July 29, 2011

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: Union Gas Limited – 2010 Demand Side Management Audit and Results

In accordance with the EB-2006-0021 Decision with Reasons, please find attached Union's 2010 DSM Annual Report, the 2010 Audit Report, and Union's Audit Summary Report. The filing of these reports fulfills the requirements outlined in Section 2.1.12 of the Board's Reporting and Record Keeping Requirement Rule.

Throughout the audit process, Union consulted with and received input from the Evaluation and Audit Committee ("EAC"). In Union's view, the 2010 Auditor, Cadmus, fulfilled all audit scope requirements. Members of the EAC expressed concerns related to the audit process. These concerns, in Union's view, are related to the current DSM framework and are best addressed as part of the process to develop terms of reference contemplated in the Board's EB-2008-0346, Demand Side Management Guidelines for Natural Gas Utilities.

Yours truly,

[Original signed by]

Marian Redford
Manager, Regulatory Initiatives

Attach.

MR/la

Final Audited
Demand Side Management
2010 Annual Report

July 29, 2011

uniongas
A Spectra Energy Company

Glossary of Terms

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

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

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

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

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

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

Demand Side Management Variance Account (DSMVA) The existence and use of a DSM variance account provides a degree of flexibility for utilities as they undertake DSM investment. A DSM variance account may be used to rebate ratepayers at year end for unused budget allocation or to recover from ratepayers additional costs incurred for DSM programs.

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

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

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

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

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

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

a) **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).
b) **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.

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

a) **Participant inside spill-over** 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.
b) **Participant outside spill-over** 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.
c) **Non-participant spill-over** represents energy savings from measures that were taken by non-participating customers but are directly attributable to the influence of the program. Non-participant spill-over is sometimes called the "Free-Driver effect."

Shared Savings Mechanism (SSM) A Shared Savings Mechanism (SSM) is a financial tool that allows utilities and customers to "share" in the societal benefits that successful DSM programs generate. SSM can include incentives for both Resource Acquisition and Market Transformation DSM programs.

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

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

Executive Summary

2010 represents Union Gas' thirteenth year of delivering cost effective Demand-Side Management (DSM) programs to its broad customer base. To date, Union Gas' commitment to DSM initiatives has translated to approximately 812 million m³ of annual natural gas savings, equivalent to more than $1.6 billion in net Total Resource Cost (TRC) benefits.

Union is pleased to report that the 2010 DSM portfolio generated 121.1 million m³ of natural gas savings from a program budget spend of $21.5 million, which equates to a Shared Savings Mechanism (SSM) incentive of $ 6.58 million. Union's 2010 Market Transformation activities as measured by the OEB approved scorecard metrics generated an incentive of $0.5 million. While Union continued to demonstrate highly successful DSM delivery in 2010, and aggressively pursued cost effective DSM opportunities, it should be noted that uncertainty surrounded achieving the 100% target until near the end of the year. Given this uncertainty, Union did not access the allowable 15% Demand Side Management Variance Account (DSMVA) for additional funding. As a result the actual spend was slightly below the 2010 budget of $22.5 million.

Although Union's results in 2010 were not lofty as in 2009, Union did set a new high in annual natural gas savings achieved through program delivery in 2010. It is also worth mentioning that the decrease in TRC savings for 2010 did not correlate to a downturn in the number of custom projects; quite the opposite was the case, with double the number of custom projects, from 629 projects in 2009 to 1259 in 2010.[1] Despite the increase in additional time and resources required to facilitate this number of projects, third party verifiers noted a vast improvement in the level of documentation for the Commercial Custom project files.[2]

Union also collaborated extensively with its Evaluation and Audit Committee (EAC) in 2010. In addition to the advisory role for the 2009 Audit, Union worked with the EAC on the Market Transformation Strategy project and 2011 scorecard, to review measure updates from the 2009 audit and technical input assumptions for numerous new measures offerings.

Union celebrates the success of its 2010 DSM programs and the associated significant energy cost reductions that ratepayers have realized.

[1] In 2009 there were 286 Commercial and 343 DC custom projects versus 822 Commercial and 437 DC in 2010. This includes TRC and non-TRC generating projects.

[2] The level of documentation for large industrial Distribution Contract custom projects continues to exceed requirements.

1. Introduction

Primarily authored to present an annual retrospective of Union's energy efficiency initiatives and DSM portfolio results in terms of TRC, budget spend, Shared Savings Mechanism (SSM), and Lost Revenue Adjustment Mechanism (LRAM), the 2010 DSM Annual Report also serves as a vehicle through which to benchmark the results, highlight Union's successes and lessons learned, summarize evaluation research conducted in 2010, and to present Union's 2011 TRC target.

Since the introduction of Union's current DSM framework, the DSM budget has increased from $17 million in 2007 by 10% in each subsequent year,[3] reaching $22.627 million in 2010. Of the 2010 budget, $1.464 million was included for Market Transformation programs and $1.730 million for programs delivered to Low-income customers. Following the formula for calculating the TRC target,[4] Union's 2010 Net TRC Target of $240,256,491 was filed with the Board in Union's 2009 Annual DSM Report. Union surpassed that TRC target by $44 million, achieving $284,132,964 for the year's DSM portfolio at a total cost of $21,532,363.

Union's 2010 DSM portfolio included programs directed towards Residential, Low-income, Commercial, and Distribution Contract (DC) segments as listed below. Major TRC drivers are illustrated in Figure 1.0.

Residential Markets (R):

- ESK Program with multiple delivery strategies
- Programmable Thermostat Rebate

Low-income (LI):

- Helping Homes Conserve
- Home Weatherization Program

Commercial (C):

- Energy Recovery Ventilators
- Condensing Boilers
- Rooftop Units
- Infrared Heaters
- Heat Recovery Ventilators
- High Efficiency Furnaces
- De-stratification Fans
- Programmable Thermostats
- Low Flow Pre-rinse Spray Nozzle
- Kitchen Ventilation
- Condensing Gas Water Heater s
- Front-Loading Clothes Washer
- Steam Trap Survey
- Design Assistance Program
- Feasibility Studies
- Custom Projects

[3] As outlined in the OEB's Decision with Reasons dated August 25, 2006.
[4] As established in Phase 1 of the OEB DSM Generic Proceeding.

Distribution Contract (DC):

- Custom Projects

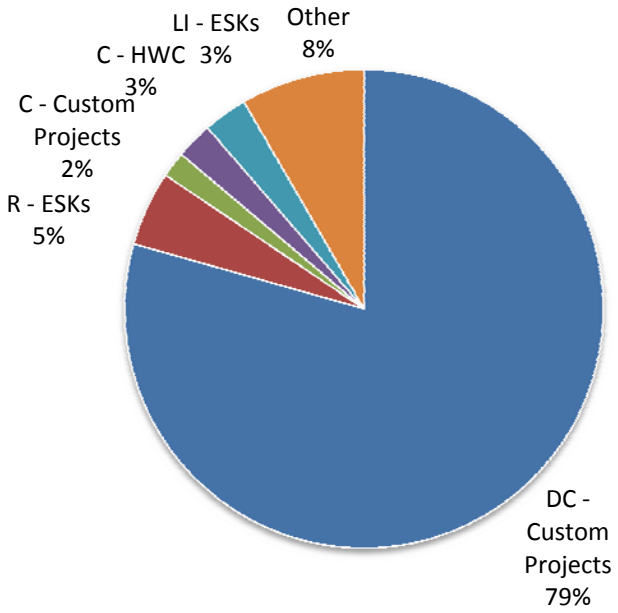


Figure 1.0, Major TRC Drivers

Program TRC results are presented in the body of this report and are benchmarked at the customer segment level against previous year's results in efficient technology units. Previously, Union's DSM Annual Report presented the year over year results in terms of TRC achieved, however input assumptions and adjustment factors for TRC vary from year to year, and as such, tracking program success on a unit basis is presented herein in order to provide a clearer picture of milestones and achievements.

2. Planning and Evaluation Background

Operating within the evaluation parameters of the OEB approved 2007-2009 DSM Plan, Union continues to demonstrate its leadership role in the cultural shift towards energy efficiency and conservation. Union's DSM activities are driving market change through focused efforts on delivering natural gas savings and related customer benefits. Union's DSM portfolio includes a mix of Resource Acquisition and Market Transformation efforts.

All resource acquisition measures are screened for cost effectiveness using the TRC test as outlined in the Decision with Reasons EB-2006-0021 and detailed in section 2.1 below. Although potential new measures for DSM were limited in 2010, Union strategically incorporated new delivery methods to gain traction in the market, such as a new end-use customer funding approach and the expansion of service provider incentives in the Commercial Market. Programs that were less cost effective were scaled back or eliminated.

Two sets of input assumptions form the basis for the 2010 DSM program evaluation as follows:

1) The planning input assumptions used in this report for natural gas m³ savings, TRC results, and the SSM incentive are those filed by Union (EB-2009-0166) on August 11, 2009 and approved by the Board on September 30, 2009. The 2010 DSM New Measure Update (EB-2010-0182) was filed on April 30, 2010 and approved by the Board on June 22, 2010. The updates to existing measures resulting from the 2009 Audit outcomes (EB-2009-0166) were filed on March 14, 2010.
2) For the LRAM section of the annual report, the m³ savings have been calculated using the most current input assumptions available at the time the Annual Report was completed.

Input assumptions for SSM and LRAM are provided in Appendix A.

2.1 Cost Effectiveness Screening

As mentioned above, potential DSM measures face a TRC screening test, which measures the benefits and costs of DSM investments from a resource perspective. Benefits include avoided natural gas, electricity, and water resource use and their associated costs, while the costs relate to the incremental cost of energy efficient equipment in relation to its non-efficient equivalent and any associated program support costs. Costs and benefits are projected over the Effective Useful Life (EUL) of the measure and discounted to calculate the Net Present Value (NPV).[5] All TRC results reported are net of free rider calculations.[6]

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

In calculating the DSM associated avoided costs used in the TRC test , Union follows the methodology laid out by the OEB in the Phase 1 Decision of the DSM Generic Proceeding EB-2006-0021, as well as that approved by the OEB for Enbridge Gas Distribution in the EB-2005-0001/EB-2005-0437 proceeding. Calculating avoided costs for Union are related to customer rates as well as gas supply management policies and practices. The 2010 Union Gas Avoided Costs were included in the filing of the 2009 Union Gas DSM Annual Report.

2.2 Monitoring and Tracking

Effective and reliable tracking is recognized as essential to the veracity of program evaluation and reporting. In 2010, Union has continued rolling out a multiphase enhancement project for DSMt, Union's internal tracking system. In addition, in 2010 a major enhancement was completed to the Out-looking in DSMt that simplified the process to outlook TRC by measure. Improvements to DSMt reduce manual reporting, improve data accuracy, streamline data tracking, and increase audit and verification controls.

2.3 Program Evaluation & Verification

There are two broad categories of evaluation activities; impact evaluation, and process evaluation. Impact evaluations focus on participation and related savings resulting from DSM programs. Process

[5] A discount rate of 10% is used to calculate the net present value.
[6] Free riders are program participants who would have installed the energy efficient measure without the influence of Union's DSM program.

evaluations focus on the effectiveness of program design and delivery to assess why effects occurred. Union has historically focused on impact evaluation, but has expanded the focus in 2009 and 2010 to include process evaluation for Commercial and Distribution Contract Custom Projects.

As part of Union's commitment to DSM impact evaluation, several verification studies are performed annually to examine the accuracy of claimed savings. A summary of the verification studies undertaken in 2010 is provided in the Verification and Evaluation section (Section 9) of this report.

2.4 2010 Evaluation Priorities

Evaluation priorities are typically established through consultation with Union's Evaluation and Audit Committee (EAC), originally with the intention of evaluating input assumptions for each of the program measures included in the 2007-2009 DSM Plan over the course of the three years. While undertaking a third of measure evaluations annually was the initial strategy, many evaluation projects that might have been undertaken in 2009 were precluded by the OEB commissioning and approval of Navigant Consulting Inc.'s, *Measures and Assumptions for Demand Side Management (DSM) Planning*, dated April 16, 2009. In 2010, as Union entered the fourth year of a three year framework, this challenge remained unchanged. In addition, the 2009 Audit extended longer than expected and other competing priorities with the EAC, specifically new measure approvals, limited the Evaluation Priorities identified for 2010. Table 2.0 outlines the projects that were undertaken in 2010 and the current status of the project.

Table 2.0, 2009 Evaluation Priority Projects

Name of Study	Consulting Firm	Status	Appendix
Process Evaluation of Commercial & Distribution Contract Custom Projects	Tetra Tech *(formerly PA Consulting)*	Phase Two Complete	F
Market Share Study of Gas Fired Infrared Heaters	Nexant	Complete	G

Executive Summaries for completed evaluation research studies are appended to this report in Appendices F and G.

2.5 2010 Annual Report Audit

To substantiate Union's DSM Portfolio results, this DSM annual report was subject to an independent external audit, performed by The Cadmus Group for the 2010 program year. The intention of the audit was to confirm to stakeholders that claimed DSM savings are correct and that the SSM, LRAM, and Market Transformation incentive calculations are appropriate.

The Auditor was required to express an opinion on the appropriateness of claimed TRC, SSM, LRAM and Demand Side Management Variance Account (DSMVA) based on their review of Union's Annual Report. The Auditor provided a final opinion that the TRC Savings and amounts recoverable for SSM, LRAM and DSMVA have been correctly calculated using reasonable assumptions.

3. Overall 2010 DSM Program Results

In 2010, Union's DSM program generated net TRC benefits of $284,132,964 for customer and 121,115,763 m³ in natural gas savings. It is worth noting that 2010 represents the highest annual natural gas savings achieved throughout the history of DSM program delivery for Union Gas. Program spending in 2010 totalled $21,532,363, including $1.328 million for Market Transformation and $1.575 million for Low-income. The Distribution Contract (DC) market continued to deliver the largest portion of savings in 2010 followed by the Commercial, Residential and Low-income markets respectively.

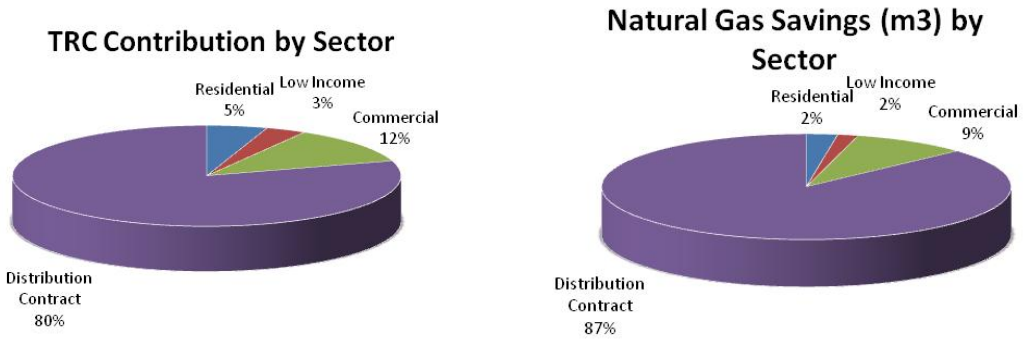


Figure 3.0, 2010 Results by Sector (Percentage)

Union's TRC target for 2010 as filed in the 2009 Annual Report was established as $240,256,491. In an effort to achieve this target, Union focused on a balance of programs in each sector. Table 3.0 summarizes Union's overall DSM results for 2010.

Table 3.0, Overall 2010 Program Results by Sector

Sector	Net TRC	Natural Gas Savings (m3)	Units	Expenditures	TRC per Dollar Spent
Residential	$ 14,666,627	2,967,279	296,792	$ 2,888,286	$ 5.08
Low Income	$ 9,744,496	1,981,427	64,406	$ 1,575,064	$ 6.19
Commercial	$ 34,397,361	10,997,192	84,870	$ 3,932,266	$ 8.75
Distribution Contract	$ 232,077,531	105,169,866	357	$ 5,055,246	$ 45.91
Market Transformation				$ 1,328,450	
Other Direct Program Costs				$ 6,753,051	
2010 Results	**$ 284,132,964**	**121,115,763**	**446,425**	**$ 21,532,363**	$ 13.20
2009 Results	$ 308,255,602	92,604,301	601,359	$ 22,222,457	$ 13.87
2008 Results	$ 262,754,219	62,852,176	526,913	$ 20,258,900	$ 12.97

**Expenditures include program and incentive costs*

DSM initiatives for 2010 were delivered through the sector-specific programs outlined in Table 3.1. 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.

Table 3.1, Sector Programs

Sector	Program
Residential	Home Retrofit
Low Income	Low Income
Commercial	New Building Construction Building Retrofit
Distribution Contract	Custom Projects

Union targets each customer sector with specific DSM programs, results for which are shown in Table 3.2.

Table 3.2, Detailed 2010 Program Results by Sector

Sector	Program	Units	Natural Gas Savings (m3)	Program Costs	Program TRC
Residential	New Home Construction	178	3,543	$ 200	$ 23,360
	Home Retrofit	296,614	2,963,736	$ 1,046,721	$ 14,643,267
	Total Residential	**296,792**	**2,967,279**	**1,046,921**	**14,666,627**
Low Income	Low Income	64,406	1,981,427	$ 231,834	$ 9,744,496
	Total Low Income	**64,406**	**1,981,427**	**$ 231,834**	**$ 9,744,496**
Commercial	New Building Construction	670	2,984,672	$ 87,819	$ 6,693,244
	Building Retrofit	84,200	8,012,519	$ 400,064	$ 27,704,117
	Total Commercial	**84,870**	**10,997,192**	**$ 487,883**	**$ 34,397,361**
Distribution Contract	Distribution Contract	357	105,169,866	$ 366,878	$ 232,077,531
	Total Distribution Contract	**357**	**105,169,866**	**$ 366,878**	**$ 232,077,531**
Total Program Results		**446,425**	**121,115,763**	**$ 2,133,516**	**$ 290,886,015**

Other Direct Program Costs	Salaries	$	5,437,067
	Research & Evaluation	$	1,288,649
	Administration	$	27,335
	Total Other Program Costs	**$**	**6,753,051**

TOTAL 2010 TRC RESULTS	**$ 284,132,964**

Figure 3.1 demonstrates that Union's 2010 total natural gas savings across all programs was approximately 121.1 million m³. Distribution Contract accounted for 87% of the total DSM portfolio natural gas savings.

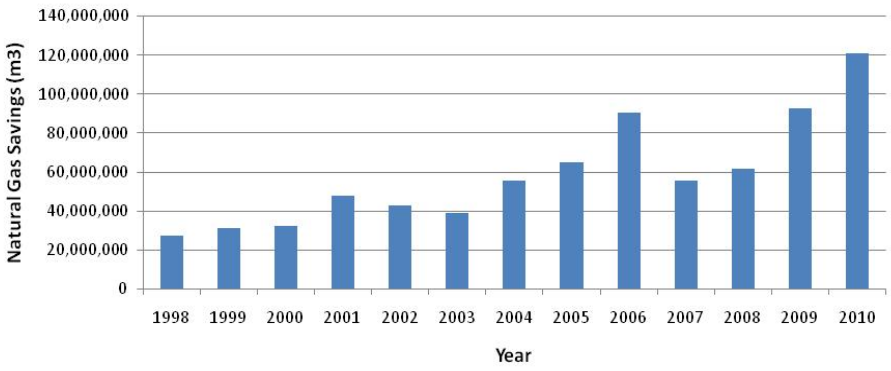


Figure 3.1, Historical Savings Results

The 2010 Board approved budget of $22.627 million was 10% higher than the $20.570 million budget approved in 2009. In 2010 Union spent over $21.5 million on DSM, including over $1.575 million on Low-income programs and $1.328 million on Market Transformation. A breakdown of 2010 expenditures by sector, compared to expenditures for 2008 and 2009, is shown in Table 3.4.

Table 3.4, Overall 2010 Direct DSM Program Costs

DSM Program Sector Costs	Incentives	Program Costs	2010 Total	2009 Total	2008 Total	2007 Total
Residential	$ 1,841,365	$ 1,046,921	$ 2,888,286	$ 2,838,449	$ 3,043,684	$ 2,160,162
Low Income	$ 1,343,230	$ 231,834	$ 1,575,064	$ 2,169,521	$ 1,445,269	$ 1,161,483
Commercial	$ 3,444,383	$ 487,883	$ 3,932,266	$ 4,637,816	$ 4,332,476	$ 3,255,495
Distribution Contract	$ 4,688,368	$ 366,878	$ 5,055,246	$ 5,022,108	$ 3,868,789	$ 2,539,282
Market Transformation	$ 1,023,174	$ 305,276	$ 1,328,450	$ 1,175,296	$ 1,096,777	$ 770,172
Total Program Sector Costs	**$ 12,340,520**	**$ 2,438,792**	**$ 14,779,312**	**$ 15,843,190**	**$ 13,786,995**	**$ 9,886,594**
Other Direct Program Costs			$ 6,753,051	$ 6,379,267	$ 6,471,905	$ 6,244,902
Total Spending			**$ 21,532,363**	**$ 22,222,457**	**$ 20,258,900**	**$ 16,131,496**

DSM Variance Account

The DSM Variance Account provides a budget true-up mechanism to rebate ratepayers at year end for unused budget allocation or to recover from ratepayers additional costs incurred for DSM programs. As currently defined, the recovery of such excess spending is limited to 15 percent budget over the Board approved DSM Plan budget per the OEB Decision with Reasons. In addition, the Company may only recover the funds captured in the account if it has achieved 100 percent of its forecast energy savings, which is its volumetric savings target. All additional funding must be utilized on incremental program expenses including market transformation programs.

Union did not access the DSMVA budget in 2010. As the 100% target was surpassed late in the year, Union was concerned about overspending the budget. As a result, Union could not drive programs any more aggressively given the restriction of hitting the target prior to utilizing the DSMVA, and based upon the final mix of actual program results, it resulted in a small under spend.

A breakdown of spending by program is contained in Appendix B. Specific details on program savings, participants,[7] and costs by sector are outlined in the next three sections of this report.

