

Demand Side Management 2007 Evaluation Report

June, 2008

FINAL AUDITED REPORT



uniongas

A Spectra Energy Company

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1. Introduction

Union Gas has consistently delivered cost effective Demand Side Management (DSM) programs since 1997. Over the past ten years Union has delivered approximately 540 million m³ of natural gas savings and net Total Resource Costs (TRC) benefits of over \$815 million¹.

Union's 2007-2009 DSM Plan was approved by the Ontario Energy Board (OEB) on January 26, 2007 in the EB-2006-0021 proceeding. Union's 2007 DSM budget was \$17.0 million. Included in the \$17 million budget was \$1.0 million for Market Transformation programs and \$1.3 million for programs targeted to low income customers. The TRC target for 2007 was set at \$188 million in Phase 1 of the DSM Generic Proceeding.

The primary purpose of this evaluation is to report on Union's energy efficiency initiatives and summarize the results delivered through the DSM program in 2007. This evaluation report plays an important role in documenting 2007 program results in comparison to the plan, and demonstrates Union's success in achieving greater results than it has in previous years. A secondary purpose for the report is to summarize the outcomes of the evaluation research undertaken in 2007. The final purposes for the evaluation report are to disclose the 2008 target and to file new measure input assumptions to the DSM Plan on a going forward basis.

In 2007, Union's DSM program generated net TRC benefits of \$215.9 million and conserved 89.6 million m³ of natural gas savings. Program spending in 2007 totalled \$16.1 million. The Shared Savings Mechanism (SSM) approved by the OEB, earned Union an incentive of \$6.2 million for 2007. The Market Transformation activities measured by OEB approved scorecard metrics generated an incentive of \$0.5 million.

¹ The historical TRC number is based on the avoided cost metrics in place at the time the results were achieved.

2. Planning and Evaluation Overview

Union's 2007-2009 DSM Plan creates a framework that is consistent with achieving the company's objective of being a leader in the emerging cultural shift towards energy efficiency and conservation. The three year OEB approved plan is primarily focused on delivering natural gas savings, but also facilitates participation during changes in the market through the Market Transformation portfolio.

In 2007, Union continued to develop the scope and reach of programs delivered through the DSM portfolio, incorporating new incentives and technologies as well as eliminating or ramping down efforts on programs that were deemed not to be cost effective. All measures are screened for cost effectiveness using the Total Resource Cost (TRC) test as detailed in section 2.1 below.

The evaluation of the 2007 DSM year is based upon two sets of planning input assumptions.

1. For the m³ savings, TRC results and the SSM incentive, the planning input assumptions used in this evaluation report are those established through Phase 2 of the DSM Generic Proceeding, issued on October 18, 2006.
2. For the Lost Revenue Adjustment Mechanism (LRAM) section of the evaluation report, the m³ savings have been calculated using the most current input assumptions available at the time the evaluation report was completed.

Appendix A summarizes the input assumptions agreed to in Phase 2 of the DSM Generic Proceeding and approved with the 2007 – 2009 DSM Plan. 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 the input assumptions, noted in (1.) above. The second sets of input assumptions, titled LRAM, are used to calculate m³ savings for LRAM and reflect the outcomes of the evaluation research.

2.1. Cost Effectiveness Screening

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

Benefits include the 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 back to calculate a net present value². Costs include equipment purchases and installation costs for participants and program costs for the utility. Some of the benefits and costs net out to 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.

Measures delivered through Union's DSM program are expected to yield a benefit-cost ratio of 1.0 or more to be included in the portfolio. Programs are evaluated annually to determine if they

² A discount rate of 10% is used to calculate the net present value.

pass the cost effectiveness screening. Starting in 2007, all measures (with the exception of pilot programs and market transformation programs) were required to pass the TRC test.

The methodology used in calculating the avoided costs to screen for cost effectiveness in 2007 was settled in the Decision in Phase 1 of the DSM Generic Proceeding. The OEB approved avoided cost methodology for Enbridge Gas Distribution (Enbridge) in EB-2005-0001/EB-2005-0437 proceeding was also used by Union. However, the costs applied in the calculations were specific to Union's franchise area and gas supply management policies and practices.

2.2. Monitoring and Tracking

Effective and reliable tracking is essential to accurately report on program results. With proper reporting processes, Union can make informed projections, pinpoint trends, and identify problems.

Union has a complete tracking system, supported by data checks at various points in the monitoring process. In 2007 Union began the process of updating the I.T. system that supports the tracking and reporting of results. This system will increase the audit controls and reduce manual intervention in reporting. This project continues in 2008 and will be in place for reporting 2008 results.

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

2.3. 2007 Program Evaluation

Program evaluation can include impact evaluation, process evaluation, and/or market evaluation studies. Impact evaluations are designed to verify participation and savings associated with given programs. Process evaluation assesses the effectiveness of channels and approaches to DSM delivery. The same study may look at both impact and process issues. Market evaluation is directed at understanding markets and establishing market shares.

A summary of the evaluation studies undertaken in 2007 is provided in the Verification and Evaluation section of this report.

2.4. 2007 Evaluation Priorities

Over the course of the 2007 – 2009 DSM Plan, Union will evaluate approximately a third of the total measures each year. To select measure evaluation research priorities for 2007, Union consulted with members of the Evaluation and Audit Committee (EAC) to identify priorities for 2007. In 2007, Union partnered with Enbridge Gas Distribution to complete the 2007 evaluation work.

In 2007 the following measures were undertaken:

- Commercial Custom project free rider rate;
- Industrial Custom project free rider rate;
- Low flow showerhead, faucet aerator, residential programmable thermostat and residential furnace free rider rates; and

- Low flow showerhead, faucet aerator and programmable thermostat deemed savings calculations

Three evaluations were completed and a summary of the evaluation studies undertaken in 2007 is provided in the 2007 Research Evaluation of Measures section of this report. The custom project free rider research for the two segments were combined in one study, as was the research for the four measures in the residential free rider study and the research for the three measures in the residential deemed savings study. The evaluation research is reflected in the TRC used to calculate LRAM.

2.5. 2007 Evaluation Report Audit

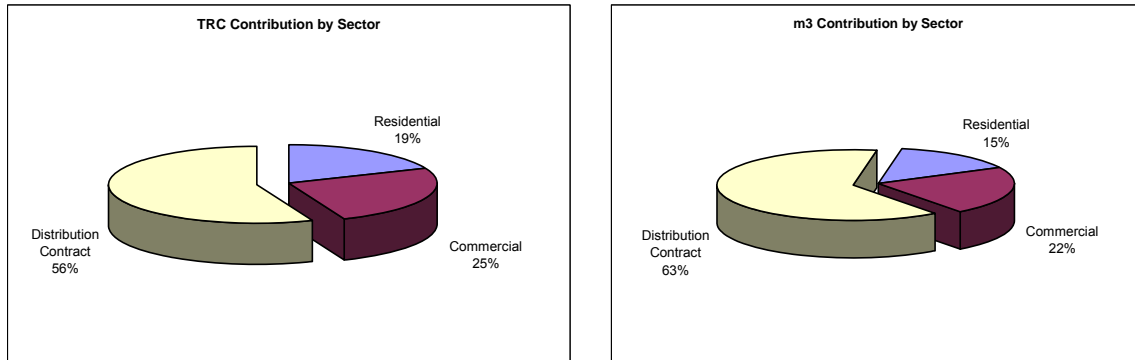
This evaluation report is subject to an independent external audit. The goal of the audit is to confirm to DSM stakeholders that claimed savings, Shared Savings Mechanism incentive, Lost Revenue Adjustment Mechanism, and Market Transformation incentive calculations are accurate.

To complete the stated goal, the audit involved a review of program results, evaluation activities and tracking processes. Nexant Inc. was awarded the contract auditing the 2007 results.

3. Overall 2007 DSM Program Results

In 2007, Union's DSM program generated net TRC benefits of \$215.9 million and 89.6 million m³ in natural gas savings. Program spending in 2007 totalled \$16.1 million, including \$0.77 million for Market Transformation.

Figure 3.1 - % Distribution by Sector



In Phase 1 of the DSM Generic Proceeding Union's TRC target for 2007 was established as \$188 million. In an effort to achieve this target, Union focused on a balance of programs in the three markets that would create an opportunity for success. Table 3.1 summarizes Union's overall DSM results for 2007. Appendix B compares actual results to the program plan for each measure.

Table 3.1 - Overall 2007 Program Results by Sector

2007 DSM Program Results	Residential	Commercial	Distribution Contract	Market Trans-formation	Indirect Costs	**Actual 2007 Results	2007 Plan	Variance Actual vs Plan
Net TRC (\$000s)	\$ 41,429	\$ 56,333	\$ 124,743	\$ (365)	\$ (6,245)	\$ 215,895	\$ 196,356	\$ 19,539
Natural Gas Savings	13,304	19,866	56,414			89,585	76,683	12,902
Participants	338,942	119,275	176			458,393	286,720	171,673
*Expenditures	3,321	\$ 3,255	\$ 2,540	\$ 770	\$ 6,245	\$ 16,131	\$ 17,000	\$ (869)
TRC/\$ Spent	12.47	\$ 17.31	\$ 49.11			\$ 13.38	\$ 11.55	\$ 1.83

The Distribution Contract market delivered the largest portion of savings in 2007 as well as the highest TRC value per dollar spent, followed by the Commercial and then the Residential market. To generate results in 2007, DSM initiatives were delivered through the sector programs outlined in Table 3.2.

Table 3.2 - Sector Programs

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

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

Table 3.3 –Detailed 2007 Sector and Program Results

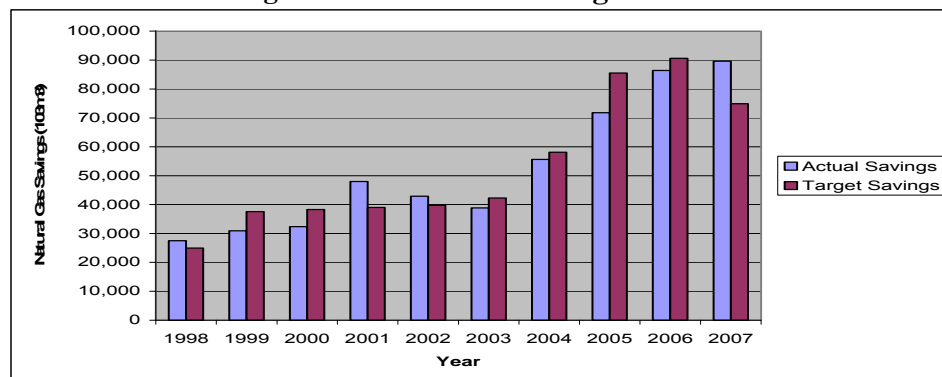
Sector	Program	Natural Gas Savings (103m3)	Participants	*Total Costs (\$000) Program & Incentive	**Program TRC (000's)
<i>Residential</i>	New Home Construction	308	396	\$ 64	\$ 191
	Home Retrofit	11,574	310,294	\$ 2,096	\$ 35,210
	Low Income	1,422	28,252	\$ 1,161	\$ 6,028
	Market Transformation			\$ 770	\$ (365)
	Total Residential	13,304	338,942	\$ 4,091	\$ 41,064
<i>Commercial</i>	New Building Construction	1,224	766	\$ 299	\$ 2,500
	Building Retrofit	18,642	118,509	\$ 2,956	\$ 53,832
	Total Commercial	19,866	119,275	\$ 3,255	\$ 56,332
<i>Distribution Contract</i>	Distribution Contract	56,414	176	\$ 2,540	\$ 124,744
	Total Distribution Contract	56,414	176	\$ 2,540	\$ 124,744
Total Program Results		89,585	458,393	\$ 9,886	\$ 222,140
<i>Indirect Costs</i>	Overhead			\$ 1,700	\$ (1,700)
	Salaries			\$ 3,484	\$ (3,484)
	Research & Evaluation			\$ 919	\$ (919)
	Administration			\$ 142	\$ (142)
	Total Indirect Costs			\$ 6,245	\$ (6,245)
					Net TRC (000's)
TOTAL 2007 PROGRAM RESULTS		89,585	458,393	\$ 16,131	\$ 215,895

* Total Costs include program, incentive & indirect costs

**Program TRC net of free rider & program costs including market transformation

Figure 3.2 demonstrates that Union's level of savings achievement has increased significantly over the past three years. In 2007, total natural gas savings across all programs was 89.6 million m³. This was 5% higher than 2006 and 114% higher when compared to annual savings achieved in 2003.

Figure 3.2 Historical Savings Results



To achieve increasing volumetric natural gas savings, Union's spending on DSM also increased. The 2007 Board approved budget of \$17 million is considerably higher than the \$13.9 million budget approved in 2006. In 2007 Union spent \$16.1 million on DSM, including \$1.2 million on Low Income programs and \$770K on Market Transformation. A breakdown of 2007 actual expenditures by sector, compared to 2007 planned expenditures and 2006 actual expenditures, is shown in Table 3.4

Table 3.4 - Overall 2007 Direct DSM Program Costs

DSM Sector Direct Program Costs	Incentives (\$000)	Program Costs (\$000)	2007 Total (\$000)	2007 Plan (\$000)	2006 Total (\$000)
Residential	\$ 2,140	\$ 1,181	\$ 3,321	\$ 3,284	\$ 3,163
Commercial	\$ 2,775	\$ 480	\$ 3,255	\$ 3,004	\$ 3,090
Distribution Contract	\$ 2,247	\$ 293	\$ 2,540	\$ 3,405	\$ 3,500
Market Transformation	\$ 406	\$ 365	\$ 770	\$ 1,000	-
Total Costs			\$ 9,886	\$ 10,693	\$ 9,753
Indirect Costs			\$ 6,245	\$ 6,307	\$ 3,129
Total Spending			\$ 16,131	\$ 17,000	\$ 12,882

A breakdown of spending by program is contained in Appendix C.

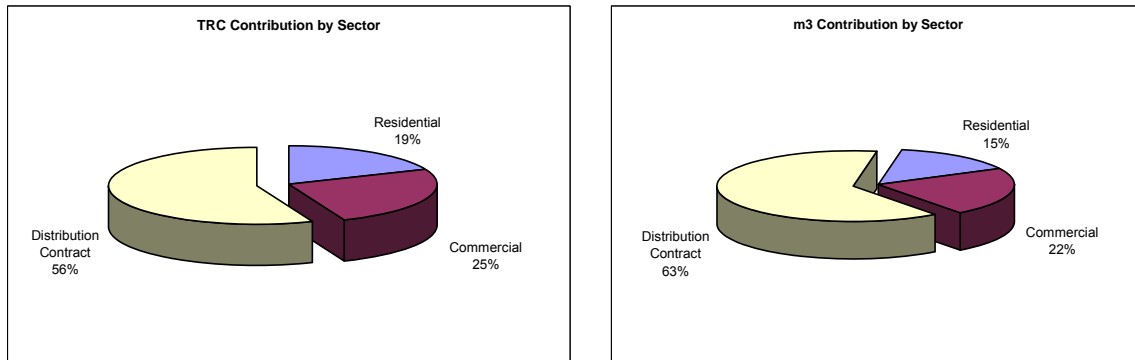
Specific details on program savings, participants³, and costs by sector are outlined in the next three sections of this report.

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

4. Residential Market

The residential program accounted for 19% of all DSM savings in 2007, contributing almost 13.3 million m³ of savings, and with a net TRC of \$41.4 million. Direct program spending in the residential market was \$3.321 million last year.

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 2007. The concentrated effort on the Low Income program was one of the more significant program changes that took place in 2007. Table 4.1 summarizes the residential program results for 2007.

Table 4.1 - 2007 Residential Program Results

2007 Residential Results Summary	New Home Construction	Home Retrofit	Low Income	Actual 2007 Results	2007 Plan	Variance Actual vs Plan
Net Program TRC (\$000)	\$ 191	\$ 35,211	\$ 6,028	\$ 41,430	\$ 29,671	\$ 11,758
Natural Gas Savings	308	11,574	1,422	13,304	10,523	2,782
Participants	396	310,294	28,252	338,942	209,600	129,342
Direct Expenditures (\$000)	\$ 64	\$ 2,096	\$ 1,161	\$ 3,321	\$ 3,284	\$ 37
TRC/\$ Spent	\$ 2.99	\$ 16.80	\$ 5.19	\$ 12.48	\$ 9.04	\$ 3.44

In 2007, the residential DSM program achieved higher TRC results than originally planned. This was largely the result of the concentrated efforts focused on existing ESK programs.

4.1. 2007 Residential Program Framework

Residential programs are designed to achieve savings in the areas of home heating, water heating and the building envelope in both new buildings and retrofit applications for residential M2 and R1 customers. Programs are delivered through a variety of channels, utilizing existing trade allies and partnership relationships 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 2007, including program changes, existing initiatives and delivery methods.

4.1.1. New Initiatives in 2007

In the new home construction market, the ENERGY STAR® for New Homes program was introduced in 2007. There was also a greater emphasis directed toward the Low Income program that was introduced in the fall of 2006.

ENERGY STAR for New Homes (ESNH)

Union's alignment with ESNH provided the company with an opportunity to drive energy efficiency in the new home construction market. Through a partnership with EnerQuality Corporation, Union participated as a member on the Policy and Procedures Advisory Council (PPAC), thereby influencing the direction of new building policies, technical specifications and training and marketing programs


Union's participation on PPAC involved assisting in the development of the marketing platform and a strategy for ESNH, as well as introducing the offer to builders in Q3, and helping them recognize the value of the ESNH program in new construction by improving the awareness of the program for new home buyers in the market.

Union Gas introduced an incentive program for builders in 2007 who built to ESNH specifications for homes that had been permitted in 2006. Builders signed a Participation Agreement with Union Gas and for every new home registered under the ESNH program (up to a specified limit) Union Gas paid the builder an incentive of \$100. The program also included training and education for builders on the ESNH requirements.

In partnership with EnerQuality, Union Gas helped promote the ESNH program using the following marketing communication tools:

- Joint sales meetings with specific builders
- Joint presentation to Home Builder's Associations and other industry forums
- Table top displays at builder workshops
- Press releases
- Bestthings magazine & bill messaging
- Point of Sale (POS) material, print & web advertising, email campaigns
- Show Guide sponsor for Home Builders & Renovators Expo (see Figure 4.2)

Figure 4.2 Show Guide Ad for Home Builder & Renovator Expo




Rethink Energy!

Our goal is to help you build ENERGY STAR® labelled homes. Consumers have a growing interest in energy efficiency. They want to save energy and save money. The most recognized brand for energy efficiency is ENERGY STAR so building and selling ENERGY STAR labelled homes is an immediate competitive advantage.

Our experts are ready to help you with your energy-efficiency building program. We'll keep you informed about high value initiatives that will make a positive difference to your bottom line.

We'll introduce you to initiatives like our Drain Water Heat Recovery Program. By using hot drain water to warm cold water pipes, homeowners will cut their water heating costs by 40%* and overall energy costs by 10%. Those are energy-efficiency numbers that help builders sell more homes.

We can help get you started.
Contact your Union Gas Account Manager or visit uniongas.com

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* Savings may vary due to individual circumstances. Reducing energy costs and increasing comfort. © Union Gas Limited 2009

Low Income (LI) Program Helping Homes Conserve

Union's DSM plan earmarked \$1.3 million in 2007 for programs targeted to low income customers. Union designed a new program based on lessons learned from a 2006 pilot with Enbridge. This new program was called Helping Homes Conserve, and it targeted customers living in the Hamilton and Brantford area who had an income at 125%, or below, the Statistics Canada's 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
- Have a gas-fired water heater (for low-flow showerhead & aerator)
- Have a gas-fired furnace (for programmable thermostats)

The 2007 target was to install 6,000 low-flow showerheads, 12,000 metres of pipe wrap and 4,000 programmable thermostats free of charge to Union's low-income customer base. Kitchen and bathroom aerators were given to the customer for self installation. To reach the targeted customers Union implemented a targeted door-to-door strategy executed through a third party delivery agent, Annron Services Ltd. Targeted Forward Sortation Addresses (FSAs)(3-digit postal codes) were used in areas where there was a high concentration of low-income households.

A door-to-door strategy was successfully executed that included pre-notification flyers dropped at customers' doorsteps, followed by a visit from a professional technician. Customers could also book an appointment by calling the Helping Homes Conserve dedicated toll-free line (1-866-354-5098) or by visiting Union's Website at www.helpinghomesconserve.ca

A landlord strategy was put in place to gain landlords' consent to install programmable thermostats in their tenants' dwellings. Union worked with the Social Agency Housing Help Centre to help identify landlords who had tenants that were eligible for this program. For tracking purposes, each customer who had one or more measures installed signed an acknowledgment form once the installation was complete.

Union's approach in 2007 was much more direct than in 2006. Instead of relying heavily on third parties such as the United Way to drive the program, Union contracted with Annron Services Ltd., to perform installations and drive the program internally. This partnership proved to be successful as approximately 7,300 showerheads, 12,800 metres of pipe wrap and 1,590 programmable thermostats were installed in 2007. Over 6,300 kitchen and 6,500 bathroom aerators were also distributed for self-installation, as outlined in the Low Income Program Summary in Table 4.2.

Table 4.2 Low Income – (Helping Homes Conserve) Program Summary

Measure	2007 Actual Participants	2007 Plan Participants	2006 Actual Participants
Low-flow showerheads	7,338	6,000	14
Kitchen Aerators	6,363	6,000	21
Bathroom Aerators	6,519	6,000	20
Pipe Insulation 2m	6,442	6,000	28
Programmable Thermostats	1,590	4,000	17

Programmable thermostats proved to be the biggest challenge as many low-income customers are renters and required landlord approval prior to installation. Although numerous low-income buildings were identified through the process, many did not qualify for the program because the utilities were included in the rent.

4.1.2. Existing Initiatives

A number of existing residential initiatives continued in 2007.

Energy Savings Kit (ESK)

A residential low-flow showerhead, two aerators and pipe wrap were distributed free of charge in the home retrofit market as part of an Energy Savings Kit (ESK). Energy Savings Kits are pre-packaged measures designed to reduce a customer's energy demand and water consumption, as well as provide consumers with further education on the efficient use of energy.

