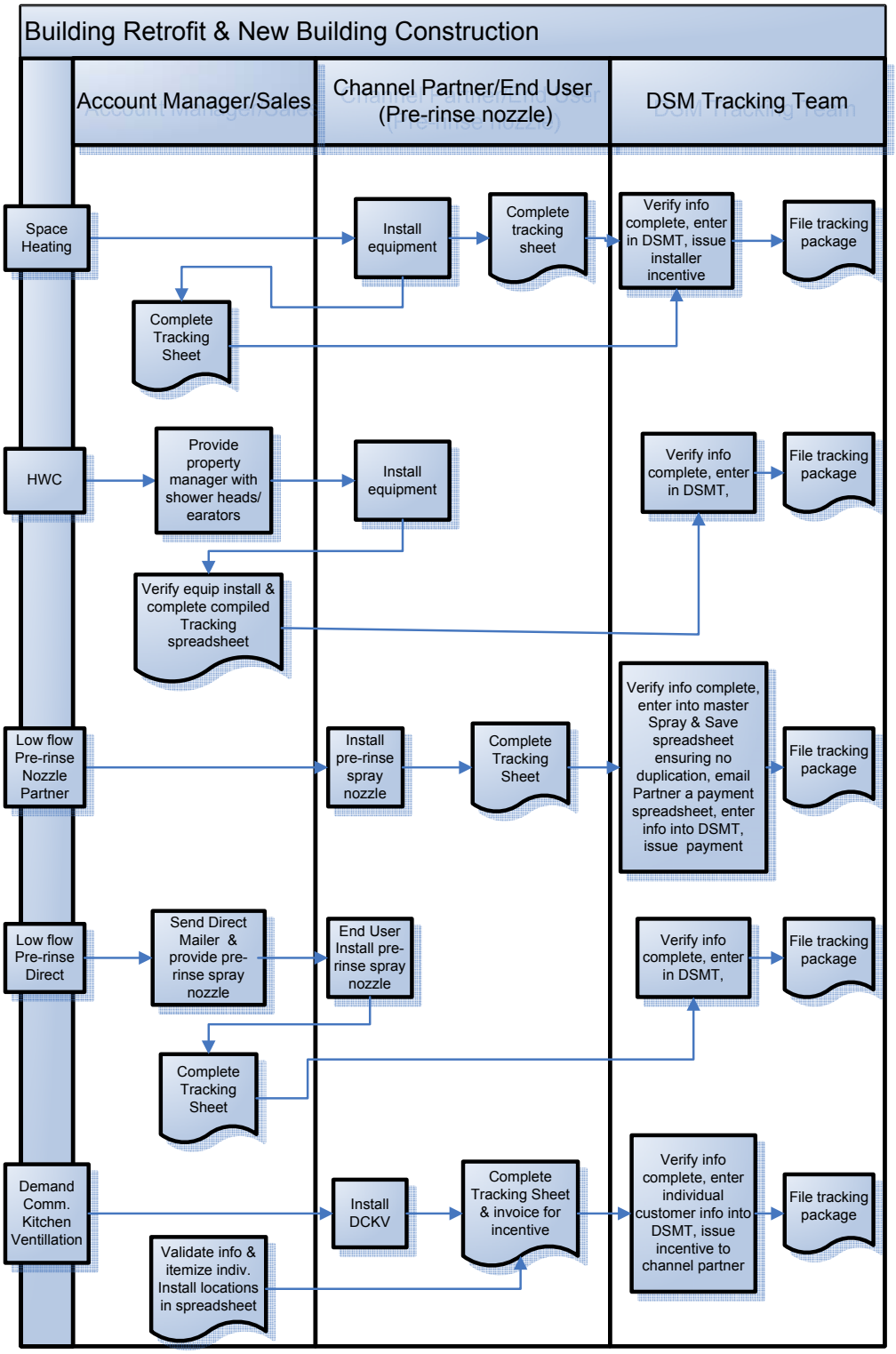
Program		Measure	Participants	Net Benefits Per Unit (m3)	Net Natural Gas Savings (m3)
New Home Construction		Energy Star for New Homes	1,343	-	-
		Total New Home Construction	**1,343**		**-**
Home Retrofit	ESK	RAM CP Install-Faucet Aerator-Bath	1,403	4	5,640
		RAM CP Install-Faucet Aerator-Kitchen	1,403	15	21,620
		RAM CP Install-Pipe Insulation - 2 m	1,403	17	24,244
		RAM CP Install-Showerhead - 1.25gpm	1,403	57	79,550
	ESK	3rd Party Install-Faucet Aerator-Bath	111	4	446
		3rd Party Install-Faucet Aerator-Kitchen	111	15	1,711
		3rd Party Install-Pipe Insulation - 2 m	111	17	1,918
		3rd Party Install-Shead-1.25 exist 2.0	8	57	454
		3rd Party Install-Shead-1.25 exist 2.1-2.5	22	57	1,247
		3rd Party Install-Shead-1.25 exist 2.6+	81	57	4,593
	ESK	HD/SB/Cust Initiated-Faucet Aerator-Bath	49,143	3	123,432
		HD/SB/Cust Initiated-Faucet Aerator-Kitchen	49,143	12	592,204
		HD/SB/Cust Initiated-Pipe Insulation - 2 m	49,143	12	605,303
		HD/SB/Cust Initiated-Showerhead - 1.25 gpm	47,123	42	1,979,859
		HD/SB/Cust Initiated-Showerhead - 1.5 gpm	2,020	31	61,968
	ESK	RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Bath	46,095	2	78,383
		RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Kitchen	46,095	9	410,922
		RAM CP/RAM Event/3rd Party Dist-Pipe Insulation - 2 m	46,095	13	577,637
		RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.25 gpm	31,696	38	1,197,630
		RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.5 gpm	14,337	28	395,543
		Furnace - High Efficiency	8,407	39	323,670
		Thermostat - Programmable	9,296	26	237,865
		Total Home Retrofit	**404,649**		**6,725,838**
Low Income	ESK	HHC-Faucet Aerator-Bath	7,694	6	45,702
		HHC-Faucet Aerator-Kitchen	7,694	23	175,192
		HHC-Pipe Insulation - 2 m	7,291	18	129,926
		HHC-Showerhead-1.25 gpm existing 2.0	537	62	33,493
		HHC-Showerhead-1.25 gpm existing 2.1 to 2.5	2,219	62	138,399
		HHC-Showerhead-1.25 gpm existing 2.6+	5,132	62	320,083
		Thermostat - Programmable - HHC	5,132	52	269,276
		Total Low Income	**35,699**		**1,112,071**
New Building Construction		Condensing Boiler	40		271,218
		Custom Agriculture Comm Weather	4		106,571
		Custom Application	104		3,588,437
		DCKV Dinner House (10000 - 15000 cfm)	1	17,978	17,978
		DCKV Fast Casual (< 5000 cfm)	5	4,561	22,805
		DCKV Full Menu (5000 - 9999 cfm)	3	10,912	32,735
		ERV	43		425,513
		Infrared Heating	342		394,875
		HRV	10		17,253
		Rooftop Unit	199	242	48,208
		Total New Building Construction	**751**		**4,925,592**
Building Retrofit		Condensing Boiler	278		2,273,627
		Custom Application	112		491,588
		Custom Multifamily Retrofit	102		407,662
		DCKV Dinner House (10000 - 15000 cfm)	2	17,978	35,956
		DCKV Fast Casual (< 5000 cfm)	1	4,561	4,561
		DCKV Full Menu (5000 - 9999 cfm)	8	10,912	87,294
		ERV	148		520,362
		Furnace - High Efficiency	117	376	44,036
		Furnace Enhanced (up to 299 Mbtu/h) - NG	23	-	-
		HRV	40		58,289
		HWC:ESK/MFP/SHP-Faucet Aerator-Bath	30,655	4	110,358
		HWC:ESK/MFP/SHP-Faucet Aerator-Kitchen	22,118	14	318,499
		HWC:ESK/MFP/SHP-Shower Head - 1.25 gpm	10,611	41	429,746
		HWC:ESK/MFP/SHP-Shower Head - 1.5 gpm	12,316	30	365,785
		Infrared Heating	589		656,576
		Pre-Rinse Low-Flow Spray Nozzle - FULL Service	1,722	776	1,336,506
		Pre-Rinse Low-Flow Spray Nozzle - LIMITED Service	800	166	133,152
		Pre-Rinse Low-Flow Spray Nozzle - OTHER	827	175	144,890
		Rooftop Unit	631	242	152,860
		Thermostat - Programmable (Warehouse, Industrial, Recreation, Agriculture)	742	430	319,357
		Thermostat - Programmable (Multifamily, Food Services) (LRAM)	346	178	61,726
		Thermostat - Programmable (Office, Institutional) (LRAM)	1,571	169	265,185
		Thermostat - Programmable (Retail, Hotels/Motels) (LRAM)	648	66	42,509
		Total Building Retrofit	**84,407**		**8,260,524**
Distribution Contract Markets		Custom Agriculture Ind Baseload	17		1,380,390
		Custom Application	172		39,447,761
		Total Distribution Contract Markets	**189**		**40,828,151**
		2008 DSM Total	**527,038**		**61,852,176**