4. Residential Market

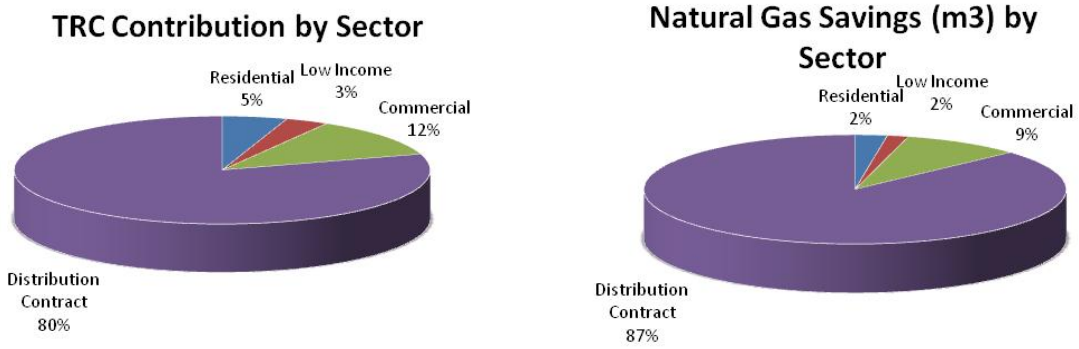


Figure 4.0, Results by Sector (Percentage)

[7] Participant counts are equivalent to the number of measures installed for each program

Residential programs accounted for 5% of all DSM TRC in 2010, contributing 3.0 million m^3 of savings, and a net TRC of over $14 million. Direct program spending in the residential market was $2.888 million.

The residential sector delivered natural gas savings through the Home Retrofit program in 2010, results for which are summarized in Table 4.0.

Table 4.0, 2010 Residential Program Results

Residential	Net TRC	Natural Gas Savings (m3)	Units	Expenditures	TRC per Dollar Spent
New Home Construction	$ 23,360	3,543	178	$ 551	$ 42.39
Home Retrofit	$ 14,643,267	2,963,736	296,614	$ 2,887,735	$ 5.07
2010 Results	**$ 14,666,627**	**2,967,279**	**296,792**	**$ 2,888,286**	**$ 5.08**
2009 Results	$ 26,073,066	4,515,861	363,922	$ 2,838,449	$ 9.19
2008 Results	$ 25,949,245	6,725,838	405,992	$ 3,043,684	$ 8.53

**Expenditures include program and incentive costs*

Although still the largest driver of TRC in the residential portfolio, 11,054 fewer Energy Savings Kits (ESK) were delivered in 2010, for a total of 72,000 (see Table 4.2 for details).

4.1 Program Framework

Residential programs are designed to achieve savings in space and water heating for Union Gas' residential individually metered residences. These programs are marketed to residential customers and are delivered through a variety of channels, including retail partnerships, builders, and third party delivery agents. New partnerships as well as working with existing trade allies, partners, and direct-to-customer promotions are strategically developed to cost-effectively promote energy efficiency within Union's residential customer base.

This section outlines the programs available to residential customers in 2010, including program changes, existing initiatives and delivery methods employed.

4.1.1 New Initiatives in 2010

Lowes Energy Savings Kit (ESK) Distribution Event

Union expanded its ESK (refer to section 4.1.2 – Existing Initiatives) approach and initiated a new channel through Lowes Home Hardware (Lowes). In 2010, this partnership was piloted in five cities (Hamilton, London, Sudbury, Brantford, and Bellville) over two days which allowed Union to expand its promotion of ESKs to new areas. This event was driven by local Radio ads, local newspaper inserts, press releases as well as local store event posters, and pre event flyers distributed by Lowes to their customers. The two day events resulted in the distribution of approximately 3,000 kits (for ESK content details, see 4.1.2 below).

Figure 4.1, Lowes ESK Event flyer and Newspaper insert

Direct Mail Campaign

In 2010 Union launched a new direct mail program targeting customers who had not yet received an ESK. By working with the newly implemented DMTI (Desktop Mapping Technologies Inc) dashboard, Union was able to generate a database of customers who had not received an ESK in the past as well as eliminate low-income potential customers.

Union started using DMTI's Location Hub software in the residential mass market in 2010. It is an address verification solution with analytic and visualization tools that enables businesses to utilize address content, already existing in databases, to rapidly transform business results.

The direct mail provided information on the components of the ESK as well as how to get one (Online, Pick-up Depots, Mail back Coupon). More than 200,000 direct mail letters were sent out covering more than 10 municipalities like Kingston, Hamilton, Thunder Bay, Milton, Sarnia, Guelph and Belleville. The direct mail resulted in the distribution of approximately 10,000 ESKs (equalling a 5% direct mail response rate).

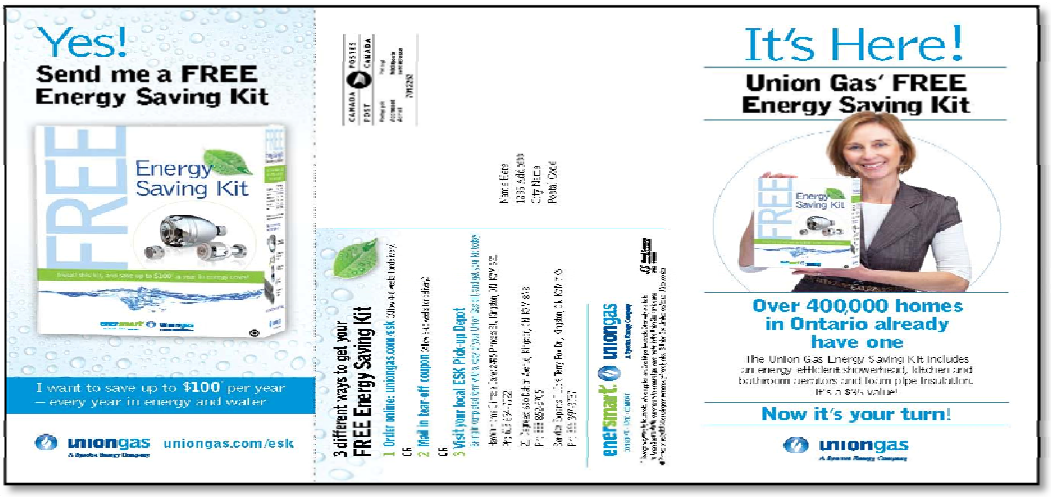


Figure 4.2, Direct Mail

Radio Campaigns

Union Gas launched a series of radio campaigns to support retailers' events like Home Depot, Rona and Lowes. The radio ad was to create more awareness about the benefits and cost savings associated with the installation of the ESK. The ad also directed customers to pick up the kit on a specific date from a specific location. The campaign was successful in creating traffic to the retailers' stores where customers received the kit. Example of the script below:

> ***Anncr: Did you know that this Saturday, Union Gas is giving away FREE Energy Saving Kits? That's right! Valued at $35 dollars, the kit includes an energy-efficient showerhead, aerators and pipe insulation. Installing it will instantly reduce your water use, water heating costs, and help you save up to one hundred dollars a year on your energy bills.***
>
> ***Tag 1: Pick up your FREE Energy Saving Kit this Saturday only, at 2 Rona locations: Blythwood Road or Commissioners Road East from 9 to 3. (While quantities last. Some restrictions apply.)***

New Home Construction Energy Saving Kits (ESKs)

Union expanded its ESK (refer to section 4.1.2 – Existing Initiatives) approach and piloted a new home construction initiative. The New Home Construction ESK program ran from July through December 2010 and worked with Mattamy, Union's largest new home builder. Once the home was built and transferred to the new homeowner, the builder's Warranty Specialist would go back to do a final inspection and install a showerhead, kitchen aerator and bathroom aerator. The program also required that the Warranty Specialist hang a "door hanger" on the shower and one on the bathroom faucet. This provided the explanation of the value-add and cost savings to the homeowner. The Warranty Specialist from Mattamy felt that it was a value-add to customers as they were working in partnership with Union Gas to reduce the homeowner's energy bills. Over the six month period, Union achieved 66 installations. In 2011, Union will continue to explore this partnership and possibly look to expand this program to other builders.

Figure 4.3, New Build ESK "Door Hangers" (front and reverse view)

4.1.2 Existing Initiatives

Energy Savings Kit (ESK)

ESKs have been distributed to Union's customers since 2004. ESKs are pre-packaged measures designed to reduce a customer's energy demand and water consumption, as well as educate consumers on the efficient use of energy. In 2010 Union continued use of a 1.25 Gallon per Minute (GPM) showerhead as a component of the ESK offering. The 1.25 GPM showerheads are not sold at retail outlets in Ontario and were manufactured as a special order for Union with high quality chrome casing aesthetics. In addition to the 1.25 GPM showerhead, the 2010 ESK consisted of:

- Pipe wrap (two 1 meter lengths)
- Energy efficient kitchen aerator (1.50 GPM)
- Energy efficient bathroom aerator (1.00 GPM)
- 1 roll of Teflon tape for ease of showerhead installation
- ESK Installation Guide, (see Figure 4.4a and 4.4b)[8]
- $15 Programmable Thermostat coupon

[8] The installation guide also directs our customer to an installation video on our website at uniongas.com

Figure 4.4a, 2010 ESK Installation Guide (front view)

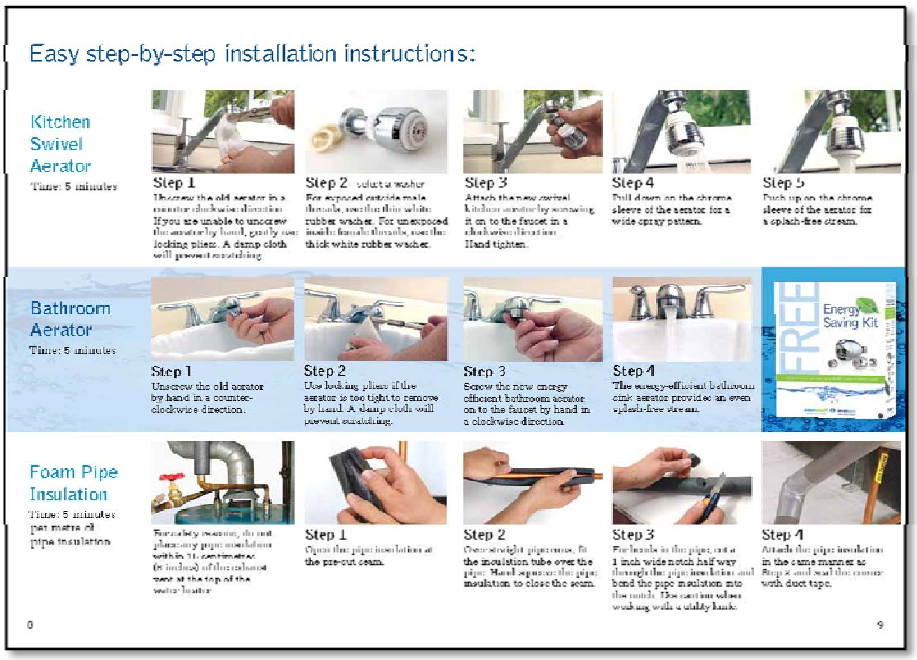


Figure 4.4b, 2010 ESK Installation Guide (reverse view)

Union Gas delivered ESKs to franchise customers through a variety of delivery methods; results for each are shown in Table 4.1.

Table 4.1, 2010 ESK Summary of Delivery by Channel

2010 ESK Results by Delivery Channel

Residential Account Managers	Retail Events	Orders/Pick Up Depots	Energy Clinics	School Board	Direct Energy Distr.	Direct Energy Install	HVAC Program Install	HVAC Program Distr	Builder Install	**Total**
2,932	8,012	37,764	636	1,040	461	85	610	20,394	66	**72,000**

In 2010 a total of 72,000 ESKs were distributed in Union's franchise area. This is approximately 11, 000 less energy saving kits than the 83,054 ESKs in 2009. Overall, the greatest driver for ESKs in 2010 was the Union Gas website online order form and pick-up depots listed on uniongas.com/esk.

Retailer ESK Distribution Events:

Over the last five years Union Gas has hosted ESK Distribution events in partnership with The Home Depot at various store locations across Union's franchise in the spring and fall. In 2009 Union Gas launched a pilot with Rona Home Hardware. In 2010 Union continued working with Home Depot and Rona and also launched some events with Lowes. In total Union launched more than 40 distribution events in cities like Milton, Guelph, Waterloo, Belleville, Sault Ste Marie, London, Burlington, Oakville, Windsor & Hamilton. In total more than 8,012 ESKs were distributed through the spring and fall events in 2010. Retailers view Union Gas as a key partner in advancing their customer's awareness and uptake of energy efficient products thus contributing to their corporate energy conservation and environmental stewardship profiles.

Figure 4.5, 2010 ESK Packaging (Branded Per Distribution Event)

Residential Account Manager ESK Distribution:

Since program inception, regional Union Gas Account Managers have been working with local ESK distribution channels. These local ESK channels are in addition to the mass marketed ESK events. Examples of local events include home shows, trade shows, business partner sales events, community events and 'local' promotions. In 2010 Union Account Managers distributed approximately 4,000 ESKs in their territories.

ESK Co-branding Partnerships

Building on the success of partnering with Direct Energy in 2008, Union Gas expanded this working approach to include Reliance Home Comfort in 2009 to reach customers less likely to receive an ESK through existing delivery channels. Through the partnership, Union provided Direct Energy and Reliance with co-branded kits that were installed/ distributed by their sales force. In 2010, ESK co-branding partners received a $40 incentive for installing ESK showerheads, and a $20 incentive for the distribution of an ESK to a qualified Union Gas customer. A key component of the installation strategy was that a

showerhead bag test was performed prior to the installation of the new energy-saving showerhead and the results were tracked accordingly.

HVAC Partnership Initiative

Designed to influence energy conservation decisions at the point of purchase, incentives are paid directly to the HVAC partners for the promotion, sale, and installation of an energy efficient measure through the HVAC Partnership. For 2010 the following incentives were available to qualified HVAC partners;

- $20 for the distribution of an energy saving kit to a qualified Union Gas customer;
- $40 for the installation of an energy saving kit to a qualified Union Gas customer;
- $25 for the sale and installation of a programmable thermostat.

In 2010, HVAC partners installed 600 ESKs and distributed more than 20,000 ESKs. Those partners participating in the ESK installation component of the program also qualified to apply for incentives for installing programmable thermostats. HVAC partners were educated to ensure that only sales to customers replacing a manual thermostat were counted as valid participants in the programmable thermostat offer.

Pick-up Depots Partnership Initiative

Union Gas is continuing to partner with retailer stores strategically located in our franchise area and serve as our distribution arm. Examples of these stores are Home Depot, Sears as well as some HVACs who own a showroom. Even though we don't offer any financial incentives to these depots, we still create traffic to their stores by including them in our bill insert sent to 1.1M residential customers. In 2010, Pick-up depots distributed more than 15,000 kits.

Figure 4.6, Pick-up Depot Promotional Material

Programmable Thermostat

In 2010 Union promoted a $15 on-bill rebate (Figure 4.7) for the purchase and installation of a programmable thermostat to its customers. In November 2010 Union Gas launched a limited time offer of a $25 on-bill rebate. This rebate, offered in the form of a coupon, was distributed through a number of channels in 2010:

- Bill inserts distributed to the entire Union residential customer base
- ESK insert
- Home Depot and other retail stores
- HVAC dealers
- Union Gas website

Figure 4.7, Programmable Thermostat: Bill Insert

Coupons were also provided to Home Depot and Rona as a form of promotion to their customers. Residential Account Managers maintained and monitored coupon inventory levels and refilled stock. In order to receive the on-bill rebate customers had to submit their active Union Gas account number on the completed coupon along with a copy of the bill of sale. Only coupon participants who indicated they were replacing a manual set- back thermostat were eligible to participate in the program.

4.1.3 Initiatives Exited in 2010

ESK School Board Partnership

In partnership with school boards Union distributed a letter offering an ESK to all staff and students, not only creating awareness of the energy saving measures but also educating young people about the importance of energy conservation. Union Gas exited this program due to the high level of logistics and labour required to launch and maintain the program.

4.1.4 Education and Awareness Efforts

Although education efforts in the residential sector do not generate TRC, affecting consumer decisions relating to the benefits of DSM through awareness is crucial to gaining, and not losing, ground. In an effort to overcome the barrier that awareness presents, Union targets educational outreach to customers to empower them to manage their energy costs. In 2010, Union continued to couple the promotion of existing TRC positive measures with educational tools such as the Wise Energy Guide. Union will continue to develop creative methods to make energy conservation education more effective.

In 2010 Union Gas continued to disseminate educational materials to inform customers and trade allies about energy efficiency through a variety of media:

- Interactive website

- Wise Energy Guides (WEG)
- InTouch monthly bill inserts
- Bi-Annual Residential HVAC Newsletter
- Energy conservation ESK events

Residential Energy Efficient Website

The Union Gas corporate website was completely re-designed and re-launched in July of 2008. The focus of site content has continued in 2009 and 2010 to promote environmental stewardship and energy efficiency. The residential section of the website (uniongas.com/energyefficiency) has a dedicated Energy Conservation menu heading through which the following sub-segments can be viewed:

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

Features on the site include:

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

Wise Energy Guide (WEG)

In 2010 Union completely revised, updated and launched a new version of the WEG. The new guide included up-to-date information on code changes, information on the house as a system, tips and solutions to reduce heat loss, manage bills, and an easy-to-use checklist to assist customers achieve energy efficiency in the home. The new guide was launched at the fall energy clinics and was also made available to all customers through the website for view and download by chapter or in its entirety.

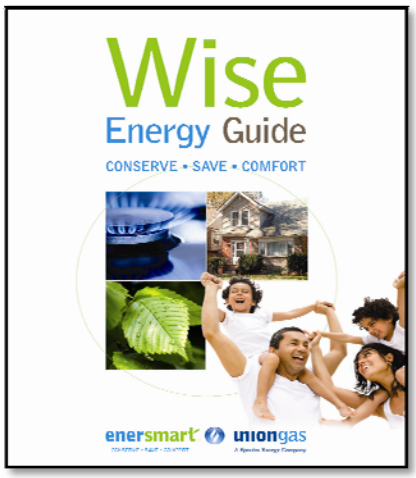


Figure 4.8, Wise Energy Guide

InTouch Monthly Newsletter

Union continued to distribute monthly InTouch Newsletters in 2010. In addition to the monthly newsletter included as a bill insert in 2010, Union posted all monthly bill inserts and newsletters online as eFlyers on uniongas.com/residential. This allows a more interactive information tool that links to related sites from within the flyer (Figure 4.9). These newsletters include an educational message on residential energy efficiency in each issue.

Figure 4.9, InTouch Newsletter

Bi-Annual Residential HVAC Newsletter

In 2010, Union continued the development of a spring and fall newsletter targeting residential HVAC contractors. The newsletters contained information on Union's energy efficiency programs, such as ESKs and programmable thermostats. The newsletter also highlighted the Government of Ontario and Government of Canada ecoENERGY Retrofit grants in addition to the Ontario Power Authority's cool savings rebate program.

Dedicated HVAC Webpage

In the fall of 2008 Union Gas launched a section of the website dedicated to its HVAC partners (Figure 4.10). In 2010, Union continued the maintenance and promotion of this website. One goal of this targeted HVAC website is to drive further energy conservation messages and measures in the existing and retrofit markets.

Figure 4.10, HVAC Webpage: www.uniongas.com/hvac

4.2 Program Results

The Residential program contributed 2,967,279 m^3 in natural gas savings with a net program TRC of $14,666,627. As identified in Table 4.2, the greatest driver of the residential results was the Energy Saving Kit.

Table 4.2 - Major Residential Savings Drivers in 2010

Initiative	2010 TRC	2010 Units	2009 Units	2008 Units	2007 Units
Energy Savings Kit	$ 14,824,836.40	72,000	83,054	96,752	67,919
Programmable Thermostat	$ 888,711.14	8,878	17,460	9,296	22,762
High Efficiency Furnace	0	-	14,246	8,407	14,824
Total	**$ 15,713,547.53**	**80,878**	**114,760**	**114,455**	**105,505**

*Program costs not included

Union annually commissions studies, based on ESK program delivery type, to verify that homeowners install the ESK measures. Adjustment factors applied to 2010 results reflect that only those participants who install the ESK measures, and keep them installed, are included in the savings calculations. The results of these 2010 verification studies are outlined in the Verification and Evaluation section (section 9) of this report.

4.3 Program Costs

Direct program spending in the residential market was over $2.888 million in 2010 as shown in Table 4.3 below.

Table 4.3 – Residential Program Costs

Residential	Incentives	Program Costs	Total Costs
New Home Construction	$ 351	$ 200	$ 551
Home Retrofit	$ 1,841,014	$ 1,046,721	$ 2,887,735
Total	**$ 1,841,365**	**$ 1,046,921**	**$ 2,888,286**

4.4 Lessons Learned

1. Challenge in identifying positive TRC measures for the Residential Market

The residential sector has limited measures which generate positive TRC results and the cost of delivering programs continues to rise in relation to the TRC earned. Both the continual downward pressure on achievable savings and the stricter codes and standards for energy efficiency are continuing to diminish measure opportunities for the residential market. Union's exploration of DSM measures for the Residential segment has heightened since the 2009 removal of the Energy Star for New Homes program and the 2010 phase out for the high efficiency furnace measure, both of which are directly related to the introduction of a new Ontario Building Code standard. This underscores the unique challenge that Ontario's gas utilities are faced with in terms of identifying new viable technologies and/or strategies to incorporate into the residential DSM program portfolio using the TRC as a cost effectiveness screening test.

2. Education

Education initiatives to reach the residential sector do not in themselves generate TRC. In an effort to offer this service to Union's customer base and empower them to manage their energy costs in 2010, Union continued to couple promotion of existing positive TRC measures with educational tools such as the Wise Energy Guide. Union will continue to develop creative methods to make energy conservation education more effective.

3. HVAC Partnership

In 2010, the HVAC partnership component of the program was altered in order to provide Union's HVAC partners with the option of either installing a showerhead for $40 or distributing an ESK for $20 as part of their service or sales calls. This dual approach and increased incentive resulted in a significant increase in distribution of ESK's through this channel. Providing additional opportunities to existing channels will help ensure the continued success of the program.

5. Low-Income – Helping Homes Conserve

Union's DSM plan allocated $1.730 million in 2010 for programs targeted to low-income customers.