ESK contents include:

- 1) Pipe Wrap -2m
- 2) Low Flow Showerhead
- 3) Low Flow Kitchen Aerator

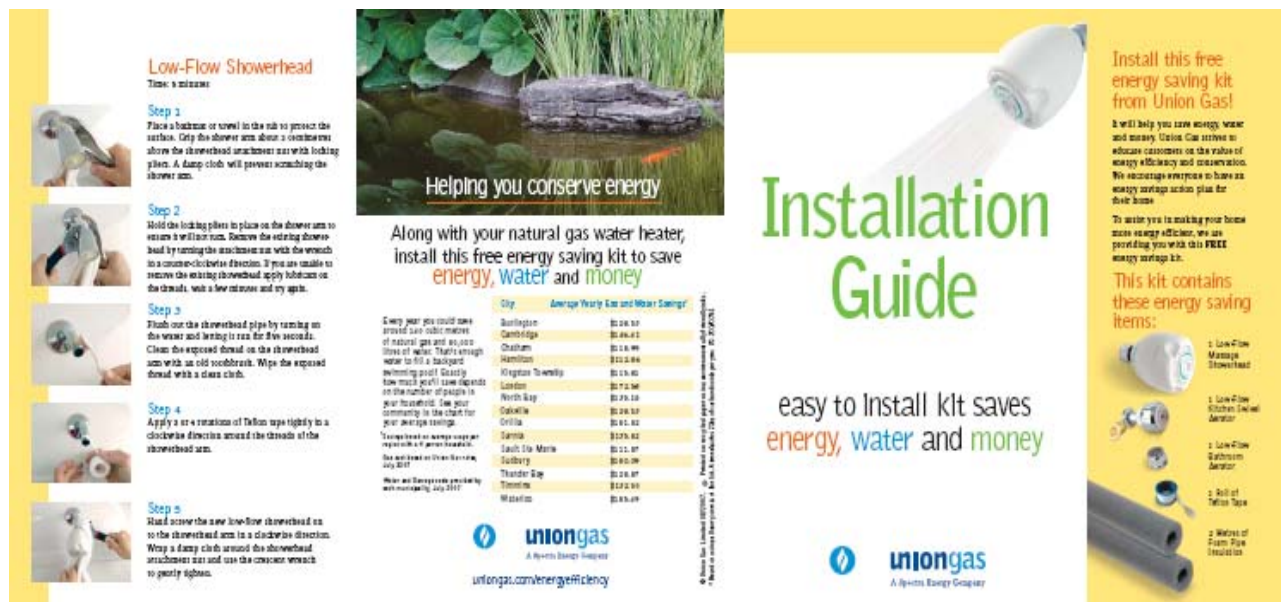
- 4) Low Flow Bathroom Aerator
- 5) 1 roll of Teflon tape for ease of showerhead installation
- 6) ESK Installation Manual – Figure 4.2
- 7) \$15 Programmable Thermostat Coupon

The Teflon tape was an added feature in 2007, to help minimize leakage from the newly installed showerhead and to remove a potential barrier to self-installation of the showerhead.

A \$15 dollar rebate coupon for the purchase of a programmable thermostat was included in the kits to promote additional energy savings.

Similar to 2006, the kits also included a detailed installation manual to assist the customer through the installation process. The installation guide was redesigned in 2007 (See Figure 4.2) to promote the ease of installation and to incorporate the Teflon tape.

Figure 4.2 – 2007 ESK Installation Guide



The graphics on the cover page of the Energy Saving Kit (Figure 4.3) were also changed to reflect the environmentally friendly properties of the plastic packaging which is made from a 100% renewable resource and contains no harmful toxins. Additionally, the production process of the plastic packaging uses less fossil fuel and emits up to 90% less greenhouse gases in comparison to conventional plastics.

Figure 4.3 – 2007 ESK Packaging

Doing Our Part For The Environment

Plastic Packaging Made From 100% Corn... Not Oil

Benefits of corn-based plastic include:

- Produced from a 100% naturally renewable resource found in plant sugars
- Uses up to 68% less fossil fuel energy to produce in comparison to what it takes to create traditional plastic
- Emits up to 90% less greenhouse gases in comparison to what it takes to create traditional plastic
- Contains no harmful toxins
- Recyclable
- Compostable where facilities exist (check with your local municipality for details)

FREE energy saving kit

\$35 value

Packaging made from a 100% annually renewable resource

FREE energy saving kit
saves energy water & money

Did you know that one tree can remove up to 22kg of carbon dioxide a year?

Kit Components	Yearly Savings	
	CO ₂	Water
Showerhead	172kg	42,000L
Kitchen faucet aerator	30kg	4,200L
Bathroom faucet aerator	30kg	4,200L
Pipe Insulation	32kg	n/a
Total	264kg	50,400L

The contents in this kit can reduce the CO₂ equivalent to what a clean tree removes in a single year.

This kit contains these energy saving items:

- 1 Low-Flow Massage Showerhead
- 1 Low-Flow Kitchen Swivel Aerator
- 1 Low-Flow Bathroom Aerator
- 1 Roll of Te-Bon Tape
- 2 Meters of Foam Pipe Insulation

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Union Gas delivered ESKs to Union Gas franchise customers through a variety of delivery methods. The delivery methods and their results are shown in Table 4.3.

Table 4.3 2007 ESK Summary of delivery by Segment

Residential Account Managers (RAM) Delivery								
	Third Party							
	Home Depot	Guelph	Energy Days	Banner Retail	Municipal*	Home Trade shows	HVAC	Total
Total	16,892	14,814	10,126	7,750	7,245	6,317	4775	67,919

*Includes learning institutions and conservation groups

The largest single delivery method for ESKs was targeted events at Home Depot stores in the Union franchise area. Union held events at eight Home Depot stores over two weekends in May. The ESK distribution events were supported by messaging through Union Gas channels including on-bill messaging, Union's website, as well as targeted radio and newspaper advertising. Each store had at least one Union Gas Account Manager present, to qualify customers, distribute ESKs and provide energy saving advice. Approximately 17,000 ESKs were distributed during this promotion.

Another important delivery method for ESKs was through the Residential Account Manager's (RAM's). They drove many initiatives including the partnerships with Guelph Environmental

Leadership (GEL), HVACs, other banner retailers, municipalities, and Union's Industrial Sales and Marketing team.

In the fall of 2007, Union partnered with the Guelph Environmental Leadership (GEL), the City of Guelph, and Project Porchlight to participate in GEL's Green Impact Guelph project. GEL fosters sustainable community conservation practices requiring cross sector collaboration. The goal of the project was to distribute 10,000 ESKs, augmented by a Compact Florescent Light bulb and a toilet leak repair kit. The partnership proved successful results, with the distribution of almost 15,000 ESKs by the end of December.

The Residential Account Managers also partnered with the Industrial Sales & Marketing team to deliver over 10,000 ESK kits to the employees of Union's large industrial & commercial customers. These events were labelled Energy Days and were coordinated in order to build energy awareness with the employees of Distribution Contract customers.

Programmable Thermostat

Union promoted a \$15 on-bill rebate 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 2007:

- Bill inserts distributed to the entire Union residential customer base (February, August, September and October)
- ESKs
- Home Depot stores
- Home Hardware stores
- Direct mail to targeted conversion customer (i.e. customers converting from electric heating to gas heating)
- HVAC dealers
- Union Gas Website

In 2007, coupons were included in ESKs and customers receiving the kits were encouraged to purchase a programmable thermostat. Homeowners submitting an application to convert to natural gas space heating received a welcome letter which included a section on energy efficiency along with a coupon to promote the purchase of a programmable thermostat.

Both Home Depot and Home Hardware had coupons provided to them for promotion to their customers. Coupon pad inventory levels were monitored and refilled as necessary by the RAMs. 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.

Over 8000 customers received on- bill rebates in 2007.

HVAC Partnership Initiative

The HVAC partnership was designed to promote, through channel partners, the sale of high efficiency natural gas measures to customers at the time of equipment replacement. HVAC partners received incentive programs to effectively influence the purchase of energy efficient

technologies. HVAC partners⁴ were eligible to receive a \$25 incentive for the sale of a high-efficiency furnace and a \$15 rebate towards the sale of a programmable thermostat.

In 2007, approximately 14,800 furnace and 14,000 programmable thermostat incentives were paid to HVAC partners.

4.1.3. Initiatives Exited in 2007

Union either phased out or did not continue supporting a number of initiatives in 2007.

TAPS (Installation of ESKs measures) Pilot

The TAPS program, implemented as a pilot in 2006 was not resumed in 2007. Union did not undertake the same program design in 2007. Further evaluation of this and other delivery methods for ESKs will be explored in 2008 to determine the most effective approach.

Meter Reading Campaign Pilot

The 2006 pilot to distribute ESKs through meter readers was not implemented as a delivery method for ESKs in 2007. The packaging of the kits was not conducive for meter readers to carry on their routes.

4.1.4. Education and Awareness Efforts

Dedicated funding to develop educational materials to keep customers informed on energy efficiency issues continues to be a priority at Union. Residential consumers have access to a variety of mediums to enrich their knowledge of energy efficiency, such as monthly InTouch bill inserts, an interactive Website, and Union's Wise Energy Guides.

Wise Energy Guide (WEG)

In 2007 Union continued with the distribution of the Wise Energy Guide (WEG) at ESK giveaway events. Included in the guide is information on a wide variety of related energy issues which include:

- An easy-to-use checklist to help get customers look at energy efficiency in the home
- Simple solutions to cut heating costs
- Tips to prevent air leakage
- Weather-stripping and caulking advice
- Home insulation tips
- Suggestions to solve moisture problems
- Natural gas equipment options
- Energy efficient product choices
- Government program offers and contact information

InTouch Monthly Newsletter

⁴ Any HVAC company is eligible to participate in Union Gas's energy efficiency programs.

Union continued to distribute monthly InTouch Newsletters in 2007. These newsletters are Union Gas bill inserts that cover a range corporate communications. Educational messages on residential energy efficiency are highlighted in every issue. The December newsletter provided a link for customers to download their Wise Energy Guide (WEG) from the Website. It also illustrated the savings associated with ESKs.

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 Government of Ontario and the Federal ecoENERGY Retrofit grants in addition to the Ontario Power Authority's cool savings rebate program were also highlighted in the newsletters.

EnerQuality Awards of Excellence

EnerQuality Corporation is a for-profit organization that delivers ENERGY STAR® for New Homes in Ontario, as well as other building leadership programs such as R-2000. In 2007, Union sponsored an EnerQuality Building Excellence Award. Doug Tarry Ltd. was awarded the ENERGY STAR Builder of the Year (mid-size).



Pictured: Union Gas employee with Doug Tarry Ltd award recipients

Residential Energy Efficient Website

Union continued to expand and upgrade its interactive energy efficient Website (www.uniongas.com/energyefficiency) with the aim of making it easier for customers to navigate. The energy efficiency section of Union's Website provides residential customers with energy efficiency tips and program offers to save energy and money in their homes.

Visitors to the Website can navigate topics such as:

- Tips to save money and energy
- Comparison tools on energy costs
- New technology information (e.g. Drain Water Heat Recovery)
- Details on ESNH and EnerGuide
- Downloadable Wise Energy Guides
- Energy efficiency rebates and incentives
- ESK depots available for customers to pick up kits
- Engee's Kids – Energy efficiency information for kids

The different pages on this Website contain links to DSM specific programs associated with selected technologies. Additional links provide Union's customers with access to energy conservation information and promotional offers through other Ontario and Canadian organizations.

4.2. 2007 Residential Program Results

The Residential program accounted for 19% of DSM savings in 2007, contributing 13.3 million m³ with a net program TRC of \$41.4 million. As Table 4.4 shows, 87% of total m³ savings came from the Home Retrofit program.

Table 4.4 – 2007 Residential Results by Program

Program	Natural Gas Savings (10 ³ m ³)	% of Total	Program TRC (\$000)	% of Total
New Home Construction	308	2.31%	\$ 191	0.46%
Home Retrofit	11,574	87.00%	\$ 35,211	84.99%
Low Income	1,422	10.69%	\$ 6,028	14.55%
Total	13,304	100%	\$ 41,430	100%

A comparison of 2007 actual results versus plan by measure is contained in Appendix B. In 2007, the Home Retrofit program offered the greatest potential for savings due mostly to the size of the retrofit market as compared to the new home market.

As shown in Table 4.5, ESKs, and programmable thermostats contributed the majority of savings in 2007.

Table 4.5 - Major Residential Savings Drivers in 2007

Initiative	*2007 TRC (\$000)	2007 Gas Savings	2006 Gas Savings
Energy Savings Kit	\$ 29,197	6,359	5,746
Programmable Thermostat	\$ 10,141	3,670	1,428
High Efficiency Furnace	\$ 3,056	2,968	1,959
Energy Star For New Homes	\$ 215	308	-
Total	\$ 42,610	13,304	9,133

* Gross TRC - program costs not allocated

Every year Union verifies the ESK initiatives to determine if people are installing the measures within the ESK. The verification results provided unique adjustment factors that are based upon the ESK program delivery type. Adjustment factors are applied to 2007 results to ensure only those participants who install the ESK measures, and keep them installed, are included in savings calculations. The adjustment factors from the verification work are outlined in the Verification and Evaluation section of this report.

4.3. 2007 Residential Program Costs

Direct program spending in the residential market was \$3,321 million last year, slightly above the planned budget of \$3,284 million. Table 4.6 summarizes the direct expenditures by residential program in 2007.

Table 4.6 – 2007 Residential Program Direct Expenditures

Program	Incentives (\$000)	Program Costs (000's)	Total Direct Costs (000's)
New Home Construction	\$ 39	\$ 24	\$ 63
Home Retrofit	\$ 1,299	\$ 798	\$ 2,097
Low Income	\$ 802	\$ 359	\$ 1,161
Total	\$ 2,140	\$ 1,181	\$ 3,321

The emphasis on the Low Income program was the primary reason for the increase in spending. The overall residential program TRC per dollar spent for 2007 was \$13.45. This was higher than the planned TRC per dollar spending of \$9.88.

4.4. Lessons Learned

1) Research and Development into New TRC Positive Measures is Required

The residential sector has few measures which generate positive TRC results. The new building code requirement has highlighted this issue due to increases in base efficiency requirements. Additionally, increasingly strict codes and standards for appliances are diminishing measure opportunities for the retrofit market. Further research needs to be completed to identify new technologies and/or strategies which generate positive TRC results and can be incorporated into the residential program portfolio.

2) Proactive Targeting of Low Income Neighbourhoods

Union Gas succeeded in finding an approach that overcame the barriers to Low Income programming experienced in 2005 and 2006. The approach used mapping software in combination with several public sources to determine low income neighbourhoods. In 2008, Union will continue to narrow its targeting using more refined neighbourhood data.

3) Walking the Talk

Union Gas recognizes its role as a steward of energy efficiency and champion of environmental issues. To this end, Union proactively sourced and utilized a corn-based plastic for the ESK packaging.

4) Ontario Based Research

The cost of delivering programs continues to rise in relation to the TRC earned as there is continual downward pressure on the achievable savings and free rider rates. There is insufficient Ontario based research to support savings claims. Data from U.S jurisdictions that may not be appropriate is used as a proxy for the Ontario market place.

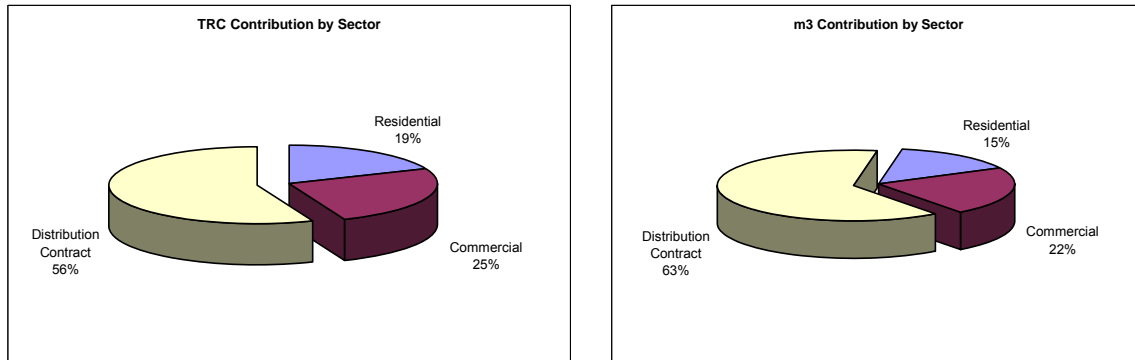
5) Education

There are continual requests of the utility to provide financial and program assistance for educational platforms that will reach the residential sector and educate them about energy conservation. Union is a trusted source of energy information that touches 1.3 million Ontarians. Education programs do not generate TRC and therefore do not pass the cost effectiveness test. This suggests there is a void in the market that needs to be addressed.

5. Commercial Market

Commercial programs accounted for 25% of DSM savings in 2007, totalling over 19.8 million m³ in natural gas savings with a net program TRC of \$56.3 million. Direct program spending in the commercial market was \$3.25 million last year.

Figure 5.1 – % Distribution by Sector



In 2007, Union continued to offer commercial programs in the New Build Construction and Building Retrofit markets. The percentage of commercial savings driven through the building retrofit market continued to grow representing 95% of sector savings last year. Table 5.1 summarizes the commercial market program results for 2007.

Table 5.1 - 2007 Commercial Program Results

2007 Commercial Results Summary	New Building Construction	Building Retrofit	Actual 2007 Results	2007 Plan	Variance Actual vs Plan
Program TRC (\$000)	\$ 2,500	\$ 53,833	\$ 56,333	\$ 68,229	\$ (11,896)
Natural Gas Savings (103m ³)	1,224	18,642	19,866	15,318	4,548
Participants	766	118,509	119,275	77,120	42,155
Direct Expenditures	\$ 300	\$ 2,956	\$ 3,256	3,004	\$ 252
TRC/\$ Spent	\$ 8.35	\$ 18.21	\$ 17.30	\$ 22.71	\$ (5.41)

The four programs that delivered the largest savings in 2007 were custom projects, hot water conservation, condensing boilers and pre-rinse spray nozzles. Custom projects represented the largest portion of savings with 6.9 million m³ or 34% percent of the overall commercial result.

The 2007 TRC results in the Commercial sector were slightly higher than in 2006, but lower than what was planned. While some programs performed significantly better than planned (i.e. hot water conservation), others did not perform as well as originally anticipated (i.e. infrared heaters).

In 2007, promotion and participation in the Feasibility Study and Design Assistance Programs continued to increase. These programs are key to the future success and sustainability of savings in the commercial sector, because they assist customers in identifying opportunities that they can incorporate in their long term business plans.

5.1. Commercial Program Framework

The commercial programs are designed to achieve savings in the areas of space heating, water heating, and the building envelope across nine customer segments – office, institutional, retail, multi-family, food service, hotel/motel, warehouse, recreational and small agricultural within the commercial M2, RO1 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 and water-heating and other process related loads

Union's Account Managers market the programs both directly to customers and indirectly through trade allies and channel partners, working to cost effectively promote energy efficiency to Union's commercial customer base.

This section outlines the programs available to commercial customers in 2007, including incentives paid, program changes in 2007, existing programs and the delivery methods utilized.

5.1.1. Commercial Program – 2007 Incentives

A portfolio of technologies was available to commercial customers in 2007 through the New Building Construction and Building Retrofit programs. The incentives for supported technologies remained unchanged from 2006 levels. Table 5.2 outlines the incentives levels for technologies supported in 2007.

Table 5.2 Financial Incentives for 2007 Programs

Technology	2007 Incentive per Unit
Energy Recovery Ventilators (ERV)	\$250-\$1,000
Condensing Boilers	\$500-\$3,000
Infrared Heaters	\$50
Heat Recovery Ventilators (HRV)	\$250
Rooftop Units	\$500
High Efficiency Furnaces	\$100
Programmable Thermostats	\$15
Low Flow Pre-Rinse Spray Nozzle	\$100
Kitchen Ventilation (DCKV)	\$1,000-\$2,000
Custom Project Equipment Incentives	\$0.05/m ³ 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

5.1.2. New Initiatives in 2007

Quasi-Prescriptive Measures

In 2007 Union introduced input assumptions for condensing boilers, infrared heaters, heat recovery ventilators (HRV), energy recovery ventilators (ERVs) that are prescriptive based on the size of the equipment. These input assumptions were created in a spreadsheet tool that Union

called a “quasi-tool” to generate accurate energy the savings corresponding to the actual capacity of equipment for condensing boilers, infrared heaters, HRVs and ERVs.

The “quasi-tool” creates a more accurate assessment of energy savings while keeping the incentive amounts more prescriptive in nature. 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 specific measure, size and application and, therefore provides a more accurate understanding of savings.

The quasi-tool was new to the 2007 portfolio and applied to the following applications:

- Boilers
- Infrared Heaters
- ERVs
- HRVs

Information sheets on the savings calculations for these measures are in Appendix F.

5.1.3. Existing Initiatives

The following initiatives were continued in the commercial program for 2007. With the exception of the Design Assistance Program, these initiatives are promoted to customers in both the new building construction and building retrofit markets.

Energy Savings Program (ESP)

The Energy Savings Program was designed to promote the sale of high efficiency natural gas technologies by participating with commercial HVAC channel partners and promoting directly to end users. In order to ensure program success, Union provided incentives, information, tools and support to educate and promote participation.

In addition to the four quasi-prescriptive measures described above, the technologies supported through this program included:

- Rooftop Units
- High Efficiency Furnaces
- Enhanced Furnaces (up to 299 Mbtu/h)
- Programmable Thermostats
- Demand Commercial Kitchen Ventilation
- Low Flow Pre-Rinse Spray Nozzle

The ESP program includes technologies with predictable savings by classification sizes, which are referred to as “prescriptive” measures.

Demand Control Kitchen Ventilation (DCKV)

Demand control kitchen ventilation systems were added to the portfolio of technologies available to commercial customers in 2006. 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.

In 2007, 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 generate the calculated savings (both gas and electrical). The DCKV savings were determined using the methodology described in the Detailed Energy Savings Report (www.melinkcorp.com).

In 2006, the program did not realize much success. As a result, efforts were made to understand and start to address the barriers to increased penetration of the DCKV technology in the marketplace. Union held three professionally facilitated focus groups with different target markets in the foodservice sector in order to understand their interest in energy efficiency, their preferred mode of communication on energy issues, and their awareness and interest in DCKV. Through the focus groups it was revealed that stakeholder awareness of the DCKV technology was relatively low and where awareness did exist, significant questions about the product still remained.

As a result of these findings, Union Gas hosted five product information and product demonstration sessions, in the franchise area, for key facility decision makers in foodservice. A total of 65 attendees, including design engineers, commercial kitchen service contractors and suppliers, and large significant end-use customers participated in the workshops.

A brochure, included in Figure 5.1, aided the education efforts with its clean design, meaningful information and testimonials.