Appendix E – 2008 TRC Results by Measure

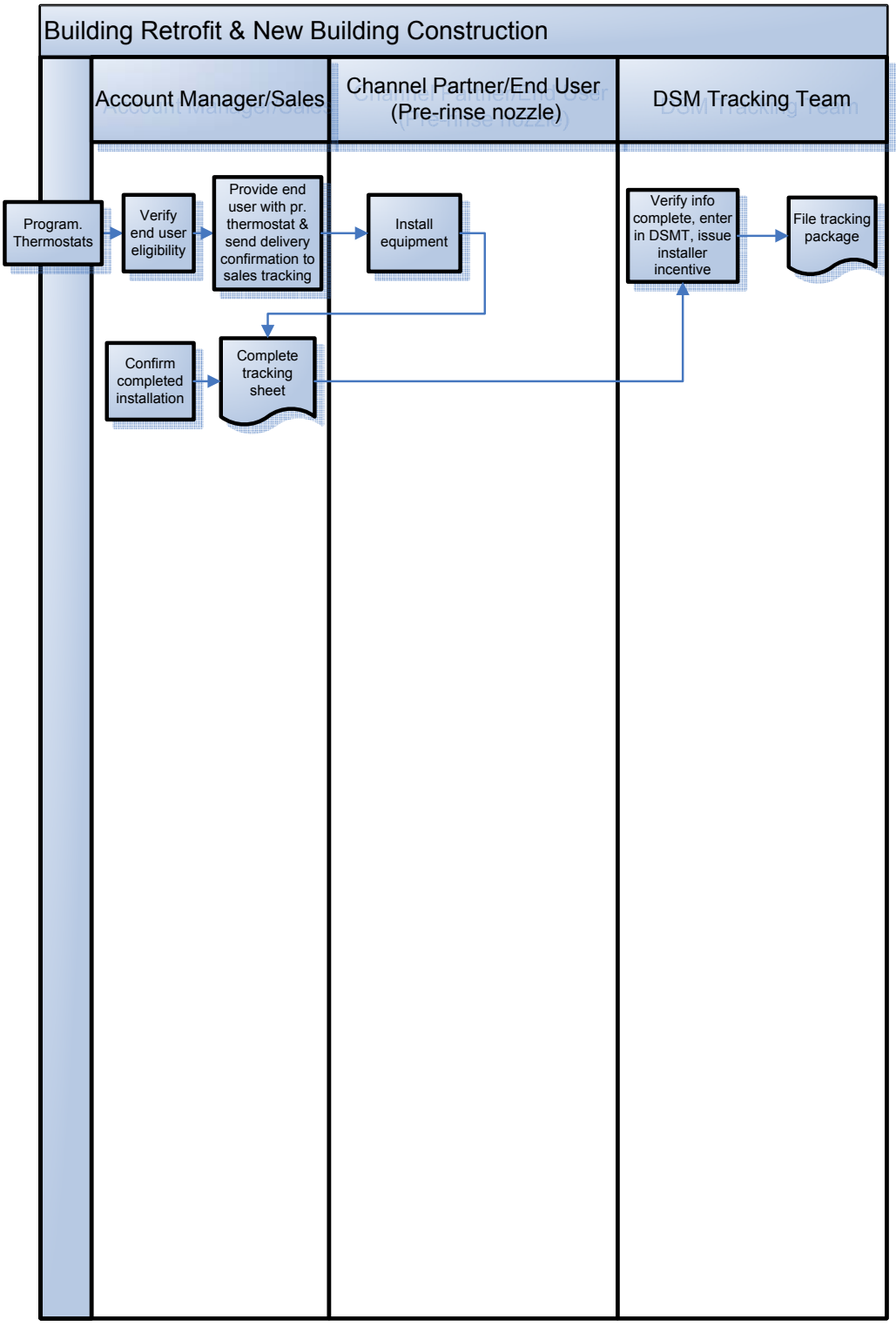
Program		Measure	Net m3 Savings Per Participant	Net Benefits Per Participant	Participants	Gross TRC	Program Costs	Net Program TRC
			(a)	(b)	(c)	(d) = (b) * (c)	(e)	(f) = (d) - (e)
New Home Construction		Energy Star for New Homes	967.10	$ 420.28	1,343	$ 564,435		
		Total New Home Construction			**1,343**	**$ 564,435**	**$ 118,386**	**$ 446,049**
Home Retrofit	ESK	RAM CP Install-Faucet Aerator-Bath	4.02	$ 25.44	1,403	35,698		
	ESK	RAM CP Install-Faucet Aerator-Kitchen	14.74	$ 98.24	1,403	137,825		
	ESK	RAM CP Install-Pipe Insulation - 2 m	16.32	$ 49.12	1,403	68,912		
	ESK	RAM CP Install-Showerhead - 1.25gpm	36.00	$ 191.36	1,403	268,480		
	ESK	3rd Party Install-Faucet Aerator-Bath	4.02	$ 25.44	111	$ 2,824		
	ESK	3rd Party Install-Faucet Aerator-Kitchen	14.74	$ 98.24	111	$ 10,904		
	ESK	3rd Party Install-Pipe Insulation - 2 m	16.32	$ 49.12	111	$ 5,452		
	ESK	3rd Party Install-Shead-1.25 exist 2.0	29.70	$ 156.31	8	$ 1,250		
	ESK	3rd Party Install-Shead-1.25 exist 2.1-2.5	42.30	$ 225.31	22	$ 4,957		
	ESK	3rd Party Install-Shead-1.25 exist 2.6+	61.20	$ 327.17	81	$ 26,501		
	ESK	HD/SB/Cust Initiated-Faucet Aerator-Bath	2.51	$ 15.65	49,143	$ 768,887		
	ESK	HD/SB/Cust Initiated-Faucet Aerator-Kitchen	11.53	$ 76.53	49,143	$ 3,760,826		
	ESK	HD/SB/Cust Initiated-Pipe Insulation - 2 m	11.63	$ 34.74	49,143	$ 1,706,990		
	ESK	HD/SB/Cust Initiated-Showerhead - 1.25 gpm	26.68	$ 148.20	47,123	$ 6,983,736		
	ESK	HD/SB/Cust Initiated-Showerhead - 1.5 gpm	14.67	$ 84.09	2,020	$ 169,868		
	ESK	RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Bath	1.70	$ 10.38	46,095	$ 478,288		
	ESK	RAM CP/RAM Event/3rd Party Dist-Faucet Aerator-Kitchen	8.53	$ 56.26	46,095	$ 2,593,514		
	ESK	RAM CP/RAM Event/3rd Party Dist-Pipe Insulation - 2 m	11.84	$ 35.36	46,095	$ 1,629,740		
	ESK	RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.25 gpm	23.99	$ 132.92	31,696	$ 4,213,020		
	ESK	RAM CP/RAM Event/3rd Party Dist-Showerhead - 1.5 gpm	13.19	$ 75.26	14,337	$ 1,079,067		
		Furnace - High Efficiency	69.30	$ 114.52	8,407	$ 962,764		
		Thermostat - Programmable	73.38	$ 204.69	9,296	$ 1,902,811		
		Total Home Retrofit			**404,649**	**$ 26,812,314**	**$ 1,309,118**	**$ 25,503,196**
Low Income	ESK	HHC-Faucet Aerator-Bath	5.94	$ 37.60	7,694	$ 289,264		
	ESK	HHC-Faucet Aerator-Kitchen	21.78	$ 145.15	7,694	$ 1,116,817		
	ESK	HHC-Pipe Insulation - 2 m	16.83	$ 47.68	7,291	$ 347,652		
	ESK	HHC-Showerhead-1.25 gpm existing 2.0	32.67	$ 171.94	537	$ 92,332		