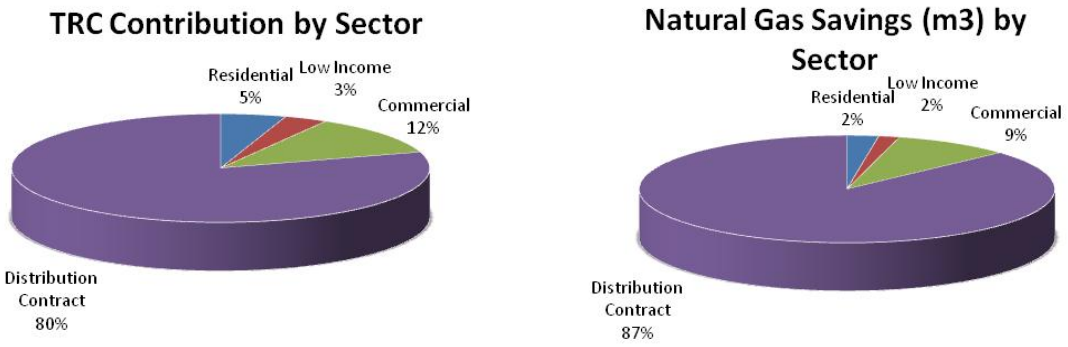


Figure 5.0, 2010 Results by Sector (Percentage)

Since the Helping Homes Conserve (HHC) program launched in the fall of 2006, it has contributed to over 7 million m³ in natural gas savings and a net TRC of over $35 million. Table 5.0 summarizes the Helping Homes Conserve program results. In 2010, the program contributed 2.0 million m³ of savings with a net program TRC of $9.744 million.

Table 5.0, 2010 Low-Income Program Results

Low Income	Net TRC	Natural Gas Savings (m3)	Units	Expenditures	TRC per Dollar Spent
2010 Results	**$ 9,744,496**	**1,981,427**	**64,406**	**$ 1,575,064**	**$ 6.19**
2009 Results	$ 13,497,387	2,746,452	87,549	$ 2,169,521	$ 6.22
2008 Results	$ 5,948,872	1,575,000	35,699	$ 1,445,269	$ 4.12

**Expenditures include program costs*

5.1 Program Framework

Low-Income DSM programs are designed to reduce the energy burden facing low-income households. This section outlines the programs available to the low-income residential market including the Helping Homes Conserve program which provides low-income customers with basic measures and the Home Weatherization program, which was designed to address the building envelope more comprehensively.

5.1.1 New initiatives in 2010

Outreach Partnership with Social Housing Services Corporation (SHSC)

In the fall of 2010, Union embarked on a partnership with SHSC to reach out to social housing property managers within six cities in Union's territory (Cornwall, Guelph, St. Thomas, Burlington, Leamington and Sarnia). An email blast describing the Helping Homes Conserve program and benefits were sent to all social housing property managers and SHSC staff members followed-up with phone calls to garner interest. All interested property managers were put in touch with our delivery agent to schedule installations for their tenants. This partnership has proved to be successful and Union will continue to work with SHSC in 2011.

Exhibiting at the Ontario Non-Profit Housing Association (ONPHA) Trade Show

Historically, Union hasn't promoted the HHC program through broad events because of our limited reach to multiple communities. Because of the significant growth in geographic reach that Union has been able to achieve over the years, Union exhibited a booth at the annual ONPHA tradeshow in late November 2010. Union found the reception of the tenants and property managers who approached the booth to be very positive and led to registrations in the program. Since the event was held in Toronto, a large number of tenants and property managers that attended resided outside of Union's service territory.

5.1.2 Existing Initiatives – Helping Homes Conserve

Union continued to deliver the basic measure low-income program Helping Homes Conserve (HHC). This program offered low-income customers the free installation of energy-efficient showerheads, pipe wrap, and a programmable thermostat. Bathroom and kitchen aerators were left with the customer for self-installation. Union continued offering the program in Hamilton, Windsor, Sudbury, North Bay, Cornwall, Brantford, London and expanded to St. Thomas, Leamington, Waterloo, Amherstburg, Cambridge, Burlington, Acton, Milton, Guelph and Waterdown.

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

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

- Pay own Union Gas bill (unless a tenant is residing in social housing)
- Live in an individually metered low-rise dwelling (three stories or less)
- Have a gas-fired water heater (for energy-efficient showerhead & aerator)
- Have a gas-fired furnace (for programmable thermostats)

Union's main approach to the low-income market was through a targeted neighbourhood strategy. A target list of low-income customers was developed through third party postal code data that identified neighbourhoods with a high propensity of low-income residents. These postal codes were then scrubbed against Union's internal customer data and target lists were created. Once the target lists were created, grid maps were developed for technicians to visually see where clusters of low-income customers resided within a small area in each city. This led to further efficiency in the field. To ensure the privacy of customers, customer names were never used on any marketing materials and were never supplied to Union's third-party installation contractor, Eco-Fitt. Instead, homes were always identified by address only.

Prior to a technician entering a neighbourhood, the identified customers were sent a direct mail educational package providing information on the program benefits and notifying them that a technician would be visiting their neighbourhood in the next few weeks. Customers then received a notification flyer two to three days prior to a technician's visit to remind them that personnel would be in the neighbourhood performing installations. Technicians would then visit the homes offering customers installations and/or booking an installation for a more convenient time. Once the installation was completed, the customer would sign an acknowledgement form and receive a programmable thermostat instruction sheet and education guide which includes low cost energy conservation tips tailored to low-income customers. If a customer was not home, a door hanger would be left behind to

let them know a representative from Union had visited and to encourage them to call the toll free number provided to book an appointment.

Low-Income Home Weatherization Program

In 2010, Union continued to deliver the Home Weatherization Program to low-income customers residing in Cornwall and Windsor. This program offers low-income customers with a free home energy audit and building envelope upgrades, including: attic insulation, wall insulation, basement insulation and draft-proofing measures. The upgrades performed in the home were determined by the results of the home energy audit. Once the installation of measures was complete, another energy audit was then performed to assess the actual energy savings realized by the upgrades.

Union had been working with Cornwall Area and Housing since 2009 and continued to work with them in 2010 to weatherize row-houses. In 2010, Union expanded the program to the Windsor area, working with Windsor Essex Homes to weatherize single detached war time homes. The expansion of the program into the Windsor area proved to be very successful as it allowed Union to deliver the program within a new area in our franchise and gave Union more experience weatherizing single detached homes. It also allowed Union to grow capacity with our delivery agent, EnviroCentre, by building an infrastructure in the Windsor area to weatherize homes.

5.1.3 Education and Awareness

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

Education Guide

To provide further value to customers after installing the measures as part of the HHC program, Union provided each customer with an Education Guide specifically tailored to low-income customers that outlined low-cost and no-cost energy reduction tips for the home. The guide included energy tips for home heating, water heating, windows, doors & weather stripping and lighting. Every customer who participated in the HHC program or attended an energy clinic received an Education Guide with their installation.

Education Clinics

In partnership with social service agency partners, Union hosted a total of seven education clinics in 2010 in London, Hamilton, Cornwall, Windsor, Cambridge and Dundas. A local Union Gas Account Manager hosted each session and spoke to the attendees about various ways that they could save energy in their home. Attendees were encouraged to try out some of the products that were discussed, such as caulking and applying window film. A mock window was available at every session for the attendees to practice on.

By hosting an interactive session which allowed the attendees to try out the products, Union was able to provide customers with the knowledge and comfort level to perform these applications in their home. At the end of the session, customers were provided with some home weatherization products such as

caulking, window film and weather-stripping for installation in their home. These products were not distributed for TRC generation but rather as an added-value for those who took the time to attend the clinic. Union also provided education materials including the Energy Saving Guide and the Helping Homes Conserve program brochure.

Local Partnerships

Establishing local partnerships in the community is critical to the success of low-income programs. These partners have extensive knowledge, experience and understanding of low-income issues, the neighbourhoods and needs of the residents. They also have trusted relationships with numerous low-income customers. To bring further awareness of Union's program to low-income customers, Union partnered with various organizations in the communities to help deliver its message and build awareness of the 2009 programs. Union partnered with the following agencies:

Hamilton

- Housing Help Centre
- Neighbour to Neighbour
- The Immigrant Women's Centre

Windsor

- The Corporation of the City of Windsor, Housing & Children's Services
- Windsor Essex Housing Corporation
- Youth and Family Resources Network
- United Way Windsor

Sudbury

- The Red Cross, Housing Division

London

- The Salvation Army of London
- Municipal Housing, London
- Families First

Cornwall

- Cornwall & Area Housing
- EnviroCentre
- Family Counselling Centre

North Bay

- North Bay Area and Social Planning Council

Brantford

- The Corporation of the City of Brantford, Social Housing

Dundas

- Dundas Community Services Centre

Cambridge

- Langs Farm Village Association

These partners have been invaluable in generating awareness for the program by distributing Union's program brochures, speaking to their clients about the program, and by allowing Union to host education clinics for their clients.

5.2 Program Results

The Helping Homes Conserve program contributed 2.0 million m^3 of savings with a net program TRC of $9.744 million. As the program concentrated on expanding its geographic reach and establishing networks to better enable the identification of qualifying participants, 2010 saw a decrease in the number of customers that participated in the program compared to 2009 (see details in Table 5.2).

Table 5.2, Helping Homes Conserve Participant Summary

Measure	2010 Units	2009 Units	2008 Units
Energy-efficient Showerhead	14,384	20,061	7,888
Kitchen Aerator	14,508	18,478	7,694
Bathroom Aerator	14,443	18,478	7,694
Pipe Insulation	14,542	18,667	7,291
Programmable Thermostat	6,395	11,790	5,132
Weatherization	134	75	0

5.3 Program Costs

Direct program spending in the low-income market in 2010 was just over $1.575 million, below the planned expenditure of $1.731 million outlined in Section 3 of this report.

5.4 Lessons Learned

1. Refined Data-mining

In 2010, Union continued to partner with DTMI (Desktop Mapping Technologies Inc.) to further refine the data mining methodology, enabling a more effective and efficient process in the field. These refinements allow Union to visualize clusters of low-income homes within communities through a newly implemented online dashboard in 2010. This allowed for more precise targeting and more efficient use of technicians time in the field.

2. Partnership Development

Continuing to foster and develop local partnerships within the community is key to providing access to information on low-income customers, promoting the program to their clients/contacts, and gaining trust within the community. Partnerships included property management firms and municipalities, a top down approach that engendered greater program traction.

6. Commercial Market

Commercial energy efficiency programs accounted for 9% of DSM savings in 2010, totalling 11 million m^3 in natural gas savings with a net program TRC of $34.397 million. Direct program spending in the commercial market was just over $3.9 million.

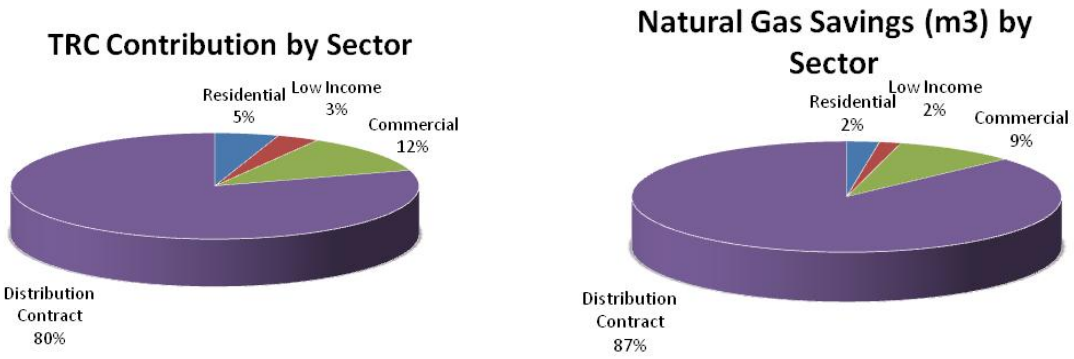


Figure 6.0, 2009 Results by Sector (Percentage)

In 2010, Union continued to offer commercial programs in the New Build Construction and Building Retrofit markets. Commercial savings driven through the building retrofit market represented 80.6% of sector savings in 2010. Table 6.0 summarizes the commercial market program results for 2010.

Table 6.0, 2010 Commercial Program Results

Commercial	Net TRC	Natural Gas Savings (m3)	Units	Expenditures*	TRC per Dollar Spent
New Building Construction	$ 6,693,244	2,984,672	670	$ 888,664	$ 7.53
Building Retrofit	$ 27,704,117	8,012,519	84,200	$ 3,043,602	$ 9.10
2010 Results	**$ 34,397,361**	**10,997,192**	**84,870**	**$ 3,932,266**	**$ 8.75**
2009 Results	$ 74,008,306	21,069,115	149,677	$ 4,637,816	$ 15.96
2008 Results	$ 71,428,055	13,186,116	85,095	$ 4,332,476	$ 16.49

** Expenditures include direct program costs.*

Given the diverse nature of commercial custom projects and their importance to the overall DSM portfolio, in 2010 Union Gas continued with the implementation of a new process that provides quality control reviews of custom project files as recommended through the audit of Union Gas's 2008 DSM Annual Report. Quality control management for custom projects came into effect in July of 2009 and has continued throughout 2010.

6.1 2010 Program Framework – Approach to Market

Union Gas approaches the commercial market in segments from both an internal resources and an external communications perspective based on industry type. Segmenting based on industry type means that Union approaches 'like' customers in a more harmonized way and targets each segment with more customized, relevant and valuable communications. The 11 main customer segments targeted in 2010 included: Office, Retail, Multifamily, Foodservice, Hotel/Motel, Manufacturing, Agriculture, Warehouse, Entertainment/Recreation, Education, and Healthcare. All segments were within the Commercial M1, M2, R01 and R10 rate classes. This segmented approach allows Union to utilize existing resources more

effectively, to more successfully educate business customers about energy savings they could experience and to more effectively influence their decisions to participate in our DSM programs. In addition, segmenting based on industry type has provided Union with market insight, allowing better understanding of both the remaining and the new DSM opportunities available.

When targeting each segment, Union engages a highly skilled team of Sales Account Managers and Marketing support to execute on one or more of the following approaches to market:

- ***Direct Sales Approach***: With this approach, Union's Account Managers work directly with the end-user, including educating them on potential options to improve the energy efficiency of their facilities, Union's available programs and the application process. In 2010, additional focus was placed on the direct sales approach to program delivery.
- ***Mass Market Approach***: Union's marketing team uses a number of different mass marketing techniques such as direct mails, email blasts, and advertising to target the end-use customer.
- ***National Account Approach***: Union's National Account Managers communicate and influence end-use customers using a top-down, centralized approach. National Account customers are those that have multiple property locations throughout Union's franchise area with similar design and use, such as Retail chains, Government buildings, Schools, Property Mgmt firms and Foodservice chains.

Not only does Union reach and influence the market through the above direct sales, mass market and national account approaches, but also through a network of industry partners. These industry partners specify or install energy efficient equipment and/or directly educate or influence our customers to adopt natural gas energy efficient equipment. Maintaining and growing relationships with each of the following industry partners ensures that they are educated on Union's programs and that they can articulate the savings, benefits and incentives to customers::

- ***Service Providers -*** Architectural consultants, builders, HVACs, engineering consultants and energy service companies.
- ***Suppliers*** - Third parties that promote, sell and/or install our promoted programs.
- ***Associations*** - Associations align with our segment specific approach to market and provide industry insight necessary to designing programs that resonate with customers and drive action.
- ***Manufacturers*** - Manufacturers of the technologies that Union promotes provide insight into products' key benefits, as well as approach to market.
- ***Distributors*** - Distributors strongly influence the market and their customers, the contractors. Contractors then influence the end-use customers installing the equipment.

6.1.1 Commercial Program – 2010 Incentives

A portfolio of energy efficient technologies was available to commercial customers in 2010 through the Commercial New Buildings and Commercial Existing Buildings programs. Union uses the EnerSmart Program brand platform to educate customers about, and promote the adoption of, high efficiency natural gas technologies and/or processes, as well as audits, surveys, studies etc. Union's commercial EnerSmart programs are divided into 3 types, including:

1. ***Prescriptive Programs:*** These programs have predictable energy savings based on the size and classification of the equipment. The energy savings for these measures are prescriptive in nature and have been approved by the OEB in EB-2009-0166 and EB-2010-0182.

2. ***Quasi-Prescriptive Programs:*** These programs, also approved by the OEB, are slightly different than the Prescriptive technologies. The key difference is that the potential energy savings for these technologies are 'quasi-prescriptive' not prescriptive. This means that the majority of the saving inputs will be prescriptive; however, there will be one or possibly few inputs that need to be customized for each installation to determine the TRC value. Examples of inputs that would have to be customized for each installation/claim are: where a piece of equipment is installed (new or existing building), type of business (e.g. Foodservice or Healthcare) and size of equipment (e.g. CFM or BTU).

3. **Custom Programs:** The Custom program pays for surveys and studies that identify energy efficiency projects that save money and reduce natural gas consumption. The Custom program also helps fund the purchase and installation of non-prescriptive/non-quasi-prescriptive equipment that make a company more energy efficient. Because there is a myriad of technologies and combinations, the TRC for each project is unknown; therefore, Union always requires a unique calculation of expected TRC on a project-by-project basis.

End-Use Customer Funding Strategy

In 2010, Union transitioned to an end-use customer funding approach where the bulk of the incentive moved from the Service Provider to the end-use customer. This new approach, is simple and transparent and it ensures not only that the customer is clear on Union's influence, but also that the incentive is rewarding those that are actually making the decision and adopting the energy efficient application and/or process.

To ensure that the Service Providers' role in the education/buying process is recognized and to ease the incentive transition for Service Providers – in addition to the end-use customer incentive change – Union also introduced a "Service Provider Incentive". This Service Provider incentive offers architectural consultants, commercial builders, commercial HVACs, engineering consultants, energy service companies (ESCo's), suppliers, key associations, distributors and manufacturers a financial incentive for their influence in the sale and installation of all prescriptive programs with the exception of HWC and Pre-Rinse Spray Nozzles. Table 6.1 outlines the incentive levels for the commercial technologies supported in 2010.

Table 6.1, Financial Incentives for 2010 Programs

Prescriptive Programs	Customer Incentive	Service Provider Incentive	Incremental Cost
Front-Loading Clothes Washer CEE Tier 2	$100	$100	$600
Condensing Boilers Up to 299 MBtu/hr 300 – 999 MBtu/hr => 1,000 MBtu/hr	$500 $2,000 $3,000	$100	Quasi
Condensing Gas Water Heater 1000 gal/day/tank	$400	$100	$2,230

DCKV 0 - 4,999 cfm 5,000 - 9,999 cfm 10,000 - 15,000 cfm	$1,000 $2,500 $2,000	$100	$10,000 $15,000 $20,000
Destratification Fan	$1,000	$100	Quasi
Energy Recovery Ventilator (ERV) Up to 1,000 cfm Over 1,000 cfm	$250 $1,000	$100	Quasi
Heat Recovery Ventilator (HRV)	$250	$100	Quasi
HWC – Showerheads & Faucet Aerators	1 Free Showerhead, Kitchen & Bathroom Aerator/unit	N/A	Showerheads - $3.69, Kitchen Aerator - $1.39, Bath Aerator - $0.55
Infrared Heaters	$100	$100	Quasi
Pre-Rinse Spray Nozzle	Free	N/A	$88 (New Measure) or $150 (Replacement of Previous 1.6gpm Measure)
Programmable Thermostat	Free P-Stat + Free Install OR Free P-Stat + $40 install incentive	$15 per stat	$110
Rooftop Unit	0	$100	$375
Custom Project Equipment Incentives	15% of capital costs (up to $40,000)	N/A	Custom
Feasibility Study	50% of cost (up to $10,000)* **multisite cap of $15,000*	N/A	Custom
Steam Trap Survey	50% of cost (up to $6,000)	N/A	Custom
Design Assistance Program	N/A	$4,000/project	Custom
Industrial Process Study	66% of cost (up to $40,000)	N/A	Custom

6.1.2 New Initiatives in 2010

Condensing Gas Water Heater 1,000 gal/day/tank Program

In 2010, Union introduced a Condensing Gas Water Heaters 1,000 gal/day/tank program as part of the prescriptive portfolio. Condensing gas water heaters are high-efficient gas water heaters that operate at 95% thermal efficiency. This thermal efficiency is higher than the conventional tank type water heaters that operate at 80% efficiency – which results in faster hot water cycle times and, therefore, reduced building operating/energy costs. This program was targeted at multifamily, foodservice, education, recreation/ entertainment and healthcare customers. Marketing efforts included promotion through a direct sales approach, mass market initiatives (direct mails and email blasts), tradeshows/events, and key association publications.

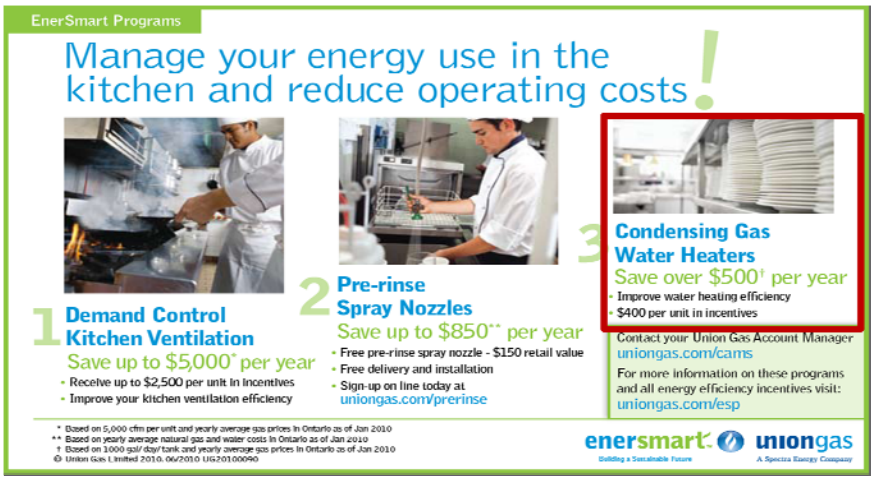


Figure 6.1, Condensing Gas Water Heater Promotional Literature

Front-Loading Clothes Washer- CEE Tier 2 Program

Union launched a CEE Tier 2 Front-Load Clothes Washers program in 2010. These are high efficient washers that can achieve gas savings of 66% over base equipment (top loading washers). Front load washers extract more moisture from the clothes, thereby reducing the time, energy and cost of drying. This program was targeted at the multifamily segment. Marketing efforts included promotion through a direct sales approach, mass market initiatives (direct mails and email blasts), tradeshows/events, relationships with key manufacturers and suppliers, and promotion in key association publications.