Figure 5.1 – Demand Control Kitchen Ventilation Brochure

Demand Control Kitchen Ventilation

Lower your energy costs by increasing ventilation efficiency

SAVE \$1,200 to \$5,000 per year in energy costs!
(See reverse for details)

Installing a Demand Control Kitchen Ventilation system not only reduced my overhead but increased my staff's productivity in the kitchen with a better work environment.

Erin Pastorak,
Building Services Supervisor,
St. Joseph's Care Group

Demand Control Kitchen Ventilation
Lower your energy costs by increasing ventilation efficiency
Here's how it works

Traditional ventilation systems operate at one speed regardless of how hard the appliances, and your staff, are working. But Demand Control Kitchen Ventilation systems respond to variations in stove use, allowing the two-speed or variable-speed fans to regulate exhaust and makeup airflow as necessary. Therefore, when stoves are off or only a few burners are in use, the exhaust fans work at lower speed and use less energy.

More comfortable work environment

A Demand Control Kitchen Ventilation system provides benefits beyond energy savings. It will create a more comfortable kitchen by reducing noise pollution and improve indoor air quality by controlling CO₂ levels. A more comfortable kitchen staff leads to a more productive kitchen!

Please visit our website or contact your local Union Gas representative to learn more!

uniongas
A Spectra Energy Company

uniongas.com/technologiesandsolutions

ENERGY • EFFICIENCY • EXCELLENCE

† All savings calculated on an annual natural gas consumption of 85,000 mcf. The annual natural gas consumption is calculated by taking an average of natural gas consumption during the 2010 fiscal year from Union Gas Limited's major end customers that use more than 11,000 mcf per year. Consumption levels and savings will vary based on appliance, reduced deterioration, and natural gas price. Natural gas prices are based on the Canadian Market Reference Price (C-MRP). The calculations do not include GST, energy rebates or financing costs.

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As a result of these efforts the DCKV program performed well in the last quarter of 2007 and program expectations were met. Additional education and customer research will be done in 2008 to further develop this program.

Low Flow Pre-rinse Spray Nozzle

In 2007 the plan was to continue delivering the pre-rinse spray nozzle program through a partnership developed in 2006. Union had success with this delivery method in 2006. Unfortunately internal management and staffing changes in the delivery partner greatly diminished the focus on the program results and jeopardized the program's success.

Union responded with a direct marketing approach and field-based delivery methodology that mitigated some of the Q1 and Q2 shortfalls. At the end of 2007, the low flow pre-rinse spray nozzle program contributed eight million less TRC than originally planned.

For 2008, the direct marketing campaign that will be targeted at potential end-use customers will be reinstituted to heighten awareness around this measure and drive installations. In addition, the partnership has been revived with a renewed focus on spray nozzle program delivery.

Union delivered a 1.24 gpm spray nozzle in 2007. The substantiation document for 1.24 gpm spray nozzle is based on the methodology used to calculate the 1.6 gpm unit approved in the Generic Proceeding. The substantiation document for the 1.24 gpm unit is detailed in Appendix F and the input assumptions used to calculate SSM and LRAM are also documented in Appendix A.

Infrared Heaters

Throughout 2007, Union partnered directly with major manufacturers to deliver the program to distributors and contractors at the point of purchase. The program offered a combined incentive of \$50 per unit sold to both the distributors and contractors. Under the program design the distributor reported participation levels back to the manufacturers, who in turn provided Union with the details for recording and paying the incentives. Verification checks ensured that units submitted through the Energy Savings Program would not be double counted.

The 2007 infrared program underperformed when compared to the initial plan numbers, particularly in the retrofit market. Changes in the delivery of the program from 2006 created uncertainty with partners and customers contributing to the lower performance. However, there was a 22% improvement over 2006 results indicating that there is an interest in the marketplace for the technology. In 2008 the infrared program will once again be revisited to communicate more effectively the revised program approach. To this end, a complete marketing program and customer communication push is planned.

Custom Projects

Custom projects cover opportunities where savings are linked to unique building specifications, uses and technologies. These may involve new technologies or design concepts. The program engaged channel partners in the design and engineering communities, as well as key commercial customers (multiple facility end users such as national accounts, retail chains, property management firms, non-profit housing authorities, school boards, municipalities and other end users). The program included both incentives and educational support. Custom projects incentives were set at \$0.05/m³ saved, up to a maximum of \$15,000. All custom projects must pass a TRC test for cost effectiveness before being approved.

Hot Water Conservation (HWC)

This program was designed to reduce hot water consumption through the installation of low flow showerheads and faucet aerators, which leads directly to natural gas and water savings. Union supplied the low flow showerheads and faucet aerators at no charge to participating agencies who installed these measures as a part of their maintenance programs. This program targeted non-profit and social housing, hotel/motel., institutional sectors, property managers of other multi-family facilities, as well as end users.

Design Assistance Program (DAP)

In 2007, Natural Resources Canada discontinued its Commercial Building Incentives Program (CBIP), the basis behind Union's Design Assistance Program (DAP) program. CBIP was replaced with a set of information and modeling tools that continued to encourage the commercial marketplace to build beyond the Model National Building Code. Union continued to offer incentives under DAP to channel partners in the design and engineering communities as well as key commercial customers (multiple facility end users such as national accounts, retail chains, property management firms, non-profit housing authorities, school boards and municipalities). The program provided a \$4000 incentive to eligible participants on a per project basis to assist with breaking down the barriers of costly modeling and demonstrating 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 programs provided financial support to channel partners and end users and worked to promote energy efficiency audits. These audits included an efficiency analysis of natural gas equipment as well as electricity and water use. An incentive of 30% of the cost (up to \$4,000) was paid for feasibility studies. The incentive for boiler audits was \$250 per unit. No savings were attributed to the programs; however, participation was tracked. Feasibility studies and boiler audits helped to ensure the sustainability of future project opportunities in the Commercial sector.

Other Market Support Initiatives

Market support initiatives included information pieces such as EnerCases, Leading Edges, the Union Gas Website, and computerized E-Tools. Customer and channel education included lunch and learn sessions, sponsorship of energy efficiency workshops, and program communication materials.

A wide ranging commercial marketing mailer that offers a walk through with a Union Gas energy efficiency expert at no cost to the customer was distributed in 2007. The direct to commercial customer approach was resource intensive, but the offer produced significant results with over 500 building walk-throughs scheduled. There have been energy efficiency gains at almost each site visit and the customers have been extremely impressed with the approach. In 2008, the offer will be refined and focused on high-value energy intensive segments.

5.1.4. Commercial Program – Delivery

Union's Commercial DSM program participants are located throughout the franchise area. To educate and deliver DSM savings to this customer segment, Union relied on a highly skilled team of Account Managers. A significant effort was required to educate potential participants on the DSM programs offered by Union, and on the benefits that can result from participation. 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

The channel approach to program delivery involved Union's field account managers influencing channel partners (i.e. engineering, design/build firms or HVAC contractors), who were key to the end user's decision making process with regard to energy equipment, and Strategic Account Managers influencing manufacturers and distributors. Union worked with all channel partners who influenced end users in a variety of ways, from including 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.

Participating channel partners were provided with incentives for the promotion of higher efficiency measures that later lead to an installation. Union also provided tools to channel partners to help them effectively relay the message to end users on the advantages of energy efficient technologies.

Direct to Customer

The direct-to-customer approach of delivering DSM programs involves interaction by Union's Account Managers with the potential participant, or end user. The Account Manager worked directly with the end user, educated them on programs and potential options to improve their existing energy efficiency and linked them with the appropriate delivery channels.

Union's Strategic Accounts group also utilized the direct-to-customer approach for delivery of DSM programs to national accounts. National accounts are defined as those customers with multiple property locations throughout Union's franchise area including retail chains, property management firms, food service chains and others. Strategic Accounts Managers worked with these large customers to educate them on Union's DSM initiatives and the benefits of participation.

Additional focus was placed on the direct to customer approach to delivery in 2007. This proved to be a challenge because the focus in recent years was largely on a channel approach. The resources required to manage this approach were considerable but the results proved that there was a benefit to a focused direct-to-commercial customer approach. Program awareness was an important factor and more focus in this area is expected to yield greater results in future years.

Both the channel and direct-to-customer approaches complement each other to ensure the greatest influence on all of the key decision makers. In order to drive significant DSM results, strong relationship building and on-going maintenance is required throughout all levels of the commercial customer chain to deliver the programs outlined above.

5.2. 2007 Commercial Programs Results

The Commercial program delivered natural gas savings of over 19.8 million m³ with a net program TRC of \$56.3 million through the New Building Construction and Building Retrofit markets in 2007. As shown in Table 5.3 below, the largest commercial results came from the building retrofit market which represented 95.6 of TRC results and 94% of natural gas savings last year.

Table 5.3 - 2007 Commercial Results by Program

Commercial Programs	Natural Gas Savings	% of Total	Program TRC (\$000)	% of Total
New Building Construction	1,224	6.16%	\$ 2,500	4.44%
Building Retrofit	18,642	93.84%	\$ 53,833	95.56%
Total	19,866	100%	\$ 56,333	100%

Overall, 2007 TRC results in the commercial sector were 5% higher than in 2006, but 19% lower than plan. While some initiatives (i.e. hot water conservation) performed significantly better than planned, others did not perform as well as originally planned (i.e. infrared and pre-rinse spray nozzle program). A comparison of actual TRC results versus plan by measure is contained in Appendix B.

In 2007, Union only supported measures with a positive TRC. The two initiatives that delivered the largest savings in 2007 were the Hot Water Conservation and Custom Projects. Table 5.4 outlines the savings achieved by these measures.

Table 5.4 – Major Commercial Savings Drivers in 2007

Program	*2007 TRC (\$000)	2007 Gas Savings (10³m³)	2006 Gas Savings (10³m³)
Hot Water Conservation	\$ 21,287	4,226	5,328
Custom Projects	\$ 16,010	6,892	10,417
Total	\$ 37,297	11,118	15,745

Hot Water Conservation projects represented the largest portion of savings with over \$21 million in TRC and 4.2 million m³ in natural gas savings. Low Flow Aerators contributed to \$6.7 million in TRC towards this program, \$4 million over the initial plan. The aerators were primarily installed in conjunction with the low flow showerheads in the multi-family market. There was a considerable focus in the field to ensure that the aerators were installed simultaneously with the showerheads creating a much higher ratio of aerators installed. This led to significantly higher actual aerators results versus plan in 2007. The focus continued to be on the social housing sector, but increased uptake was also seen from large property management firms.

For Custom Projects, Union annually completes a verification study to confirm the accuracy of custom project savings. The sampling methodology for Commercial Custom Projects is included in Appendix M. The results of the verification study are included in the Verification and Evaluation section of the report.

The increased number of feasibility studies completed in 2006 contributed to the success of the custom projects program in 2007. In 2007, promotion and participation in the feasibility study and design assistance programs increased significantly. The number of boiler audits completed was 2.5 times higher than in 2006. Overall, as shown in Table 5.5 below, 245 studies and audits were completed in 2007, up 45% compared to 2006. These programs are key to the future success and sustainability of savings in the commercial sector.

Table 5.5 – Feasibility Studies and Audits

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

Although Commercial TRC program results were lower than originally planned for 2007, there was improvement when compared to 2006.

5.3. 2007 Commercial Program Costs

Direct commercial program expenditures in 2007 equalled \$3.25 million, up slightly from the 3.090 million spent in 2006, and higher than the planned budget of \$3.004 million. Table 5.6 summarizes the direct expenditures for the commercial sector in 2007.

Table 5.6 – 2007 Commercial Program Direct Expenditures

Commercial Program	Incentives (\$000)	Program Costs (\$000)	Total Direct (\$000)
New Building Construction	\$ 255	\$ 44	\$ 299
Building Retrofit	\$ 2,519	\$ 436	\$ 2,955
Total	\$ 2,774	\$ 480	\$ 3,254

In 2007, almost all of the increased spending went to incentives in the building retrofit market, which were needed to drive the savings results achieved.

For the overall commercial program a TRC of \$17.30 was achieved for every direct dollar spent in 2007. This was slightly lower than the TRC per dollar spent of \$22.71 based on the plan.

5.4. Lessons Learned

1) Customer Understanding is Critical

Customer understanding is extremely important when introducing new programs or making significant changes to existing programs. This issue includes the customer's understanding of the technology and Union's understanding of the information required to influence the customer's buying decision. As new technology and DSM measures are introduced in 2008, a customer's understanding of the technology will be a critical component in the program design process. Customer research, focus groups and workshops including demonstrations add significant value to Union's DSM portfolio.

2) Focused Efforts Increase Results

For certain initiatives, having focused resources can lead to higher results. In 2007, some re-alignment of resources was performed to allow Account Managers to focus on specific programs. This was evidenced in the Hot Water Conservation program, where additional resources were added to specifically promote the aerator component of this program, which resulted in increased participation and energy savings.

3) Balancing Channel and Direct Customer Approaches

Union will need to continue to develop both channel and direct-to-customer communication methods to reach potential customers in future years. The experience learned from the pre-rinse spray nozzle program in 2007 is clear; relying on a single unpaid channel partner to deliver a program may be risky. Both the channel and the direct-to-customer approaches should continue to be leveraged to reach desired results.

4) The Value of Audits

Audit programs continue to encourage customers to pro-actively think about energy conservation and supply the support needed to build measures into their future business plans. With a planning cycle of up to two years, audit programs will ensure the long term sustainability of conservation programs in the commercial market.

6. Distribution Contract Market

The EnergyWise program for the distribution contract market accounted for 56% of total TRC results in 2007, with a net program TRC of \$124.7 million. Programs in this sector achieved 56.4 million m³ in natural gas savings. Direct program expenditures were \$2.54 million.

Figure 6.1 - % of Contribution by Sector

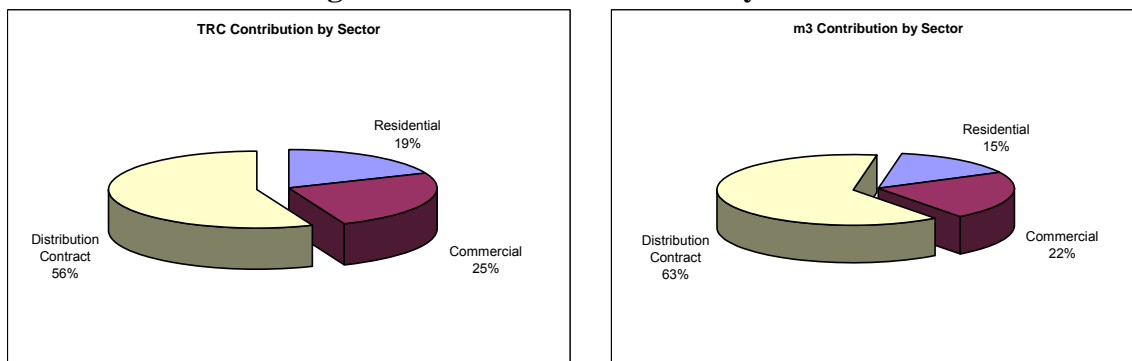


Table 6.1 summarizes the distribution contract market program results for 2007.

Table 6.1 – 2007 Distribution Contract Results

2007 Distribution Contract Summary	Actual 2007 Results	2007 Plan	Variance Actual vs Plan
Program TRC (\$000)	\$ 124,744	\$ 94,000	\$ 30,744
Natural Gas Savings (103m3)	56,414	50,000	6,414
Participants	300	330	(30)
Direct Expenditures (\$000)	\$ 2,540	\$ 3,405	\$ (865)
TRC/\$ Spent	49.11	27.61	21.51

The 2007 TRC results in the distribution contract sector were 21% higher than 2006 and 33% higher than plan. In an effort to reach the overall TRC target of \$188 million, an aggressive target of \$94 million was set for this program. Although the number of custom project participants decreased over last year, the information gained from studies over the last several years has increased. This has led to a more informed decision making process by the customer ensuring that only the projects that maximised savings and minimized capital investment were carried through to implementation.

In 2007, a significant amount of work was completed with respect to the overall audit program. Even though the number of studies decreased, the average cost per study increased over this time period. There was an increased trend for specific engineering and process analysis to refine capital costs and determine potential savings. The increased study detail is required as the competition for capital investment continues to grow. Feasibility audits are an essential tool to ensure the future success and sustainability of the distribution contract sector.

Programs in the distribution contract market are not differentiated into new build and existing building as there is very little new build activity in this sector. All TRC benefits in this sector are the result of custom project activity and necessitated a positive TRC screening.

Program Framework

The following section outlines the programs available to distribution contract participants as well as the delivery methods utilized in 2007.

The EnergyWise programs were designed to achieve savings in boilers and process-specific energy applications, as well as space heating, water heating and the building envelope. These programs were marketed to large, volume contract-rate customers. Union's Account Managers marketed the programs 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. Their knowledge and ability to build positive relationships was critical to influencing the market and achieving successful implementation of the programs.

Table 6.2 shows the incentive guidelines for the 2007 distribution contract programs. Funding guidelines did not change from 2006 levels.

Table 6.2 – Program Incentives

Program Elements	2007 Incentive Guidelines
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
Equipment Incentive	10% up to \$30K
Demonstration of New Technologies	10% up to \$50K
Education and Promotion	Up to 100%

Boiler performance testing and steam plant audits

The Boiler Performance program was designed 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 CO2 impacts.

Engineering analysis and energy audits

The engineering analysis and energy audit program supported engineering feasibility studies and energy efficiency audits that included an analysis of natural gas equipment as well as electricity, compressed air, water and wastewater. The completed audit was used by Union to help customers formulate a priority list of energy efficiency projects geared to site-specific energy plans and budgets. Where appropriate, Union also assisted customers, manufacturers, and

installers in putting together a business case that the customer's technical staff could utilize to secure corporate capital funding for energy efficient equipment replacement and/or process changes.

Steam trap surveys

Steam Trap surveys were designed to reduce losses from steam distribution systems. The program worked to support steam trap surveys conducted by qualified service companies. The surveys identified leaking traps, over-sized or under-sized traps, and blocked or flooded traps, as well as assessing the need for improvements in condensate return systems. Many surveys are still being completed to determine the best practices for piping insulation and resultant savings potential.

Equipment incentives

Equipment incentives were available for eligible high-efficiency equipment installations, identified with or without an audit. In either case, Union provided the customer with third party cross-sector expertise in energy efficiency opportunities. The industrial trend over the past several years has been to reduce overhead costs and many companies lack in-house experts who can analyze potential projects. Union helped fill this gap, using its knowledge and reputation, as well as incentives, to influence equipment choices.

Union's role in promoting and implementing energy efficient choices continued to help companies control energy costs and remain competitive in a global environment.

Education and promotion

In 2007, Union invested considerably in educational and promotional tools to encourage participation in the distribution contract programs. Educational and promotional efforts included:

- EnergyWise brochures
- Enercase reports
- GasWorks newsletter
- 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 or government workshops

GasWorks is a technology newsletter designed to help support Union's energy efficiency and sustainability strategies. The focus is on technology and energy conservation solutions to help large users of natural gas to better manage their business. The newsletter contained valuable information on a variety of topics, as well as links to various tools, calculators, a large online library and the "Ask an Expert" service provided by Tech Resources. The design of the newsletter supported the "People Energy Partners" brand and allowed Union to market the EnergyWise program, with information linking to the Union's Website. There are over 1,100 individuals on the distribution list, and only three have opted out of the newsletter since its introduction in November of 2007.

Union created six different brochures, incorporating the theme "people, energy and partners" to assist with the education of distribution contract customers. The brochures were branded with the name "EnergyWise" and included the following topics:

- Equipment Incentives
- Aluminium Sector Opportunities

- Steam Savings
- Process Audits
- Commercial & Industrial Energy Conservation Programs
- Institutional Sector Opportunities

In addition four EnerCase brochures, outlined below, provide customer testimonials of a challenge they encountered and the solution Union helped to provide.

- Waste Heat Recovery
- High-Temperature Process Burners
- Integrated Energy Management
- Monitoring and Targeting

The covers of an EnergyWise and an EnerCase brochure are illustrated in Figure 6.1.

Figure 6.1 – Sample cover of an EnergyWise and an EnerCase brochure



Both the EnergyWise and EnerCase program brochures were highly successful in promoting Union’s energy efficiency programs to customers and facilitating partnerships within industry groups. The brochures and application forms were used as the basis to develop a Website page that also contains technology information, conversion calculations, and a series of links for additional references.

Technical presentations presented at customer meetings were archived and can be accessed at the Union Website. A customized email address was also setup to facilitate electronic transfer of project information.

Union also hosted several workshops throughout the year to promote the DSM program to distribution contract customers.

- “TAP Your Steam System Workshop” sessions were held in four different cities across Ontario
- The Great Lakes Industrial Control workshop, held in Sarnia, targeted the chemical and refinery industry
- Two workshops on Monitoring, Targeting & Reporting were held at the OHA (Ontario Hospital Association) meeting

- The forum on Energy Efficiency Improvement for Process Heating Systems in the Steel Industry was attended by 35 customers

DSM/EnergyWise programs were also promoted at IPE Windsor, IPE London, Northumberland Manufacturing Association (Energy Day) in Port Hope, and the NMA Annual Conference – 2008 “Improvement in Action... Together” in Colbourg.

Promoting the distribution contract energy efficiency programs in 2007 also included sponsoring and exhibiting in tradeshow and conferences. This included the AIST (Association for Iron and Steel Technology), CHES, Dofasco Energy/Health Fair, Excellence in Manufacturing conference, Canadian Boiler Society Tradeshow, IGUA (Industrial Gas User’s Association), Greenhouse Conference, Energy 2007 Conference, and the OAPPA.

In addition, Union’s Account Managers and Technical Project Managers also worked closely with different government efficiency, environmental and professional organizations including the Office of Energy Efficiency (OEE), the Canadian Industry Program for Energy Conservation (CIPEC), CANMET Energy Technology Centre, Conservation Bureau and Municipal Economic Development Coordinators.

6.1. 2007 Distribution Contract Program Results

As noted above, 2007 was a successful year for the distribution contract EnergyWise program, generating a net program TRC of \$124.7 million and 56.4 million in m³ savings with direct program spending of \$2.54 million.

The increase in volume savings achieved in this market continued as 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. The increased focus on facility audits also helped build the sustainability of savings in the distribution contract market.

Custom Project Analysis

All savings in the distribution contract sector are achieved exclusively through custom projects. As shown in Table 6.3, in 2007 there were 176 participants in the custom projects program, down 39% from 2006. The m³ savings achieved through custom projects were 6% higher in 2007 when compared to 2006.