	ESK	HHC-Showerhead-1.25 gpm existing 2.1 to 2.5	46.53	$ 247.84	2,219	$ 549,966		
	ESK	HHC-Showerhead-1.25 gpm existing 2.6+	67.32	$ 359.88	5,132	$ 1,846,925		
		Thermostat - Programmable - HHC	150.48	$ 428.68	5,132	$ 2,199,974		
		Total Low Income			**35,699**	**$ 6,442,930**	**$ 494,058**	**$ 5,948,872**
New Building Construction		Condensing Boiler			40	$ 776,901		
		Custom Agriculture Comm Weather			4	$ 247,751		
		Custom Application			104	$ 12,190,570		
		DCKV Dinner House (10000 - 15000 cfm)	10,364.50	$ 53,037.09	1	$ 53,037		
		DCKV Fast Casual (< 5000 cfm)	3,477.00	$ 12,972.67	5	$ 64,863		
		DCKV Full Menu (5000 - 9999 cfm)	5,662.00	$ 27,890.02	3	$ 83,670		
		ERV			43	$ 852,793		
		Infrared Heating			342	$ 1,088,764		
		HRV			10	$ 31,289		
		Rooftop Unit	1,211.25	$ 3,048.18	199	$ 606,588		
		Total New Building Construction			**751**	**15,996,225**	**$ 115,465**	**$ 15,880,760**
Building Retrofit		Condensing Boiler			278	$ 6,499,127		
		Custom Application			112	$ 2,417,532		
		Custom Multifamily Retrofit			102	$ 2,171,478		
		DCKV Dinner House (10000 - 15000 cfm)	16,582.25	$ 75,238.19	2	$ 150,476		
		DCKV Fast Casual (< 5000 cfm)	3,477.00	$ 13,041.94	1	$ 13,042		
		DCKV Full Menu (5000 - 9999 cfm)	9,058.25	$ 40,016.67	8	$ 320,133		
		ERV			148	$ 971,687		
		Furnace - High Efficiency	376.38	$ 724.42	117	$ 84,757		
		Furnace Enhanced (up to 299 Mbtu/h) - NG	321.30	$ 618.41	23	$ 14,223		
		HRV			40	$ 78,077		
		HWC:ESK/MFP/SHP-Faucet Aerator-Bath	5.40	$ 34.18	30,655	$ 1,047,735		
		HWC:ESK/MFP/SHP-Faucet Aerator-Kitchen	19.80	$ 131.96	22,118	$ 2,918,656		
		HWC:ESK/MFP/SHP-Shower Head - 1.25 gpm	36.00	$ 201.26	10,611	$ 2,135,584		
		HWC:ESK/MFP/SHP-Shower Head - 1.5 gpm	19.80	$ 114.74	12,316	$ 1,413,188		
		Infrared Heating			589	$ 1,640,767		
		Pre-Rinse Low-Flow Spray Nozzle	2,906.05	$ 7,921.01	3,349	$ 26,527,479		
		Rooftop Unit	1,211.25	$ 3,048.18	631	$ 1,923,401		
		Thermostat - Programmable	415.20	$ 1,749.29	3,307	$ 5,784,900		
		Total Building Retrofit			**84,407**	**56,112,244**	**$ 564,949**	**$ 55,547,295**
Distribution Contract Markets		Custom Agriculture Ind Baseload			17	$ 3,213,239		
		Custom Application			172	$ 163,696,990		
		Total Distribution Contract Markets			**189**	**$ 166,910,229**	**$ 663,760**	**$ 166,246,469**
		Total Market Transformation					**$ 346,516**	
		Total Program Results			**527,038**	**$ 272,838,376**	**$ 3,612,252**	**$ 269,226,124**
		Other Direct Program Costs					$ 4,771,905	
		Indirect Program Costs					$ 1,700,000	
		2008 Total Net TRC						**$ 262,754,219**