6.1.3 Existing Initiatives/Programs

The following outlines details of Union's existing Prescriptive and Quasi-Prescriptive Water and Space Heating programs in addition to Union's Custom Programs.

Water Heating Programs - Prescriptive

The technologies supported in this area included:

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

Pre-Rinse Spray Nozzle

This technology involves a high-pressure 0.64gpm nozzle. This is the most efficient spray nozzle available in North America and can save up to $850 per year in gas energy costs. In 2010, Union continued to deliver this program through third party delivery with Ecolab Corporation (Ecolab). Union maintained this partnership in 2010 given the success achieved in working with Ecolab in 2009 and given Ecolab's presence in the Foodservice Segment. This has allowed Ecolab's field service representatives to both capitalize on their long standing business relationships with Foodservice establishments and to form new relationships across the Union franchise area to deliver this program. To ensure success of the program Union created a "Target Customer List" (includes customers who have never participated in the pre-rinse program) for Ecolab. Ecolab reps then utilized a 'Direct Sales' approach to target each customer on this list.

As the program has been in place since 2006, and based on the approximate 7,000 food service establishments in the Union franchise area, the program is nearing market saturation. This explains the decrease in units from 1,987 in 2009 to 333 in 2010.

Union promoted the benefits of energy-efficient pre-rinse spray nozzles through:

- direct sales approach with Ecolab (our delivery partner) representatives
- mass marketing initiatives such as direct mails and email blasts
- tradeshows/events – e. g Canadian Restaurant & Foodservice Association show
- key association ads, newsletters, publications, Union's business web site

Figure 6.2, Pre-rinse Spray Nozzle Promotional Literature (front and back)

Showerheads/Aerators (Hot Water Conservation Program - HWC)

This program was designed to reduce hot water consumption, and the corresponding natural gas required to heat the water, through the installation of energy efficient showerheads and faucet aerators. Union supplied the measures at no charge to participating agencies who installed them as a part of their maintenance program. This program targeted property managers and multi-family facilities by offering a free 1.25gpm Showerhead, a 1.5gpm Kitchen Aerator and a 1.0gpm Bathroom Aerator for each unit in their building.

To deliver this program in 2010, Union continued its partnership with Eco-Fitt Corporation (Eco-Fitt). Eco-Fitt was responsible for tracking and managing all orders generated by Union's mass market campaigns through Eco-Fitt's online system or by fax. All customers were qualified using a "Past

Participation" list which ensures that any customer that has participated in the past cannot participate again.

In 2010, Union distributed 78,263 units, a marked decline from 134,478 in 2009. As the market gets saturated, this program continues to become more challenging.

The Hot Water Conservation Program was promoted through:

- mass market initiatives such as direct mails and email blasts
- tradeshows/events – e.g Property Manager Expo
- key association ads, newsletters, publications etc
- Union's business website

Figure 6.3, Showerheads & Aerators Promotional Material

Space Heating Technologies – Prescriptive

Measures that fall within this category include:

- Programmable Thermostats
- Demand Control Kitchen Ventilation
- Destratification Fans
- Condensing Rooftop Units

Programmable Thermostats (P-Stats)

This program promotes the replacement of mercury thermostats with a P-Stat. A P-Stat adjusts the temperature of a building space according to a series of programmed settings that take effect at

different times of the day. The benefit of this is a reduction in annual heating/cooling costs by up to 10%. This program is available to all customers.

Union Gas offers a number of different incentives including:

- *Customer receives a free P-Stat and free installation:* Only available to customers within high TRC segments of Warehouse, Manufacturing, Agriculture & Entertainment/Recreation.
- *Customer receives a free P-Stat & $40 installation incentive (no free installation):* This is available to all customers.
- *Customer purchases own P-Stat and receives $80 ($40 P-Stat & $40 install incentive):* This is available to all customers.

In 2010, Union continued our partnership with Eco-Fitt Corporation (Eco-Fitt) for the P-Stat Program. Eco-Fitt was responsible for tracking and managing all orders generated by Union's mass market campaigns through Eco-Fitt's online system or by fax.
In 2010, Union distributed 3,911 p-stats, a marked decline from 9,320 in 2009. As the market continues to saturate, this program continues to become more challenging.

This program was promoted through:

- mass market initiatives such as direct mails and email blasts
- direct sales, where Union worked with contractors who promoted this program directly to end-users
- tradeshows/events - e.g PM-Expo (Property Manager Expo)
- key association ads, newsletters, publications
- Union's website

Figure 6.4, Programmable Thermostat Promotional Material

Demand Control Kitchen Ventilation (DCKV)

Traditional ventilation systems operate at only one speed, whereas the speed of demand control kitchen ventilation systems automatically respond to changes in cooking volume and heat, resulting in much greater efficiency. The prescriptive savings for DCKV were based on three ranges of total range hood exhaust: 0 – 4999 CFM, 5000 – 9999 CFM, and 10,000 – 14,999 CFM. The midpoint of each exhaust range was used to calculate energy savings for both gas and electricity.

Union works closely with manufacturers and end use customers to promote Demand Control Kitchen Ventilation (DCKV) systems. Union's efforts resulted in 18 installations, a decrease from the 42 installations in 2009. This was due to longer than normal sales cycles in the National Accounts segment in 2010 resulting in fewer installations. Union marketed the benefits of DCKV through the following communication vehicles:

- Industry trade magazine advertisements
- Newsletter communication through association (ORHMA)
- Re-designed communication material
- Trade show participation

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

Figure 6.5, Demand Control Kitchen Ventilation Promotional Material

Destratification Fans

In 2010, Union continued the destratification fan program that was introduced in 2009 as part of the prescriptive portfolio. Destratification fans offer the highest potential for energy savings in facilities with large stratified temperature differences; typically, the greater the ceiling height, the greater the potential for savings in the heating load. Destratification fans are large downdraught fans ranging from 8 to 24 feet in diameter. They offer an inexpensive and efficient way to bring heat down from the ceiling to mix with cooler floor temperature air, ensuring a consistent and comfortable temperature where it is most needed.

In 2010, Union targeted warehouses and offered end-use customers $1,000 per unit. This initiative resulted in the installation of 30 units in 2010, a marked increase from the 13 units delivered in 2009.

Marketing efforts included working with manufacturers and targeting potential customers, such as warehousing and industrial segments, via direct mail efforts and targeted communication. Relationships with key Service providers and manufacturers were built and actively managed in 2010 to ensure awareness of Union's program and to ensure the program was being promoting to their customers.

Figure 6.6, Destratification Fan Promotional Material

Two-Stage Rooftop Units

Rooftop heating units are an inexpensive method of providing heat for most low and mid-rise commercial buildings. Gas fired rooftop space heaters can be used in a wide range of building types. Heating capacities range from under 100,000 Btu/hr to over 500,000Btu/hr.

All customers are eligible for this program; however Union Gas mainly targets Education, Retail and Office customers. In 2010, Union Gas offered a $100 incentive per two-stage unit installed. Marketing efforts included promotion through a direct and national account sales approach, key education and retail tradeshows/events, and relationships with key Service Providers and Manufacturers.

Space Heating Technologies – Quasi-Prescriptive

As described previously, the energy savings for some measures are dependent on the application and location of the installation and employ an automated savings calculator. These quasi-prescriptive measures include:

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

ERVs & HRVs

The most efficient way to provide indoor air quality is with an ERV or HRV. ERVs capture heat/moisture and HRVs capture only heat. Recovered heat/energy is used to heat air entering the building, reducing

costs and making the whole system operate more efficiently – resulting in energy savings. All customers are eligible for this program; however Union mainly targets Healthcare and Education customers.

In 2010, Union offered end-use customers $250-$1,000 per unit. Union did not change the marketing of this program in 2010 and continued with promotion through:

- direct and national account sales approach
- key Healthcare/Education association ads, newsletters, publications – And through direct mails and email blasts to their membership (our customers)
- key Healthcare/Education tradeshows/events – e.g OASBO
- building/maintaining relationships with key Service Providers and Manufacturers to ensure they're educated on our programs and to ensure they're promoting it to their customer

Condensing Boilers

In 2010, Union continued its Condensing Boiler program. A Condensing Boiler recovers energy that would normally be discharged into the atmosphere through a flue. This improves heating efficiency by approximately 15-20% compared to a conventional boiler, resulting in reduced gas bills. It also requires less space, offering more flexibility in small space environments. All customers are eligible for this program; however Union Gas mainly targets Healthcare and Education customers.

In 2010, Union offered end-use customers $500-$3,000 per unit. Union did not change the marketing of this program in 2010 and continued with promotion through:

- direct and national account sales approach
- key Healthcare/Education association ads, newsletters, publications – And through direct mails and email blasts to their membership (our customers)
- key Healthcare/Education tradeshow/events – e.g OASBO
- building/maintaining relationships with key Service Providers and Manufacturers to ensure they're educated on our programs and to ensure they're promoting it to their customers

Figure 6.7, ERV/HRV & Condensing Boiler Promotional Material

Infrared Heaters

Infrared heaters help customers conserve energy and money, as they deliver heat directly to where it's needed – to people and objects, instead of inefficiently heating the air within a space, like traditional forced air heating systems do**.** All customers are eligible for this program; however Union Gas mainly targeted warehouses. In 2010, Union offered end-use customers $100 per unit and continued with promotion through:

- Direct Sales Approach
- Mass marketing initiatives such as direct mails and email blasts
- Building/maintaining relationships with key Service Providers, Distributors and Manufacturers to ensure they're educated on our programs and to ensure they're promoting it to their customers

Figure 6.8, Infrared Heater Promotional Material

Custom Projects

Custom projects cover opportunities where energy savings are linked to unique building specifications or design concepts, processes or new technologies that are outside the scope of prescriptive and/or quasi-prescriptive programs. Trade allies in the design and engineering communities, and key commercial customers are the targeted audience for this program, which includes both incentives and educational support.

As mentioned earlier, in 2010 Union transitioned to an end-use customer funding approach where the bulk of the incentive moved from the Service Provider to the end-use customer. This new approach is simple and transparent and it not only ensures that the customer is clear on Union's influence, but also that the incentive is rewarding those that are actually making the decision and adopting the energy efficient application and/or process.

Commercial custom project incentives were harmonized with Distribution Contract incentive offerings, and set at 15% of the incremental cost, up to a maximum of $40,000 per project (incremental cost is defined as the difference in cost between the high efficient option and the base case option). All custom projects must pass a TRC test for cost-effectiveness before being approved.

In 2010, commercial custom projects were classified and tracked in one of the following four segments to align with free rider research completed in 2008:

- Commercial New Buildings
- Commercial Existing Buildings

- Multi-family
- Agriculture

However, as a result of the 2009 audit, custom projects now have a 54% free rider rate so projects are no longer tracked separately.

In 2010, Union continued to implement an improved quality control process for custom projects. Professional engineers review every project as they are submitted to validate the savings calculations and ensure the appropriate supporting documentation is provided. In addition, three online checklists were developed during 2010 in response to recommendations made during the 2009 Audit. Each checklist included a list of items Account Managers and /or Project Managers were requested to check for prior to submitting projects for review by Quality Control Engineers. They were intended to act as visual reminders regarding the required documentation for each project type. The following checklists were developed and incorporated within the Automated Information Management System (AIMS) in September 2010:

- Equipment Checklist – for use on all equipment projects
- Study Checklist – for use on all study applications with the exception of DAPs
- Education Checklist – for use on all education / training applications

This substantial process improvement resulted in a clear improvement in the commercial project files as validated through the independent verification of 2010 Commercial Custom Projects (see Section 9).

Design Assistance Program (DAP)

Union continued to offer incentives under the Design Assistance Program to channel partners in the design and engineering communities as well as key commercial customers that are responsible for the design and management of multiple facilities. A $4,000 incentive per project was provided to eligible participants to assist with breaking down the financial barriers associated with modeling high efficient buildings. This program demonstrated that energy efficient options beyond the building code are cost effective to developers of new buildings and operators of existing buildings undergoing a significant renovation. The DAP program was available to new buildings and existing building participants.

Feasibility Studies and Boiler Audits

Through the provision of financial support to end use customers, energy efficiency audits are conducted to analyze the efficiency of natural gas equipment, including a review of gas, electric and water use, if applicable. An incentive equal to 50% of the audit cost (up to a maximum of $10,000) was offered for feasibility studies, and $250 per boiler audit. Given the TRC neutral nature of audit programs, no savings are attributed, but participation rates are tracked. Feasibility studies have proven to help identify future project opportunities that ensure the sustainability of energy efficiency in the commercial sector.

6.2 Programs Results

The commercial sector delivered natural gas savings of 11 million m^3 with a net program TRC of $34 million through the New Buildings and Existing Buildings markets in 2010. As shown in Table 6.2 below, the largest commercial results came from the building retrofit market which represented 73% of TRC results.

Table 6.2 - 2010 Commercial Results by Program

Commercial Programs	Natural Gas Savings (m3s)	% of Total	Program TRC	% of Total
New Building Construction	2,984,672	27%	$ 6,781,063	18%
Building Retrofit	8,012,519	73%	$ 28,104,181	82%
Total	**10,997,192**	**100%**	**$ 34,885,244**	**100%**

Overall, 2010 TRC results in the commercial sector were 53% lower than in 2009 mainly due to fewer large-scale custom projects. The two initiatives that delivered the largest savings in 2010 were Hot Water Conservation and Condensing Boilers, as presented in Table 6.3. Commercial Custom projects did not contribute as largely to the overall TRC in 2010, accounting for over 14% of the overall TRC, while Condensing Boilers represented the largest portion of Commercial savings with over $9.9 million in TRC, or more than 28% of the segment savings, in 2010.

Table 6.3, Major Commercial Savings Drivers in 2010

Program	2010 Gross TRC	2010 Units	2009 Units	2008 Units	2007 Units
Custom Projects	$ 5,107,810	263	144	165	255
Hot Water Conservation	$ 7,275,529	78,263	134,478	75,700	115,781
ERVs	$ 3,339,955	262	466	191	437
Condensing Boilers	$ 9,944,397	598	508	318	352
Programmable Thermostats	$ 4,151,051	3,911	9,320	3,307	830
Pre-Rinse Spray Nozzles	$ 678,052	333	1,987	3,349	906
Infrared Heaters	$ 2,424,424	656	926	931	558
HRVs	$ 493,578	183	213	50	96
DCKVs	$ 415,846	18	42	20	28
Rooftop Units	$ 77,387	209	1,224	830	242
Destratification Fans	$ 825,445	30	13	-	-
HE Furnaces	$ -	-	356	140	562
CEE Tier 2 Front Loading Clothes Washer	$ 74,213	103	-	-	-
Condensing Gas Water Heaters	$ 77,558	41	-	-	-
Total	**$ 34,885,244**	**84,870**	**149,677**	**85,001**	**120,047**

Commercial Custom Projects continue to play an important role in driving DSM Savings for Union, generating over $5.1 million in TRC in 2010. Figure 6.9 displays the adjusted TRC benefits, excluding cost, by resource type as a percentage of total TRC benefits from commercial custom projects in 2009.

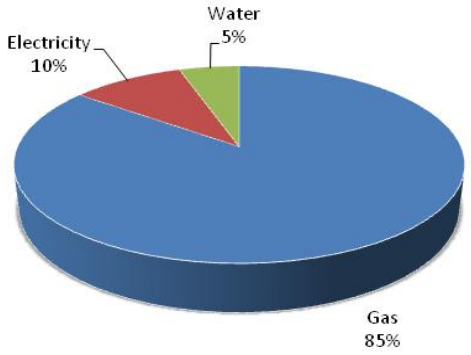


Figure 6.9, Commercial Custom Projects Benefits by Resource Type

Due to the diverse nature of custom projects, verifying claimed savings of a representative sample of projects is essential to ensuring accurate results. To this end, a sampling methodology was developed by Navigant (formerly Summit Blue Consulting) in 2008 to generate optimal custom project representation for verification. Since 2008, this new stratified approach captures projects representing not only a meaningful sample of claimed gas savings, but also water and electricity savings. In 2010, Michaels Engineering was contracted to complete commercial custom project paper reviews utilizing the new sampling methodology. Study details and results are provided in Section 9, Verification and Evaluation.

As shown in Table 6.4, participation in feasibility studies increased by 360% in 2010. This increase was a result of increased participation in our programs by multi-site participants, namely school boards, municipalities, and multi-family property managers embarking on energy audits of their properties. There were no boiler audits performed in the commercial market due to a decreased priority in 2010 for boiler audits and also, the implementation of a minimum standard for audit reports in 2010. Prioritization was given to program elements that increased the potential of future TRC projects, as well as those that were otherwise deemed desirable, and these priorities were incorporated into a minimum program standard. The standard will be used as a filter to determine incentive eligibility going forward and will be used for both the Commercial and Distribution Contract markets.

Table 6.4, Feasibility Studies and Audits

Measure	2010 Studies Completed	2009 Studies Completed	2008 Studies Completed
Feasibility Studies	559	121	160
Boiler Audits	0	46	85
Total	**559**	**167**	**245**

6.3 Program Costs

Direct commercial program expenditures in 2010 equalled approximately $3.4 million, a decrease of 15% from 2009. Table 6.5 summarizes the direct expenditures for the commercial sector in 2010.

Table 6.5, 2010 Commercial Program Direct Expenditures

Commercial Program	Incentives	Program Costs	Total Costs
New Building Construction	$ 800,845	$ 87,819	$ 888,664
Building Retrofit	$ 2,643,538	$ 400,064	$ 3,043,602
Total	**$ 3,444,383**	**$ 487,883**	**$ 3,932,266**

Overall the commercial sector achieved a TRC of $8.75 for every direct dollar spent in 2010, a decrease from the TRC per dollar spent of $15.96 in 2009.

6.4 Lessons Learned

1. **Incorporated Quality Control Recommendations into Program Procedures**

In 2010, Union incorporated a series of recommendations from the 2009 DSM Annual Report Audit into the Commercial Custom Program Procedures. The recommendations identified opportunities to improve data collection procedures, thereby ensuring the appropriate level of detail is available during project verification.

The addition of quality control engineers improved the quality of commercial custom project submissions. It also substantially increased the time and cost of processing these submissions. In Q1 2011, Union will be looking to better establish an appropriate balance between project validation and TRC value or alternatively consider instituting a minimum TRC savings threshold before a project qualifies for funding. Unfortunately, this could result in removing support for small commercial customers with custom projects, however there needs to be a balance between level of effort, resource requirements, and the value of the project.

2. Automating Custom Project Process (DSM Tracking and Reporting Upgrade)

2010 was the second complete year utilizing the upgraded DSM Tracking and Reporting System. Enhancements addressing quality control and evaluation outcomes were implemented. The electronic database and filing system allowed for project information to be inputted and instantly reviewed. An internal requirement to track measures at the customer meter level resulted in a substantial increase in the number of projects processed; for example, municipal projects which historically would be submitted as a single project were separated based on billing meter. The automated system allowed administrators to process 822 projects (includes TRC and non-TRC generating projects) in 2010, almost three times more than the 286 processed in 2009.

7. Distribution Contract Market

Distribution Contract (DC) and Commercial programs are aligned under one brand platform, the EnerSmart Program (ESP). This ensures a seamless, recognizable brand throughout Union's franchise. Unlike other DSM market segments, the DC market falls within the scope of custom projects.

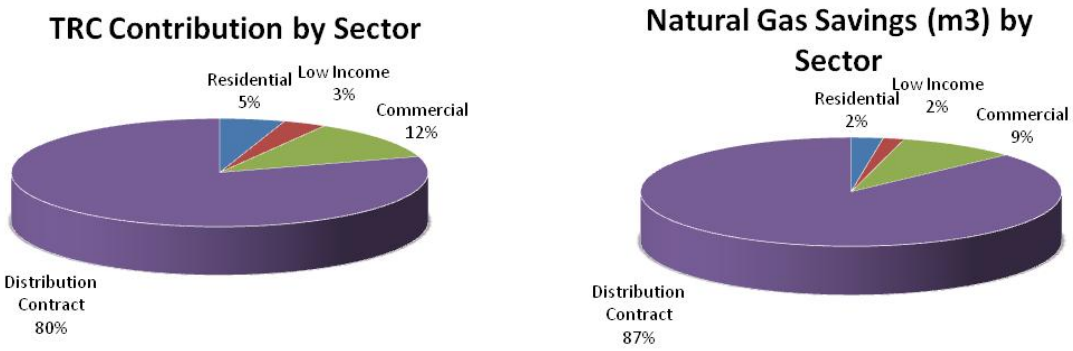


Figure 7.0, Results by Sector (Percentage)

The EnerSmart program for the DC market accounted for 80% of total TRC results in 2010, with a net program TRC of $232 million. Programs in this sector achieved 105.2 million m³ in natural gas savings. Direct program expenditures were $5.055 million.

TRC results in the DC sector were 15% higher than in 2009, and the overall number of participants in custom projects including boiler audits and feasibility studies increased from 211 participants in 2009 to 311 in 2010. Table7.0 summarizes the DC market program results for 2010.

Table 7.0, 2010 DC Results

Distribution Contact	Net TRC	Natural Gas Savings (m3)	Projects	Expenditures	TRC per Dollar Spent
2010 Results	**$ 232,077,531**	**105,169,866**	**357**	**$ 5,055,246**	**$ 45.91**
2009 Results	$ 201,056,110	64,272,873	211	**$ 5,022,108**	**$ 40.03**
2008 Results	$ 166,246,469	40,828,151	127	$ 3,868,789	$ 42.97
2007 Results	$ 124,743,752	36,258,973	101	$ 2,539,282	$ 49.13

**Expenditures include program costs*

Enhancements were made and implemented to the DSM tracking and reporting system in 2009 and 2010 to assist with the sales cycle process. The improved automated tracking features allow Account Managers to track feasibility studies and boiler audits and monitor the future potential energy efficiency projects identified as part of the audit process. The enhancements provide a reporting basis to allow for follow-up of potential projects, thereby encouraging the adoption of efficient processes and technologies identified within feasibility audits. In addition, it enables Union to demonstrate its influence on projects from inception to commissioning. As demonstrated in Table 7.1, 311 projects were completed through the automated DSM tracking and reporting system in 2010.