Table 6.3 – Custom Project Savings Results

Distribution Contract Savings Results	Actual m3 Savings (000s)	% of Total m3 Results	Actual Participants	% of Total Participant Results
2006	52,984	100%	288	77%
2007	56,414	100%	176	58%

The average size of projects in this market increased as more mid to large size projects, which maximized savings associated with the capital expenditure, were completed. As the competition for capital continues to be tight, additional expertise and time is required, before projects are

approved and implemented in order to validate all the elements that contribute to the bottom line savings. Some of the elements requiring consideration include resources, maintenance, operations and for multi-faceted projects, natural gas, electricity and water savings need to be identified. These multi-faceted projects need to be initiated and completed in the upcoming year to sustain the savings achievements of the overall program.

As the distribution contract sector represents the largest amount of savings generated within the overall DSM program, it is prudent that Union evaluates the results appropriately. In 2007, Union continued with the custom project program verification study for distribution contract projects. The details behind this study can be found in the Verification and Evaluation section of this report.

Facility Audit Results

Facility audits continued as part of the EnergyWise program in 2007 with 77 studies at individual sites completed. Table 6.4 below shows that participation in the Boiler Audit program decreased 38% in 2007 but participation in the Feasibility Study program increased by 5%.

Table 6.4 – Facility Audit Participation

Program Participants	2007 Studies Completed	2006 Studies Completed	2005 Studies Completed
Feasibility Studies	59	56	29
Boiler Audits	18	29	23
Total	77	85	52

The facility audits program is very important in the distribution contract sector as funding to complete facility efficiency upgrades are often difficult to find. Many customers are unclear where to start evaluating their facility's potential for energy conservation. This is largely due to the fact that until recently, energy has been a small component of total production costs; therefore, in house expertise and executive interest in the matter was limited.

Feasibility studies work to effectively demonstrate the potential and cost savings associated with improving energy efficiency within a facility. The studies can be used to obtain appropriate internal support and allocate the necessary funding to implement one or more projects. These studies have proven to be essential to many of our customers who are putting capital-project requests forward to management for approval. Union must work with customers from start to finish; both identifying potential energy efficiency opportunities and helping to direct these projects through to implementation.

The existence of a feasibility study program is essential to driving savings in the future.

6.2. Program Costs

The actual direct budget expenditures in 2007 totalled \$2.5 million – 28% lower than 2006 levels and 11% under budget.

Table 6.5 – Distribution Contract Program Expenditures

Distribution Contract Direct Program Costs	Incentives (\$000)	Market Support (\$000)	Total (\$000)
2006	\$ 3,322	\$ 178	\$ 3,500
2007	\$ 2,247	\$ 293	\$ 2,540

Table 6.3 shows that a significant portion of spending in 2007 went to incentives, which were required to drive higher savings results. Custom project incentive guidelines were maintained at the 2006 level. The incentives impacted the project payback and, in turn, improved the competition for capital within the customer's organization. Offsetting the incremental costs of these projects has worked well in generating both participants and savings in the sector.

6.3. Lessons Learned

1) Union's Involvement Remains Critical

Many Distribution Contract customers are production focused and often lack the internal expertise to evaluate energy savings potential in their facilities. Union's Account Managers and Technical Project Managers play a critical role in helping to identify, implement, and validate energy efficiency options. In addition, Union's Technical Project Managers provide valuable technical advice, equipment performance testing and project assessment assistance.

Union must continue to work with participating customers and pursue new customers, to realize the savings potential of energy efficiency options.

2) Education is the Cornerstone

Union's focus on education with its customer continues to be the cornerstone to change perceptions and behaviour. Many customers turn to Union for training that is technically relevant and cost effective. In the future Union will look for additional opportunities to partner with other organizations and associations to promote education on energy efficiency options.

3) Continuous Improvement Processes Aid Energy Efficiency Adoption

The experience of Union's Account Managers shows that customers who have continuous improvement processes in place are more likely to support energy efficiency. Customers who already support the idea of continuous improvement in other areas of their business find it easier to adopt energy efficiency as a continuous improvement process.

4) Technical Resources Valued Over Incentives

Union's customers have stated that technical help was considered to be the greatest benefit of Union's program. Also important to Union's customers were incentives, which help to secure internal funding and capital cost reductions. As the focus on the environment and energy efficiency grows, the labour market for technical specialists will become very tight. It is imperative that Union actively recruit and train individuals for these key roles.

5) Employee Teams Are Having an Impact

Customers are starting to fully realize the benefits informing employee teams to achieve energy efficiency goals. Union has developed a whole section on its website to be used as an Employee

Team start-up reference. Those that have long-standing teams are starting to broaden the scope to include exploring overall sustainability goals.

6) Verification Processes

Given the timing constraints in the early spring, and the importance of verifying industrial custom projects, verification processes will be reviewed and amended as necessary.

6.4. Custom Project – TRC Benefits by Resource Type

A number of these projects also had multiple utility savings, including electricity and water, which also contributed to higher societal benefit 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.

Chart 6.2 – Custom Projects – Benefits by Resource Type

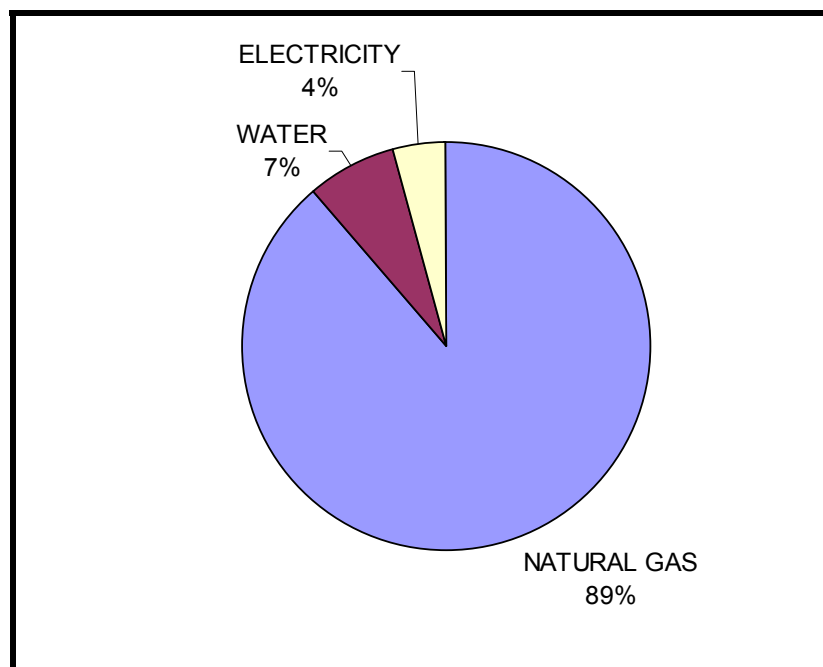


Chart 6.2 displays the adjusted TRC benefits, excluding cost by resource type as a percentage of total TRC benefits from custom projects in 2007

7. Market Transformation (Drain Water Heat Recovery)

Market Transformation (MT) was a new element agreed upon in the OEB's Generic Hearing for the 2007 – 2009 DSM Plan. Market Transformation was allocated a \$1 million dollar budget for 2007, increasing by 10% for each year within the three year plan. Market Transformation is unique from the other DSM portfolio programs as it is not required to drive TRC; however, it is expected to meet clear criteria, as shown in the approved Market Transformation Scorecard for 2007 (Table 7.1).

7.1 2007 Market Transformation Program Framework

Union Gas selected the Drain Water Heat Recovery (DWHR) as the technology central to the Market Transformation (MT) portfolio. It was deemed important by the EAC and Union that MT initiatives be significant and sustained until the market has been successfully transformed (i.e. ideal state being code or standard change), or market dynamics altered. DWHR in the new build market was selected as the MT focus for 2007. The technology was selected as it was relatively new to the market and awareness and availability was nonexistent. The new build market was seen as an excellent target market as it is well defined in terms of size and provided a solid opportunity for increasing the technology's penetration.

To achieve increased technology penetration and awareness in the marketplace the program focused on residential builders and contractors. Union provided training and incentives to those builders and contractors who installed the drain water heat recovery units in their new homes. Union Gas worked collaboratively with retail companies, and a DWHR manufacturer to provide effective education and program initiatives. The program was evaluated against a scorecard approach approved through the OEB's Generic Hearing. The MT scorecard tracked results against a number of different metrics to measure program performance.

These metrics included:

- the number of builders participating in the program
- the number of units installed through the program
- customer & builder awareness of technology
- contractor education

Union undertook baseline research to understand the awareness in the marketplace of key stakeholders in the new home construction field – Builders and Residential Customers. The baseline awareness levels for Builders and Customers were 31% and 12% respectively. In addition, only 12% of Builders already offered DWHR as an option to their customers.

Second, Union planned a number of educational seminars through EnerQuality and the Ontario Home Builders Association to raise awareness of the DWHR technology to Builders. Union also had a presence at several Trade/Builder Shows. In addition, Union ensured that it addressed the potential barrier to technology penetration with education aimed at the contractors (specifically plumbers) utilized by participating Builder partners. Four contractor education sessions were held in total at various locations in South Western Ontario.

Lastly, and most importantly 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 \$450/DWHR unit to the Builder upon confirmation of installation. Furthermore, if the Builder installed within 10% of the committed number of units in

2007 they received a bonus per unit. Each Builders signed commitment letters at the outset of the program to establish their committed unit target.

Figure 7.1 – An advertisement providing exposure to participating builders

Builders Make a Difference

Union Gas Ltd. would like to acknowledge the following builders for committing to install a total of 630 drain water heat recovery units into their new homes:

BK Cornerstone	Palumbo Homes
Boer Homes	Reid's Heritage Homes
Caraco Development	Ruscio Construction
Churchill Homes	Stalwood Homes
Dave VanElslander	Wm J. Ross Construction
Denmar Construction	Z Group
Dominion Parc Homes	Zavarella Construction
Dor-Ann Homes	
Eastforest Homes	
Ed Debusschere Custom Homes	
Eden Homes	
Emerald Homes	
Empire Communities	
Ewald Homes	
French's Fine Homes	
Centrac Homes	
Gilles Michaud Construction	
Hayhoe Homes	
J. Corsi Developments Inc.	
Lakepointe Homes	
Losani Homes	
L.S. Bock Development Inc.	

Drain Water Heat Recovery Benefits*

- ✓ Saves customers 40% or more on water heating costs.
- ✓ Reduces greenhouse-gas emissions.
- ✓ Easy to install.

* Emissions may vary based on individual hot water use, fluctuating energy costs and installation variables.

Builders are making a big difference for our environment by doing the little things better.

Congratulations for making improvements to your homes that will reduce over 378 tonnes of greenhouse gas emissions every year!† This equates to the removal of 420 cars from the road.

† Assuming occupancy of three people per house. Typical drain water heat recovery units will reduce greenhouse gas emissions by approximately 200 kg/person/year when they are displacing natural gas water heating.

www.uniongas.com/dwhr

uniongas
A Spectra Energy Company

7.2 2007 Market Transformation Program Results

The MT Scorecard listed in Table 7.1 outlines the results achieved in the MT program during 2007.

Table 7.1 – 2007 Market Transformation Scorecard Results

Element	Indicator (weighting)	50%	100%	150%	Actual Outcome	Result	Score
ULTIMATE OUTCOMES	Builder's Enrolled (25)	4	8	12	20	150%	75/50
	Units Installed (25)	250	500	750	906	150%	
MARKET EFFECTS (Research)	Customer Awareness Survey (10)	5%	10%	n/a	25%	150%	29/30
	Builder Knowledge Survey (10)	25%	50%	n/a	87%	100%	
	Builder Promotion (10)	50%	100%	n/a	92%	92%	
PROGRAM PERFORMANCE (Training/Awareness Building)	Builder Training Workshop (7.5)	1	3	5	5	150%	25/20
	Contractor/Sub-contractor Workshop (7.5)	1	3	5	4	100%	
	Trade Show / Builder Show (5)	1	2	3	2	50%	
Total Score							129/100

The score listed at the bottom right shows that overall Union exceeded its 100% target and therefore achieved the maximum MT incentive payout. In more descriptive terms Union undertook the following to promote DWHR to Builders and Customers:

- Promoted and educated stakeholders using the following:
 - Union Gas Website
 - Two targeted brochures – one for consumers and one for Builders (see Figure 7.2)
 - Press releases
 - Co-branded marketing material with various partnering Builders
- Participated as an exhibitor in the following:
 - ASHRAE Conference in April
 - OHBA annual conference in September
 - Construct Canada in November
- Facilitated the following:
 - Contractor training sessions
 - ENERGY STAR® for New Homes workshops
 - Home Builder Association (HBA) meetings
 - A builder focus group to aid in future program design

Figure 7.2 – 2007 Market Transformation Promotional Materials



Lost:
Reusable heat going down the drain

Found:
Energy savings one shower at a time

Union Gas and Mattamy Homes are proud to bring you energy savings through **Drain Water Heat Recovery**. Your new home contains a simple device that saves up to 30 percent on water heating costs.

How does it work?
This innovative technology is simple, long-lasting and has no moving parts to break down. The cold water coming into your house runs through a series of coils that are tightly wrapped around your drain stack. When you shower, the hot water that is going down the drain transfers its heat through the copper walls of the drain water heat recovery unit to warm the fresh water before it goes into your water heater. The heat is transferred, but the drain water never mixes with the fresh water. Simply put, drain water heat recovery helps your water heater use less energy.

Benefits

- Reusing heat, instead of letting it go down the drain, saves energy and reduces greenhouse gas emissions. It's smart and environmentally responsible.
- It keeps you from running out of hot water while showering.
- It's maintenance-free.

Committed to Conservation
Union Gas and Mattamy Homes have partnered to bring you drain water heat recovery in your new home as part of their commitment to conservation.

For more information, go to: uniongas.com/energyefficiency | mattamyhomes.com

7.3 2007 Market Transformation Program Costs

Union budgeted \$1 million dollars within its 2007 Plan for MT activity. Union spent \$770 thousand, under spending by about \$230 thousand. 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.

7.4 Lessons Learned

1) DWHR continued support required

Union is well on its way to helping transform the marketplace with respect to DWHR. However, much work is still to be done. Union believes it is necessary to continue with a large scale DWHR effort in 2008, and likely in 2009 as well. A new MT Scorecard has been developed for 2008 and is attached as Appendix H.

2) Timing of Scorecard Development

Union will work in collaboration with its Evaluation and Audit Committee to have a 2009 Market Transformation scorecard developed before the close of 2008. Union will work to establish an appropriate point at which to move away from a Market Transformation program to a resource acquisition based program model for DWHR.

8. Verification and Evaluation – 2007 Results

In order for Union to provide assurance to the accuracy of claimed savings, several verification studies are undertaken 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.

Related research is also completed to allow Union to better understand the overall impacts and benefits that specific programs provide our customers.

8.1. Residential Verification Studies

Union undertook two verification studies on 2007 residential programs to ensure the savings claimed were accurate. Union also used the collected information to assess areas of program success and areas for potential improvement.

Table 8.1 lists the residential verification studies undertaken for 2007.

Table 8.1 – Summary of Project Audits for Residential Programs

Program	Title	Source	Objective
ESKs – Union Direct and HVAC Partnership	Final Report Following an Audit in 2007 of the Union Gas ESK- Residential Initiative	Beslin Communications Group Inc.	<ul style="list-style-type: none">- Verify product installation- Gauge customer satisfaction with equipment- Gauge performance of Channel Partners in delivery of products and ESK info.
ESKs – Home Depot	Final Report Following an Audit in 2007 of the Union Gas ESK- Home Depot Initiative	Beslin Communications Group Inc.	<ul style="list-style-type: none">- Verify product installation- Gauge customer satisfaction with equipment- Determine reasons why customer did not install products

The results of these evaluations summarized below.

8.1.1. 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 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 8.2 and Table 8.3.

Table 8.2 - Adjustment Factors – Union Gas Direct and HVAC

ESK	Measure Verified Installed	Measure Remained Installed	Adjustment Factor
Low Flow Showerhead	71%	97%	68.9%
Kitchen Faucet Aerators	61%	94%	57.3%
Bathroom Faucet Aerators	48%	95%	45.6%
Pipe Wrap	70%	99%	69.3%

Table 8.3 - Adjustment Factor - Home Depot

ESK	Measure Verified Installed	Measure Remained Installed	Adjustment Factor
Low Flow Showerhead	77%	95%	73.2%
Kitchen Faucet Aerators	72%	92%	66.2%
Bathroom Faucet Aerators	56%	96%	53.8%
Pipe Wrap	77%	99%	76.2%

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.

8.2. 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.

For 2007, upon recommendation from the Evaluation and Audit Committee (EAC), Union jointly with Enbridge Gas Distribution (EGD) contracted Summit Blue Consulting to develop an appropriate sample design for the annual engineering review of custom DSM projects. The development of this sample methodology was 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.

8.2.1 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 M. Due to differences across customers and project types, the commercial sector was stratified by building type with a separate stratum for retrofit projects due to their large energy savings. The population in the both the new building sector and agriculture sector were statistically insignificant (collectively representing ~ 1.4% of

total commercial custom project net m³ savings) and therefore, samples were not drawn from these two sectors. Table 8.4 summarizes the commercial sector sample selected based on the size and strata recommended in the report.

Table 8.4 - Commercial Sector Custom Project Sample Selected for Verification

Sample Size	Strata	Net M ³ Gas Savings	% of savings of Total Net m ³ Savings	Total Commercial Sector 2007 Net m ³ Savings
3	Strata C-1 (largest projects)	1,112,812	14.1%	-
9	Strata C-2 (Sample of Retrofit)	297,059	3.8%	-
8	Strata C-3 (Sample of Multi)	131,628	1.7%	-
20	Total	1,541,499	19.6%	7,879,155

*The Commercial Agriculture & New Building sectors were not stratified for the sample as they collectively represented ~1.4% of the total Commercial Custom Project Net m³ savings.

Summit Blue recommended a paper review study for the verification of savings results for 20 commercial projects.

The deliverables of the paper verification studies include:

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

Engineering reviews were conducted by Jacques Whitford on 20 sample projects representing over 19% of the total net m³ natural gas commercial custom project savings.

The results of the Commercial project verification study are shown in Table 8.5 below.

Table 8.5 – Commercial Custom Project Verification Study Results

	Commercial		
	Claimed Savings	Audited Savings	
Natural Gas Savings	2,219,545	2,201,039	m3/yr
Water Savings	95,981,184	80,500,087	liters/yr

Nexant calculated the realization rate for commercial custom projects as 97.92% across all three strata identified in table 8.4 above. The realization rates were not applied in 2007.

8.3. Distribution Contract Custom Project Verification Study

The Summit Blue recommended sample size and stratification were based on the Industrial projects completed in 2007. The industrial sector was stratified by size of project. Table 8.6 summarizes the industrial sectors randomly selected sample based on the three strata recommended in the report.

In completing this work, Union is looking to validate whether or not the claimed savings reported through the custom projects process are accurate.

Table 8.6 Union Gas Sample Plan

Sample Size	Sector	Strata	Savings	% of savings of Total Net m ³ Savings	Total Distribution Contract Sector 2007 Net m ³ Savings
2	Industrial	Strata I-1 (Census of largest projects)	20,917,459	36%	-
3		Strata I-2 (Sample)	5,650,872	10%	-
3		Strata I-3 (Sample)	554,098	1%	-
10	Total		27,122,429	47%	57,330,659

For 2007, Summit Blue selected ten custom projects from the distribution contract sector for the verification study, based on the methodology outlined in Appendix M.

The objectives of the verification studies include:

- To determine whether savings calculations in the application were reasonable based on information available at time made
- To review the assumptions used in calculations
- To discuss variations between projected savings and measures savings
- To verify that the equipment installation was completed at site
- To review the confidence interval levels achieved in the results and statement of errors for calculations

The on-site verification studies are currently being conducted by Diamond Engineering. The ten randomly selected projects represent over 47% of the total net m³ natural gas savings of all Distribution Contract custom projects.

The results of the Distribution Contract project verification study are shown in Table 8.7 below.

Table 8.7 – Commercial Custom Project Verification Study Results

	Distribution Contract		
	Claimed Savings	Audited Savings	
Natural Gas Savings	38,746,335	38,144,437 - 39,587,185	m3/yr
Water Savings	265,248,190	229,736,527 - 237,199,200	liters/yr
Electricity Savings	5,025,391	5,029,551 - 5,213,818	kWh/yr

Nexant calculated the realization rate for distribution contract custom projects as 114.32% across all three strata identified in table 8.4 above. The realization rates were not applied in 2007.

9. 2007 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 to one-third of the measures for each year of the plan.

Union undertook evaluation research for 2007 based on the information filed in the 2007 – 2009 DSM Plan and developed in consultation with the Evaluation and Audit Committee. Union partnered with Enbridge Gas Distribution in 2007 and early 2008 to complete the evaluation research priorities detailed in Table 9.1.

Table 9.1 – 2007 Evaluation Research Measure Priorities

Free Rider & Spillover Research	Deemed Savings Research
Low flow Showerheads	Low flow Showerheads
Low flow Aerators	Low flow Aerators
Programmable Thermostats – Residential	Programmable Thermostat - Residential
High Efficiency Furnaces – Residential	
Custom Projects – Commercial	
Custom Projects - Industrial	

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

- Deemed Savings Residential Prescriptive Measures
- Custom Project Free Rider (Draft version)
- Free Rider & Spillover Residential Prescriptive measures

The final results of the Evaluation Research are reflected in Appendix J – L inclusive.

The adjustments to LRAM input assumptions based on the results from these studies are included in Appendix A. The LRAM calculation incorporates the results from these studies

The prioritization of the remaining measures to be evaluated in 2008 and 2009 is currently under consultation with the EAC. The final 2008 list will be filed with the OEB in July 2008.

10. 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:

$$\sum(\text{Rate Class Volume Reduction} \times \text{2007 Delivery Rate}) = \text{LRAM Claimed}$$

For 2007, the year one⁵ LRAM amount is \$0.767 million based on 2007 delivery rates and natural gas savings of 55.8 million m³. The 2007 LRAM statement is detailed in Table 10.1 below.