Appendix F – Program Tracking Flow Charts

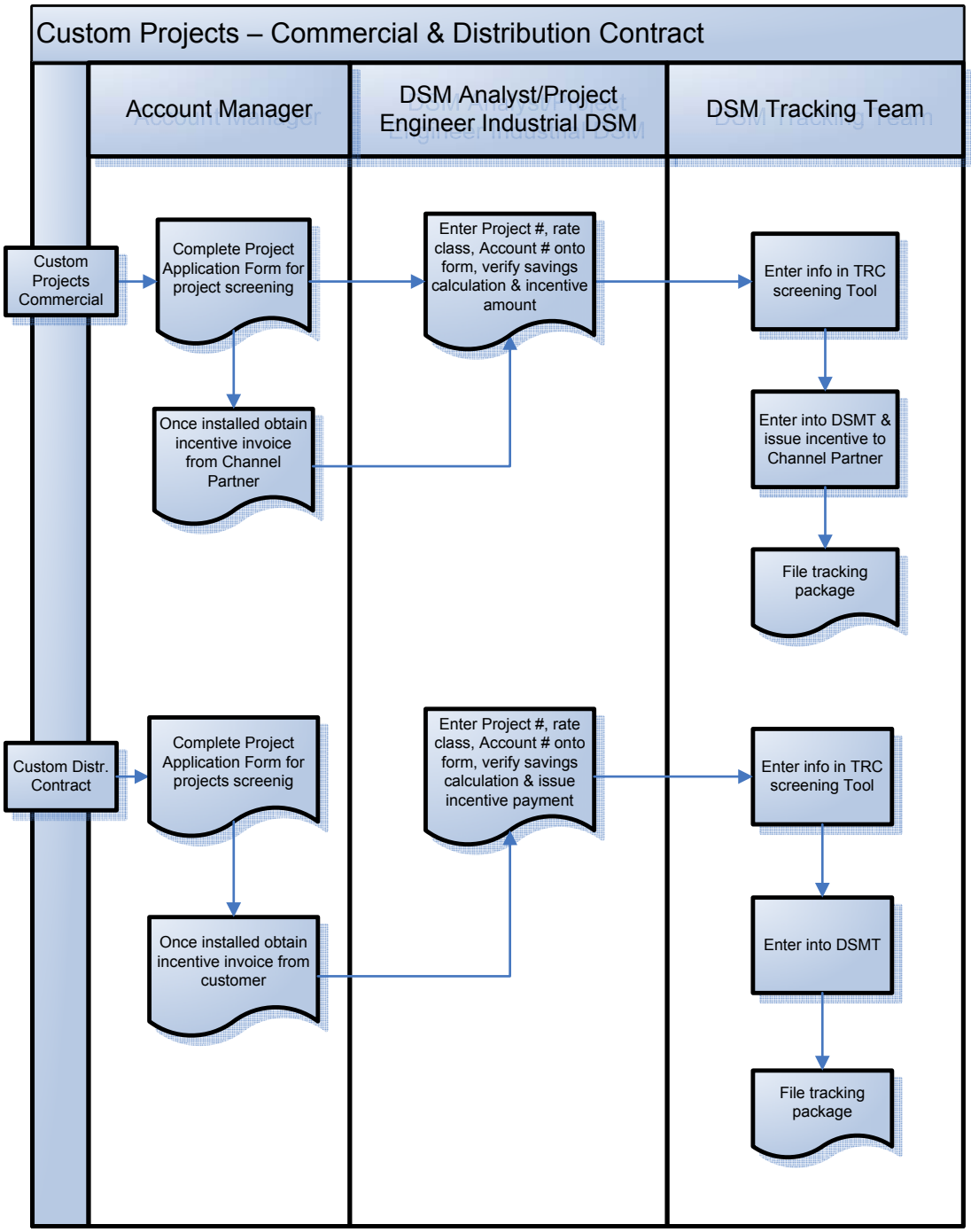




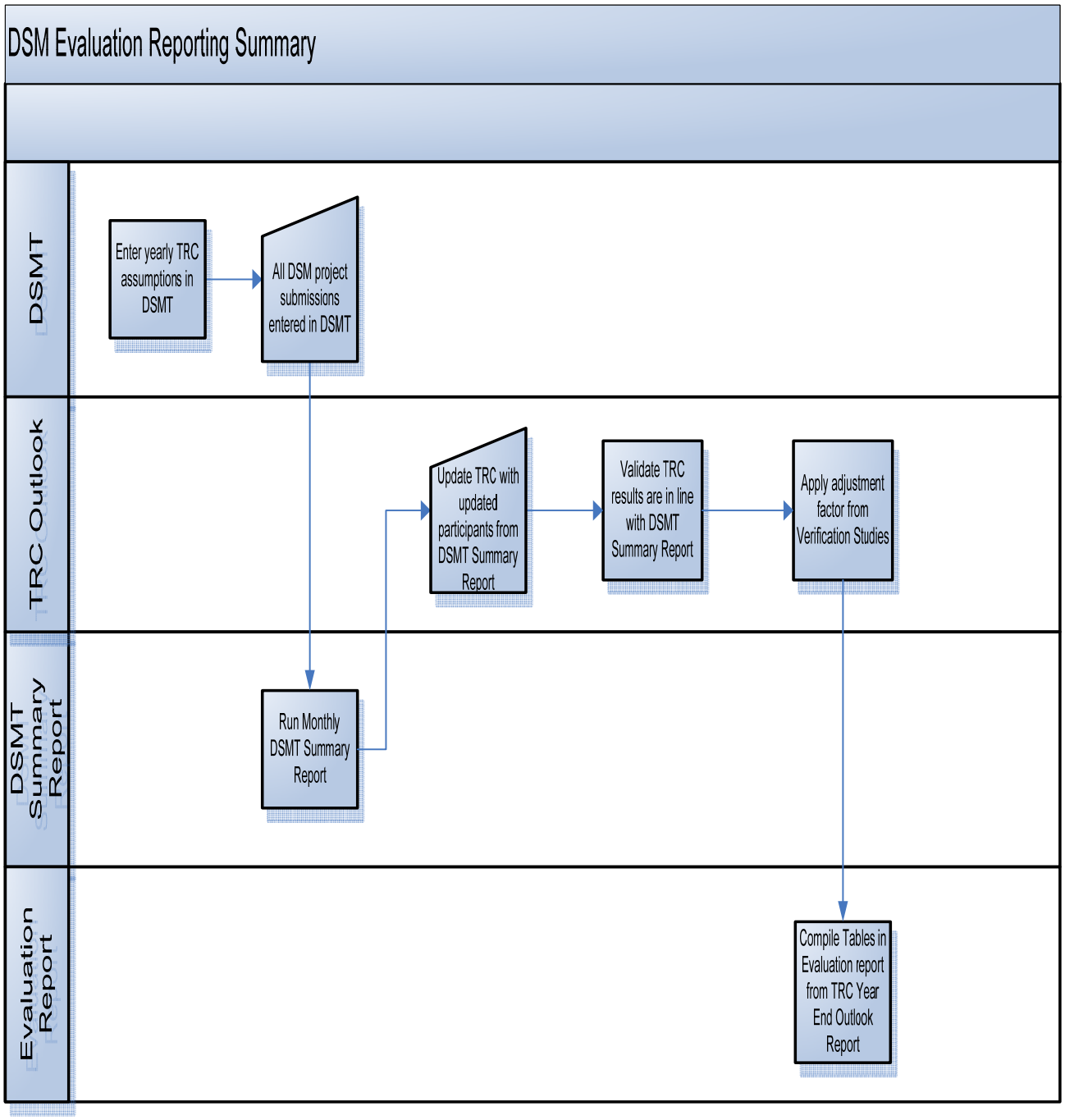
HWC – Commercial Hot Water Conservation Tracking Sheet, targeted at Multi-family & Social Housing



HWC – Commercial Hot Water Conservation Tracking Sheet, targeted at Multi-family & Social Housing



Feasibility studies & Boiler Audits are included in Custom Project Process


DSM Evaluation Reporting Summary
DSMT
TRC Outlook
DSMT Summary Report
Evaluation Report
Enter yearly TRC assumptions in DSMT
All DSM project submissions entered in DSMT
Update TRC with updated participants from DSMT Summary Report
Validate TRC results are in line with DSMT Summary Report
Apply adjustment factor from Verification Studies
Run Monthly DSMT Summary Report
Compile Tables in Evaluation report from TRC Year End Outlook Report

Appendix G – 2009 Avoided Costs

INFLATION FACTOR	1.9%
DISCOUNT RATE	10%

NATURAL GAS ENERGY SAVINGS RATES						
	Residential/Commercial				Industrial	
	Baseload		Weather Sensitive		Baseload	
Year	Rates	NPV	Rates	NPV	Rates	NPV
1	0.40779	0.40779	0.41476	0.41476	0.39155	0.39155
2	0.38171	0.75480	0.38662	0.76623	0.35645	0.71560
3	0.36214	1.05409	0.36571	1.06847	0.34198	0.99822
4	0.36902	1.33134	0.37266	1.34846	0.34848	1.26004
5	0.37603	1.58817	0.37974	1.60782	0.35510	1.50258
6	0.38318	1.82610	0.38695	1.84809	0.36185	1.72725
7	0.39046	2.04650	0.39431	2.07067	0.36872	1.93539
8	0.39788	2.25067	0.40180	2.27685	0.37573	2.12819
9	0.40544	2.43981	0.40943	2.46786	0.38287	2.30680
10	0.41314	2.61502	0.41721	2.64479	0.39014	2.47226
11	0.42099	2.77733	0.42514	2.80870	0.39755	2.62554
12	0.42899	2.92769	0.43322	2.96054	0.40511	2.76752
13	0.43714	3.06697	0.44145	3.10120	0.41280	2.89905
14	0.44544	3.19600	0.44983	3.23150	0.42065	3.02090
15	0.45391	3.31553	0.45838	3.35221	0.42864	3.13377
16	0.46253	3.42626	0.46709	3.46403	0.43678	3.23834
17	0.47132	3.52883	0.47597	3.56761	0.44508	3.33520
18	0.48027	3.62385	0.48501	3.66357	0.45354	3.42493
19	0.48940	3.71187	0.49422	3.75246	0.46215	3.50805
20	0.49870	3.79341	0.50361	3.83480	0.47094	3.58505
21	0.50817	3.86895	0.51318	3.91108	0.47988	3.65638
22	0.51783	3.93893	0.52293	3.98175	0.48900	3.72246
23	0.52767	4.00375	0.53287	4.04721	0.49829	3.78368
24	0.53769	4.06380	0.54299	4.10785	0.50776	3.84038
25	0.54791	4.11942	0.55331	4.16402	0.51741	3.89291
26	0.55832	4.17095	0.56382	4.21606	0.52724	3.94158
27	0.56893	4.21869	0.57454	4.26427	0.53726	3.98665
28	0.57974	4.26291	0.58545	4.30893	0.54746	4.02841
29	0.59075	4.30387	0.59658	4.35030	0.55787	4.06710
30	0.60198	4.34182	0.60791	4.38862	0.56846	4.10293