7.1 Program Framework

The DC market is not differentiated into new build and existing buildings as there is very little new build activity in this sector. The DC market is not a homogenous one, with most projects tied directly to

unique processes or technology requirements. Each project is validated on a stand-alone basis by a comprehensive professional engineering review and is required to pass a TRC screening process.

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

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

7.1.1 DC Program 2010 Incentives

Table 7.2 shows the incentive guidelines for the 2010 DC initiatives. Funding guidelines did change slightly from 2009 levels.

Table 7.1, Program Incentives

Program Element	Incentive Guideline
Equipment Incentive	15% of cost (up to $40,000)
Industrial Process Studies	66% of cost (up to $20,000)
Energy Efficiency Feasibility Studies	50% of cost (up to $10,000)
Steam Trap Surveys	50% of cost (up to $6,000)
Education and Promotion	Available upon request
Demonstration of New Technologies	10% of cost (up to $50,000)
DAP	$4,000 per project

Equipment incentives

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

Industrial Process Studies

Union provided customer incentives up to $20,000 to conduct detailed engineering analysis and design of specific process equipment or operational improvements that have been identified with or without a general plant audit. The program worked to support performance testing and analyses 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.

Energy Efficiency Feasibility Study

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

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

Steam Trap Surveys

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

Education and promotion

Customers have repeatedly told Union they find significant value in the training and educational material provided by the utility.

Union continued to expand investment in the following educational and promotional tools:

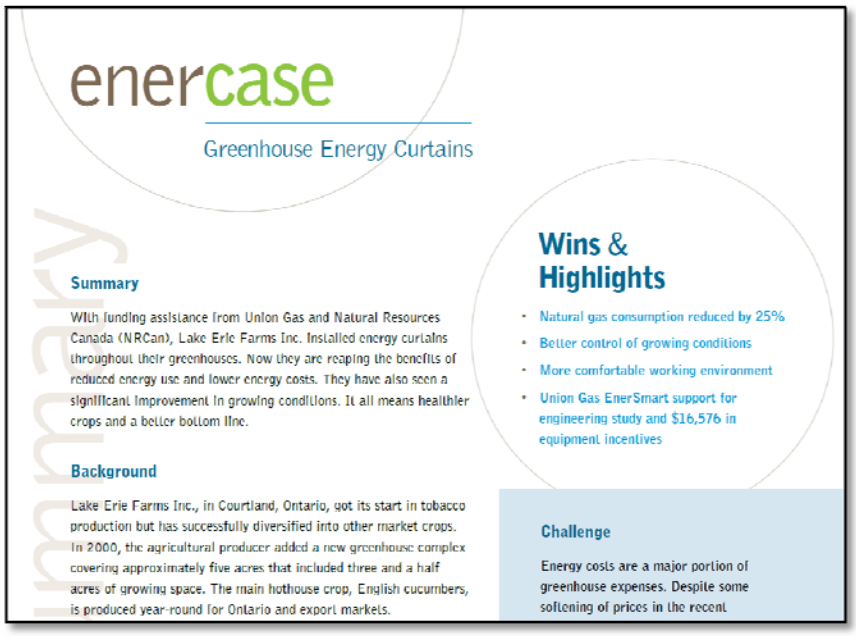
- GasWorks newsletter
- EnerSmart brochures
- EnerCase reports
- Workshops to promote the efficient use of natural gas and increase the awareness of energy saving opportunities
- Sponsorship of specific educational forums
- Promotion and attendance at independent professional development groups, trade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

GasWorks is a technology and energy conservation newsletter, designed to assist large users of natural gas to better manage their business. The newsletter not only provided links to Union's website but also various tools, calculators, an online library, and the "Ask an Expert" service provided by Union's technical resources. Throughout 2009, GasWorks maintained a distribution list of over 1,050 individuals which is slightly lower than the 1,100 individuals subscribed to the newsletter in January 2009.

Below is a summary of the most accessed articles of 2010.

- Summer Energy and Fuel Price Outlook
- Winter Fuel Proce Outlook for 2011
- Heat Recovery from Cooling Towers
- Maple Leaf Foods / Rothsay – Condensing Heat Recovery
- Boiler Inspection Checklist

In 2010, Union developed one additional *EnerCase* brochure, showcasing Lake Erie Farms. The new *EnerCase* brochure was designed to assist in the education of DC customers.


enercase

Greenhouse Energy Curtains

Summary

With funding assistance from Union Gas and Natural Resources Canada (NRCan), Lake Erie Farms Inc. installed energy curtains throughout their greenhouses. Now they are reaping the benefits of reduced energy use and lower energy costs. They have also seen a significant improvement in growing conditions. It all means healthier crops and a better bottom line.

Background

Lake Erie Farms Inc., in Courtland, Ontario, got its start in tobacco production but has successfully diversified into other market crops. In 2000, the agricultural producer added a new greenhouse complex covering approximately five acres that included three and a half acres of growing space. The main hothouse crop, English cucumbers, is produced year-round for Ontario and export markets.

Wins & Highlights

- Natural gas consumption reduced by 25%
- Better control of growing conditions
- More comfortable working environment
- Union Gas EnerSmart support for engineering study and $16,576 in equipment incentives

Challenge

Energy costs are a major portion of greenhouse expenses. Despite some softening of prices in the recent

Figure 7.1, EnerSmart Enercase – Lake Erie Farms

Union's webpage, dedicated to the EnerSmart program, contains an application form, technology information, conversion calculations, technical presentations from customer meetings, and a series of links for additional references. Included in the links are the newly developed brochures and inserts, which were added to a growing library of ***EnerSmart*** and ***EnerCase*** brochures. These brochures include customer testimonials regarding challenges encountered and solutions Union helped provide (see Figure 7.1).

Figure 7.2, Website screenshot: uniongas.com/largebusiness/energyconservation

Union hosted several workshops throughout 2010 to promote energy conservation to DC customers. These workshops were attended by 150 delegates in total. Table 7.2 provides a summary of seminars and number of participants.

Table 7.2, 2010 Seminar's Hosted by Union

Name of Seminar	# of Participants
Calculating and Predicting Savings A Hands-On Energy Management Workshop	66
Monitoring, Targeting and Reporting workshop at Ontario Hospital Association (OHA)	7
EnerSmart for Business - Energy Auditing 101	9
Sustainable Energy Plan Workshop	25
Tap Your Steam Training	30

In addition to hosting seminars, Union also showcased its program offerings and industry knowledge by attending industry meetings and tradeshows. Table 7.3 lists the meetings and tradeshows specific to large industrial customers that Union attended in 2010.

Table 7.3, 2010 Customer Meetings and Tradeshows

Customer Meetings and Tradeshows	Date
Large Commercial / Industrial Customer Meeting and Tradeshow	May 2010
Greenhouse Growers Trade Show and Open House Featuring Energy Curtains and Linkageless Control Suppliers	Sept 2010

Education does not stop with customer training and seminars. Union prides itself on providing highly valued energy expertise, technical support, and resources for industrial customers. As a leader in energy efficiency committed to working closely with government efficiency, environmental, and professional organizations, Union fully understands the latest trends and technologies, not only as potential solutions for customers, but also with the co-benefit of shared learning. Some examples of industry partnerships include:

Canadian Manufacturers and Exporters (CME)

- Union actively participated as a member of the CME Energy Committee sessions
- Sponsored/exhibited/presented at the 2010 "THINK" Sustainability Summit
- Sponsored/exhibited at the CME/London Economic Development Corporations Manufacturers Only Event
- Participated in the CME Regional Energy Forums (3) in 2010
- Submitted one editorial feature for the CME publication "Industry Matters"

Ontario Ministry of Small Business and Consumer Services

- The Ontario Ministry of Small Business and Customer Services developed a one day session to introduce small businesses in the Windsor, ON area to programs and funding sources, including Union's energy efficiency programs.

Consortium for Energy Efficiency (CEE)

- Through this partnership, Union networked with efficiency program administrators from across the United States and Canada on developing common approaches to advancing energy efficiency.

Energy Solutions Centre (ESC)

- Through the ESC, Union collaborated with energy utilities, municipal energy authorities, equipment manufacturers, and vendors to accelerate the acceptance and deployment of new energy-efficient, gas-fuelled technologies.

Natural Resources Canada (NRCan)

Union's involvement with NRCan includes participation in research activities, funding of industry-specific benchmark studies, and offering Union customers assistance in obtaining government funding for energy efficiency projects. Specific NRCan programs include:

- Office of Energy Efficiency (OEE)
- Canadian Industry Program for Energy Conservation (CIPEC)
- CANMET Energy Technology Centre

Other

- Union also worked within Municipal Economic Development Coordinators to share information and build awareness on Union programs offerings that may benefit their constituents.

7.2 Program Results

Under the new uniformed DC EnerSmart program branding, DC Custom projects continued to generate the largest contribution to Union's DSM portfolio, with a net program TRC of $232.1 million, approximately 105.2 million m^3 in natural gas savings, and direct program spending of $5 million. With 311 TRC generating projects in 2010, Union's EnerSmart program continues to gain presence in the DC market segment.

The continued success of the DC custom program was a result of ongoing efforts over the last several years to identify and implement multi-year projects. Accomplishing an increase in DC project results despite slow economic recovery in 2010 can be attributed to increased communications, strong account relationships, and provision of technical initiatives to customers to help implement shorter term projects while identifying multi-year project opportunities.

Custom Project Analysis

The custom projects program completed 311 TRC generating projects in 2010, representing a total of 357 installed measures as shown in Table 7.4.

Table 7.4, DC Custom Project Analysis

Year	# of Measures	Customer Invested Capital	Average Capital $ / Measures
2008	243	$56,485,631	$232,451
2009	386	$94,266,048	$244,109
2010	357	$156,265,927	$358,408

7.3 Program Results

DC represents more than half of the DSM savings achieved across the overall portfolio; given the customized nature through which these results are generated, Union conducts a third party on-site engineering study to verify the results of a representative project sampling. Diamond Engineering provided the DC on-site custom project verification services in 2010, the sample for which was pulled using the stratified sampling method established in 2008. The verification report is presented in Section 9 of this report.

Unlike previous years when the DC portfolio was weighted heavily by one large project, the 2010 DC projects were more evenly distributed with the largest project representing 13% of the overall DC Net TRC.

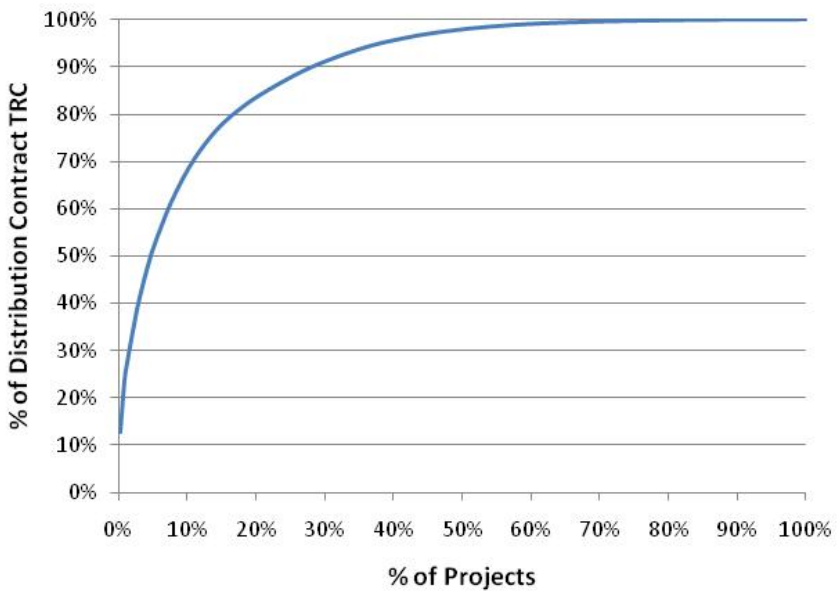


Figure 7.3, Distribution Analysis of Custom

As depicted in Figure 7.3, 20% of Distribution Custom projects accounted for approximately 84% of the TRC savings generated by this group of customers. These large, and in many cases multi-year projects require significant capital investment by the customer, as well as engineering resources from both the customer and Union. It is therefore logical that the customers require sizeable energy savings and reasonable payback periods in order to meet their own internal return on capital requirements to support the initial investment.

A number of these projects also had multiple utility savings, including electricity and water, however the bulk of the savings (94%) were specific to natural gas. The level of effort and expertise required for these multi-year, multi-disciplinary projects was high for both the customer and Union. Figure 7.4 displays the adjusted TRC benefits, excluding cost, by resource type as a percentage of total TRC benefits from DC custom projects in 2010.

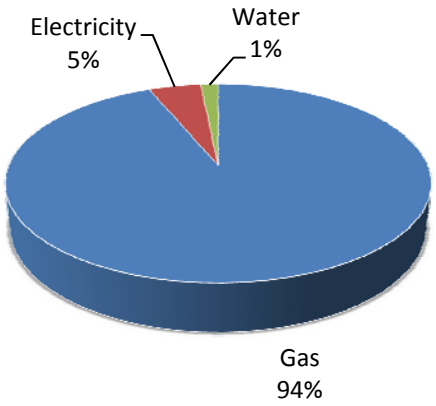


Figure 7.4, Distribution Custom Projects Benefits by Resource Type

Facility Audit Results

Facility audits continued as an important part of the EnerSmart program in 2010. Securing the necessary funding to complete facility efficiency upgrades is often difficult for customers, and many are unclear where or how to start evaluating their facility's potential for energy conservation. Feasibility studies work to effectively demonstrate the potential energy and cost savings associated with improving energy efficiency within a facility. These studies are often the basis used by the customer to build a business case that will allocate the necessary corporate funding for project implementation. There were 106 feasibility studies completed in 2010, as shown in Table 7.5.

Participation in the boiler audit program showed a significant decrease in 2010. This may have been due to the implementation of a minimum standard for audit reports in 2010. Report elements that increased the potential of subsequent TRC projects, as well as elements that were deemed desirable, were identified and incorporated into a minimum standard. The standard will be used as a filter to determine incentive eligibility going forward and will be used for both the commercial and distribution contract markets.

Table 7.5 – Facility Audit Participation

Measure	2010	2009	2008
Feasibility Studies and DAP	106	121	95
Boiler Audits	18	46	17
Seminars	5	5	4
Total	**80**	**172**	**116**

7.4. Program Costs

Direct budget expenditures in 2010 totalled just over $5 million, slightly lower than 2009 levels.

Table 7.6, DC Program Expenditures

Distribution Contract Expenditures	Incentives	Program Costs	Total Costs
2010	$ 4,688,368	$ 366,878	$ 5,055,246
2009	$ 4,231,669	$ 790,439	$ 5,022,108
2008	$ 3,205,029	$ 663,760	$ 3,868,789

Table 7.6 shows that the majority of the budget in 2010 went to incentives, which was required to support the increased number of projects.

7.4. Lessons Learned

1. Monthly communications with customers help keep energy efficiency in the forefront

Union has been able to maintain high retention and interest in monthly energy efficiency topics since launching the GasWorks monthly newsletter. The interest in the EnerSmart website continued to increase substantially with web visits increasing from approximately 4,700 visits in 2009 to over 8,700 in 2010.

2. Shift in technology

In 2010, the agriculture sector helped to increase the penetration of process improvements by 5.7% (see Table 7.7 below). Many of the greenhouses in Union's service territory installed new IR Poly film. Many of the technologies are experiencing either steady or upward trending. Union will continue to monitor results to determine trends and adjust its focus accordingly.

Table 7.7, Number of Installed Technology and Per Cent of Total Projects

	2010	**2009**	**2008**	Trend
Process Improvements	130 (53.5%)	99 (47.8%	56 (44.1%)	Increasing
Steam System Improvements	39 (16.0%)	30 (14.5%)	20 (15.7%)	Increasing
Heat Recovery Systems	29 (11.9%)	26 (12.6%)	29 (22.8%)	Variable
Space & Water Heating System Improvements	21 (8.6%)	26 (12.6%)	24 (18.9%)	Variable
Application Specific Measurements & Controls	24 (9.9%)	11 (5.3%)	9 (7.1%)	Increasing

3. Tying Research to Program Design

Previously initiated and ongoing Metering and Targeting (M&T) projects have been continued in 2010 by a series of research projects with future program design in mind. In addition, the Building Optimization Program Design (BOPD) project continued in 2010. For the BOPD project, Union worked with an industry leader in building optimization/commissioning program design to provide expertise and guidance as Union embarks on developing a building optimization program. Outcomes from the research projects are currently being incorporated into program offerings for 2012.

4. Partnerships

Union has partnered with a series of entities in 2010 to offer feasibility studies and coaching opportunities to our customers, including:

360 Energy

Union funded and partnered with 360 Energy to bring their Sustainability Energy Plan development expertise to customers. The Sustainable Energy Plan is an assessment of energy efficiency opportunities, which can be used as a starting point for capital investments. An introduction to the techniques used for developing a Sustainable Energy Plan was provided to customers who attended a training session, and those interested in creating their own plan were offered incentive funding towards the cost of 360 Energy services.

Universities/EnerSmart for Business with University of Windsor and McMaster University

Establishing a partnership with universities has numerous mutually beneficial outcomes, not only does it build energy management expertise for participating students, it also provides Union's commercial industrial clients with free energy audits. Union Gas initially partnered with the Department of Civil and Environmental Engineering at the University of Windsor. This unique business-academia partnership has

received accolades and recognition from students, the academic world, and media across Canada. Due to the great success of the University of Windsor partnership, Union Gas initiated a new partnership with McMaster University.

Through the partnerships with both the Universities of Windsor and McMaster, Union's Energy Audit Program targets local schools as well as businesses with free energy audits to enable the reduction of energy use and greenhouse gas emissions. Union Gas provided $500,000 in funding for the program and donated the specialized equipment needed to conduct the audits.

As with the University of Windsor partnership, McMaster is responsible for managing the program and reporting on program results. The Energy Audit Program is part of Union Gas' broader EnerSmart program, which offers incentives to its larger commercial and industrial customers to implement projects that will use natural gas more efficiently and lower operating costs.

Additionally, Union Gas also provided equipment training, educational presentations as well as government training sessions to both universities to share industry specific knowledge and tools that address energy savings in industrial applications with students. Performing the energy audits is a practical lesson for the students, entrenching what they have learned and improving their overall engineering approach to conserve energy.

The partnership has significantly contributed to capacity building for Ontario, and real life experience for participating engineering students. It functions as a way to immerse each student involved into a post-graduation mindset.

5. Automating Project Processing, DSM Tracking and Reporting Upgrade

2010 was the second complete year that the upgraded Account Information Management System (AIMs) was in operation. Enhancements addressing quality control and evaluation outcomes were implemented. The electronic database and filing system allowed for project information to be input and instantly reviewed. 436 projects (this includes TRC and non-TRC generating projects) were put through the enhanced DSM Tracking system in 2010, 51 more than 2009, and 194 more than 2008. This reduced the administrative process burden despite the increase in project files.

8.0 Market Transformation

As determined through the OEB Decision with Reasons August 25, 2006, EB-2006-0021, $1 million was allocated for Market Transformation in 2007, with a 10% escalating factor for each subsequent year of the three year plan. Converse to Resource Acquisition programs, Market Transformation is not required to pass the TRC test; however, it is expected to meet clear criteria as outlined in the approved Market Transformation Scorecard for 2010 (Table 8.0 below). The utility is "entitled to an incentive payment of up to $0.5 million in each year of the multi-year plan based on the measured success of market transformation programs."

Union's Market Transformation activities have been focused exclusively on the Drain Water Heat Recovery technology since 2007. Although Union views the Drain Water Heat Recovery program as a success, Union realizes that the future of market transformation will involve potentially new and emerging technologies. Consequently, Union became more involved in industry discussions and events surrounding market transformation technologies in 2010.

In 2010, LEEP TAP (Local Energy Efficiency Program™, Technology Adoption Program ™) sessions were initiated by Natural Resources Canada (NRCan) in conjunction with EnerQuality and sponsored in part by Union and Enbridge. Four locations were selected in 2010 including: London, Toronto, Hamilton and Sudbury. A group of about 20 builders and building experts were selected to participate in focus group research with respect to future market transformation programs. Session one was a "white board" exercise where builders brainstormed 100-200 ideas, Session two narrowed this down to 50-60 ideas with spec sheets from NRCan, Session three short listed 10-20 and the final Session four yielded the top 5-10 technologies. There were three main groups including: heating and building envelope, electrical and mechanical systems, and solar and renewable energy. The meetings were started in 2010 and all are expected to be completed in 2011. A final report is expected in 2011. Refer to the diagram below for details of the process.

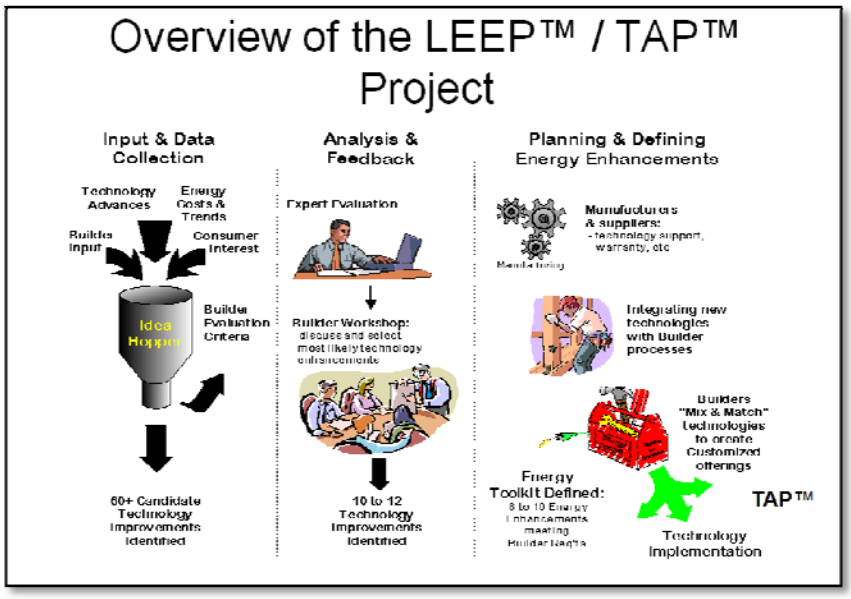


Figure 8.0, 2010 LEEP™/TAP™ Market Transformation process diagram (obtained with permission from EnerQuality)

8.1 Drain Water Heat Recovery Program Framework

In 2007, Union selected Drain Water Heat Recovery (DWHR) for the purpose of Market Transformation (MT) specific to the residential new construction market. Given its well defined and sizeable market, the residential new construction segment provides a significant opportunity for increasing the technology's overall market penetration.