Table 10.1 - 2007 LRAM Statement

UNION GAS LIMITED						
Lost Revenue Adjustment Mechanism						
2007 Audited Forecast						
Line No.	Particulars	Net Volume Savings 10 ³ m ³	2007 Lost Volumes in 2007 Rates 10 ³ m ³	Annualized Impact		
				2007 Delivery Rate \$/10 ³ m ³	2007 Revenue Impact (Total LRAM) (\$)	2007 Revenue Impact (LRAM Variance) (\$)
		(a)	(b)	(c)	(d) = (a) x (c)	(e) = [(a) - (b)] x (c)
<u>South</u>						
1	M2 Residential	4,662	5,232	61.01	284,434	-34,770
2	M2 Commercial	10,659	20,096	50.736	540,814	-478,776
3	M2 Industrial	732	2,021	40.168	29,390	-51,789
<u>Industrial</u>						
4	M4	3,730	17,681	9.291	34,655	-129,619
5	M5	638	0	15.631	9,974	9,974
6	M7	4,283	6,840	3.344	14,321	-8,552
7	T1	16,582	10,944	0.798	13,232	4,499
8		<u>41,285</u>	<u>62,814</u>		<u>926,820</u>	<u>-689,034</u>
<u>North</u>						
9	Residential 01	943	2,197	112.971	106,559	-141,638
10	Commercial 01	1,440	1,048	105.147	151,398	41,204
11	Commercial 10	1,355	2,066	66.749	90,415	-47,489
12	Industrial 10	3,997	237	61.265	244,885	230,365
<u>Industrial</u>						
13	Rate 20	652	7,845	2.877	1,874	-20,696
14	Rate 100	6,181	12,312	2.102	12,992	-12,888
15		<u>14,567</u>	<u>25,705</u>		<u>608,124</u>	<u>48,859</u>
16	Total	<u>55,852</u>	<u>88,519</u>		<u>1,534,944</u>	<u>-640,175</u>
17	Year One Impact ⁽¹⁾				<u>767,472</u>	<u>-320,088</u>

(1) Year One is calculated as 50% of the total

*This does not include interest

⁵ In RP-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.

The 2007 LRAM statement has been prepared using a combination of the measure input assumptions agreed to by the Board in EB-2006-0021 Decision with Reasons and the best available information outlined in our evaluation priority studies. These assumptions are detailed in Appendix A. LRAM results by measure are shown in Appendix D.

The net TRC value using the LRAM input assumptions (i.e. best available information) and 2007 avoided costs is \$120,013,936.

11. Shared Savings Mechanism (SSM)

For 2007, 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.

Union's net TRC calculation for 2007 is shown in Table 11.1.

Table 11.1 – 2007 Net TRC Calculation

New Home Construction	\$ 215,394	
Home Retrofit	\$ 36,007,616	
Low Income	\$ 6,386,242	
Residential Program Costs	\$ (1,545,691)	
Total Residential TRC		\$ 41,063,561
New Building Construction	\$ 2,544,049	
Building Retrofit	\$ 54,269,714	
Commercial Program Costs	\$ (480,236)	
Total Commercial		\$ 56,333,527
Distribution Contract	\$ 125,036,439	
Distribution Contract Program Costs	\$ (292,685)	
Distribution Contract		\$ 124,743,754
Program TRC		\$ 222,140,842
Salaries and Wages and Admin	\$ (3,625,782)	
Research and Evaluation	\$ (919,120)	
Overhead	\$ (1,700,000)	
O&M Expenditures		\$ (6,244,902)
NET TRC		\$ 215,895,940

Union's TRC target for 2007 is \$188 million, which results in the following SSM calculation:

$$\begin{aligned}
 \text{SSM} &= \{[(\text{Net TRC} - (\text{Range End Percentage} \times \text{Target TRC})) / (\text{Payout Increment Percentage} \times \text{Target TRC})] \times \text{Incremental Payout}\} + \text{Base Payout} \\
 &= \{[(\text{Net TRC} - (75\% \times \$188,000,000)) / (0.1\% \times \$188,000,000)] \times \$10,000\} + \$2,250,000 \\
 &= \{[(\$215,895,940 - \$141,000,000) / \$188,000] \times \$10,000\} + \$2,250,000 \\
 &= \$398.39 \times \$10,000 + \$2,250,000 \\
 &= \mathbf{6,233,827}
 \end{aligned}$$

The TRC breakdown by measure is included in Appendix E.

The SSM breakdown by rate class is shown in Table 11.2 below.

Table 11.2 – 2007 SSM by Rate

<p style="text-align: center;"><u>UNION GAS LIMITED</u> Shared Savings Mechanism 2007 Audited Results</p>		
Line No.	Particulars	Amount ⁽¹⁾ (\$)
	<u>South</u>	
1	M2 Residential	1,028,757
2	M2 Commercial	1,272,305
3	M2 Industrial	59,414
4	<u>Industrial</u>	
5	M4	457,084
6	M5	48,770
7	M7	473,084
8	T1	1,394,684
9		<u>4,734,098</u>
	<u>North</u>	
10	Residential 01	191,600
11	Commercial 01	110,048
12	Commercial 10	96,589
13	Industrial 10	350,627
	<u>Industrial</u>	
14	Rate 20	74,222
15	Rate 100	676,644
16		<u>1,499,729</u>
17	Total	<u><u>6,233,827</u></u>
<u>Notes:</u>		
(1)	The allocation is based on 2007 TRC results achieved by rate class.	

12. 2008 Section

The primary purpose for this Evaluation Report is the review of the 2007 outcomes. The secondary purpose is to establish targets and assumptions for 2008. This section focuses on the items that need to be considered for 2008.

The new TRC target for 2008 takes form based upon the 2007 results as outlined in the 2007 - 2009 DSM Plan. In addition, new measures to the 2008 DSM portfolio need to be filed with the OEB. In order to ensure adequate time for review by the EAC, Union will file new or amended 2008 input assumptions with the Board within the allowable months grace after the June 30 deadline.

1. Target Setting

In EB-2006-0021 Decision with Reasons, the approach to determining annual TRC is explained.

“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.”

Union has developed market segment targets that ensure each target is represented appropriately while optimizing the actual TRC per dollar spent. Based upon the 2008 TRC target outlined above, the following targets have been set by sector:

Union has set the 2008 target on the LRAM TRC. If Union changes its free rider input assumptions for Commercial and Industrial Custom Projects for use in its 2008 SSM claim, then it will recalculate the 2008 target based on those new free rider inputs assumptions.

2008 TRC Target

2007 Net TRC Target	Actual 2007 Net TRC with 2007 Input Assumptions ¹	Actual 2007 Net TRC with 2007 LRAM Input Assumptions 2008 Avoided Costs ²	2008 Net TRC Target
(mil TRC)	(mil TRC)	(mil TRC)	(mil TRC)
(a)	(b)	(c)	(a) + (c) / 2 * 15%
\$188.0	\$215.9	\$125.3	\$180.1

**New 2008 Target Calculated on June 29 using best available information*

Notes:

1) Actual 2007 TRC with 2007 SSM Input Assumptions and 2007 Avoided Costs

2) 2007 TRC with LRAM Input Assumptions with 2008 Avoided Costs

2. Generic Hearing Phase II updated Input Assumptions

Revised and Additional Measure Inputs from the Generic Phase II Hearing

Union Gas will continue to work with its Evaluation and Audit Committee in order to file agreed upon input assumptions not already addressed within this Evaluation Report but relevant for 2008, before the end of July.

The following measures and identified input assumptions will be deleted, amended or added as appropriate relative to the Phase II Generic Hearing (EB-2006-0021).

- Delete residential new construction basement insulation
- Delete the Energy Star Homes inputs (based on old Ontario Building Code and Energy Star standards)
- Delete new construction high efficiency furnace
- Delete EnerGuide for New Houses
- Amend unit savings for new construction programmable thermostat
- Delete Energy Star clothes washing machine values
- Amend ECM furnace free ridership
- Amend aerators savings
- Amend replacement furnace free riders
- Add definition of custom boiler baseline rules/process
- Delete Home Rewards

- Amend showerheads for all cases (incl multi-res)
- Amend residential programmable tstat
- Add custom measure lives
- Amend commercial HEF FR rates for furnaces
- Amend pre-rinse spray nozzle savings
- Add HRV/ERV
- Add Energy Star inputs (based on the variance between the new Ontario Building Code and Energy Star standards)
- Add destratification fans

3. 2008 Market Transformation

DWHR Program Description

Union will work to engage builders and customers through efforts outlined in the market transformation plan. A description of each of the program activities is provided below.

New Build Market

In the second year of the program, Union will target 30 key builders to install 1500 DWHR units in new homes. This target represents a 66% increase from last years installed units. To build interest among new home builders, financial incentives will be provided to builders to promote the inclusion of DWHR equipment as an option in their homes. In cases where rental programs are the preferred option, Union will look to provide an incentive to both the builder and the home buying customer.

Union will seek to increase consumer and builder awareness of DWHR through educational and awareness campaigns and activities. Educational and awareness campaigns and activities may include:

- Marketing materials explaining the benefits of DWHR which are made available for distribution at builder industry and home show events, direct to builders through our account managers and for use by builders in their model homes.
- Direct mail campaign to all builders in the Union Gas franchise highlighting the benefits of DWHR.
- Sponsorship and presence at various builder industry shows and home shows which allows us the opportunity to speak one-on-one with builders and new home buyers.
- Union will conduct DWHR workshops to train builders in effectively marketing the value of the DWHR technology to new home buyers. This training will give builders and sales agents the ability to convey the benefits of the technology to potential home buyers.
- Advertising in trade magazines with high builder readership levels.
- Develop strategic partnerships with Direct Energy and Reliance Home Comfort to further our reach to builders and to provide them with a rental option.

In subsequent years of the program, as customer awareness increases and DWHR becomes a standard builder option Union will shift the financial incentive from the builder directly to the customer.

Retrofit Program (monitor only)

In an effort to reach-out and test the Retrofit market, Union will conduct a small program targeted at existing home owners. Although the main focus on the DWHR program is on the New Build Market, Union feels it's important to start understanding the Retrofit market in order to build a full-scale program in subsequent years. This program will be a monitor-only program and will not count towards our scorecard earnings.

Union will partner with a strategic big-box retailer partner and offer a financial incentive to existing home owners in a small test area of the Union franchise area.

Metrics Description:

- a. Builders Enrolled – The number of builders participating in the second year of the DWHR market transformation program. The 100% target for this metric is 30 builders.
- b. Units Installed – The number of units installed as a result of the market transformation program. The 100% target for this metric is 1500 units installed.
- c. Customer Awareness Survey – The percent increase of customer awareness and knowledge of DWHR relative to the survey results. The 100% target for this metric is an increase in general customer awareness and knowledge of DWHR to 21%.
- d. Builder Awareness Survey – The percent increase in builder awareness and knowledge of DWHR relative to the survey results. The 100% target for this metric is an increase in builder awareness and knowledge of DWHR to 70%.
- e. Builder Promotion – The percent increase in builder promotion of DWHR to potential home buyers relative to promotion levels determined from 2007 builder surveys and discussions with builders on current promotion practices and available information to potential home buyers. The 100% target for this metric is an increase to 33% builder promotion.
- f. Units installed Retrofit - number of units retrofitted into existing homes as a result of the market transformation Retrofit program. We expect a minimal number of units installed through this program in 2008. The units will not contribute to our scorecard value and will be a “monitor only” metric.

The new MT Scorecard has been developed for 2008 and is attached as Appendix H.

4. 2008 Avoided Costs

The Avoided Costs for 2008 are attached as Appendix I.

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

Measure	SSM							
	Input Assumptions Per Unit of Measure							
Measure	Natural Gas Savings (m³)	Electricity Savings (KWh)	Water Savings (Litres)	Incremental Cost (\$)	Equipment Life (Years)	Adjustment Factor	Free Rider Rate	Source*
New Home Construction								
Energy Star for New Homes	818	1000	-	\$3,020	25	-	5%	1
Home Retrofit								
ESK Kitchen Faucet Aerators - Home Depot	14	-	6,520	\$2	10	60.0%	10%	2
ESK Bath Faucet Aerators - Home Depot	14	-	6,520	\$2	10	60.0%	10%	2
ESK Pipe Insulation - 2 m - Home Depot	17	-	-	\$1	15	76.2%	4%	2
ESK Showerhead - Low Flow - Home Depot	91	-	19,354	\$5	10	73.2%	17.5%	2
ESK Kitchen Faucet Aerators - RAM Delivered	14	-	6,520	\$2	10	51.5%	10%	2
ESK Bath Faucet Aerators - RAM Delivered	14	-	6,520	\$2	10	51.5%	10%	2
ESK Pipe Insulation - 2 m - RAM Delivered	17	-	-	\$1	15	69.3%	4%	2
ESK Showerhead - Low Flow - RAM Delivered	91	-	19,354	\$5	10	68.9%	17.5%	2
Low Income - Kitchen Faucet Aerators	14	-	6,520	\$3	10	-	1%	1
Low Income - Bath Faucet Aerators	14	-	6,520	\$3	10	-	1%	1
Low Income - ESK Pipe Insulation - 2 m	17	-	-	\$4	15	-	1%	1
Low Income - ESK Showerhead - Low Flow	115	-	30,966	\$15	10	-	5%	1
Low Income - Thermostat - Programmable	212	100	-	\$90	18	-	1%	1
Furnace - High Efficiency - HVAC	385	-	-	\$650	18	-	48%	1
Furnace - High Efficiency - Direct to Consumers	385	-	-	\$650	18	-	48%	1
Thermostat - Programmable	212	100	-	\$65	18	77.7%	11%	1
New Building Construction								
Condensing Boiler - up to 1499 MBtu/h	quasi	-	-	quasi	25	-	5%	3
ERV - up to 10000 cfm	quasi	-	-	quasi	15	-	5%	3
HRV Heat recovery ventilator	quasi	-	-	quasi	15	-	5%	3
Infrared Heating	quasi	-	-	quasi	20	-	33%	3
Rooftop Unit	1275	-	-	\$1,250	20	-	5%	1
DCKV - Fast Casual (<5000 CFM)	3,658	7,319	-	\$5,000	20	-	5%	3
DCKV - Full Menu (5000 - 9999 CFM)	9,535	23,180	-	\$10,000	20	-	5%	3
DCKV - Dinner House (10000 - 15000 CFM)	17,455	40,929	-	\$15,000	20	-	5%	3
Custom Projects	Actual	Actual	Actual	Actual	Actual	-	30%	1
Measure	SSM							
	Input Assumptions Per Unit of Measure							
Measure	Natural Gas Savings (m³)	Electricity Savings (KWh)	Water Savings (Litres)	Incremental Cost (\$)	Equipment Life (Years)	Adjustment Factor	Free Rider Rate	Source*
Existing Buildings Program								
Condensing Boiler - up to 1499 MBtu/h	quasi	-	-	quasi	25	-	5%	3
ERV - up to 10000 cfm	quasi	-	-	quasi	15	-	5%	3
HRV Heat recovery ventilator	quasi	-	-	quasi	15	-	5%	3
Infrared Heating	quasi	-	-	quasi	20	-	33%	3
Rooftop Unit	1275	-	-	\$1,250	20	-	5%	1
High Efficiency Furnace	459	-	-	\$650	18	-	18%	1
Enhanced Furnace (Up to 299 Mbtu/h) - NG	459	-	-	\$650	18	-	30%	1
Enhanced Furnace (Up to 299 Mbtu/h) - Elec.	-78	873	-	\$550	18	-	10%	1
Thermostat - Programmable	519	921	-	\$65	18	-	20%	1
DCKV - Fast Casual (<5000 CFM)	3,658	7,319	-	\$5,000	20	-	5%	3
DCKV - Full Menu (5000 - 9999 CFM)	9,535	23,180	-	\$10,000	20	-	5%	3
DCKV - Dinner House (10000 - 15000 CFM)	17,455	40,929	-	\$15,000	20	-	5%	3
Low Flow Showerhead	115	-	30,966	\$15	10	-	10%	1
Low Flow Kitchen Aerator	14	-	6,520	\$3	10	-	10%	1
Low Flow Kitchen Aerator	14	-	6,520	\$3	10	-	10%	1
Low Flow Pre-Rinse Nozzle	3,059	-	544,145	\$100	5	-	5%	1
Custom Projects	Actual	Actual	Actual	Actual	Actual	-	30%	1
Distribution Contract Market								
Custom Projects	Actual	Actual	Actual	Actual	Actual	-	30%	1

LRAM			
Input Assumptions Per Unit of Measure			
Natural Gas Savings (m3)	Adjustment Factor	Free Rider Rate	Source*
818	5%		
11	60.0%	33%	5 & 6
6	60.0%	33%	5 & 6
17	76.2%	4%	
4	73.2%	17.5%	5 & 6
11	51.5%	33%	
6	51.5%	33%	5 & 6
17	69.3%	4%	
4	68.9%	17.5%	5 & 6
11		1%	6
6		1%	6
17		1%	
4		5%	6
152		1%	6
385		68%	5
385		68%	5
152	77.7%	43%	5 & 6
quasi		5%	
quasi		5%	
quasi		5%	
quasi		33%	
1,275		5%	
3,658		5%	
9,535		5%	
17,455		5%	
Actual		variable	4

LRAM			
Input Assumptions Per Unit of Measure			
Natural Gas Savings (m3)	Adjustment Factors	Free Rider Rate	Source*
quasi		5%	
quasi		5%	
quasi		5%	
quasi		33%	
1,275		5%	
459		18%	
459		30%	
78		10%	
519		20%	
3,658		5%	
9,535		5%	
17,455		5%	
4		10%	6
11		10%	6
6		10%	6
3,059		5%	
Actual		variable	4
Actual		variable	4

* Source of assumptions:

1. Phase 2 of DSM Generic Hearing; 2. Input Assumptions: Phase 2 of DSM Generic Hearing, Adjustment factors: 2007 Beslin Verification Studies; 3. 2007-2009 Union Gas Approved DSM Plan
4. Summit Blue Custom Free Rider Study - by sector; 5. Summit Blue Residential Prescriptive Free Rider study; 6 Summit Blue Residential Deemed Savings study

Appendix B – 2007 Results Breakdown

RESIDENTIAL TRC BREAKDOWN BY PROGRAM	Actual 2007 Results		2007 Plan		Variance Actual vs Plan	
	Participants	TRC (\$)	Participants	TRC (\$)	Participants	TRC (\$)
<u>NEW HOME CONSTRUCTION</u>						
Energy Star for New Homes	396	215,394	200	108,785	196	106,609
<u>HOME RETROFIT</u>						
ESK Faucet Aerators - 3rd Party	33,784	1,832,959	30,000	1,649,257	3,784	183,702
ESK Pipe Insulation - 2 m - 3rd Party	16,892	474,126	15,000	424,444	1,892	49,682
ESK Showerhead - Low Flow - 3rd Party	16,892	4,008,012	15,000	3,575,705	1,892	432,307
ESK Faucet Aerators - RAMs Delivered	102,054	4,723,677	30,000	2,152,372	72,054	2,571,305
ESK Pipe Insulation - 2 m - RAMs Delivered	51,027	1,297,573	15,000	546,032	36,027	751,541
ESK Showerhead - Low Flow - RAMs Delivered	51,027	11,386,605	15,000	4,729,458	36,027	6,657,147
Furnace - High Efficiency - HVAC	14,814	3,054,412	10,000	2,061,841	4,814	992,570
Furnace - High Efficiency - Direct to Consumers	10	2,062	4,000	824,737	-3,990	-822,675
Energy Star Clothes Washers	0	0	200	36,351	-200	-36,351
Thermostat - Programmable - HVAC	14,018	5,683,191	5,000	2,692,669	9,018	2,990,522
Thermostat - Programmable - Direct to Consumers	8,744	3,545,001	15,000	8,078,007	-6,256	-4,533,006
TOTAL HOME RETROFIT	309,262	36,007,618	154,200	26,770,873	155,062	9,236,745
<u>LOW INCOME</u>						
Low Income - ESK Bath Aerators	6,519	650,583	6,000	598,788	519	51,795
Low Income - ESK Kitchen Aerators	6,363	635,014	6,000	598,788	363	36,227
Low Income - ESK Pipe Insulation - 2 m	6,442	227,464	6,000	211,857	442	15,607
Low Income - ESK Showerhead - Low Flow	7,338	3,960,604	6,000	3,238,434	1,338	722,171
Low Income - Thermostat - Programmable	1,590	913,126	4,000	2,297,173	-2,410	-1,384,047
TOTAL LOW INCOME	28,252	6,386,792	28,000	6,945,039	252	-558,247
TOTAL RESIDENTIAL TRC	337,910	42,609,803	182,400	33,824,697	155,510	8,785,106
O&M PROGRAM COSTS (includes \$365K Market Transformation)		-1,545,691		-2,051,000		
NET RESIDENTIAL TRC		41,064,112		31,773,697		9,290,415
<u>COMMERCIAL TRC BREAKDOWN BY PROGRAM</u>						
<u>NEW BUILDING CONSTRUCTION</u>						
Condensing Boiler - quasi-prescriptive	27	299,694	80	1,263,496	-53	-963,802
ERV - quasi-prescriptive	263	709,827	60	819,468	203	-109,641
HRV - quasi-prescriptive	29	150,351	75	343,329	-46	-192,978
Infrared Heating - quasi-prescriptive	100	267,517	500	1,061,389	-400	-793,872
Rooftop Unit	35	78,981	75	169,245	-40	-90,264
DCKV_Fast Casual (<5000 CFM)	0	0	4	47,874	-4	-47,874
DCKV_Full Menu (5000 - 9999 CFM)	1	37,911	2	75,821	-1	-37,911
DCKV_Dinner House (10,000 - 15,000 CFM)	0	0	1	71,134	-1	-71,134
Thermostat - Programmable	261	119,899	0	0	261	119,899
Custom Appl - Rate ClassCore Comm 10; M2/R01	50	879,871	0	0	50	879,871
TOTAL NEW BUILDING CONSTRUCTION	766	2,544,051	797	3,851,756	-31	-1,307,706
<u>BUILDING RETROFIT</u>						
Condensing Boiler - quasi-prescriptive	325	4,992,731	100	1,579,369	225	3,413,362
ERV - quasi-prescriptive	174	1,509,454	55	751,179	119	758,275
HRV-quasi-prescriptive	67	162,437	30	137,332	37	25,105
Infrared Heating - quasi-prescriptive	458	1,226,555	1,100	2,335,056	-642	-1,108,501
Rooftop Unit	207	465,979	60	135,396	147	330,583
High Efficiency Furnace	546	269,117	130	64,098	416	205,019
Enhanced Furnace	16	6,694	25	9,521	-9	-2,827
Thermostat - Programmable	569	1,003,793	200	353,595	369	650,198
DCKV_Fast Casual (<5000 CFM)	2	23,937	14	167,560	-12	-143,623
DCKV_Full Menu (5000 - 10,000 CFM)	23	871,942	7	265,374	16	606,568
DCKV_Dinner House (10,001 - 15,000 CFM)	2	142,268	2	142,268	0	0
Low Flow Showerhead	40,499	14,458,897	42,500	21,731,594	-2,001	-7,272,697
Low Flow Aerator	75,282	6,830,167	30,000	2,721,762	45,282	4,108,405
Low Flow Pre-Rinse Nozzle	906	6,293,076	2,100	14,586,600	-1,194	-8,293,524
Custom Appl - Rate ClassCore Comm 10; M2/R01	465	16,012,148	0	19,700,000	465	-3,687,852
TOTAL BUILDING RETROFIT	119,541	54,269,195	76,323	64,680,704	43,218	-10,411,509
TOTAL COMMERCIAL TRC	120,307	56,813,246	77,120	68,532,461	43,187	-11,719,215
O&M PROGRAM COSTS		-480,236		-303,000		
NET COMMERCIAL TRC		56,333,010		68,229,461		-11,896,451