WATER AND ELECTRICITY SAVINGS RATES				
	Residential/Commercial/Industrial			
	Water Rates		Electricity Rates	
Year	Rates	NPV	Rates	NPV
1	1.755	1.755	0.078	0.078
2	1.788	3.380	0.080	0.151
3	1.822	4.886	0.081	0.218
4	1.857	6.281	0.083	0.281
5	1.892	7.574	0.085	0.339
6	1.928	8.771	0.086	0.392
7	1.965	9.880	0.088	0.442
8	2.002	10.907	0.090	0.488
9	2.040	11.859	0.091	0.530
10	2.079	12.740	0.093	0.570
11	2.118	13.557	0.095	0.606
12	2.159	14.314	0.097	0.640
13	2.200	15.014	0.098	0.671
14	2.241	15.664	0.100	0.700
15	2.284	16.265	0.102	0.727
16	2.327	16.822	0.104	0.752
17	2.372	17.338	0.106	0.775
18	2.417	17.816	0.108	0.797
19	2.462	18.259	0.110	0.816
20	2.509	18.670	0.112	0.835
21	2.557	19.050	0.114	0.852
22	2.606	19.402	0.116	0.868
23	2.655	19.728	0.119	0.882
24	2.705	20.030	0.121	0.896
25	2.757	20.310	0.123	0.908
26	2.809	20.569	0.126	0.920
27	2.863	20.809	0.128	0.930
28	2.917	21.032	0.130	0.940
29	2.972	21.238	0.133	0.950
30	3.029	21.429	0.135	0.958

Appendix H – Summit Blue Revised Sampling Methodology for Custom Project Verifications

Summit Blue was contracted to update the sampling method for the annual engineering review of custom DSM projects with large commercial and industrial (C&I) customers, which was developed earlier this year. The objective was to revise the method to address issues encountered as part of the 2007 project reviews and comments from the independent auditors for both Enbridge and Union Gas 2007 results. These issues included the following:

1. Overall, adjust the strata sizes to meet practical challenges in field applications, e.g., census samples for the largest projects.

2. Develop an approach that considers the significance of water and electricity savings.

3. Revise the sampling method to:

    a. Accommodate the recommendation to schedule two sample assessment periods per year in order to move towards more "real time evaluation," and

    b. Allow for more cost-effective evaluations to be conducted.

The approach presented in this Memorandum addresses the issues listed above and takes into account practical issues related to the time needed to perform verifications of Custom C&I projects as well as the high cost of verifying these projects. This results in the need to balance select sample design factors while still providing the confidence in estimated TRC benefits needed by the Ontario Energy Board (OEB) and the Evaluation and Audit Sub Committee (EAC).

The approach presented below represents a general method that can be applied in subsequent years. The exact number of projects selected for a given strata in the commercial sector may change if the sampling frame for that sample strata in a particular year does not have an adequate number of projects. In this case, strata can be combined or small changes in the sample sizes for each stratum can be made. The utility would look at the distribution of projects by sector each year and apply the practical considerations outlined in this Memorandum. These practical considerations include the number of projects in the segment, the size of the segment savings, and the similarity of projects across segments. The concept underlying this approach should be applicable in future verification studies as long as the overall distribution of projects is roughly the same and the water TRC benefits remain relatively small.

The following are not changed from the previous 2007 general sampling method:

1. Continue to meet OEB requirements that "*the projects selected for assessment should consist of a random selection of 10% of the large custom projects representing at least 10% of the total volume savings for all custom projects and consist of a minimum number of five projects*."[5]

2. Stratify by industrial and commercial projects and by size as well as by significant commercial segments to reduce the variance within samples and help ensure a representative sample of the population given the sample sizes used in the verification.

3. A continued focus on projects with meaningful TRC values and savings. Projects that account for 92% of 2008 year-to-date TRC benefits for Enbridge Gas and 98% for Union Gas are included in the sampling frame[6]. There are a large number of smaller projects each providing a small

[5] EB-2006-0021, Decision with Reasons, Ontario Energy Board, page 45-46.

[6] The vast majority of the TRC benefits come from the largest two thirds of the projects. For this method, the smallest one-third of the projects were not included in the sample frame due to their small size and small contribution to TRC benefits as compared to the cost of performing site verifications. 92% of Enbridge TRC benefits are derived from the 2/3 of the projects and 98% of Union TRC benefits.

contribution to TRC benefits. The cost of verifying these small projects outweighs the benefits of the information provided to the OEB and EAC. This approach results in cost-effective evaluation that efficiently uses ratepayer monies.

The following are changes from the previous 2007 sampling method:

1) The source of TRC benefits is considered in the sampling approach; the TRC benefits result from natural gas savings, electric savings, and water savings. The EAC raised the issue that past verification efforts have focused on verifying gas savings and these procedures have been well established. The smaller TRC benefits from electric and water savings recently included in gas utility total TRC benefits have not been examined as closely and may deserve more attention in terms of procedures used and confidence in these methods.

   It is important to acknowledge that each separate question asked of a set of data requires more information. For example, developing separate samples to address gas TRC benefits, electric TRC benefits, and water TRC benefits could double or even triple the sample size needed to meet the OEB requirements. The cost of C&I custom verification for each sampled project is quite high, and the costs of the entire evaluation would be greatly increased. To achieve the objective while still maintaining a balance between the costs and benefits of verified savings, dual samples were drawn based on TRC benefits of gas and TRC benefits of electricity. The TRC benefits of water were less than 1% of total 2008 year-to-date TRC benefits for Union Gas as further described in 2) below.

2) Addressing two questions rather than just one question—verified gas and verified electricity TRC benefits rather than just verified gas TRC benefits—requires a slightly larger overall sample. Fortunately, every site sampled for electricity TRC verification also has gas savings which provides a data point for gas savings verification. This allows for a leveraged approach to address these two estimation questions. However, a sample selected to address just gas TRC savings, as was done in preceding years, would be more efficient at addressing that question. As a result, a larger sample is needed to address both questions, i.e., verified gas savings and verified electric savings. The recognition that each sample point drawn for estimating electric TRC verification also gives us a gas estimate that can be verified allows for a smaller overall verification sample than would have been required if samples were selected independently – one sample to address only gas benefits and a second sample designed to address only electric benefits. While not a change from 2007, TRC benefits from project water savings were not included in this sample design as they account for less than 1% of overall TRC benefits for the first three quarters of 2008. The costs of project verification do not seem to warrant verifying water savings at this time. Even if estimated water savings were off by 50%, this would only result in a 0.5% error in total benefits. Incorporating the water savings into a joint sampling approach would have increased the sample size by approximately one third, which would greatly increase the cost of verification and provide limited additional information to the OEB and EAC. It was judged to not be a good use of ratepayer funds as part of the verification effort.

   [NOTE: Union Gas is completing one large project that will provide significant TRC benefits from water savings, and this project will be included in the sample as an extra sample point. The benefits from this project are expected to represent at least 90% of all water TRC benefits so the verification of this project results for water savings would be expected to provide a high level of confidence in overall water savings.]

   If TRC benefits from water savings increase substantially in the future, then this approach—that only verifies water savings if these savings happen to occur in conjunction with sampled gas and electric savings within the joint-sample—might need to be modified.[7]

[7] In 2007, Enbridge annual NPV benefits from water savings were also less than 1% and although Union Gas had 7% of TRC benefits from water savings with one project accounting for 40% of water NPV benefits.

3) The sample for the industrial sector will continue to be stratified based on size of projects. The difference is that a sample of projects will be randomly selected from the largest six projects based on TRC benefits from gas savings and another sample of projects will be randomly selected from the six largest projects based on TRC benefits from electricity savings. In the first three quarters of 2008, Enbridge had five industrial projects with electricity savings; Union had six. Therefore the sample from the remaining projects will be selected based on gas TRC benefits.

4) The development of the joint electric and gas sample for the Commercial Sector for both Enbridge Gas and Union Gas is more complex. As noted earlier, the strata and sample is designed to assess the confidence in electricity savings as well as gas savings within different segments. A decision was made to trade-off a more accurate assessment of gas savings since the EAC has expressed confidence in the ability of the utilities to estimate gas savings.

5) The following process is used to select the samples within each segment:

   a) In all samples for each segment first select from the larger projects based only on electricity TRC benefits.

   b) If there are not enough electric projects to fill out that strata, the remaining selected projects for each segment are based on gas TRC benefits that fit the strata definitions.

6) Another change from the 2007 sample method is that there is no stratum that has as its target sample a census of projects to be selected. In all cases, the Sampling Frame for the projects in a stratum exceeds the number of projects to be sampled. The reason for this change is to avoid confusion about the meaning of a "census" target. A census target approach to sampling within a stratum (as done in 2007) is done to increase the precision of a stratified sample by eliminating the variances around the mean of that stratum. If not all points can be sampled in a stratum the variance would be greater than zero but the sampling method would still be sound, given that the sample is based on random selection principles.