Union's DWHR Program engages manufacturers of the technology in addition to builders, customers, and plumbers. Also, the company's program has and will continue to facilitate the sales process between manufacturers and home builders, work cooperatively to identify opportunities to attempt to reduce per unit costs, and encourage the development of a competitive marketplace for DWHR.

Residential builders and contractors are the program's primary focus for training. Incentives are offered to builders that participate in the program. Union worked collaboratively with channel partners, such as HVAC contractors and the DWHR manufacturers to provide effective education and program participation incentives.

To enhance transformation of the DWHR market, Union revised its program approach in mid-June 2010 to focus on direct marketing and one-to-one builder outreach. By switching to a direct marketing approach Union was able to target builders on a personal level which resulted in increased take-up and participation within the builder community. Direct marketing approaches included:

- Co-branded marketing communication material with individual builders
- Working closely with builders to install units and signage in their model homes
- Outreach through partnerships with the OHBA (Ontario Home Builder's Association) and EnerQuality, as well as Manufacturers (RenewABILITY and EcoInnovations)
- Outreach at local builder events (i.e. golf tournaments, local home builder association gatherings, etc)

Union also provided builder incentives to encourage the purchase and installation of DWHR units including:

- $400 builder purchase incentive

8.1.1 Program Improvements in 2010

Addition of a Second Manufacturer

In January 2010, Union made the strategic decision to encourage the development of a competitive marketplace by adding Quebec based, EcoInnovations, to the DWHR Program. In order to facilitate this addition, Union began working with their Ontario Manufacturer's Sales Agent, Air Solutions.

Altered Incentive Structure

In June 2010, Union altered the incentive structure by providing incentives to manufacturers, who then pass on savings to builders as an on-bill rebate. Previously, the program offered rebates to builders directly, but they were not paid until after the builder had bought the unit and submitted proof of their purchase to the program. This new incentive structure encourages the development of relationships between market participants and increases their accountability. The Union Gas Residential Account

Manager is removed from the middle of the process thereby furthering the evolution toward a non-utility supported market for DWHR systems. In order to facilitate this significant logistical change, a sell sheet for builders was added in 2010 to educate builders of the new process.

Figure 8.1, 2010 DWHR Sell Sheet to Builders Outlining New Process

Innovative Marketing Additions

In order to increase the value to builders, lawn signs displayed at homes ready to close were added in October 2010. An added benefit is that this marketing material catches homeowners' eyes as they are driving by the homes. Union has created a push-pull strategy by appealing to both builders (to install DWHR) and to homeowners (to request DWHR of their builder).

Figure 8.2, 2010 Drain Water Heat Recovery Lawn Sign

Figure 8.3, 2010 Drain Water Heat Recovery Model Home Signage – Builder specific (Hunt homes)

Increased Dedicated Account Team

In 2010, Union added four new Residential Account Managers dedicated to program delivery and managing relationships with builders. A total of nine roles have specified territories for not only DWHR and builder marketing, but also for ESK distribution.

Long Term Market Transformation Strategy Analysis

In 2010, Union completed a Long Term Market Transformation Strategy Project with GDS Associates, Inc. Union had committed to the Evaluation & Audit Committee (EAC) to "better define Market Transformation in terms of key objectives, timelines, and demonstrated response by the marketplace" by the end of June 2010.

The analysis consisted of gaining a detailed understanding of the Union Gas Drain Water Heat Recovery 2010 program including the ultimate goals, market barriers, market actors, program activities (delivery method), program inputs and potential external influences. A logic model was developed as well as a table outlining the Short Term, Intermediate Term, and Long Term Outcomes, Indicators, and Data Sources. To refer to the full report, please see Appendix H.

8.1.2 Market Transformation Scorecard for 2010

As in previous years, the 2010 MT scorecard tracked results against a number of different metrics to effectively measure program performance. Weighed against tracking results from 2010, these metrics included:

- Number of participating builders as tracked by the program;
- Overall number of units installed as a percentage of residential new attachments (formerly referred to as "housing starts") as tracked by the program and available residential new attachments for Union's franchise;

The scorecard was altered from 2009 to remove two variables, homeowner and builder awareness, due to challenges with statistical significance. Since this program is in the fourth year, awareness of the product is quite high for builders, but still relatively small for homeowners. In previous years, Marketing included a bill insert and advertised the product in EnerSmart magazine. As the target audience for this magazine is fairly small (only those homeowners moving into new build homes each year are applicable), Union decided to focus on model home signage and promotional activities in 2010.

8.2 Program Results

Table 8.0 outlines the results achieved in the MT program in 2010.

Table 8.0, 2010 Market Transformation Scorecard Results

Metric	50% Target	100% Target	150% Target	Weight	2010 Actual	Result	Score
Participating Builders	106	111	116	20	116	150%	30
Units Installed as a % of Residential New Attachments*	13.30%	15.30%	17.30%	80	15.72%	110%	88.38
						130%	**118.38**

**formerly referred to as "Housing Starts"*

Having surpassed 100% of the performance metrics, Union achieved a $500,000 MT incentive payout for 2010. Union undertook the following initiatives to promote DWHR to builders resulting in 116 participating builders and a total of 2,331 installations.

It is worth noting that market transformation programs are typically designed to influence consumer behaviour and attitudes through education. Based on DSM program delivery experience, Union has found that education, awareness, and outreach are critical components to program success, be they market transformation or resource acquisition. Although customer and builder surveys were removed from the 2010 Market Transformation scorecard, Union will continue to invest in strategic outreach to promote the efficiency benefits achieved through drain water heat recovery.

Efforts to promote the program and educate builders in 2010 included:

- An updated and dedicated builder section on Union Gas' website (www.uniongas.com/builder)
- Provision of editorials in builder magazines;
- Direct mail was sent to builders promoting the DWHR unit;

- Dissemination of a 'New Build Package' that included a DWHR brochure, DWHR installation guides, process and sell sheet, construction heating brochure, and customer attachment process in a branded folder;
- Co-branded builder model home signage with various partnering builders; and,
- Co-branded personalized sell sheets with various partnering builders.

Promotional and educational efforts targeting customers included:

- Union Gas Website;
- Customer DWHR video; and,
- Customer brochure.

Participated as a sponsor/exhibitor in the following:

- Ontario Home Builders Association (OHBA) Builder Forum;
- OHBA Annual Conference;
- Construct Canada/Homebuilder and Reno Forum;
- London OHBA golf tournament;
- Five HBA golf tournaments; and
- Habitat for Humanity sponsorships (including sponsorship of local homes, working with Habitat for Humanity and a local manufacturer to get a DWHR unit installed in all homes, volunteer days to raise awareness, editorials, press releases, recognition on corporate and local websites, signage on local build sites, etc). Union was recognized for their involvement in 2010 through a special ceremony and water colour picture.

Figure 8.4, Habitat for Humanity Ceremony and Water Colour Pictures

Figure 8.5, Union Habitat for Humanity Volunteers

Advertised in Ontario Home Builder magazine during the following times:

- Early Spring 2010;
- Summer 2010;
- Fall 2010;
- OHBA Awards 2010;
- Winter 2010; and,
- Annual Directory 2010.

Regularly carried out builder outreach activities to educate and ensure positive working relationships:

- Facilitated various local Home Builder Association (HBA) meetings throughout Union's territory; and
- LEEP™ TAP™ sessions through NRCan.

8.3 Program Costs

Union budgeted $1.331 million for its 2010 MT activity and spent $ 1,331 (as shown in Table 8.2). Union was able to mitigate some costs related to builder and contractor training sessions as a result of leveraging partnerships with EnerQuality, HBA, other internal Union Gas departments and various individual builders.

Table 8.2, 2010 Market Transformation Expenditures

Market Transformation Expenditures	Incentives	Program Costs	Total Costs
2010	$ 1,023,174	$ 305,276	$ 1,328,450
2009	$ 825,330	$ 349,966	$ 1,175,296
2008	$ 750,261	$ 346,516	$ 1,096,777

8.4 Lessons Learned

1. **Importance of the development of a non-utility supported competitive marketplace**

The addition of a second manufacturer to the program as well as altering the incentive structure has highlighted to Union the importance of the development of a non-utility supported competitive marketplace for DWHR. Since these changes have been in place, the program is experiencing increased productive competition, lower administrative costs, and the ability for Union to focus on additional innovative marketing and educational efforts. Additional efforts will be required in 2011 to streamline the process and make it more effective for all program participants however, 2010 saw a very productive roll out of the new process.

2. **Clarity Required on Long Term Strategy Timeframe**

In 2010, Union worked collaboratively with the EAC and GDS to complete the Long Term Market Transformation Strategy Project. Though consensus was achieved on the long term goal, logic model, and strategies within the report; further efforts are required to achieve a shared understanding on the long term timeframe of the DWHR program.

9. Verification and Evaluation – 2010 Results

In order to provide assurance of the accuracy of claimed savings, Union undertakes several verification studies each year. These evaluation projects are designed to ensure that the claimed participation and installation rates for technologies delivered through Union's programs are accurate. An assessment of claimed savings obtained through custom projects is also completed. In addition, Union carries out related research to better understand the overall impacts and benefits that specific programs provide its customers. For 2010, Union commissioned verification studies for its Residential ESK, Low Income HHC, Commercial Custom and Distribution Custom Programs as detailed in this section of the report.

9.1 Residential and Low Income Verification Studies

Union conducted two verification studies for the Residential ESK Program and one for the Low Income Helping Homes Conserve program to ensure the savings claimed were accurate, as listed in Table 9.0. These verifications determined the number of ESK/HHC elements that were installed and remained installed for 2010. Additionally, since the savings associated with the ESK/HHC showerheads relate to showering for an entire home, the verification also established the portion of showering that was attributable to the ESK/HHC showerhead. The purpose of these studies was to provide an 'adjustment' factor to be applied to the claimed savings. Union also uses the collected information to assess areas of program success and areas for potential improvement.

Table 9.0, Summary of Program Verifications for Residential Programs

Program	Title	Source	Objective
ESKs: Union Direct and HVAC Partnership	Final Report Following an Audit in 2010 of the Union Gas ESK Residential Push (2010)	Beslin Communications Group Inc.	·Validate consumers' awareness of products received; ·Verify product installation; ·Verify percentage showering; ·Gauge customer satisfaction with equipment; ·Determine influence of channel partners in end-users' decisions to install products; and, ·Gauge performance of channel partners in delivery of products and ESK information.
ESKs: Home Depot	Final Report Following an Audit in 2010 of the Union Gas ESK Home Depot "Pull" Initiative (2010)	Beslin Communications Group Inc.	·Validate accuracy of information tracking sent by partners claiming incentives; ·Verify product installation; ·Verify percentage showering; ·Understand end-users' knowledge of energy efficiency, purchase motivations, and general satisfaction; ·Determine factors affecting end-users' decisions to install; and, ·Opinions on other incentives Union Gas could offer
HHC: Low Income	Final Report Following an Audit in 2010 of the Union Gas HHC Low Income Initiative (2010)	Beslin Communications Group Inc.	·Validate consumers' awareness of products received; ·Verify product installation; ·Verify percentage showering; ·Gauge customer satisfaction with equipment; ·Determine influence of channel partners in

			end-users' decisions to install products; and, ·Gauge performance of channel partners in delivery of products and ESK information.

The results of these evaluations are summarized in section 9.1.1 below.

9.1.1 ESK and HHC Program Verification

In order to fully assess the savings generated through the ESK and HHC program offerings, Union completed a verification study to determine the rate at which measures were installed and remained installed post installation with participants. In 2010, the verification studies added a question to account for the percentage of showering that was actually captured by the program showerheads as recommended in the 2009 audit. During the 2010 audit, an additional recommendation was made to reflect the percentage of homes that heat their water with natural gas. This value was captured in the verification study, but had not been presented in the tabulated results. The final verified and post-audited results for the ESK & HHC programs are presented in Tables 9.1, 9.2, and 9.3 below.

Table 9.1, Adjustment Factors: ESK Union Gas Direct and HVAC (Push)

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under low-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	48.51%	75.51%		90.00%	32.97%
Kitchen Aerator	56.44%	89.47%		90.00%	45.45%
Pipe Wrap	62.87%	92.91%		90.00%	52.57%
Showerheard	56.93%	85.22%	81.70%	90.00%	35.67%

Table 9.2, Adjustment Factors: ESK Home Depot (Pull)

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under low-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	52.97%	92.52%		90.00%	44.11%
Kitchen Aerator	66.34%	95.52%		90.00%	57.03%
Pipe Wrap	61.88%	98.40%		90.00%	54.80%
Showerhead	70.79%	95.10%	83.90%	90.00%	50.84%

Table 9.3, Adjustment Factors: HHC Low Income

Measure	Measure Verified Installed	Measure Remained Installed	% Showering under low-flow Showerhead	% with Natural Gas Hot water heaters	Adjustment Factor
Bath Aerator	97.00%	92.78%		94.00%	84.60%
Kitchen Aerator	96.00%	97.92%		94.00%	88.36%
Pipe Wrap	100.00%	100.00%		94.00%	94.00%
Showerheard	100.00%	96.00%	92.19%	94.00%	83.19%

9.2 Custom Project Verification Study

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

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

- A review of verification protocols developed by a number of organizations;
- The application of industry practice as demonstrated in program evaluation; and,
- The application of appropriate assumptions for a custom project program.

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

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

These issues were addressed in the revised sampling method developed by Summit Blue for verification in 2008.

9.2.1 Commercial Custom Project Verification Study

Navigant (formerly Summit Blue) was contracted to extract a statistically representative sample for Commercial Custom Project verification using the methodology established in 2008. To this end, the program projects were stratified by resource benefits and sectors as summarized in Table 9.4 below.

Table 9.4, Sample of Commercial Custom Projects for Verification

Stratum #	Description	n (stratum)	NATURAL GAS (m^3)	WATER (000's L)	ELECTRICITY (kWh)	NATURAL GAS TRC (Gross of Incremental Costs)	WATER TRC (Gross of Incremental Costs)	ELECTRICITY TRC (Gross of Incremental Costs)	Total TRC (Net of Incremental Costs)
1	Top 6 Electricity TRC	3	404,557	-	1,084,812	$ 563,100	$ -	$ 390,385	
2	Top 6 Gas TRC	3	534,630	-	-	$ 875,524	$ -	$ -	
3	Remaining Electricity TRC	11	253,056	1,013	254,503	$ 366,515	$ 8,266	$ 90,692	
4	Remaining	9	218,768	4,367	-	$ 307,570	$ 27,892	$ -	
	Sample Total	**26**	**1,411,011**	**5,380**	**1,339,315**	**$ 2,112,709**	**$ 36,157**	**$ 481,078**	**$ 1,444,606**
	Population		5,469,225	49,229	2,122,381	8,361,832	383,799	807,345	$ 7,725,871
	Sample % of Population		26%	11%	63%	25%	9%	60%	19%

*Pre-audited savings claims

Navigant pulled a sample total of 26 projects for the 2010 Commercial Custom Projects program, all of which were verified by Michaels Engineering.

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

Given the geographic distribution of Commercial Custom Projects compared to benefits that the projects achieve, verification for this program includes a paper review of the projects files and telephone interviews with customers and service providers for the verification of savings results for these 26 commercial projects. The deliverables of the paper verification studies included:

- A description of approach used to measure savings (including gas, water, and electricity savings, incremental cost and measure life, as appropriate);

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

Adjustment factors determined through the Commercial Custom Project Verification Study are presented in Table 9.5 below.

Table 9.5, 2010 Commercial Custom Program Verification Study Results

Commercial Custom Program Verification Results					
Resource	**Claimed Savings**		**Audited Savings**	**Realization Rate**	
Natural Gas Savings		1,411,011	1,069,280	75.8%	m3/year
Water Savings		5,380,530	5,354,947	99.5%	litres/year
Electricity Savings		1,339,315	1,182,357	88.3%	kWh/year
Incremental Cost	$	1,185,338	$ 1,140,053	96.2%	

In reviewing the incremental cost adjustments presented in the verification study, the Auditor determined that the one project that generated the adjustment did not represent systematic errors in estimating incremental costs; thus, the auditor recommended the adjustments not be applied to the portfolio.

In addition to the incremental cost and resource savings values that Union has applied to program results from verification as recommended in the 2008 DSM Audit, the 2010 Auditor recommended that Union adopt the Effective Useful Life (EUL) adjustments put forward by the verification consultant. As noted in Table 9.6, adopting the EUL adjustments resulted in a EUL adjustment of 86.6%. The Final Audited adjustments presented in Table 9.6 below have been applied to the 2010 Commercial Custom Program portfolio as recommended by the 2010 Auditor.

Table 9.6, Commercial Custom Project Audit Adjustments

Resource	2010 Draft Annual Report	2010 audit Value
Natural Gas	75.8%	75.8%
Electricity	99.5%	99.5%
Water	88.3%	88.3%
Costs	96.2%	100.0%
Equipment Life	N/A	86.6%

9.2.2 DC Custom Project Verification Study

As described in the sampling for commercial custom project verification study above, a sample of thirteen custom projects from the DC sector was selected for the verification study based on the revised Summit Blue methodology.

The sample for the industrial sector is stratified based on size of projects for gas, water, and electricity savings. Projects were randomly selected from among the largest projects based on TRC benefits from gas savings and the largest based on electricity savings. Table 9.6 summarizes the DC sector custom projects that were randomly selected sample based on three strata.

Table 9.7, Sample of DC Custom Projects for Verification

Stratum #	Description	n (stratum)	NATURAL GAS (m^3)	WATER (000's L)	ELECTRICITY (kWh)	NATURAL GAS TRC (Gross of Incremental Costs)	WATER TRC (Gross of Incremental Costs)	ELECTRICITY TRC (Gross of Incremental Costs)	Total TRC (Net of Incremental Costs)
1	Top 6 Electricity TRC	3	3,280,429	84	15,243,210	$ 15,490,965	$ 679,078	$ 7,102,571	
2	Top 6 Gas TRC	4	41,022,257	73,908	786,955	$ 61,939,828	$ 366,067	$ 169,674	
3	Remaining Electricity TRC	3	7,682,094	78,675	1,387,915	$ 8,630,310	$ -	$ 147,876	
4	Remaining	3	2,168,204	15,532	-	$ 2,841,765	$ 75,895	$ -	
	Sample Total	**13**	**54,152,984**	**168,199**	**17,418,080**	**$ 88,902,869**	**$ 1,121,040**	**$ 7,420,120**	**$ 52,339,884**
	Population		206,272,059	546,054	31,858,137	$ 192,193,564.91	$ 3,453,195.44	$ 12,861,909.88	**$ 192,193,565**
	Sample % of Population		26%	31%	55%	46%	32%	58%	27%

The thirteen randomly-selected projects represent over 27% of the total TRC savings of all DC custom projects based on the original Distribution Contract claimed savings.

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

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

Table 9.8, 2010 Distribution Contract Custom Project Verification Study Results

DC Custom Program Verification Results			
Resource	**Claimed Savings**	**Audited Savings**	**Realization Rate**
Natural Gas Savings	54,152,984	60,057,171	110.9% m3/year
Water Savings	168,199,458	207,701,780	123.5% litres/year
Electricity Savings	17,418,080	17,109,707	98.2% kWh/year
Incremental Cost	$ 45,104,146	$ 45,104,146	100.0%

Through the Audit process, new adjustment factors were recommended and have been applied to the Distribution Contract project savings as shown in Table 9.9. In accordance with the 2010 DSM Auditor recommendations, two EUL adjustment factors were determined to be outliers and as such were not

extrapolated to the overall DC Custom Program. Adjustments for the outliers were applied directly to the specific projects, while all other adjustments for the DC Custom Program were applied to the Program portfolio as recommended by the auditor.

Table 9.9, Distribution Contract Custom Project Audit Adjustments

Resource	2010 Draft Annual Report	2010 audit Value
Natural Gas	110.9%	110.9%
Electricity	123.5%	122.1%
Water	98.2%	98.4%
Costs	100.0%	100.0%
Equipment Life	N/A	110.3%

10. 2010 Measures Evaluation Research

During the course of the three-year DSM framework, Union's measure evaluation strategy has been to undertake evaluations of a third of each program measure included in the 2007-2009 DSM Plan annually in accordance to EB-2006-0021. 2009 presented an unusual challenge because many of the evaluation projects that might have been undertaken in 2009 were precluded by the OEB commissioning and approving of Navigant Consulting Inc.'s, *Measures and Assumptions for Demand Side Management (DSM) Planning*, dated April 16, 2009. In 2010, as Union entered the fourth year under the framework what was intended to be a three year framework, this challenge remained unchanged. In addition, a longer than expected 2009 Audit, in conjunction with other competing priorities, limited the number of Evaluation Priorities identified for 2010.

Union undertook two studies in 2010 as detailed in Table 10.0 below.

Table 10.0, 2010 Evaluation Research

Name of Study	Consulting Firm	Status	Appendix
Process Evaluation of Commercial & Distribution Contract Custom Projects	Tetra Tech *(formerly PA Consulting)*	Phase Two Complete	F
Market Share Study of Gas Fired Infrared Heaters	Nexant	Complete	G

Of the two evaluation projects, the Process Evaluation Study on Commercial and DC Custom Project Programs has a longer timeline and will be completed in three phases. The initial phase, which included the delivery of a detailed evaluation plan and logic model was completed in June 2009. Phase Two included the majority of the evaluation-related activities, including staff interviews, customer surveys and a refined logic model. This phase was focused on completing a formal and thorough process evaluation to asses both the *market facing* processes and the *internal program* processes and presenting the results in a Draft Report. The Draft Executive Summary is included in Appendix F. Phase 3 will include a final report and implementation workshop(s) which will be delivered in 2011.