DISTRIBUTION CONTRACT TRC BREAKDOWN						
<u>DISTRIBUTION CONTRACT</u>						
Feasibility Studies	101	-		-		-
Boiler Audits	23	-		-		-
Custom Appl - Industrial - Sales & Mktg	176	125,036,439	330	94,000,000	-154	31,036,439
TOTAL DISTRIBUTION CONTRACT TRC	300	125,036,439	330	94,000,000	-30	31,036,439
O&M PROGRAM COSTS		<u>-292,685</u>		<u>-290,000</u>		<u>-2,685</u>
NET DISTRIBUTION CONTRACT TRC		124,743,754		93,710,000		31,033,754
PORTFOLIO TOTAL NET TRC		222,140,876		193,713,158		28,427,719
SALARIES		-3,483,821		-3,162,000		-321,821
RESEARCH AND EVALUATION		-919,120		-1,385,000		465,880
OVERHEAD		-1,700,000		-1,700,000		0
ADMINISTRATION		<u>-141,961</u>		<u>-60,000</u>		<u>-81,961</u>
OVERALL NET TRC FOR 2007		215,895,975		187,406,158		28,489,817

Appendix C – 2007 DSM Spending by Program

Program	Incentives	Program Costs	Total Costs
Residential			
*New Home Construction	\$ 39,600	\$ 24,317	\$ 63,917
*Home Retrofit	\$ 1,298,738	\$ 797,507	\$ 2,096,245
Low Income	\$ 802,143	\$ 359,340	\$ 1,161,483
Total Residential	\$ 2,140,481	\$ 1,181,164	\$ 3,321,645
Market Transformation			
DWHR	\$ 405,645	\$ 364,527	\$ 770,172
Total Market Transformation	\$ 405,645	\$ 364,527	\$ 770,172
Commercial			
*New Building Construction	\$ 255,312	\$ 44,180	\$ 299,492
*Building Retrofit	\$ 2,519,947	\$ 436,056	\$ 2,956,003
Total Commercial	\$ 2,775,259	\$ 480,236	\$ 3,255,495
Distribution Contract			
Distribution Contract	\$ 2,246,597	\$ 292,685	\$ 2,539,282
Total Distribution Contract	\$ 2,246,597	\$ 292,685	\$ 2,539,282
Total Direct Costs	\$ 7,567,982	\$ 2,318,612	\$ 9,886,594
Indirect Cost			
Salaries			\$ 3,483,821
Research and Evaluation			\$ 919,120
Overhead			\$ 1,700,000
Admin			\$ 141,961
Total Indirect Costs			\$ 6,244,902
Total 2007 DSM Spending			\$ 16,131,496
* Program costs allocated between new and retrofit markets based on percentage of incentives paid in each program			

Appendix D – 2007 LRAM Results by Measure

Programs	Partici- pants	Natural Gas Savings per Unit (m ³)	Net Natural Gas Savings (m ³)
<u>NEW HOME CONSTRUCTION</u>			
Energy Star for New Homes	396	818	307,732
Total New Building Construction	396		307,732
Programs	Partici- pants	Natural Gas Savings per Unit (m ³)	Net Natural Gas Savings (m ³)
<u>HOME RETROFIT</u>			
Furnace - High Efficiency - HVAC	14,814	385	1,825,085
Furnace - High Efficiency - Direct to Consumers	10	385	1,232
Thermostat - Programmable - HVAC	14,018	152	943,439
Thermostat - Programmable - Direct to Consumers	8,744	152	588,488
<u>ESK - Home Depot</u>			
ESK - Bath Faucet Aerators	16,892	6	36,506
ESK - Kitchen Faucet Aerators	16,892	11	82,465
ESK - Pipe Insulation - 2 m	16,892	17	210,149
ESK - Showerhead - Low Flow	16,892	4	44,483
<u>ESK - Residential Account Manager</u>			
ESK - Bath Faucet Aerators	51,027	6	93,539
ESK - Kitchen Faucet Aerators	51,027	11	215,638
ESK - Pipe Insulation - 2 m	51,027	17	577,103
ESK - Showerhead - Low Flow	51,027	4	126,512
Total Home Retrofit	309,262		4,744,639
Programs	Partici- pants	Natural Gas Savings per Unit (m ³)	Net Natural Gas Savings (m ³)
<u>LOW INCOME</u>			
ESK - Bath Aerators	6,519	6	38,723
ESK - Kitchen Aerators	6,363	11	69,293
ESK - Pipe Insulation - 2 m	6,442	17	108,419
ESK - Showerhead - Low Flow	7,338	4	27,884
Thermostat - Programmable	1,590	152	239,263
Total Low Income	28,252		483,582
Programs	Partici- pants	Natural Gas Savings per Unit (m ³)	Net Natural Gas Savings (m ³)
<u>NEW BUILDING CONSTRUCTION</u>			
Condensing Boiler (Quasi Prescriptive)	27	9285	167,380
ERV (Quasi Prescriptive)	263	8,515	382,122
HRV (Quasi Prescriptive)	29	3,300	110,413
Infrared Heating (Quasi Prescriptive)	100	1,022	86,860
Rooftop Unit	35	1,275	42,394
Thermostat - Programmable - Commercial	47	519	19,514
Thermostat - Programmable - Hotels	214	103	17,634
DCKV - Fast Casual (<5000 CFM)	0	3,658	0
DCKV - Full Menu (5000 - 9999 CFM)	1	9,535	9,058
DCKV - Dinner House (10000 - 15000 CFM)	0	17,455	0
Custom Projects - New Build Construction	50	0	179,335
Total New Building Construction	766		1,014,710

Programs	Partici- pants	Natural Gas Savings per Unit (m ³)	Net Natural Gas Savings (m ³)
<u>Building Retrofit</u>			
Condensing Boiler (Quasi Prescriptive)	325	9285	2,789,968
ERV (Quasi Prescriptive)	174	8,515	953,912
HRV (Quasi Prescriptive)	67	3,300	129,589
Infrared Heating (Quasi Prescriptive)	458	1,022	411,176
Rooftop Unit	207	1,275	250,729
High Efficiency Furnace	546	459	206,757
Enhanced Furnace (Up to 299 Mbtu/h) - NG	16	459	5,141
Enhanced Furnace (Up to 299 Mbtu/h) - Elec.	0	-78	0
Thermostat - Programmable	569	519	236,249
DCKV - Fast Casual (<5000 CFM)	2	3,658	6,950
DCKV - Full Menu (5000 - 9999 CFM)	23	9,535	208,340
DCKV - Dinner House (10000 - 15000 CFM)	2	17,455	33,165
Low Flow Showerhead	40,499	4	145,796
Low Flow Bath Aerator	40,906	6	220,892
Low Flow Kitchen Aerator	34,376	11	340,322
Low Flow Pre-Rinse Nozzle	906	3,059	2,632,881
Custom Projects - Building Retrofit	465	0	2,843,233
Custom Projects - Multi-Family			1,394,704
Custom Projects - Agriculture			233,045
Total Building Retrofit	119,541		13,042,849
Programs	Partici- pants	Natural Gas Savings per Unit (m ³)	Net Natural Gas Savings (m ³)
<u>DISTRIBUTION CONTRACT</u>			
Feasibility Studies			
Boiler Audits			
Custom Projects - Industrial	176	-	35,852,652
Custom Projects - Agriculture			406,321
Total Distribution Contract	176	-	36,258,973
2007 DSM Program Total	458,393		55,852,485

Appendix E – 2007 TRC Results by Measure

Measure	Net m3 Per Participant	Net Benefits Per Participant	Participants	Gross TRC	Market Support Costs	Net Program TRC
	(a)	(b)	(c)	(d) = (b)*(c)	(e)	(f)=(d)-(e)
New Home Construction						
Energy Star For New Homes	777	\$544	396	\$215,394		
Total New Home Construction			396	\$215,394	\$24,317	\$191,077
Home Retrofit						
Furnace - High Efficiency - HVAC	200	\$206	14,814	\$3,054,412		
Furnace - High Efficiency - Direct to Consumers	200	\$206	10	\$2,062		
Thermostat - Programmable - HVAC	147	\$405	14,018	\$5,683,191		
Thermostat - Programmable - Direct to Consumers	147	\$405	8,744	\$3,545,001		
Energy Savings Kits						
ESK Faucet Aerators - Home Depot	8	\$54	33,784	\$1,832,959		
ESK Pipe Insulation - 2 m - Home Depot	12	\$28	16,892	\$474,126		
ESK Showerhead - Low Flow - Home Depot	55	\$237	16,892	\$4,008,012		
ESK Faucet Aerators - RAM Delivered	6	\$46	102,054	\$4,723,677		
ESK Pipe Insulation - 2 m - RAM Delivered	11	\$25	51,027	\$1,297,573		
ESK Showerhead - Low Flow - RAM Delivered	52	\$223	51,027	\$11,386,605		
Total Home Retrofit			309,262	\$36,007,616	\$797,507	\$35,210,109
Low Income						
Low Income - ESK Bath Faucet Aerators	14	\$100	6,519	\$650,583		
Low Income - ESK Kitchen Faucet Aerators	14	\$100	6,363	\$635,014		
Low Income - ESK Pipe Insulation - 2 m	17	\$35	6,442	\$227,464		
Low Income - ESK Showerhead - Low Flow	109	\$540	7,338	\$3,960,604		
Low Income - Thermostat - Programmable	210	\$574	1,590	\$912,577		
Total Low Income			28,252	\$6,386,243	\$359,340	\$6,026,903
New Building Construction						
Feasibility Study - DAP						
Condensing Boiler (quasi-prescriptive)	8821	\$15,794	27	\$299,694		
ERV (quasi-prescriptive)	8089	\$13,658	263	\$709,827		
HRV (quasi-prescriptive)	3135	\$4,578	29	\$150,351		
Infrared Heating (quasi-prescriptive)	685	\$2,123	100	\$267,517		
Rooftop Unit	1211	\$2,257	35	\$78,981		
DCKV_Fast Casual (<5000 CFM)	3475	\$11,968	-	\$0		
DCKV_Full Menu (5000 - 9999 CFM)	9058	\$37,909	1	\$37,909		
DCKV_Dinner House (10,000 - 15,000 CFM)	16582	\$71,133	-	\$0		
Thermostat - Programmable - commercial	415	\$1,768	47	\$83,095		
Thermostat - Programmable - hotels	82	\$172	214	\$36,804		
Custom Appl - Rate ClassCore Comm 10; M2/R01			50	\$879,871		
Total New Building Construction			766	\$2,544,049	\$44,180	\$2,499,869
Measure	Net m3 Per Participant	Net Benefits Per Participant	Participants	Gross TRC	Market Support Costs	Net Program TRC
	(a)	(b)	(c)	(d) = (b)*(c)	(e)	(f)=(d)-(e)
Building Retrofit						
Condensing Boiler (quasi-prescriptive)			322	\$4,962,037		
ERV (quasi-prescriptive)			174	\$1,509,454		
HRV (quasi-prescriptive)			67	\$162,437		
Infrared Heating (quasi-prescriptive)			297	\$730,637		
Rooftop Unit	1211	\$2,257	200	\$451,321		
High Efficiency Furnace	379	\$493	544	\$268,228		
Enhanced Furnace (Up To 299 Mbtu/h) - NG	321	\$418	16	\$6,694		
Enhanced Furnace (Up To 299 Mbtu/h) - Elec	-70	\$51	-	\$0		
DCKV_Fast Casual (<5000 CFM)	3475	\$11,968	2	\$23,936		
DCKV_Full Menu (5000 - 9999 CFM)	9058	\$37,909	23	\$871,918		
DCKV_Dinner House (10,000 - 15,000 CFM)	16582	\$71,133	2	\$142,266		
Thermostat - Programmable	415	\$1,768	528	\$933,491		
Low Flow Showerhead	82	\$356	40,111	\$14,259,627		
Low Flow Aerator	13	\$91	74,638	\$6,771,563		
Low Flow Pre-Rinse Nozzle	2906	\$6,947	906	\$6,293,624		
Custom Appl - Rate ClassCore Comm 10; M2/R01			446	\$14,238,877		
Total Building Retrofit			118,276	\$51,626,109	\$436,056	\$51,190,053
Measure	Net m3 Per Participant	Net Benefits Per Participant	Participants	Gross TRC	Market Support Costs	Net Program TRC
	(a)	(b)	(c)	(d) = (b)*(c)	(e)	(f)=(d)-(e)
Industrial General Service						
Condensing Boiler (quasi-prescriptive)			3	\$30,694		
Infrared Heating (quasi-prescriptive)			161	\$495,918		
Rooftop Unit	1211	\$2,094	7	\$14,658		
High Efficiency Furnace	379	\$444	2	\$889		
Thermostat - Programmable	415	\$1,715	41	\$70,302		
Custom Appl - Industrial General Service			18	\$1,606,502		
Total Industrial General Service			232	\$2,218,962		\$2,218,962
Industrial Small						
Low Flow Showerhead	104	\$514	388	\$199,270		
Low Flow Aerator	13	\$91	644	\$58,604		
Custom Projects			2	\$166,769		
Total Industrial Small			1032	\$424,643		\$424,643
Distribution Contract						
Custom Projects			176	\$125,036,439		
Total Distribution Contract			176	\$125,036,439	\$292,687	\$124,743,752
Market Transformation					\$364,527	
Total Program Results			458,392	\$224,459,456	\$2,318,614	\$222,140,842
Indirect Costs						\$6,244,902
Total 2006 Net TRC						\$215,895,940

Appendix F – Substantiation Documents for Quasi-Measures & revised Pre-rinse Spray Nozzle

1 CONDENSING BOILERS

Commercial New Building Construction and Building Retrofit

Efficient Technology & Equipment Description
Condensing Boiler (88% estimated seasonal efficiency)
Base Technology & Equipment Description
Non-condensing Boiler (76% estimated seasonal efficiency)

Resource Savings Assumptions

Natural Gas	0.0119 m ³ / Btu/hr
The natural gas savings are based on the reduction in space heating gas consumption from using a condensing boiler relative to a non-condensing boiler. The principle assumption in the calculation of the savings is that the condensing boiler is properly oversized by 20%. The heating load for the entire heating season can be determined from the installed capacity and boiler seasonal efficiency using degree day analysis. A generic rate of savings of 0.0119 m ³ / Btu/hr of capacity was determined from this analysis. The single savings number is weighted average of Union Gas South (70%) and Union Gas North (30%) savings estimates.	
Electricity	n/a kWh
Water	n/a L

Other Input Assumptions

Equipment Life	25 years
Condensing boilers have an estimated service life of 25 years. ⁶	
Incremental Cost	\$15.40 / 10 ³ Btu/hr
A generic incremental cost of \$14,000 per million Btu / hr (adjusted for the US/CDN exchange by a factor of 1.10) was used based on information recently published in the ASHRAE Journal. ⁷	
Free Ridership	5 %
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211. ⁸	

⁶ ASHRAE Applications Handbook – 2003, Chapter 36 – Owning and Operating Costs, Table 3.

⁷ "Boiler System Efficiency", Thomas H. Durkin, ASHRAE Journal - July 2006

⁸ EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

2 INFRARED HEATERS

Commercial New Building Construction and Building Retrofit

Efficient Technology & Equipment Description
Infrared Heater
Base Technology & Equipment Description
Unit Heater

Resource Savings Assumptions

Natural Gas					0.0102 m ³ / Btu/hr			
The infrared heater gas savings were based on the analysis procedures previously created by Agviro Inc. for Union. The analysis was supplemented by adding a 20% over sizing factor on the equipment in the analysis. A generic rate of savings of 0.0102 m3 / Btu/hr of capacity was determined from this analysis. The single savings number is weighted average of Union Gas South (70%) and Union Gas North (30%) savings estimates.								
Electricity					n/a kWh			
Electricity savings are determined from the difference in electricity consumption of the infrared heater and a comparable unit heater.								
		Blower Motor		Infrared		Operating Hours (hrs)		
Capacity		hp	kW	hp	kW	Unit Heater	Infrared	Electrical Savings (kWh)
less than	50000	0.167	0.124	0.042	0.031	2509	2133	312
less than	165000	0.333	0.249	0.042	0.031	2509	2133	624
greater than	165000	0.500	0.373	0.042	0.031	2509	2133	936
*Electricity savings based on Solaronics models that use a 1/24 hp motor.								
Water					n/a L			

Other Input Assumptions

Equipment Life	20 years
Infrared Heaters have an estimated service life of 20 years. ⁹	
Incremental Cost	\$15.40 / 10 ³ Btu/hr
An incremental cost of \$350 was used based on past input assumptions filed by Union. ¹⁰	
Free Ridership	33 %
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211. ¹¹	

⁹ “Prescriptive Incentives for Select Natural Gas Technologies”, Prepared for Enbridge Consumers Gas and Union Gas Ltd., Prepared by: Jacques Whitford Environment Limited, Agviro Inc., and Engineering Interface Ltd., September 27, 2000.

¹⁰ EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

¹¹ “Demand Side Management Research to Establish Free Ridership Rates for Infra-Red Tube Heaters among End Users and Channel Partners”, marketPower Research, February 14, 2005.

3. HEAT RECOVERY VENTILATOR (HRV)

Commercial New Building Construction and Building Retrofit

Efficient Technology & Equipment Description
Ventilation with HRV
Base Technology & Equipment Description
Ventilation without HRV

Resource Savings Assumptions

Natural Gas	Varies with m ³ / CFM inputs																				
<p>The ERV and HRV gas savings are determined from engineering calculations utilizing inputs such as air flow, indoor/outdoor temperatures, indoor/outdoor and relative humidity. The operating hours of the equipment are based on typical values for the following commercial market sub-segments: Multi-Family, Hotel, Restaurant, Retail, Office, School, Health Care, Nursing Home, and Warehouse.</p> <table border="1"> <thead> <tr> <th>Building Occupancy</th><th>Typical Hrs of Operation per week</th></tr> </thead> <tbody> <tr> <td>Multi-Family</td><td>168</td></tr> <tr> <td>Hotel</td><td>168</td></tr> <tr> <td>Restaurant</td><td>108</td></tr> <tr> <td>Retail</td><td>108</td></tr> <tr> <td>Office</td><td>60</td></tr> <tr> <td>School</td><td>84</td></tr> <tr> <td>Health Care</td><td>168</td></tr> <tr> <td>Nursing Home</td><td>168</td></tr> <tr> <td>Warehouse</td><td>168</td></tr> </tbody> </table>		Building Occupancy	Typical Hrs of Operation per week	Multi-Family	168	Hotel	168	Restaurant	108	Retail	108	Office	60	School	84	Health Care	168	Nursing Home	168	Warehouse	168
Building Occupancy	Typical Hrs of Operation per week																				
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Retail	108																				
Office	60																				
School	84																				
Health Care	168																				
Nursing Home	168																				
Warehouse	168																				
Electricity	n/a kWh																				
Water	n/a L																				

Other Input Assumptions

Equipment Life	15 years
HRVs have an estimated service life of 15 years. ¹²	
Incremental Cost	\$3.40 / CFM
The incremental costs are based on relative scaling of incremental costs \$1700 / 500 CFM. ¹²	
Free Ridership	5 %
Previous free-ridership rate as per 2005 ADR Settlement – EB-2005-0211 was 0%. Union will use a value of 5% until a more definitive value can be determined from evaluation.	

¹² "Prescriptive Incentives for Select Natural Gas Technologies", Prepared for Enbridge Consumers Gas and Union Gas Ltd., Prepared by: Jacques Whitford Environment Limited, Agviro Inc., and Engineering Interface Ltd., September 27, 2000.

4 ENERGY RECOVERY VENTILATOR (ERV)

Commercial New Building Construction and Building Retrofit

Efficient Technology & Equipment Description
Ventilation with ERV
Base Technology & Equipment Description
Ventilation without ERV

Resource Savings Assumptions

Natural Gas	Varies with m ³ / CFM inputs																				
<p>The ERV and HRV gas savings are determined from engineering calculations utilizing inputs such as air flow, indoor/outdoor temperatures, indoor/outdoor and relative humidity. The operating hours of the equipment are based on typical values for the following commercial market sub-segments: Multi-Family, Hotel, Restaurant, Retail, Office, School, Health Care, Nursing Home, and Warehouse.</p> <table border="1"> <thead> <tr> <th>Building Occupancy</th><th>Typical Hrs of Operation per week</th></tr> </thead> <tbody> <tr> <td>Multi-Family</td><td>168</td></tr> <tr> <td>Hotel</td><td>168</td></tr> <tr> <td>Restaurant</td><td>108</td></tr> <tr> <td>Retail</td><td>108</td></tr> <tr> <td>Office</td><td>60</td></tr> <tr> <td>School</td><td>84</td></tr> <tr> <td>Health Care</td><td>168</td></tr> <tr> <td>Nursing Home</td><td>168</td></tr> <tr> <td>Warehouse</td><td>168</td></tr> </tbody> </table>		Building Occupancy	Typical Hrs of Operation per week	Multi-Family	168	Hotel	168	Restaurant	108	Retail	108	Office	60	School	84	Health Care	168	Nursing Home	168	Warehouse	168
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Retail	108																				
Office	60																				
School	84																				
Health Care	168																				
Nursing Home	168																				
Warehouse	168																				
Electricity	n/a kWh																				
Water	n/a L																				

Other Input Assumptions

Equipment Life	15 years
ERV's have an estimated service life of 15 years. ¹³	
Incremental Cost	\$2.50 / CFM
The incremental costs are based on relative scaling of incremental costs \$2500 / 1000 CFM. ¹³	
Free Ridership	5 %
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211. ¹⁴	

¹³ “Prescriptive Incentives for Select Natural Gas Technologies”, Prepared for Enbridge Consumers Gas and Union Gas Ltd., Prepared by: Jacques Whitford Environment Limited, Agviro Inc., and Engineering Interface Ltd., September 27, 2000.