Tables 1 and 2 present this sampling approach for each sector. [Note: Depending upon the actual number of projects within a given strata definition, there may be a need to combine strata if the total number of projects is too small to allow for appropriate sampling within that strata.]

Table 1. General Sampling Approach for the Industrial Projects for Each Utility

Stratum	Random Sample
I1.Strata Sampling Frame: Top 6 projects based on benefits from gas savings	3
I2.Strata Sampling Frame: Top 6 projects based on benefits from electricity savings	3
I3.Strata Sampling Frame: Remaining industrial projects (select from sample remaining projects with gas benefits)	3
I4.Strata Sampling Frame: Remaining industrial projects (select sample from remaining projects with electricity benefits)	3

Table 2. General Sampling Approach for Commercial Projects for Each Utility

[All commercial projects are first selected based on Electric TRC Benefits; then, each stratum is filled out with gas projects that fit that strata definition]

Segment	Stratum	Random Sample
New Construction (NC)	NC-1. Strata Sampling Frame: 6 Largest NC Projects	3
	NC-2. Strata Sampling Frame: Remaining NC Projects	4
Building Renovation (BR)	BR-1. Strata Sampling Frame: 6 Largest BR Projects	3
	BR-2. Strata Sampling Frame: Remaining BR Projects	4
Multi-Residential (MR)	MR-1. Strata Sampling Frame: 4 largest MR Projects	2
	MR-2. Strata Sampling Frame: Remaining MR Projects	4
Other Sectors (e.g., Agriculture)	All projects	3
TOTAL		**23**

This joint sampling method yields a total sample of 12 Industrial projects (compared to 10 in 2007) and 23 Commercial projects for verification (compared to 20 projects in 2007). Of these projects in the sample, all would have estimated gas TRC benefits that would be used to estimate the gas TRC Standard Error of the ratio estimate, i.e. Realization Rate, and confidence interval around that value. The resulting sample of electricity projects would have electricity savings that would be used to estimate the same values for that fuel source. The total sample would be 35 projects compared to 30 projects in the 2007 verification.

This sample design was tested against data from 2007 and produced a 90% confidence and +/- 15% precision around the estimate of gas TRC benefits. The direct calculation around estimated electricity TRC benefits would have required additional data and database manipulation.[8] It is expected that the estimated Realization Rates for gas TRC benefits and electric TRC benefits will differ; however, the confidence with which these are estimated should be similar based on the quality of the verification efforts used by Enbridge and Union. The implication is that the Standard Error for both estimates would be approximately the same, particularly when the finite population correction factor[9] is used for electricity project samples that represent a large fraction of all electricity projects within that stratum. If the Standard Error of the Realization Rate can be assumed to be roughly the same for gas and electricity from this sample—and there is every reason to think that they would be the same—then

[8] This information could be provided, but would require project electric TRC benefits which would have meant additional database work to conduct a cross-check. It was not believed this additional work was needed as it is assumed the Standard Error for electric savings Standard Error of the ratio estimate (realization rate) would be similar and thus the confidence and precision (which are a function of the standard error) would be similar. Although the standard deviation and sample size will differ for gas and electric savings, the standard error is of approximately the same magnitude.

[9] The finite population correction factor measures how much extra precision we achieve when the sample size becomes close to the population size.

the proposed method to draw the sample should produce approximately 90% confidence +/- 15% precision intervals for both gas and electric TRC estimates.

One issue facing the utilities in performing the verification effort is the length of time needed to conduct the study of each selected project. To address this, the sample is drawn in two steps to allow more calendar time for the actual verification work. This first step is to draw a random sample of 6 industrial and 11 or 12 commercial projects. Since a large proportion of projects and savings are installed in the fourth quarter of every year, it is recommended that the first sample be selected from projects installed in the first three quarters of the year and the second sample be drawn from all projects, except those selected in the first wave. This approach also has the advantage of helping ensure that the sample is not only representative in terms of size of projects and commercial segment in which they occurred, but also in terms of when the projects were conducted throughout the year. This two-step approach should allow for better overall results by allowing both utilities the calendar time needed to perform the verification work.

In conclusion, this approach was developed based on a review of the 2007 project data along with all the 2008 data that are available. A number of sampling approaches were considered, and this was viewed as the most appropriate approach given the objectives of the verification effort. As long as the data retain roughly the same distribution of projects in terms of size, this general approach should provide data adequate for the verification in future years as well as for 2008.

Appendix I – Free-ridership and Spillover Pre-rinse Spray Nozzles (PA Consulting Group Final Report, November 26, 2008)

Executive Summary

1.1 STUDY OBJECTIVES

PA Consulting Group was contracted to conduct a study to update the value for free-ridership and provide a value for spillover for the 1.24 gpm pre-rinse spray nozzle prescriptive measure that are sufficiently "robust and well-substantiated" to serve Union Gas for the balance of the current multi-year DSM plan and into the next multi-year DSM plan.

1.2 STUDY METHODOLOGY

The study used primary and secondary research methodologies to conduct quantitative and qualitative assessments of free-ridership and spillover for the pre-rinse spray nozzles delivered by the ESP. This report will document our approach to the following tasks:

- Primary data collection with participants
- Primary data collection with market actors
- Literature review.

The central quantitative approach was carried out with telephone surveys with ESP participants. This survey research is summarized below.

1.2.1 Participant telephone survey

The participant survey asked a number of questions to address receipt and installation of the low-flow pre-rinse spray nozzle(s), satisfaction with the nozzle(s), free-ridership and spillover, and firm characteristics. Prior to telephoning participants, PA mailed an advance letter on Union Gas letterhead that explained the purpose of the study and asked for their cooperation in completing an upcoming telephone survey. The letter also provided a toll-free number that participants could call to complete the survey at their convenience.

Cooperation was very high, with 68 percent of sampled respondents agreeing to respond to the telephone survey. The average interview length was eleven minutes.

1.2.2 Market actor survey

Between September 29, 2008, and October 10, 2008, PA staff attempted to contact twenty-seven different food service equipment distributors, dealers and suppliers that were identified as supply chain market actors for pre-rinse spray nozzles. The list was created by Energy Profiles Ltd. In addition to the supplied list, one service company was contacted and interviewed as a reference obtained during another interview.

PA completed seven in-depth interviews and also verified that five of the organizations on the Energy Profiles Ltd. list did not distribute pre-rinse spray nozzles. Two organizations refused to be interviewed. PA was unable to complete interviews with the remaining organizations despite

the use of multiple attempts over different weeks.

1.2.3 Literature review

The focus of the literature review was to gather information on other similar studies of pre-rinse spray nozzles as a food service sector Demand Side Management (DSM) measure. Specifically, we searched for particular study results for measure-specific free-ridership and spillover rates for this technology. PA researched numerous relevant secondary resources as identified in the Free-ridership & Spillover for (Low-flow) Pre-rinse Spray Nozzles Detailed Research Methodology report (submitted to Union Gas) to identify research studies for low-flow pre-rinse spray nozzles.

1.3 OVERALL PARTICIPANT FREE-RIDERSHIP ESTIMATES

The overall program free-ridership found in this study was 12.4 percent (Table 1-1). This estimated free-ridership rate is in line with the estimates provided by the market actors who were interviewed for the study, who suggested a range of 5 percent to 30 percent.

Table 1-1: Free-ridership Rate

Free-ridership Rate	Unweighted Count	Confidence Interval
12.4%	160	+/-5% at the 95% confidence level

The estimated free-ridership rate found in this study is fairly low. Until prices decrease and availability increases, it appears that the ESP direct install, no-cost promotion of the pre-rinse spray nozzles will generate strong net energy savings, with rather low free-ridership rates. Contributing to this are the low operating margins typically experienced in the food service sector, which makes even moderate incremental costs for higher efficiency an important barrier to adoption.

1.4 OVERALL "LIKE" PARTICIPANT SPILLOVER ESTIMATES

"Like" spillover examined the percentage of low-flow pre-rinse spray nozzles installed by participants on their own (no program assistance) because of their experience with the free nozzle they received. The "like" spillover rate is very low at approximately three percent. This is not unusual given that the study survey was conducted relatively soon after customers received spray nozzles through the program. The hope is that as customers gather more familiarity with the low-flow nozzles their inclination to purchase and install additional nozzles on their own increases. However, this inclination will necessarily be bounded by the number of pre-rinse spray nozzles used in their facility.