This Process Evaluation for Custom Projects was chosen because the Custom Program is such a significant piece of Union's portfolio both in terms of savings achieved and internal resources to deliver the program effectively. The Process Evaluation concluded the that Custom Program is running well despite a number of existing barriers, including lower natural gas prices and smaller project sizes which

require a similar amount of financial and staff resources to sell. The participants surveyed revealed that they are satisfied with the program and highly value the customer service and technical expertise delivered by Union Account Managers and Project Managers. Nearly all participants said the program met or exceeded their expectations.

Several recommendations are included in the draft report split into three sections; Understanding and Servicing Your Customers, Assessing Internal Processes, and Reviewing Audit and Verification Methods and Requirements. These recommendations are presented in the Draft Executive Summary provided in Appendix F.

Union retained Nexant to complete a market study detailing the individual market share of gas fired Infrared (IR) heaters. Since the deemed gas savings associated with IRs assumed an equal market distribution for three different types of IRs that have varying related savings, this study was conducted to refine the savings values for IRs to reflect a more accurate market share for the three types of IRs. To accomplish the study objectives, Nexant focused on and completed both primary and secondary research on the market distribution of the technology in question and a survey of key market players within the industry to assess the current market share of IR Heaters. The outcomes of the Market Share Study are reflected in the LRAM results, which are presented in Appendix G.

Establishing evaluation priorities for 2011 evaluation will be determined in consultation with the EAC.

11. Lost Revenue Adjustment Mechanism (LRAM)

The LRAM was 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:

$$\Sigma(\text{Rate Class Volume Reduction} \times \text{2009 Delivery Rate}) = \text{LRAM Claimed}$$

For 2010, the year one LRAM amount is $0.634 million based on 2010 delivery rates and natural gas savings of 121.1 million m^3. The 2010 LRAM statement is detailed in Table 11.0 below.

Table 11.0, 2010 LRAM Statement

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2010 Unaudited Results

Line No.	Particulars	Audited Volumes (10^3 m^3)	2010 Delivery Rates ($/$10^3$ m^3)	Revenue Impact ($)
		(a)	(b)	(a) x (b) x 50%
	South			
1	M1 Residential	4,105	$ 44.749	$ 91,854
2	M1 Commercial	4,920	$ 44.749	$ 110,081
3	M1 Industrial	36	$ 44.749	$ 809
4	M2 Commercial	4,505	$ 40.470	$ 91,153
5	M2 Industrial	3,515	$ 40.470	$ 71,124
6	M4 Industrial	7,254	$ 8.545	$ 30,992
7	M5 Industrial	8,174	$ 14.783	$ 60,420
8	M7 Industrial	11,495	$ 2.411	$ 13,857
9	T1 Industrial	32,818	$ 0.884	$ 14,506
10		76,822		$ 484,796
	North			
11	01 Residential	843	$ 96.673	$ 40,767
12	01 Commercial	666	$ 90.054	$ 29,986
13	10 Commercial	706	$ 64.910	$ 22,897
14	10 Industrial	298	$ 59.486	$ 8,859
15	20 Industrial	6,759	$ 3.404	$ 11,504
16	100 Industrial	35,022	$ 2.027	$ 35,495
17		44,294		$ 149,508
18	Total	121,116		$ 634,304

The 2010 LRAM statement has been prepared using the 2011 input assumptions approved by the OEB. These assumptions are detailed in Appendix A. LRAM results by measure are shown in Appendix C. In EB-2006-0021 Decision with Reasons the Board ruled that the year one impact of DSM activities is equivalent to 50% of the savings in the first year in which the DSM measure is undertaken.

12. Shared Savings Mechanism (SSM)

For 2010, 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; and,

- For TRC savings greater than 75 percent of the TRC target, an SSM payout shall equal $2,250,000 plus $10,000 for each 1/10 of 1 percent of target reached up to the maximum SSM annual cap of $8,500,000.

For 2010, the 2009 SSM incentive cap of $8,921,583 million will increase annually by the Ontario CPI as determined in October of the preceding year. For 2010, the annual SSM incentive cap increased to **$8,939,426**. This was reflective of the 0.2% annual increase of the Ontario CPI as determined October 2010. Union's net TRC calculation for 2010 is shown in Table 12.0.

Table 12.0, 2010 Net TRC Calculation

New Home Construction	$ 23,559		
Home Retrofit	$ 15,689,988		
Residential Program Costs	$ (1,046,921)		
Net Residential TRC		**$ 14,666,627**	
Low Income	$ 9,976,330		
Low Income Program Costs	$ (231,834)		
Net Low Income TRC		**$ 9,744,496**	
New Building Construction	$ 6,781,063		
Building Retrofit	$ 28,104,181		
Commercial Program Costs	$ (487,883)		
Net Commercial TRC		**$ 34,397,361**	
Distribution Contract	$ 232,444,409		
Distribution Contract Program Costs	$ (366,878)		
Net Distribution Contract TRC		**$ 232,077,531**	
Salaries	$ (5,437,067)		
Research & Evaluation	$ (1,288,649)		
Administration	$ (27,335)		
Total Other Program Costs		**$ (6,753,051)**	
Net TRC			**$ 284,132,964**

Union's TRC target for 2010 is $240,256,491 million, which results in the following SSM calculation:

SSM = {[(Net TRC – (Range End Percentage x Target TRC)) / (Payout Increment Percentage x Target TRC)] x Incremental Payout} + Base Payout

= {[(Net TRC – (75% x $240,256,491)) / (0.1 % x $240,256,491)] x $10,000} + $2,250,000

= {[($284,132,964 - $180,192,368)/$240,256] x $10,000} + $2,250,000

= $432.62 x $10,000 + $2,250,000

= $6,576,235

The TRC breakdown by measure is included in Appendix D. The SSM breakdown by rate class is shown in Table 12.1 below.

Table 12.1 – 2010 SSM by Rate

UNION GAS LIMITED
Shared Savings Mechanism
2010 Audited Results

Line No.	Particulars		Amount[1] ($)
	South		
1	M1 Residential	$	480,235
2	M1 Commercial	$	346,809
3	M1 Industrial	$	845
4	M2 Commercial	$	299,172
5	M2 Industrial	$	253,075
6	M4 Industrial	$	504,301
7	M5 Industrial	$	393,687
8	M7 Industrial	$	574,902
9	T1 Industrial	$	1,418,964
10		$	4,271,989
	North		
11	01 Residential	$	96,323
12	01 Commercial	$	65,610
13	10 Commercial	$	48,396
14	10 Industrial	$	10,467
15	20 Industrial	$	348,229
16	100 Industrial	$	1,735,221
17		$	2,304,246
18	Total	$	6,576,235

[1] The allocation is based on 2010 TRC achieved by rate class

13. DSM in 2011

The primary purpose of this Annual Report is to review program outcomes from the preceding year. The secondary purpose is to establish targets for 2011. This section focuses on the items that need to be considered for 2011.

The new TRC target for 2011 is based upon the 2010 results as outlined in EB-2006-0021 Decision with Reasons:

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

Based upon the TRC target guidelines outlined above, the 2011 TRC target is calculated utilizing audited 2008, 2009, and 2010 results adjusted to reflect 2011 avoided costs.

Table 13.0, 2011 DSM Target

2008 Audited Results with 2011 Avoided Costs	2009 Audited Results with 2011 Avoided Costs	2010 Audited Results with 2011 Avoided Costs
$ 211,207,502	$ 211,255,119	236,631,314

2011 TRC Target
$ 252,652,675

13.1 2011 Avoided Costs

The Avoided Costs for 2011 are attached in Appendix E.

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

	Measure		SSM Input Assumptions								LRAM Input Assumptions		
			Equipment Life	Energy Load	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m3)	Water Savings (L)	Electricity Savings (kWh)	Incremental Cost	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m3)
NHC	Faucet Aerator - Bath - 1.5gpm		10	baseload	33.0%	100.0%	6	2,004	-	$0.55	33.0%	100.0%	6
NHC	Faucet Aerator - Kitchen - 1.5gpm		10	baseload	33.0%	100.0%	19	6,201	-	$1.39	33.0%	100.0%	19
NHC	Showerhead - 1.25gpm		10	baseload	10.0%	100.0%	44	13,885	-	$3.69	10.0%	100.0%	44
HR	ESK	Install - Faucet Aerator - Bath - 1.5gpm	10	baseload	33.0%	36.6%	6	2,004	-	$0.55	33.0%	36.6%	6
HR	ESK	Install - Faucet Aerator - Kitchen - 1.5gpm	10	baseload	33.0%	50.5%	23	7,797	-	$1.39	33.0%	50.5%	23
HR	ESK	Install - Pipe Insulation - 2m	10	baseload	4.0%	100.0%	18	-	-	$2.00	4.0%	100.0%	18
HR	ESK	Install - Showerhead - 1.25gpm	10	baseload	10.0%	69.6%	44	13,885	-	$3.69	10.0%	69.6%	44
HR	ESK	Install - Showerhead - 1.25gpm exist 2.0-2.5	10	baseload	10.0%	69.6%	46	14,294	-	$3.69	10.0%	69.6%	46
HR	ESK	Install - Showerhead - 1.25gpm exist 2.6+	10	baseload	10.0%	69.6%	88	22,580	-	$3.69	10.0%	69.6%	88
HR	ESK	Pull - Faucet Aerator - Bath - 1.5gpm	10	baseload	33.0%	44.1%	6	2,004	-	$0.55	33.0%	44.1%	6
HR	ESK	Pull - Faucet Aerator - Kitchen - 1.5gpm	10	baseload	33.0%	57.0%	23	7,797	-	$1.39	33.0%	57.0%	23
HR	ESK	Pull - Pipe Insulation - 2m	10	baseload	4.0%	54.8%	18	-	-	$2.00	4.0%	54.8%	18
HR	ESK	Pull - Showerhead - 1.25gpm	10	baseload	10.0%	50.8%	44	13,885	-	$3.69	10.0%	50.8%	44
HR	ESK	Push - Faucet Aerator - Bath - 1.5gpm	10	baseload	33.0%	33.0%	6	2,004	-	$0.55	33.0%	33.0%	6
HR	ESK	Push - Faucet Aerator - Kitchen - 1.5gpm	10	baseload	33.0%	45.4%	23	7,797	-	$1.39	33.0%	45.4%	23
HR	ESK	Push - Pipe Insulation - 2m	10	baseload	4.0%	52.6%	18	-	-	$2.00	4.0%	52.6%	18
HR	ESK	Push - Showerhead - 1.25gpm	10	baseload	10.0%	35.7%	44	13,885	-	$3.69	10.0%	35.7%	44
HR	Thermostat - Programmable		15	weather	43.0%	100.0%	53	-	54	$25.00	43.0%	100.0%	53
LI	ESK	HHC - Faucet Aerator - Bath - 1.0gpm	10	baseload	1.0%	84.6%	10	3,435	-	$0.55	1.0%	84.6%	10
LI	ESK	HHC - Faucet Aerator - Kitchen - 1.5gpm	10	baseload	1.0%	88.4%	23	7,797	-	$1.39	1.0%	88.4%	23
LI	ESK	HHC - Pipe Insulation - 2m	10	baseload	1.0%	94.0%	18	-	-	$2.00	1.0%	94.0%	18
LI	ESK	HHC - Showerhead - 1.25gpm exist 2.0-2.5	10	baseload	1.0%	83.2%	46	14,294	-	$3.69	1.0%	83.2%	46
LI	ESK	HHC - Showerhead - 1.25gpm exist 2.6+	10	baseload	1.0%	83.2%	88	22,580	-	$3.69	1.0%	83.2%	88
LI	Thermostat - Programmable - HHC		15	weather	1.0%	100.0%	53	-	54	$26.95	1.0%	100.0%	53
LI	Weatherization		23	weather	0.0%	100.0%	Actual	Actual	Actual	Actual	0.0%	100.0%	Actual
NBC	CEE Tier 2 Front-Loading Clothes Washer (MF ONLY)		11	baseload	10.0%	100.0%	117	58,121	396	$600	10%	100.0%	117
NBC	Condensing Boiler - up to 299 MBtu/h		25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	Condensing Boiler - 300 to 999 MBtu/h		25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	Condensing Boiler - over 1,000 Mbtu/h		25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	Condensing Gas Water Heater (1,000gal/day)		13	baseload	5.0%	100.0%	1,551	-	-	$2,230	5%	100.0%	1,551
NBC	Custom Agriculture		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54%	100.0%	Actual
NBC	Custom New Construction		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54%	100.0%	Actual
NBC	DCKV Fast Casual (< 5000 cfm)		15	weather	5.0%	100.0%	4,801	-	13,521	$10,000	5%	100.0%	4,801
NBC	DCKV Full Menu (5000 - 9999 cfm)		15	weather	5.0%	100.0%	11,486	-	30,901	$15,000	5%	100.0%	11,486
NBC	ERV - up to 1000CFM - Multi Family, Health Care, Nursing		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	ERV - 1001 to 4999CFM - Multi Family, Health Care, Nursing		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	ERV - up to 1000CFM - Hotel, Restaurant, Retail		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	ERV - 1001 to 4999CFM - Hotel, Restaurant, Retail		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	ERV - up to 1000CFM - Office, Warehouse, School		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	ERV - 1001 to 4999CFM - Office, Warehouse, School		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	HRV - up to 4999CFM - Multi Family, Health Care, Nursing		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	HRV - up to 4999CFM - Hotel, Restaurant, Retail		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	HRV - up to 4999CFM - Office, Warehouse, School		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5%	100.0%	Quasi
NBC	Infrared Heating - 20 to 75 MBtu/hr		20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	33%	100.0%	Quasi
NBC	Infrared Heating - over 75 MBtu/hr		20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	33%	100.0%	Quasi
NBC	Rooftop Unit		15	weather	5.0%	100.0%	255	-	-	$375	5%	100.0%	255
BR	CEE Tier 2 Front-Loading Clothes Washer (MF ONLY)		11	baseload	10.0%	100.0%	117	58,121	396	$600	10.0%	100.0%	117
BR	Condensing Boiler - up to 299 MBtu/h		25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	Condensing Boiler - 300 to 999 MBtu/h		25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	Condensing Boiler - over 1,000 Mbtu/h		25	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	Condensing Gas Water Heater (1,000gal/day)		13	baseload	5.0%	100.0%	1,551	-	-	$2,230	5.0%	100.0%	1,551
BR	Custom Agriculture		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual
BR	Custom Multifamily		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual
BR	Custom Retrofit		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual
BR	DCKV Fast Casual (< 5000 cfm)		15	weather	5.0%	100.0%	4,801	-	13,521	$10,000	5.0%	100.0%	4,801
BR	DCKV Full Menu (5000 - 9999 cfm)		15	weather	5.0%	100.0%	11,486	-	30,901	$15,000	5.0%	100.0%	11,486
BR	Destratification Fan		15	weather	10.0%	100.0%	Quasi	Quasi	Quasi	Quasi	10.0%	100.0%	Quasi
BR	ERV - over 1000CFM - Multi Family, Health Care, Nursing		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	ERV - up to 1000CFM - Hotel, Restaurant, Retail		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	ERV - over 1000CFM - Hotel, Restaurant, Retail		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	ERV - up to 1000CFM - Office, Warehouse, School		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	ERV - over 1000CFM - Office, Warehouse, School		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	HRV - Multi Family, Health Care, Nursing		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	HRV - Hotel, Restaurant, Retail		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	HRV - Office, Warehouse, School		14	weather	5.0%	100.0%	Quasi	Quasi	Quasi	Quasi	5.0%	100.0%	Quasi
BR	HWC - Faucet Aerator - Bath - 1.0gpm		10	baseload	10.0%	100.0%	7	2,371	-	$0.55	10.0%	100.0%	7
BR	HWC - Faucet Aerator - Kitchen 1.5gpm		10	baseload	10.0%	100.0%	16	5,377	-	$1.39	10.0%	100.0%	16
BR	HWC - Showerhead - 1.25gpm		10	baseload	10.0%	69.0%	45	8,824	-	$3.69	10.0%	69.0%	32
BR	Infrared Heating - 20 to 75 MBtu/hr		20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	33.0%	100.0%	Quasi
BR	Infrared Heating - over 75 MBtu/hr		20	weather	33.0%	100.0%	Quasi	Quasi	Quasi	Quasi	33.0%	100.0%	Quasi
BR	Pre-Rinse Spray Nozzle - Full - 0.64gpm		5	baseload	0.0%	100.0%	1,286	252,000	-	$88	0.0%	100.0%	1,286
BR	Pre-Rinse Spray Nozzle - Full - 0.64gpm replacing existing 1.6gpm		5	baseload	0.0%	100.0%	457	97,292	-	$150	0.0%	100.0%	457
BR	Pre-Rinse Spray Nozzle - Limited - 0.64gpm		5	baseload	0.0%	100.0%	339	66,400	-	$88	0.0%	100.0%	339
BR	Pre-Rinse Spray Nozzle - Limited - 0.64gpm replacing existing 1.6gpm		5	baseload	0.0%	100.0%	90	19,197	-	$150	0.0%	100.0%	90
BR	Pre-Rinse Spray Nozzle - Other - 0.64gpm		5	baseload	0.0%	100.0%	318	62,200	-	$88	0.0%	100.0%	318
BR	Pre-Rinse Spray Nozzle - Other - 0.64gpm replacing existing 1.6gpm		5	baseload	0.0%	100.0%	109	23,166	-	$150	0.0%	100.0%	109
BR	Rooftop Unit		15	weather	5.0%	100.0%	255	-	-	$375	5.0%	100.0%	255
BR	Thermostat - Programmable - Ware, Ind, Rec, Agr		15	weather	20.0%	100.0%	538	-	266	$110	20.0%	100.0%	108
BR	Thermostat - Programmable - Food Service		15	weather	20.0%	100.0%	223	-	156	$110	20.0%	100.0%	69
BR	Thermostat - Programmable - Multifamily		15	weather	20.0%	100.0%	223	-	156	$110	20.0%	100.0%	15
BR	Thermostat - Programmable - Office, Institution, Education		15	weather	20.0%	100.0%	211	-	112	$110	20.0%	100.0%	50
BR	Thermostat - Programmable - Retail, Hotel		15	weather	20.0%	100.0%	82	-	63	$110	20.0%	100.0%	13
DCM	Custom Agriculture Ind Baseload		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual
DCM	Custom Application		Actual	Actual	54.0%	100.0%	Actual	Actual	Actual	Actual	54.0%	100.0%	Actual

Appendix B: 2010 DSM Spending by Program

Sector	Program	Program Costs	Incentive Costs	Total
Residential	* New Home Construction	$ 200	$ 351	$ 551
	*Home Retrofit	$ 1,046,721	$ 1,841,014	$ 2,887,735
	Total Residential	**$ 1,046,921**	**$ 1,841,365**	**$ 2,888,286**
Low Income	Low Income	$ 231,834	$ 1,343,230	$ 1,575,064
	Total Low Income	**$ 231,834**	**$ 1,343,230**	**$ 1,575,064**
Commercial	*New Building Construction	$ 87,819	$ 800,845	$ 888,664
	*Building Retrofit	$ 400,064	$ 2,643,538	$ 3,043,602
	Total Commercial	**$ 487,883**	**$ 3,444,383**	**$ 3,932,266**
Distribution Contract	Distribution Contract	$ 366,878	$ 4,688,368	$ 5,055,246
	Total Distribution Contract	**$ 366,878**	**$ 4,688,368**	**$ 5,055,246**
Market Transformation	DWHR	$ 305,276	$ 1,023,174	$ 1,328,450
	Total Market Transformation	**$ 305,276**	**$ 1,023,174**	**$ 1,328,450**
Total Program Sector Costs		**$ 2,438,792**	**$ 12,340,520**	**$ 14,779,312**
Other Direct Program Costs	Salaries			$ 5,437,067
	Research & Evaluation			$ 1,288,649
	Administration			$ 27,335
	Total O&M impacting TRC			**$ 6,753,051**
Total 2010 DSM Spending				**$ 21,532,363**