¹⁴ EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

5. PRE-RINSE SPRAY NOZZLE (1.24 GPM)

Efficient Technology & Equipment Description
Low-flow pre-rinse spray nozzle (1.24 GPM)
Base Technology & Equipment Description
Standard pre-rinse spray nozzle

8.3.1. Resource Savings Assumptions

Natural Gas	3059 m ³
Natural gas savings claims are based on the reduction of hot water use achieved by switching from a standard flow pre-rinse spray nozzle (3 USGPM) ¹⁵ to a low-flow pre-rinse spray nozzle (1.24 USGPM). Savings are based on the assumption of 3.75 hours of use per day ¹⁶ , 363 days per year. Savings were determined using the Pre-Rinse Spray Nozzle Savings spreadsheet ¹⁷ which provides consistent results with the Food Service Technology Centre's "Pre-Rinse Spray Valve Calculator". ¹⁸	
Electricity	n/a kWh
Water	544,145 L
Water savings claims ^{5,6} are based on the reduction of water use achieved by switching from a standard flow spray nozzle (3 USGPM) to a low-flow spray nozzle (1.24 USGPM).	

8.3.2. Other Input Assumptions

Equipment Life	5 years
Pre-rinse spray nozzles have an estimated service life of 5 years. ^{2,19}	
Incremental Cost (Cust. / Contr. Install)	- \$100
The incremental cost is assumed to be \$100 – the cost of the spray nozzle and installation. This is comparable to the incremental cost of \$60 reported by the Region of Waterloo ²⁰	
Free Ridership	5 %
A free ridership rate of 5% is based on Enbridge's consultation with distributor.	

¹⁵ "How to Buy a Low Flow Pre-Rinse Spray Valve", DOE Bulletin WS-5, September 2004.

¹⁶ Enbridge market survey of average usage

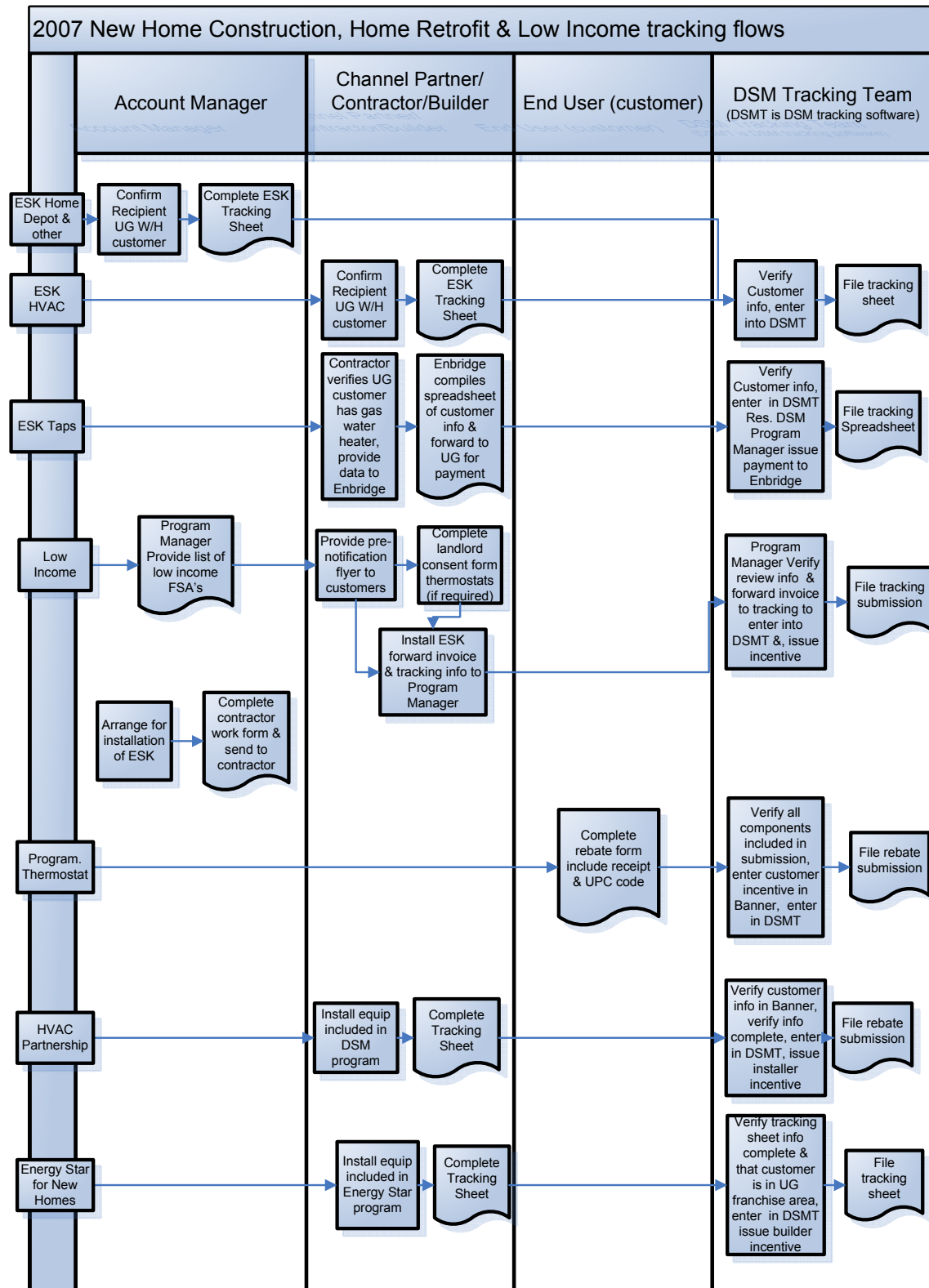
¹⁷ Pre-Rinse Spray Nozzle Savings Assumptions rev1.xls, Union Gas

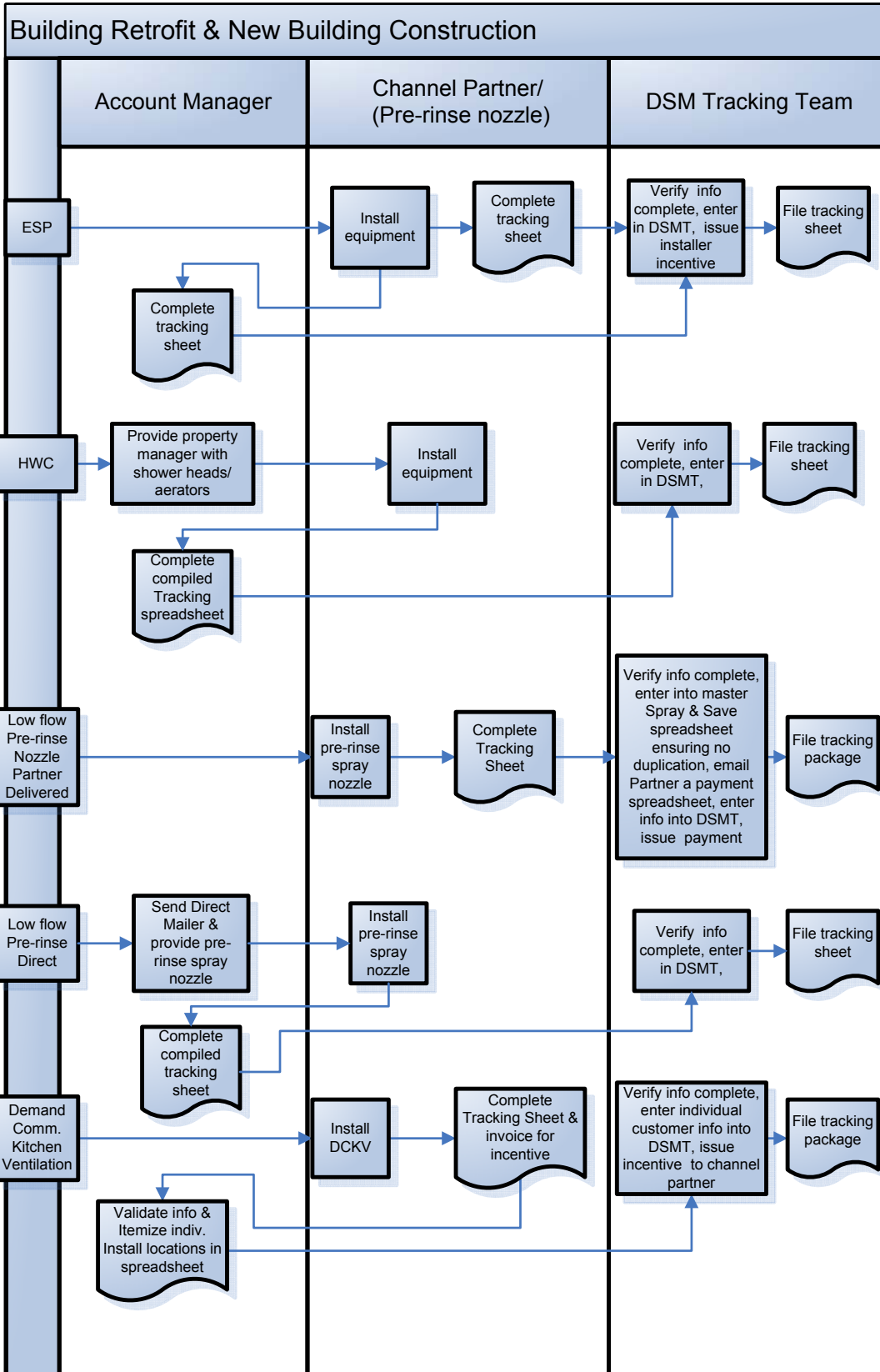
¹⁸ www.fishnick.com/tools/watercost/

¹⁹ CEE Commercial Kitchens Initiative - Program Guidance on Pre-Rinse Spray Valves

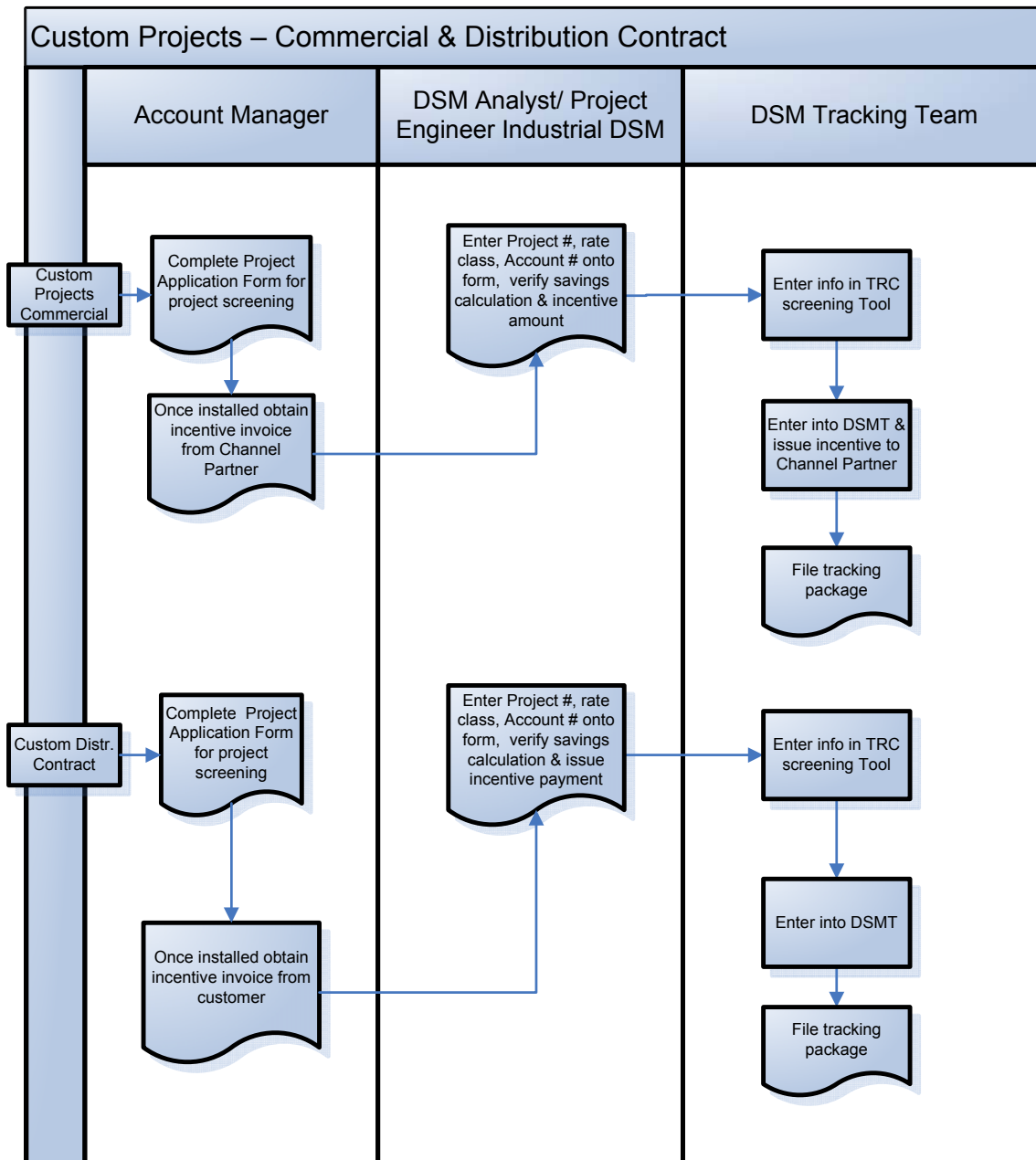
²⁰ "Region of Waterloo – Pre-Rinse Spray Valve Pilot Study – Final Report", Veritec Consulting Inc., January 2005

Appendix G – Program Tracking Flow Charts

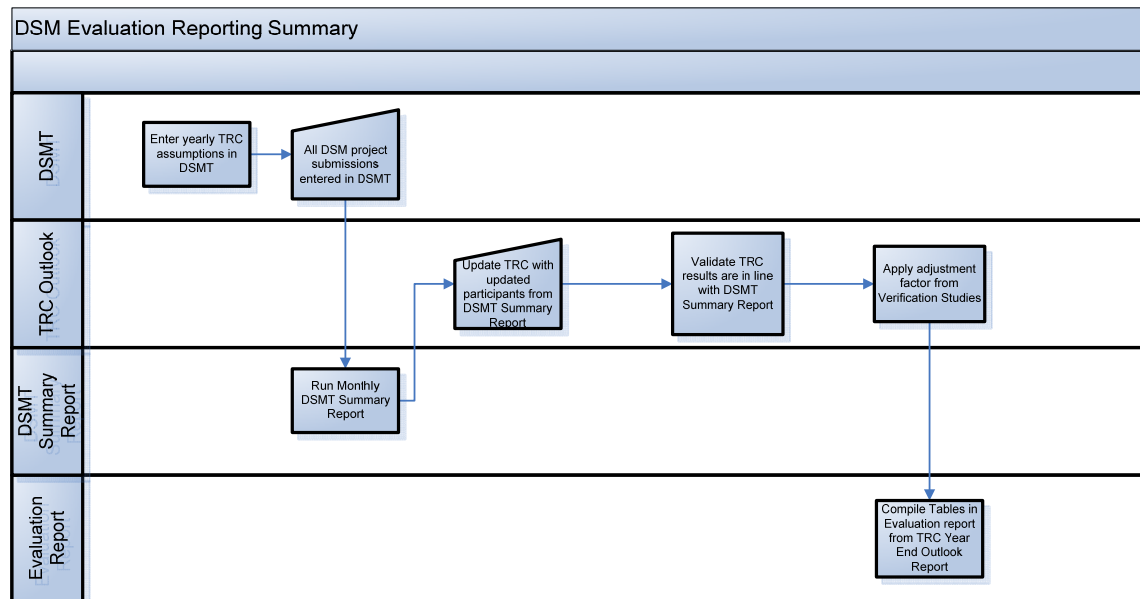




ESP – Energy Savings Program – ERV, HRV, rooftop units, condensing boiler, infrared heaters, H/E Furnaces, programmable thermostats
HWC – Commercial Hot Water Conservation Tracking Sheet, targeted at Multi-family & Social Housing



Feasibility studies & Boiler Audits are included in Custom Project Process



Appendix H – 2008 Market Transformation Scorecard

2008 MT Scorecard – DWHR*

Element	Indicator (weighting)	50%	100%	150%
ULTIMATE OUTCOMES	Builder's Enrolled (25)	25	30	35
	Units Installed New Build (45)	1000	1500	1800
MARKET EFFECTS (Research)	Customer Awareness Survey (10) Baseline – 15%	17%	21%	25%
	Builder Knowledge Survey (10) Baseline – 58%	62%	70%	78%
	Builder Promotion Survey (10) Baseline – 23%	29%	33%	37%
PROGRAM PERFORMANCE (Training/ Awareness Building)	Builder Training Workshop (0)	N/A	N/A	N/A
	Trade Show / Builder Industry Show (0)	N/A	N/A	N/A
RETROFIT DWHR	Units Installed Retrofit (0)	Monitor Only		

* The MT Scorecard is 100% based on DWHR in the New Build market

Appendix I – 2008 Avoided Costs

INFLATION FACTOR	1.9%
DISCOUNT RATE	10%

NATURAL GAS ENERGY SAVINGS RATES						
Year	Residential/Commercial				Industrial	
	Baseload		Weather Sensitive		Baseload	
	Rates	NPV	Rates	NPV	Rates	NPV
1	0.37010	0.37010	0.37255	0.37255	0.34728	0.34728
2	0.35301	0.69102	0.35935	0.69923	0.33120	0.64837
3	0.33622	0.96889	0.33343	0.97479	0.31816	0.91131
4	0.34261	1.22629	0.33977	1.23006	0.32421	1.15489
5	0.34912	1.46474	0.34622	1.46654	0.33036	1.38054
6	0.35575	1.68564	0.35280	1.68560	0.33664	1.58956
7	0.36251	1.89027	0.35950	1.88853	0.34304	1.78320
8	0.36940	2.07983	0.36633	2.07651	0.34956	1.96258
9	0.37642	2.25543	0.37329	2.25066	0.35620	2.12875
10	0.38357	2.41810	0.38039	2.41198	0.36297	2.28268
11	0.39086	2.56879	0.38761	2.56142	0.36986	2.42528
12	0.39828	2.70838	0.39498	2.69986	0.37689	2.55737
13	0.40585	2.83770	0.40248	2.82810	0.38405	2.67974
14	0.41356	2.95749	0.41013	2.94690	0.39135	2.79310
15	0.42142	3.06847	0.41792	3.05695	0.39878	2.89812
16	0.42943	3.17127	0.42586	3.15890	0.40636	2.99539
17	0.43758	3.26650	0.43395	3.25334	0.41408	3.08551
18	0.44590	3.35472	0.44220	3.34083	0.42195	3.16899
19	0.45437	3.43644	0.45060	3.42187	0.42996	3.24632
20	0.46300	3.51215	0.45916	3.49695	0.43813	3.31796
21	0.47180	3.58228	0.46789	3.56650	0.44646	3.38433
22	0.48077	3.64724	0.47678	3.63092	0.45494	3.44580
23	0.48990	3.70742	0.48583	3.69061	0.46358	3.50275
24	0.49921	3.76317	0.49507	3.74590	0.47239	3.55551
25	0.50869	3.81482	0.50447	3.79711	0.48137	3.60438
26	0.51836	3.86266	0.51406	3.84456	0.49051	3.64965
27	0.52821	3.90698	0.52382	3.88851	0.49983	3.69159
28	0.53824	3.94804	0.53378	3.92922	0.50933	3.73044
29	0.54847	3.98607	0.54392	3.96694	0.51901	3.76643
30	0.55889	4.02130	0.55425	4.00188	0.52887	3.79977

WATER AND ELECTRICITY SAVINGS RATES				
Year	Residential/Commercial/Industrial			
	Water Rates		Electricity Rates	
	Rates	NPV	Rates	NPV
1	1.685	1.685	0.076	0.076
2	1.717	3.246	0.078	0.147
3	1.750	4.692	0.079	0.212
4	1.783	6.032	0.081	0.273
5	1.817	7.272	0.082	0.329
6	1.851	8.422	0.084	0.381
7	1.886	9.487	0.085	0.429
8	1.922	10.473	0.087	0.473
9	1.959	11.387	0.089	0.515
10	1.996	12.234	0.090	0.553
11	2.034	13.018	0.092	0.588
12	2.073	13.744	0.094	0.621
13	2.112	14.417	0.095	0.652
14	2.152	15.041	0.097	0.680
15	2.193	15.618	0.099	0.706
16	2.235	16.153	0.101	0.730
17	2.277	16.649	0.103	0.752
18	2.320	17.108	0.105	0.773
19	2.365	17.533	0.107	0.792
20	2.409	17.927	0.109	0.810
21	2.455	18.292	0.111	0.827
22	2.502	18.630	0.113	0.842
23	2.549	18.943	0.115	0.856
24	2.598	19.233	0.117	0.869
25	2.647	19.502	0.120	0.881
26	2.698	19.751	0.122	0.893
27	2.749	19.982	0.124	0.903
28	2.801	20.195	0.127	0.913
29	2.854	20.393	0.129	0.922
30	2.908	20.577	0.131	0.930

Appendix J - Savings Values in Selected Residential DSM Prescriptive Programs, Summit Blue Final Report - June 23, 2008

Executive Summary

Summit Blue Consulting, LLC/Summit Blue Canada, Inc., working jointly with the Energy Center of Wisconsin, was commissioned by Enbridge and Union Gas to conduct research producing estimates of resource savings values (natural gas, water, electricity) from selected residential measures. The process to assess the recommended estimates included an extensive literature review, determination of input parameters and engineering algorithms, collection of available and appropriate data including primary customer research, discussion with and feedback from utility staff, development of uncertainty estimates, and application of algorithms to determine savings estimates and confidence ranges.