Appendix J – Deemed Savings for Pre-Rinse Spray Nozzles Energy Profiles Limited, Final Report January 30, 2009

Executive Summary

1.0 Introduction

Union Gas requested a study that would provide updated values for deemed savings for their current 1.24 USgpm PRSV, and a potential future 0.64 USgpm version of the Pre-Rinse Spray Nozzle measure. The study was required to produce savings results that reflected the delivery methods for the measures, and that were robust and well substantiated, requiring both a comprehensive literature review, and field research to generate primary data.

Energy Profiles Limited (EPL) undertook this project to provide Union with deemed savings for their PRSV program, including the literature review and field research.

2.0 STUDY METHODOLOGY

Task 1: Literature Review

EPL undertook a comprehensive literature review along with other secondary research to understand the current North American context and existing savings studies.

Task 2: Factors Evaluated from the Literature Review

EPL used information from the literature review to quantify the daily and annual duration of use of both the commonly used spray valve (3.0 gpm) and the low-flow spray valve (1.24 gpm) under measured site conditions.. The results were correlated with a categorization of types of food service operations from the Union Gas database of food service operations in its franchise territory, supported by the proportion of food service operations in Ontario as provided by the Canadian Restaurant and Food Service Association (CRFSA), in order to develop a weighed average duration for the food service population.

Task 3: Field Research

In order to evaluate water pressure, temperature and water heater efficiency, EPL undertook a set of site visits across a sample of food service establishments in the Union Gas franchise territory to gather site information. These locations were either a participant in the spray valve program or a non-participant.

During these site visits, EPL recorded the following information:

- Type of food service operation
- Site water pressure
- Inlet and outlet water temperature for the hot water tank
- Type and rating of gas water heater
- Temperature of water supplied to the PRSV

A kit of equipment was assembled and calibrated by EPL. The information from the site visits was recorded and collated for use in the subsequent tasks. A total of 38 sites were surveyed.

Task 4: Calculation of Deemed Savings

The results of Task 2 provided a summary of water savings developed from the literature search in two forms, one using the categories defined by the Canadian Food Service and Restaurant Association (CFSRA) and also used by Statistics Canada (Statscan), and one used by Union.

The field research in ask 3 was used to adjust water savings by average pressure across the sites in each community. The temperature rise across the water heater and the make, model and rated efficiency of the heater were combined with estimates of total annual hot water consumption to determine the natural gas input required to heat a unit of hot water. The temperature of the water delivered to the PRSV was used to determine the proportion of hot water delivered to the PRSV. This was combined with the unit energy for heating hot water and the annual water consumption savings to determine the natural gas savings

3.0. Summary of Deemed Savings Results

The summary of deemed annual water and natural gas savings for a single PRSV for both a standard (1.24 USgpm) proposed PRSV (0.64 USgpm), as recommended by EPL is presented in Table 1-1.

Table 1-1: Summary of Deemed Savings

	Standard (1.24 Usgpm) PRSV		Proposed (0.64 Usgpm) PRSV	
Segment	**Annual Water Savings, m3/yr**	**Annual Gas Savings, m3/yr**	**Annual Water Savings, m3/yr**	**Annual Gas Savings, m3/yr**
Full Service Restaurants	182	931	252	1286
Limited Service Restaurants	55	278	66	339
Other	53	272	62	318

4.0 Conclusion

Water usage by the PRSV and therefore potential savings varies widely between types of food service establishments, with a ratio of about four to one between Full Dining and Limited Service establishments. EPL recommends that there be three separate values of water and gas savings, to be applied based on a report of the segment in which the valve is installed by the applicant or installer.

Appendix K – Boiler Base Case Efficiency Study
SeeLine Group, Final Report January 30, 2009

Study Objective

Union Gas Ltd. requested a study that would provide an estimate of boiler baseline efficiency levels in new and existing commercial buildings. This study was intended to update estimates originally developed as part of a larger study undertaken by Jacques Whitford Environment Ltd in 2000.[1] Two of the members of the original Jacques Whitford team participated in this study and SeeLine Group Ltd. (SLG) is pleased to present the following results in response to Union's request.

Methodology

The major activities undertaken included the following:

1. Review the current products offered by manufacturers by technology and efficiency range.
2. Review all available statistics on commercial boiler sales in Canada and the US.
3. Design and deliver a survey of manufacturers and distributors of commercial boilers in Ontario, and request market share information on boiler sales by efficiency in new and existing buildings, and estimates of the efficiency of the installed base of boilers in Ontario.
4. Determine market share by efficiency range, capacity, new & existing building, and boiler type (including condensing and non-condensing models) in Ontario.
5. Find the average boiler efficiency using the above market share information.
6. Describe a few representative boilers that match this base case efficiency.

Average Boiler Efficiency Market Share

For this task, SLG has used the product data collected in Task 1 and from the survey, and combined this with the manufacturers' estimated market share of sales by efficiency range for new construction and replacement to determine the average efficiency of boilers sold in Ontario. This also required two additional assumptions, neither of which is available on any basis from any source, one being commercial boiler market share by manufacturer (which CIPH does not have and therefore cannot divulge), and the other individual manufacturer or distributor market share by end-application – new construction or retrofit. Note that the manufacturers do not track where products are installed after shipment, thus making it impossible to delineate shares by market segment.

To improve the accuracy of the estimates and to ensure that the survey was comprehensive in terms of market participants, a comparison of the companies contacted in the survey and the list of reporting companies from CIPH was undertaken. On this basis, the survey was very comprehensive in terms of respondents, requiring very little adjustment to match the coverage of the CIPH data. From a review of the products offered by each reporting company and their geographic location, SLG was able to adjust the estimates of market share to recognize regional strength or weakness in the Ontario market.

From this information, SLG weighted the boiler shipments by the average efficiency level in each range to determine a single weighted average market. Approximately 62% of boilers shipped have efficiency levels of less than 85%; 17% have efficiency levels in the mid-range

category, and roughly 21% are above 90%. In the case of the high efficiency boilers, this represents a significant increase over the results provided in 2000 that indicated condensing boilers represented less than 5% of the market. The chart also shows that retrofit market is primarily driving the increase in market share of high efficiency boilers. It should be noted that this is based on an estimated market share provided by SLG.

The formula used to estimate weighted market share was calculated separately for each manufacturer, for each efficiency range, and for each end-use market (New Construction and Retrofit/Replacement), and is stated as follows:

> Weighted Market Share = Estimated Overall Market Share x Proportion of Sales by Efficiency Range x Proportion Sold to End-Use Market, where,

- Estimated Overall Market Share was taken from the SLG estimate prepared for this project;
- Proportion of Sales by Efficiency Range was taken from SLG survey results;
- Proportion of Sales to End-Use Market was taken from the SLG estimate prepared for this project.

This approach made full use of the information provided in the survey responses on energy efficiency range of shipments by end-use market. Preparation of the Overall Market Share, and the Proportion of Sales by Efficiency Range, were prepared by undertaking a careful review of the range of products offered and the geographic territory served, for each of the 10 manufacturers and distributors who participated in the SLG survey, as well as for the 26 manufacturers who participate in the CIPH survey. On this basis, 14 manufacturers from the CIPH list were allocated no market share, resulting in a very high degree of consistency between the two lists.

The estimated Market Share Weighted Efficiency of commercial boilers being sold for new construction is 84.3% thermal efficiency.

The estimated Market Share Weighted Efficiency of commercial boilers being sold for retrofit is 84.9% thermal efficiency.

Because of the necessity to provide estimates for market share by supplier, and supplier market share by end-use application, SLG estimates the accuracy of the market share weighted efficiency figures to be approximately ±8%.

In the preparation of these estimates, SLG did not consider the impact of Union Gas demand-side management (DSM) programs on the results. While there may be a methodology for estimating this impact, it would require collecting significant information from other sources, possibly including program participant surveys, and is beyond the scope of the project. The accuracy of such an estimate could not be determined without first proceeding with the preparation of the estimate, and then evaluating the quality and accuracy of the individual data sources.