Research findings are as follows:

- *Savings from showerheads were lower than current estimates and varied only by delivery method (Table E-1).* Recommended estimates for TAPS range from 15 to 68 m³ of gas savings (4,600 to 17,500 litres of water savings) depending on what is replaced and the replacement showerhead. Similar estimates for ESK are: from 4 to 40 m³ gas and from 2,200 to 10,700 litres of water savings. Current estimates are 115 m³ of gas savings from TAPS and 91 m³ from ESK (water savings of 30,966 and 19,354 litres, respectively). Considerable uncertainty exists in some input variables, which have a significant impact on results, and the utilities should invest in field research to narrow variability in the estimates. Differences were found by delivery method (TAPS, ESK) but not for target markets such as low income. The difference in delivery methods is that under the TAPS program up to two showerheads are installed by a contractor, whereas in the ESK program, one showerhead is provided in the ESK, which is installed by the customer.
- *Several aspects to savings from showerhead retrofits—related both to baseline showering behavior and to potential changes in behaviour after retrofit— contribute to uncertainty in savings from showerhead replacement (Table E-1 - Recommended annual savings values are shown in a column labeled as such).* Recognizing that some parameters have not been well studied in Ontario (or elsewhere), we built an uncertainty analysis into our methodology. Results of this analysis suggest about 50% uncertainty in savings estimates, owing primarily to uncertainty in several key inputs, including (but not limited to) the degree to which shower flow is throttled by users. Excluding adjustments related both to baseline showering behaviour and to potential changes in behaviour after retrofit, the uncertainty in the estimates drops from 50% to between 20% and 30%. *Field research in the Enbridge and Union Gas service territories is recommended on the factors shown in table E-1 to provide better estimates of these parameters (or direct estimates of retrofit impacts) in order to mitigate this uncertainty.*
- *Savings from kitchen faucet aerators are similar to current estimates but lower for bathroom aerators (Table E-2).* Current estimates for faucet aerators savings are 14 m³ gas and 6,520 litres of water compared to research findings of 11 m³ gas savings (3,900 litres water) for kitchen aerators rated at 2.0 gpm and 6 m³ gas savings (2,000 litres water) for bathroom aerators rated at 1.5 gpm. No differences were found by delivery method or with low-income.
- *Programmable thermostats were estimated to provide annual natural gas savings of 152 m³ for heating and annual electricity savings of 26 kWh from cooling (Table E-3).* Gas savings are about 70% of the current estimate of 212 m³ and electricity savings are much lower at just over 25% of the current estimate of 100 kWh.
- *A ten-year measure life is still appropriate for showerheads and aerators, but measure life for programmable thermostats should drop to 15 years.* We recommend a 10-year measure life for

low flow showerheads and efficient faucet aerators but adopting the Energy Star measure life of 15 years for programmable thermostats rather than the currently approved estimate of 18 years.

Table E-1. Estimates of Savings from Efficient Showerheads

Showerheads	<i>Gallons per Minute (gpm)</i>		Recommended Annual Savings		No Throttling		No Throttling or Temperature Change		No Throttling or Temp./Length Change	
	<i>Existing</i>	<i>Replaced</i>	gas (m ³)	water (litres)	Gas (m ³)	Water (l)	Gas (m ³)	Water (l)	Gas (m ³)	Water (l)
Per Household Enbridge TAPS and Low Income Union Gas install and Low Income	2.0	1.25	33	8,900	47	12,512	51	12,512	55	13,550
	2.1 - 2.5 (2.41)	1.25	47	12,400	74	19,087	78	19,087	84	20,674
	2.6 + (3.06)	1.25	68	17,500	114	28,903	117	28,903	128	31,375
	2.0	1.50	15	4,600	29	8,228	33	8,228	37	9,033
	2.1 - 2.5 (2.41)	1.50	29	8,100	59	15,486	60	15,486	66	16,218
	2.6 + (3.06)	1.50	50	13,300	95	24,478	100	24,478	110	27,041
Per Showerhead (ESK)		2.00	4	2,200	11	3,918	16	3,918	18	4,456
		1.50	22	6,400	45	12,634	49	12,634	54	13,367
		1.25	40	10,700	65	16,907	67	16,907	72	17,822

Table E-2. Estimates of Savings Values for Efficient Faucet Aerators

Location	Replacement (gpm)	Recommended Annual Savings (per aerator)	
		gas (m3)	water (litres)
Kitchen	2.0	11	3,900
	1.5	22	7,800
Bathroom	2.0	2	600
	1.5	6	2,000

Table E-3. Estimates of Savings Values for Programmable Thermostats

	Recommended Annual Savings
Natural Gas	152 m ³
Electricity	26 kWh

Appendix K – Residential Measure Free Ridership and Inside Spillover Study, Summit Blue Final Report - June 4, 2008.

Executive Summary

This report presents the results of market research conducted by Consulting, LLC/Summit Blue Canada, Inc. (“Summit Blue”) during the winter of 2007-2008 to ascertain the level of free ridership for each of these energy efficiency measures. The study also estimated the level of inside spillover related to each measure.

Study Overview

Summit Blue Consulting was commissioned by Enbridge and Union Gas to conduct research that would produce estimates of free ridership and inside spillover for the four residential measures targeted by the OEB’s Generic Proceeding decision.

The study included the following research tasks performed during the winter of 2007-2008:

- Development of a project work plan and an associated analysis plan detailing the study’s methodology;
- A review of literature focused on attribution knowledge pertaining to the measures in the project scope, including development of natural gas furnace shipment data to help estimate high-efficiency free ridership;
- Telephone surveys of five program/measure groups of customers: Enbridge TAPS, Union Gas Energy Saving Kits, Thermostat Coupons, Union Gas Furnace and Enbridge Furnace program participants;
- Telephone surveys of furnace contractors; and
- An analysis and scoring of the customer survey contractor interviews, and furnace shipment data, to produce the free ridership and inside spillover estimates.

These tasks were coordinated to refine the methodology and execute the secondary and primary research needed to develop data from which free ridership and inside spillover could be estimated, and the actual free ridership and inside spillover estimation procedures.

Research Method

The research method used was derived from previous attribution research that Summit Blue has conducted. It was modified to fit the Enbridge and Union Gas residential program context and the measures being researched. The method employed survey-based customer self-reporting augmented with a contractor survey to obtain a proxy perspective for furnaces and programmable thermostats. The method also employed furnace shipment market data for high-efficiency furnaces.

Low-flow showerhead and faucet aerator estimates relied entirely on customer self-reports, with the showerhead scoring adjusted to reflect the fact that the program-available showerheads are substantially more efficient than those available in stores. The estimate for programmable thermostats used a combination of survey-based customer self-reports and survey-based furnace contractor proxy self-reports. The estimates for high-efficiency furnaces were made from the furnace contractor survey and furnace shipment and housing market data; for Enbridge furnaces,

because of its customer-direct furnace program approach, a customer self-report survey also was employed.²¹

The primary research was guided by and augmented with the findings of an associated review by the research team of key industry literature.

Literature Review

The work began with the review of selected industry literature and available sales market data on the various measures. This was done to assess whether self-reported views or independent market sales data, or both, would be most appropriate to use for developing evidence of free ridership and inside spillover.²² The literature review confirmed that, where possible, market data on unit sales of each measure should be used. Such data were found for furnaces and an approach was developed to utilize those data together with furnace contractor surveys and, for Enbridge, a customer survey, to develop an overall furnace free ridership estimate.

The literature review also found that, where market data are not available for the measures being studied, customer self-reports would provide reliable information from which free ridership and inside spillover could be estimated.

The literature review and Summit Blue's past work on attribution also suggested types of questions to ask customers and furnace contractors.

Survey Development and Analysis

The results of the surveys were scored to create free ridership and inside spillover estimates. For low-flow showerheads, faucet aerators and programmable thermostats, and for Enbridge furnaces, the customer surveys' free ridership and inside spillover questions were processed through a series of simple scoring algorithms that translated those questions' responses into free ridership and inside spillover element scores for each measure and program type. The scoring elements then were summed and averaged across all survey respondents.

The furnace contractor survey developed data to represent a proxy view of free ridership for high-efficiency furnaces. The resulting free ridership scores for furnaces were combined on a weighted basis with furnace market data and, for Enbridge, the Enbridge furnace customer survey results.

Market data on furnace shipments and housing starts were used to develop a third perspective on high-efficiency furnaces. A longitudinal analysis of the associated trend in high-efficiency furnace shipments in Ontario produced the central free ridership value for furnaces. Comparisons with other provinces' high-efficiency furnace shipments produced high-range and low-range estimates of free ridership about the central value produced by the Ontario longitudinal shipment analysis. The free ridership estimates resulting from the market data were combined on a

²¹ The customer self-report dimension also was employed for Enbridge's high-efficiency furnace program because the program is offered directly to customers and customers directly receive program incentives. Union Gas' furnace program is run entirely through contractors, whereby contractors receive program incentives and no customer-direct promotion is done by Union Gas. Thus, no direct-customer self-reports were involved for Union Gas' program and so contractor proxy self-reports and furnace market data comprised the furnace method for Union Gas.

²² The literature review also was tasked with seeking data to support a parallel study of measure energy savings, to update the utilities' impact estimates for three of the four residential measures being researched in this study (aerators, showerheads and programmable thermostats).

weighted basis with the results of the furnace contractor free ridership survey and, for Enbridge, because of its customer-direct program approach, the customer survey free ridership scores.

The customer surveys were the primary perspective used for estimating free ridership for programmable thermostats, with that perspective augmented by the furnace contractor survey. The furnace contractor survey was used as a second perspective to develop proxy views of customers' decisions to purchase such thermostats. The estimates resulting from the two surveys were summed on a weighted basis to produce the overall programmable thermostat free ridership score.

No inside spillover estimates were made from either the furnace contractor perspective or the market data perspective because neither perspective could provide the requisite data to make inside spillover estimates. Thus, only the customer surveys were used to develop the estimates of inside spillover.

The results of the scoring process were variously applied to the survey and market data obtained from the primary and secondary research to produce the free ridership and inside-spillover percentages presented as follows.

Program Net Free Ridership

Table E-1 presents the overall results of the research effort for the four measures and associated programs.

Table E-1. Measure/Program Type Net Free Ridership Estimates:

Faucet Aerators, High-Efficiency Furnaces, Low-Flow Showerheads, Programmable Thermostats			
	Net Free Ridership (Free Ridership minus Inside Spillover)	Low Range Uncertainty	High Range Uncertainty
Aerators			
TAPS On-site	24%	22%	26%
ESK Event	16%	15%	17%
Furnaces			
Enbridge	54%	40%	65%
Union	57%	42%	68%
Low-flow Showerheads			
TAPS On-site	2%	2%	2%
ESK Event	-9%	-8%	-9%
Programmable Thermostats			
General Customer	29%	26%	32%
Enbridge Furnace Customer	34%	30%	38%

Free Ridership

Breaking down the overall attribution into its free rider and inside spillover components illustrates the dynamics of the underlying components. Most notable is the general consistency of the results for a given measure, regardless of the program delivery type (customer-direct/direct-install or event/self-install).

The findings are statistically robust. All the survey findings reflect an actual confidence interval of 90%. The survey findings meet or exceed the target sampling statistic of 10% relative error for all measure/program groups except Enbridge furnace contractors (for furnaces and programmable thermostats) and Enbridge furnace customers (for furnaces and programmable thermostats). The furnace market data uncertainties result from an analysis of shipment data and housing starts in a cross-sectional comparison with other provinces, and do not have a statistical uncertainty *per se*.

The estimates apply to the year 2007. For 2008 and 2009, high-efficiency furnace free ridership is estimated to increase to 82% and 90%, respectively, based on a linear interpolation to 100% market penetration of retrofits using the market data developed for the study. This projection is made based on the imminent code change scheduled to come into effect in Canada on December 31, 2009. All other measures' values for 2008 and 2009 are recommended to retain the 2007 values.

Measure/Program Type Free ridership Estimates: Faucet Aerators, High-Efficiency Furnaces, Low-Flow Showerheads, Programmable Thermostats

	Free Rider Score	Component Score	Low Range Uncertainty	High Range Uncertainty	+/- Sampling Error
Aerators					
TAPS On-site	31%	NA	28%	34%	9%
ESK Event	33%	NA	30%	36%	9%
Furnaces					
Enbridge Customer Survey	65%	53%	49%	77%	12%
Furnace Contractor Survey		62%	52%	72%	16%
Market Data		74%	50%	90%	NA
Union Furnace Contractor Survey	68%	60%	54%	66%	10%
Market Data		74%	50%	90%	NA
Low-flow Showerheads					
TAPS On-site	10%	NA	9%	11%	8%
ESK Event	10%	NA	10%	11%	8%
Programmable Thermostats					
General Customer Customer Survey	43%	39%	39%	48%	10%
Furnace Contractor Survey		60%	53%	67%	11%
Enbridge Furnace Customer	46%	NA	40%	52%	12%

Source: Summit Blue Consulting. NOTE: the Enbridge Furnace Customer score for programmable thermostats was not used in the final scoring for this measure because the Enbridge Furnace Customer sample originally was not anticipated to reach the statistical veracity it actually ended up having.

Inside Spillover

The study found inside spillover generally to be modest, but not insignificant. Inside spillover for faucet aerators and low-flow showerheads distributed through the general TAPS program was lower than for the ESK program.

Furnaces and programmable thermostats showed consistent levels of inside spillover regardless of the program delivery type or customer segment.

The findings are statistically robust, with all but one group bettering the 90% confidence interval and 10% relative error sampling statistic target (the exception being Enbridge Furnace customers, where a “90%/12%” statistic was realized).

These estimates apply to the year 2007. All measures’ values for 2008 and 2009 are recommended to retain the 2007 values.

Measure/Program Type Inside Spillover Estimates: Faucet Aerators, High-Efficiency Furnaces, Low-Flow Showerheads, Programmable Thermostats

	Inside Spillover Score	Low Range Uncertainty	High Range Uncertainty	+/- Sampling Error
Aerators				
TAPS On-site	7%	6%	8%	9%
ESK Event	17%	15%	19%	9%
Furnaces				
Enbridge	11%	10%	12%	10%
Union	11%	10%	12%	10%
Low-flow Showerheads				
TAPS On-site	8%	7%	9%	8%
ESK Event	19%	17%	21%	8%
Programmable Thermostats				
General Customer	14%	13%	15%	10%
Enbridge Furnace Customer	12%	11%	13%	12%

Source: Summit Blue Consulting

Appendix L – Custom Projects Attribution Study, Summit Blue DRAFT Report - June 12, 2008.

Background

Summit Blue Consulting, LLC/Summit Blue Canada, Inc. (“Summit Blue”) was commissioned during the winter of 2007 to conduct a Custom Projects Attribution Study that measured free ridership and spillover. A draft report of this study was released on June 12, 2008 and provided to the Evaluation and Audit Committee as well as the auditor.

The auditor provided Union Gas and the EAC with an Addendum to the Audit Report on June 25, 2008. Due to the issues raised by the Auditor, and the fact that the report is in draft form, a summary of activity is not provided in this Evaluation Report. Also, based on the Auditor’s observations, Union will not use the Summit Blue’s custom free ridership values in 2008. With engagement of the EAC, Union will complete a new free ridership report for application on 2008 and 2009 claims.

However, given Union Gas has used the Summit Blue Free Rider numbers for its 2007 LRAM inputs, Union has captured the corresponding values in the chart below.

Summit Blue’s Attribution Results for Custom Projects (used for LRAM inputs in 2007)

Utility	Sector	Free Ridership	Participant Inside + Outside Spillover	Audit-Only Spillover %	Net-to-Gross Ratio
Union	Agriculture	0%			
Union	Commercial Retrofit	59%			
Union	Industrial	56%			
Union	Multifamily	42%			
Union	New Construction	33%			
Union	Total	54%	10%	0%	56%

Appendix M - Sampling Methodology for Engineering Review of Custom Projects

1. Overview

Union Gas LTD (Union) and Enbridge Gas Distribution (EGD) contracted Summit Blue Consulting, upon consultation with the Evaluation and Audit Committee, to develop a sampling plan to determine an appropriate sample design for the annual engineering review of custom DSM projects. The objective of this annual engineering review is to verify estimated gas savings contained in the customer project tracking system.

2. Issues

This assignment was focused on two issues:

1. Appropriate sample sizes for the annual reviews of Custom Projects program offerings (spanning both industrial and commercial projects).
2. Proper application of gas savings adjustments to reported savings as identified during the reviews

3. Results

The work effort resulted in a sample design for annual reviews of Custom projects suitable for Union to apply to the 2007 custom projects and to custom projects in subsequent years. The target precision for the sample design is 90 percent confidence plus/minus 15 percent precision but the design is likely to yield a result of 90/20.

4. Union Gas Sample

The Ontario Energy Board (OEB) has adopted guidelines for the gas utilities to follow in sample selection: “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.”

In order to ensure these guidelines are met Summit Blue Consulting’s recommendation is for ***10 on-site industrial data collection efforts and 20 phone-based data collection efforts for commercial customers.*** In addition, Summit Blue recommended three strata for industrial sector customers and four strata for commercial sector customers: a census of the largest projects and samples from retrofit, multi-family, new construction and agriculture.

Size and Stratification

A factor that was believed to be of critical importance in developing this sampling plan was to help ensure that the sample would be representative of the projects participating in the program. The ratio calculation indicates that a target of 90 percent confidence and 15 percent to 20 percent relative precision could be attained with a sample of 30 using relationships obtained from prior evaluation studies.

The Ontario Energy Board (OEB) has adopted guidelines for the gas utilities to follow in sample selection: “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.”

Sample Selection Guidelines for the Industrial Sector

Select 10 industrial projects for in-site data collection using the following steps.

Step 1: Drop the projects with the lowest annual gas savings

Sort projects by size of annual gas savings and delete the smallest 5% of projects from the sample frame. The smallest 5 percent of the projects were deleted from the sampling frame as being too small to be meaningful if selected in the sample.

Step 2: Divide the remaining projects into 3 strata

- *Select Largest Projects (Strata 1)* Taking other factors into account, apply judgment and work with the utility to identify those few much larger projects. The number of projects in this stratum would be between 1 and 4. In the unlikely case of no noticeably larger projects, select the top 4. All projects in the stratum will be sampled “with certainty”.
- *Stratify Remaining Projects Equally by Size & Select Samples (Strata 2 and 3)* Divide the remaining projects into 2 relatively equal strata based on energy savings and randomly select approximately equal sized samples from each stratum for a total of ten projects (including those selected in the first stratum).

Sample Selection Guidelines for the Commercial and Agriculture Sector

Select 20 projects for phone-based data collection efforts using the following steps.

Step 1: Drop the projects with the lowest annual gas savings

Sort projects by size of annual gas savings and delete the smallest 5% of projects from the sample frame.

Step 2: Divide the remaining projects into 5 strata

- *Select Largest Projects (Stratum 1)* Taking other factors into account, apply judgment and work with the utility to identify those few much larger projects. The number of projects in this stratum would be between 1 and 4. In the unlikely case of no noticeably larger projects, select the top 4. All projects in the stratum will be sampled “with certainty”.
- *Stratify Remaining Projects by Sector & Select Samples (Strata 2 to 5)* Select random samples from each of the four sectors: 1) remaining building retrofit projects; 2) agriculture; 3) new construction, and 4) multi-residential. Select an approximately equal sized sample from each sector for a total of 20 projects (including those selected in the first stratum). It is possible that some sectors will have very few projects and savings, for example ten projects representing less than one per cent of total claimed savings. It is acceptable to exclude those sectors from the sampling frame and select samples only from the remaining sectors.

Verification Approach and Application of Results

The savings verification approach implemented through the engineering review is used to estimate a “realization rate” for Union’s custom programs. In practice, appropriate application of the estimated realization rate is then determined in consultation with the Audit Sub-Committee.

The realization rate is an estimate of the ratio of the savings based on the updated engineering reviews for a sample of custom projects to the savings estimated for those same projects

contained in the program tracking system. A ratio of 1.0 would indicate that the engineering reviewed savings estimates match the savings contained in the tracking system. A ratio of .9 would indicate that the engineering review estimates, on average, were 10% less than the estimates contained in the tracking system for the sampled projects. Similarly, a realization rate of 1.1 would indicate that the savings from the engineering review estimates were 10% greater than the estimates of savings contained in the tracking system for that sample of projects.

The accuracy of this estimated is portrayed by the use of confidence intervals and precision levels. It is important to note that results for custom projects with very large customers or custom projects with unique applications or efficiency technologies are not able to be extrapolated to the population of other custom projects due to the unique nature of each customer, plant, and project. For example these would include custom projects with Union's Distribution Contract customers such as steel mills, ethanol plants or mines.

One factor that is important in developing a sample design using a ratio estimate is the relationship between the accuracy and quality of the tracking system and the sample design. The more accurate the tracking system is, all else being equal, the smaller the sample size that is needed to produce a realization rate with a given confidence interval and precision level.

This implies a two-step approach:

Step 1: Make sure that the tracking system is as accurate and as up-to-date as possible for *all the projects in the custom program*. This helps ensure that the tracking system is continuously updated using the most recent results of field collected and reviewed data and assumptions.

Step 2: Use an appropriately selected sample of projects to estimate a realization rate along with confidence intervals and precision levels that support good decision making regarding the accomplishments of the program.

Summit Blue Consulting also recommended scheduling two sample and assessment periods per year in order to move towards a more “real-time” evaluation. One analysis about half way through the year based on achieving 50% of savings attained in prior year and one analysis at end of year. 5 Industrial on-site reviews and 10 commercial and agriculture project phone reviews would be selected in each half of the year.

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.

Attribution

Attribution is defined as the influence the program has had on customers installing the target measure when they otherwise would not have done so, including inside spillover influences to take additional energy efficiency measures.

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.

Direct Costs

Direct costs are the utility program costs, including implementation and incentives that are directly related to an individual program.

Engineering Estimates

Engineering estimates refer to natural gas savings calculation estimates based on fundamental engineering principles and modeling assumptions.

Free Riders

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.

Indirect Costs

Indirect costs are utility costs that relate to more than one specific program. They include research/evaluation, market support and overhead.

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 $1 - \text{free ridership ratio} + \text{spillover ratio}$.

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."

Societal Cost Test (SCT)

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).

TAPS (Thermostats, Aerators, Pipe wrap & Showerheads)

A residential installation program that delivers aerators, pipe wrap and showerheads direct to customers.

Total Program Costs

The total program costs include all direct costs associated with a DSM program, including implementation and incentives.

Total Resource Cost Test

See Societal Cost Test (SCT)

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.

Utility Costs

Utility costs are all expenses (administrative, equipment, incentives marketing, monitoring and evaluation, and other) incurred by the utility in a given year for operation of a DSM program regardless of whether the costs are capitalized or expensed.