SeeLine Group alternative estimate of the energy efficiency of <u>installed</u> base commercial capacity boilers

This estimate relies on the SLG project teams' combined experience and observations of the marketplace.

<u>Background</u>

1. Commercial capacity gas-fired boilers fall into the input capacity range from 300,000Btu/hr to 2,500,000Btu/hr. The upper limit of the range is not definitive, but is more generally defined by the boiler type.

2. The traditional method of testing and rating boilers is by combustion efficiency, defined as input into the boiler minus stack losses, divided by input to the boiler.

3. In the past 5 to 8 years, the industry has moved to publishing efficiency by both combustion efficiency and thermal efficiency. Thermal efficiency is defined as heat transferred into the water, divided by input to the boiler. It is always less than combustion efficiency, reflecting the addition of jacket losses to stack losses. The size of that gap would appear to vary by the type of technology.

4. To date, there are no commercial capacity boilers rated by seasonal efficiency. For the past 10 years, ASHRAE has been preparing a new performance test standard, ASHRAE Standard 155P, that will provide a method of rating boilers by seasonal efficiency. This will include a method of considering the impact of the system to which the boiler is attached on the seasonal efficiency rating. This will likely result in the rating being specific to a particular system type, and necessitate it being published in this way.

5. Any estimate of the efficiency of the installed base of commercial capacity boilers cannot be more than an educated guess for the following reasons:

- There is no valid estimate of the number of commercial and multi-unit residential buildings in Ontario.
- There is no valid estimate of the proportion of those buildings that have hot water heating.
- There is not valid estimate of the proportion of those buildings that have hot water heater.
- There is not valid estimate of the number and type of boilers installed in each building.
- There is no shipment data available for commercial capacity boilers for Ontario by efficiency category, or at all.
- There is no valid estimate of boiler service life in Ontario. SLG estimate that copper water tube boilers range from 15 to 25 years, and cast iron boilers can last 50years.ASHRAE provides some estimates based on surveys in the US, but these are generally not considered to be accurate for Canada

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6. Prior to the mid-1970s, commercial capacity boilers were supplied with a standard combustion efficiency of about 75%. It was widely presumed that the seasonal efficiency was generally much lower, in the range of 60 to 65%. The minimum combustion of standard efficiency boilers currently offered is 78%

From the mid-1970s when the first commercial capacity boilers with higher efficiency features (electronic pilot, vent damper) began to be offered until the present, boilers having higher combustion and/or thermal efficiency have been capturing a growing share of the commercial market. Nevertheless, this share remains well below 50%.

8. Because of a number of features on more efficient boilers boost combustion efficiency or thermal efficiency they also significantly reduce start up and shut down standby losses. It is a reasonable assumption that they have an even greater impact on the seasonal performance of the boiler.

Estimated Efficiency of Installed Base of Commercial Boilers:

1. SLG believes that the installed base of commercial capacity boilers continues to be a primary standard efficiency, with a combustion efficiency of 75% to 82%. Boilers of higher efficiency have been gaining market share. However, overall stock remains largely standard efficiency. A survey of manufacturers and suppliers resulted in an average estimate combustion efficiency of 79%.

2. Based on information published by Raypak, a major boiler manufacturers, jacket losses for atmospheric boilers range from 1 to 3%. Using their definition that:

> Thermal Efficiency = Combustion Efficiency minus jacket losses,
> The thermal efficiency of the installed base of commercial capacity boilers would be;
> 79% - 2% = 77%

This estimate offers a reasonable basis of comparison with a new commercial capacity boiler using the published thermal efficiency rating to determine probable energy savings.

Glossary

Adjustment Factor
An adjustment factor is the percentage of participants who install a measure and keep it installed. Adjustment factors are established through the interviewing of a random sample (statistically significant) of program participants conducted by a third party in order to validate measure installation. The adjustment factor is applied to an initiative's gross savings results

Avoided Costs
Avoided costs are a measurement of the reduction in the delivered costs of supplying resources (natural gas, electricity and water) to customers as a consequence of a program which reduces resource use by customers.

Base Case
A base case reflects a projection of the future without the effects of the utility's DSM program. "Base cases" are required for each and every DSM scenario, even those which are just a single technology or a single participant. The difference between the base case and the energy efficient case represents the saving attributable to the energy efficient measure.

Building Envelope
The building envelope refers to the exterior surfaces (such as walls, windows, roof and floor) of a building that separate the conditioned space from the outdoors.

Channel Partner
A Channel Partner is a company that in the course of its business can influence consumers to choose gas over competing fuels. Examples include appliance retailers, HVAC contractors, engineers, and architects.

Cost Effectiveness
Cost effectiveness refers to an analysis performed to determine whether the benefits of a project are greater than the costs. It is based on the net present value of savings over the equipment life of the measures.

Free Ridership
Free riders are program participants who would have installed the energy efficient measure without the influence of Union's DSM program. Free rider rates are estimated based on research, market penetration studies or through negotiations in prior evaluation processes. The free rider rates are applied to the gross program savings results to derive actual savings.

Incentive
An incentive is a transfer payment from the utility to participants aimed at encouraging participation in a DSM program.

Incremental Cost
The incremental cost is the difference in price between the efficient technology or measure and the base case technology. In some early retirements and retrofits, the full cost of the efficient technology is the incremental cost.

Lost Revenue Adjustment Mechanism (LRAM)
The LRAM is the Ontario Energy Board approved methodology which allows the utility to recover the lost distribution revenues associated with DSM activity. These lost revenues are calculated for each rate class impacted by DSM energy efficiency programs.

Net Present Value (NPV)
Net present value calculations rely on an discount rate to state, with a single number, what the value of a number of years of benefits are. The NPV then is the sum of the discounted yearly benefits arising from an investment over the life-time of that investment.

Net-to-Gross Ratio
Gross impacts are the program impacts prior to accounting for program attribution effects. Net impacts are the program impacts once program attribution effects have been accounted for. The net-to-gross ratio is defined as 1 - free ridership ratio + spillover ratio.

Ontario Energy Board (OEB)
A regulatory agency of the Ontario Government that is an independent, quasi-judicial tribunal created by the *Ontario Energy Board Act.* The Board has regulatory oversight of both natural gas and electricity matters in the province.

Participants
The units used by a utility to measure participation in its DSM programs; such units of measurement include customers, projects and measures or technologies installed. Not all participants result in energy savings.

Participants (when natural gas savings are claimed) include gas saving measures or equipment (i.e. Boilers), packages of measure (i.e. ESKs), custom applications and services such as water heater tank de-liming. These participants are tracked through the Demand Side Management Tracking System (DSMT).

Participants (when no natural gas savings are claimed) include Feasibility and DAP study participants, energy audit participants, those who receive educational material such as the Wise Energy Guide as well as those who attend training sessions. These participants are tracked through the DSMT.

Program
A program is the utility's specifically designed approach to providing one or more demand-side options to customers.

Program Evaluation
Program evaluation refers to activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts from past, existing or potential program impacts.

Research Costs
Research costs are the utility's costs associated with the research and evaluation of DSM programs. They are not included in direct costs because they may affect more than one program.

Spillover
Spillover represents energy savings that are due to the program but not counted in program records. Spillover can be broken out in three ways:

Participant inside spillover represents energy savings from other measures taken by participants at participating sites not included in the program but directly attributable to the influence of the program.

Participant outside spillover represents energy savings from measures taken by participants at non-participating sites not included in the program but directly attributable to the influence of the program.

Non-participant spillover represents energy savings from measures that were taken by non-participating customers but are directly attributable to the influence of the program. Non-participant spillover is sometimes called the "Free-Driver effect."

Total Resource Cost Test

The Societal Cost Test provides a measure of the benefits and costs that accrue to society as a result of the installation of a DSM measure. The Societal Cost Test has a provision whereby externality benefits, when quantified, can be included in the result. The SCT at $0/tonne CO2 is also known as the Total Resource Cost Test (TRC).

Trade Allies

Trade allies include organizations (e.g. architect and engineering firms, building contractors, appliance manufacturers and dealers, and banks) that affect the energy-related decisions of customers who might participate in DSM programs.