Appendix C: 2010 LRAM Results by Measure

Program		Measure	Net Natural Gas Savings (m^3) per Unit	Units	Net Natural Gas Savings (m^3)
			(a)	(b)	(c) = (a) * (b)
Residential New Homes	ESK	Faucet Aerator - Bath - 1.5gpm	4	57	229
	ESK	Faucet Aerator - Kitchen - 1.5gpm	13	55	700
	ESK	Showerhead - 1.25gpm	40	66	2,614
Residential Existing Homes	ESK	Install - Faucet Aerator - Bath	1	695	1,023
	ESK	Install - Faucet Aerator - Kitchen	8	695	5,407
	ESK	Install - Pipe Insulation - 2m	17	695	12,010
	ESK	Install - Showerhead - 1.25gpm	28	610	16,819
	ESK	Install - Showerhead - 1.25gpm exist 2.0-2.5	29	14	404
	ESK	Install - Showerhead - 1.25gpm exist 2.6+	55	71	3,915
	ESK	Pull - Faucet Aerator - Bath	2	47452	84,137
	ESK	Pull - Faucet Aerator - Kitchen	9	47452	417,032
	ESK	Pull - Pipe Insulation - 2m	9	47452	449,351
	ESK	Pull - Showerhead - 1.25gpm	20	47452	955,227
	ESK	Push - Faucet Aerator - Bath	1	23787	31,524
	ESK	Push - Faucet Aerator - Kitchen	7	23787	166,561
	ESK	Push - Pipe Insulation - 2m	9	23787	216,089
	ESK	Push - Showerhead - 1.25gpm	14	23787	336,033
		Thermostat - Programmable	30	8878	268,204
		Total Residential		**296,792**	**2,967,279**
Low Income	ESK	HHC - Faucet Aerator - Bath	8	14443	120,966
	ESK	HHC - Faucet Aerator - Kitchen	20	14508	291,895
	ESK	HHC - Pipe Insulation - 2m	17	14542	243,590
	ESK	HHC - Showerhead - 1.25gpm exist 2.0-2.5	38	4317	163,567
	ESK	HHC - Showerhead - 1.25gpm exist 2.6+	72	10067	729,690
		Thermostat - Programmable - HHC	52	6395	335,546
		Weatherization		134	96,174
		Total Low Income		**64,406**	**1,981,427**
Commercial New Buildings		CEE Tier 2 Front-Loading Clothes Washer	105	3	316
		Condensing Boiler		105	1,007,987
		Condensing Gas Water Heater - 1000 gal/day	1,473	11	16,208
		Custom - Agriculture		2	63,823
		Custom - New Construction		2	61,602
		DCKV Fast Casual (< 5000 cfm)	4,561	2	9,122
		DCKV Full Menu (5000 - 9999 cfm)	10,912	4	43,647
		ERV		111	1,140,251
		Infrared Heating		231	304,058
		HRV		108	315,614
		Rooftop Unit	242	91	22,045
		Total Commercial New Buildings		**670**	**2,984,672**
Commercial Existing Buildings		CEE Tier 2 Front-Loading Clothes Washer	105	100	10,530
		Condensing Boiler		493	2,815,675
		Condensing Gas Water Heater - 1000 gal/day	1,473	30	44,204
		Custom - Agriculture		10	302,850
		Custom - Multifamily		16	69,518
		Custom - Retrofit		233	1,409,217
		DCKV Fast Casual (< 5000 cfm)	4,561	10	45,610
		DCKV Full Menu (5000 - 9999 cfm)	10,912	2	21,823
		Destratification Fan		30	339,037
		ERV		151	588,683
		HRV		75	179,696
		HWC - Faucet Aerator-Bath - 1.0gpm	6	28,337	178,523
		HWC - Faucet Aerator-Kitchen - 1.5gpm	14	21,317	306,965
		HWC - Shower Head - 1.25 gpm	20	28,609	568,765
		Infrared Heating		425	592,371
		Pre-Rinse Spray Nozzle - Full - 0.64gpm	1,286	123	158,178
		Pre-Rinse Spray Nozzle - Full - 0.64gpm replacing existing 1.6gpm	457	89	40,673
		Pre-Rinse Spray Nozzle - Limited - 0.64gpm	339	70	23,730
		Pre-Rinse Spray Nozzle - Limited - 0.64gpm replacing existing 1.6gp	90	1	90
		Pre-Rinse Spray Nozzle - Other - 0.64gpm	318	47	14,946
		Pre-Rinse Spray Nozzle - Other - 0.64gpm replacing existing 1.6gpn	109	3	327
		Rooftop Unit	242	118	28,586
		Thermostat - Programmable - Ware, Ind, Rec, Agr	86	2605	224,655
		Thermostat - Programmable - Food Service	55	127	7,010
		Thermostat - Programmable - Multifamily	12	56	672
		Thermostat - Programmable - Office, Institution, Education	40	956	38,469
		Thermostat - Programmable - Retail, Hotel	10	167	1,717
		Total Commercial Existing Buildings		**84,200**	**8,012,519**
Distribution Contract Markets		Custom - Agriculture		127	6,989,813
		Custom - DC		230	98,180,053
		Total Distribution Contract Markets		**357**	**105,169,866**
		Total Program Results		**446,425**	**121,115,763**

Appendix D: 2010 TRC Results by Measure

Program	Measure		TRC Per Unit	Units	Gross TRC	Program Costs	Net Program TRC
			(a)	(b)	(c) = (a) * (b)	(d)	(e) = (c) - (d)
Residential New Homes	ESK	Faucet Aerator - Bath - 1.5gpm	$ 27.54	57	$ 1,569.63		
	ESK	Faucet Aerator - Kitchen - 1.5gpm	$ 86.09	55	$ 4,734.86		
	ESK	Showerhead - 1.25gpm	$ 261.44	66	$ 17,254.92		
Residential Existing Homes	ESK	Install - Faucet Aerator - Bath	$ 9.85	695	$ 6,848.11		
	ESK	Install - Faucet Aerator - Kitchen	$ 53.62	695	$ 37,263.87		
	ESK	Install - Pipe Insulation - 2m	$ 37.90	695	$ 26,337.60		
	ESK	Install - Showerhead - 1.25gpm	$ 181.02	610	$ 110,420.30		
	ESK	Install - Showerhead - 1.25gpm exist 2.0-2.5	$ 187.46	14	$ 2,624.48		
	ESK	Install - Showerhead - 1.25gpm exist 2.6+	$ 320.20	71	$ 22,734.07		
	ESK	Pull - Faucet Aerator - Bath	$ 11.94	47,452	$ 566,575.41		
	ESK	Pull - Faucet Aerator - Kitchen	$ 60.69	47,452	$ 2,879,698.93		
	ESK	Pull - Pipe Insulation - 2m	$ 19.90	47,452	$ 944,268.47		
	ESK	Pull - Showerhead - 1.25gpm	$ 131.27	47,452	$ 6,228,904.92		
	ESK	Push - Faucet Aerator - Bath	$ 8.83	23,787	$ 210,068.02		
	ESK	Push - Faucet Aerator - Kitchen	$ 48.16	23,787	$ 1,145,635.23		
	ESK	Push - Pipe Insulation - 2m	$ 19.01	23,787	$ 452,230.98		
	ESK	Push - Showerhead - 1.25gpm	$ 91.13	23,787	$ 2,167,666.58		
	Thermostat - Programmable		$ 100.10	8,878	$ 888,711.14		
	Total Residential			**296,792**	**$ 15,713,547.53**	**$ 1,046,921**	**$ 14,666,627**
Low Income	ESK	HHC - Faucet Aerator - Bath	$ 58.70	14,443	$ 847,809		
	ESK	HHC - Faucet Aerator - Kitchen	$ 139.69	14,508	$ 2,026,565		
	ESK	HHC - Pipe Insulation - 2m	$ 36.62	14,542	$ 532,477		
	ESK	HHC - Showerhead - 1.25gpm exist 2.0-2.5	$ 247.13	4,317	$ 1,066,844		
	ESK	HHC - Showerhead - 1.25gpm exist 2.6+	$ 421.60	10,067	$ 4,244,266		
	Thermostat - Programmable - HHC		$ 171.93	6,395	$ 1,099,505		
	Weatherization			134	$ 158,865		
	Total Low Income			**64,406**	**$ 9,976,330.11**	**$ 231,834**	**$ 9,744,496**
Commercial New Buildings	CEE Tier 2 Front-Loading Clothes Washer		$ 720.51	3	$ 2,162		
	Condensing Boiler			105	$ 2,621,525		
	Condensing Gas Water Heater - 1000 gal/day		1891.662422	11	$ 20,808		
	Custom - Agriculture			2	$ 169,250		
	Custom - New Construction			2	$ 236,843		
	DCKV Fast Casual (< 5000 cfm)		$ 14,090.26	2	$ 28,181		
	DCKV Full Menu (5000 - 9999 cfm)		$ 41,127.10	4	$ 164,508		
	ERV			111	$ 2,440,182		
	Infrared Heating			231	$ 822,204		
	HRV			108	$ 241,705		
	Rooftop Unit		$ 370.27	91	$ 33,695		
	Total Commercial New Buildings			**670**	**$ 6,781,062.69**	**$ 87,819**	**$ 6,693,244**
Commercial Existing Buildings	CEE Tier 2 Front-Loading Clothes Washer		$ 720.51	100	$ 72,051		
	Condensing Boiler			493	$ 7,322,872		
	Condensing Gas Water Heater - 1000 gal/day		$ 1,891.66	30	$ 56,750		
	Custom - Agriculture			10	$ 815,380		
	Custom - Multifamily			16	$ 140,766		
	Custom - Retrofit			233	$ 3,745,570		
	DCKV Fast Casual (< 5000 cfm)		$ 14,090.26	10	$ 140,903		
	DCKV Full Menu (5000 - 9999 cfm)		$ 41,127.10	2	$ 82,254		
	Destratification Fan			30	$ 825,445		
	ERV			151	$ 899,773		
	HRV			75	$ 251,872		
	HWC - Faucet Aerator-Bath - 1.0gpm		$ 43.65	28,337	$ 1,236,924		
	HWC - Faucet Aerator-Kitchen - 1.5gpm		$ 99.12	21,317	$ 2,113,001		
	HWC - Shower Head - 1.25 gpm		$ 137.22	28,609	$ 3,925,605		
	Infrared Heating			425	$ 1,602,220		
	Pre-Rinse Spray Nozzle - Full - 0.64gpm		$ 3,735.45	123	$ 459,460		
	Pre-Rinse Spray Nozzle - Full - 0.64gpm replacing existing 1.6gpm		$ 1,272.61	89	$ 113,262		
	Pre-Rinse Spray Nozzle - Limited - 0.64gpm		$ 919.65	70	$ 64,376		
	Pre-Rinse Spray Nozzle - Limited - 0.64gpm replacing existing 1.6gp		$ 130.47	1	$ 130		
	Pre-Rinse Spray Nozzle - Other - 0.64gpm		$ 856.51	47	$ 40,256		
	Pre-Rinse Spray Nozzle - Other - 0.64gpm replacing existing 1.6gpn		$ 188.98	3	$ 567		
	Rooftop Unit		$ 370.27	118	$ 43,692		
	Thermostat - Programmable - Ware, Ind, Rec, Agr		$ 1,367.00	2,605	$ 3,561,032		
	Thermostat - Programmable - Multifamily, Food Service		$ 543.33	183	$ 99,430		
	Thermostat - Programmable - Office, Institution, Education		$ 487.38	956	$ 465,935		
	Thermostat - Programmable - Retail, Hotel		$ 147.63	167	$ 24,654		
	Total Commercial Existing Buildings			**84,200**	**$ 28,104,181**	**$ 400,064**	**$ 27,704,117**
Distribution Contract Markets	Custom - Agriculture			127	$ 10,553,665		
	Custom - DC			230	$ 221,890,744		
	Total Distribution Contract Markets			**357**	**$ 232,444,409**	**$ 366,878**	**$ 232,077,531**
Total Program Results				**446,425**	**$ 293,019,531**	**$ 2,133,516**	**$ 290,886,015**
Other Direct Program Costs						$ 6,753,051	
2010 Total Net TRC							**$ 284,132,964**

Appendix E: 2011 Avoided Costs

INFLATION FACTOR	1.9%
DISCOUNT RATE	10%

NATURAL GAS ENERGY SAVINGS RATES						
	Residential/Commercial				Industrial	
	Baseload		Weather Sensitive		Baseload	
Year	Rates	NPV	Rates	NPV	Rates	NPV
1	0.28805	0.28805	0.29045	0.29045	0.27964	0.27964
2	0.32765	0.58591	0.33207	0.59233	0.31775	0.56850
3	0.33450	0.86236	0.34036	0.87362	0.32600	0.83793
4	0.34086	1.11845	0.34683	1.13420	0.33219	1.08751
5	0.34733	1.35568	0.35342	1.37559	0.33851	1.31871
6	0.35393	1.57545	0.36013	1.59920	0.34494	1.53289
7	0.36066	1.77903	0.36697	1.80635	0.35149	1.73130
8	0.36751	1.96762	0.37395	1.99824	0.35817	1.91510
9	0.37449	2.14232	0.38105	2.17600	0.36497	2.08536
10	0.38161	2.30416	0.38829	2.34068	0.37191	2.24308
11	0.38886	2.45408	0.39567	2.49322	0.37898	2.38920
12	0.39624	2.59296	0.40319	2.63454	0.38618	2.52455
13	0.40377	2.72161	0.41085	2.76545	0.39351	2.64993
14	0.41145	2.84080	0.41865	2.88672	0.40099	2.76609
15	0.41926	2.95120	0.42661	2.99906	0.40861	2.87369
16	0.42723	3.05348	0.43471	3.10312	0.41637	2.97336
17	0.43535	3.14822	0.44297	3.19953	0.42428	3.06570
18	0.44362	3.23599	0.45139	3.28883	0.43234	3.15124
19	0.45205	3.31729	0.45997	3.37156	0.44056	3.23047
20	0.46064	3.39261	0.46871	3.44820	0.44893	3.30388
21	0.46939	3.46238	0.47761	3.51919	0.45746	3.37188
22	0.47831	3.52701	0.48669	3.58496	0.46615	3.43487
23	0.48739	3.58689	0.49593	3.64588	0.47501	3.49322
24	0.49665	3.64235	0.50535	3.70232	0.48403	3.54728
25	0.50609	3.69373	0.51496	3.75460	0.49323	3.59735
26	0.51571	3.74133	0.52474	3.80303	0.50260	3.64374
27	0.52550	3.78543	0.53471	3.84789	0.51215	3.68671
28	0.53549	3.82627	0.54487	3.88946	0.52188	3.72652
29	0.54566	3.86411	0.55522	3.92796	0.53180	3.76340
30	0.55603	3.89916	0.56577	3.96362	0.54190	3.79756

WATER AND ELECTRICITY SAVINGS RATES				
	Residential/Commercial/Industrial			
	Water Rates		Electricity Rates	
Year	Rates	NPV	Rates	NPV
1	1.91250	1.91250	0.08325	0.08325
2	1.94884	3.68417	0.08483	0.16037
3	1.98586	5.32538	0.08645	0.23182
4	2.02359	6.84573	0.08809	0.29800
5	2.06204	8.25414	0.08976	0.35931
6	2.10122	9.55883	0.09147	0.41610
7	2.14115	10.76745	0.09321	0.46871
8	2.18183	11.88707	0.09498	0.51745
9	2.22328	12.92425	0.09678	0.56260
10	2.26552	13.88505	0.09862	0.60443
11	2.30857	14.77511	0.10049	0.64317
12	2.35243	15.59962	0.10240	0.67906
13	2.39713	16.36342	0.10435	0.71231
14	2.44267	17.07097	0.10633	0.74311
15	2.48908	17.72643	0.10835	0.77164
16	2.53638	18.33362	0.11041	0.79807
17	2.58457	18.89609	0.11251	0.82256
18	2.63367	19.41715	0.11465	0.84524
19	2.68371	19.89984	0.11682	0.86625
20	2.73471	20.34699	0.11904	0.88572
21	2.78666	20.76121	0.12131	0.90375
22	2.83961	21.14492	0.12361	0.92045
23	2.89356	21.50039	0.12596	0.93593
24	2.94854	21.82968	0.12835	0.95026
25	3.00456	22.13472	0.13079	0.96354
26	3.06165	22.41729	0.13328	0.97584
27	3.11982	22.67906	0.13581	0.98723
28	3.17910	22.92156	0.13839	0.99779
29	3.23950	23.14620	0.14102	1.00757
30	3.30105	23.35429	0.14370	1.01663

Appendix F: Draft Executive Summary
Process Evaluation Findings for the Commercial and Distribution Contract Custom Project Programs

Union Gas Limited (Union) is a natural gas utility in Ontario serving nearly 1.3 million residential, commercial and industrial customers in over 400 communities in northern, south-western and eastern regions of the province. As a regulated energy utility, Union is mandated by the Ontario Energy Board to provide Demand Side Management initiatives to its large and diverse service area.

This report provides the process evaluation findings of the Commercial and Distribution Contract Custom Projects program (also referred to as the Custom Program) offered by Union Gas to their Commercial and Distribution Contract customers. The objective of the process evaluation was to assess Union Gas' Custom Program offerings and how they are delivered, assess customer experience with the program, document areas of the program that are operating well, and identify opportunities for improvement.

The Custom Program offers to customers incentives for installing program qualifying equipment. The program also provides technical assessment services to customers. This technical assessment can be integral in the sales process, providing customers with data needed to assess the benefits of the capital improvement.

The Custom Program is a significant program in Union Gas' portfolio. Not only does it comprise a majority of the portfolio savings, but it also requires significant resources and efforts from a variety of key market actors, including Account Managers and Project Managers, not to mention customer staff resources.

The Custom Program design has been fairly constant over the past four years. However, there have been some structural shifts in the program staffing organization and design shifts to standardize the processes and incentive structures for Commercial versus Distribution Contract projects. The program was also rebranded from EnergyWise to enersmart, which is the umbrella program for both the Distribution Contract and Commercial sectors. These revisions are seen as positive changes by program staff interviewed.

The participant survey revealed that participating customers are by and large satisfied with the program. Participants also highly value the customer service brought to bear by Union Gas staff, recognizing those personal program touches as being influential in their decisions and the areas for highest satisfaction.

Through the staff interviews, it became apparent that there are a number of staff concerns that are likely affecting the program's efficiencies. The issues documented within this report are the program documentation and application requirements, usefulness of the program tracking system, the difficulty in culling customer data for marketing purposes, and resource constraints have on the ability to meet program goals.

From discussions with program staff and identification of the key issues related to the system, it is apparent that there are significant time and resource inefficiencies resulting from processing data in

AIMS. However, absent from creating a new tracking system, the program will need to identify solutions to optimize staff time and the system's usefulness.

Beyond the internal constraints mentioned above, program staff discussed other existing or anticipated barriers to meeting their goals. These barriers include lower natural gas prices and smaller project sizes (which incidentally require similar financial and staff resources to sell). Staff also raised issues related to the free-ridership methodology, which results in reduced program savings.

The remainder of this executive summary details the methodology employed by the evaluation. The methodology is followed by a more detailed account of the key findings and recommendations gleaned from this process evaluation.

Methodology

This study was designed around three phases. The phases are defined below.

Phase 1: Process Evaluation Plans and Logic Models. The Tetra Tech team created a program logic model based on interviews with key program staff. This logic model, along with the process evaluation plan, comprised the Phase 1 deliverable.

Phase 2: Project Implementation. The majority of evaluation-related activities took place in phase 2, including additional staff interviews and customer surveys. The activities conducted in Phase 2 are discussed below.

Phase 3: Final Report and Implementation Workshop. This report represents the first deliverable in phase 3. The evaluation team will hold a one-day implementation workshop to present the key findings and recommendations for program and/or process improvements. This report reflects the efforts of Phase 2, and represents the product that will be finalized in Phase 3.

A number of activities informed this process evaluation. These activities include:

- Review of all documentation provided by Union Gas
- Two waves of interviews with internal stakeholders
- Program participant surveys
- On-site visits to Chatham

Key Findings

This section briefly outlines key findings detailed throughout this report.

Barriers to Meeting Goals

Interviews with program staff revealed that although the program historically exceeded their goals within their budget, the ability to do so is becoming increasingly difficult. There were a number of barriers identified by staff that they believe is either currently or could potentially inhibit the program's ability to meet goals.

- **Depressed gas prices.** Lower gas prices reduce the payback period for projects, thereby making the idea of installing high-efficiency equipment via custom projects less attractive.

- **Fewer large projects.** Many staff discussed that it is becoming increasingly difficult to reach larger projects, and that they need to meet savings through a higher number of smaller projects.
- **Potential for decreased program funding.** Budgetary concerns were raised by several staff, especially as the plans for the next program cycle were being drafted at the time of the interviews.
- **Difficulty in using the program tracking system, AIMS.** Nearly all interviewees discussed the limitation of AIMS and how the system reduces the efficiency of program operations.
- **Significant time spent on program documentation.** Some staff perceive that following up on documentation needs shifts staff resources from selling projects.
- **Internal and external staff constraints.** Both internal Union Gas and external customers are wearing multiple hats in their respective organizations.
- **The audit and verification process (including the free-ridership analysis) decreases the resulting program savings.** Union Gas contracts with auditors and consultants to review a sample of projects and their related savings. The utility also hires a consultant to verify the results, including free-ridership. Results from these activities – including the free-ridership studies – affect the program's ability to meet goals.

In regards to free-ridership in particular, staff were concerned that the methodology does not appropriately capture the program influence in terms of technical assistance, and places too high of an emphasis on the influence of the rebate. They also were concerned that the study did not capture the perception of the correct decision makers (as there can be multiple individuals that are part of the process) or can be biased due to recall issues affected by the amount of time that elapses between project initiation and the survey itself.

The customer survey results provided some insight into these concerns. The results showed the importance of the information imparted during the sales process, and that the importance to customers of the return on investment far exceeds that of the incentives themselves.

A Deeper Review of Program Administration, Processes, and Resources

The issues most prevalently raised by program staff related to program administration and processes were the program documentation requirements, limitations of the program tracking system, marketing of the program, and staff and time resources.

Program documentation requirements

Primarily, as a result of more stringent requirements for savings verification, the program is facing increased documentation needs for each project. The documentation does not necessarily directly match the size of the project; in other words, smaller projects may require just as much documentation as larger projects.

Program staff also raised concerns regarding the impact some administrative processes have on customers' experiences. For example, the program documentation could create frustrations for the customer, who may need to respond to utility questions on multiple occasions. As another example, staff hypothesized that there is a point where the documentation requirements do not outweigh the benefits of the rebate, thereby reducing the customers' desire to participate in the program and/or purchase higher efficiency equipment.

While there were some customers that were frustrated with the process, for the most part participants were okay with the program requirements. The average time participants spend on collecting

information for the program is six hours[9]. Nearly all (95 percent, n=60) participants said that the rebate they received was worth the effort to collect all project details.

Program data tracking

AIMS is the program's tracking system. AIMS is an improvement from the prior system, which was working off of paper copies or on person Excel files. However, all interviewees agreed that there are shortfalls to the AIMS system. One of the interviewees recognized the benefit of the program from a management perspective, but that the management benefit comes at the expense of staff time.

Beyond the cumbersome nature of the system, program staff view the system as inhibiting program progress and negatively affecting the program's cost-effectiveness. A number of staff expressed their frustration that sales staff are spending significant time entering information into this system rather than being in the field and working with customers.

Although everyone interviewed recognizes the limitations of the system, the question remains what should be done about it. An overhaul would be costly and require a justification.

A number of recommendations were mentioned by program staff in regards to AIMS. One recommendation made, which is reportedly being implemented, is to upload account information into the system. Another recommendation was to use clerical or lower paid staff to enter part or all of the application data into the system. However, interviewees did recognize that the limitation of using staff not closely involved in the project is that these staff may unknowingly enter incorrect information into the system. A third recommendation mentioned by staff was to provide more systematic and extensive training to the account and project managers.

Marketing of the program

The program uses a wide variety of venues to market to their customers. Based on the documentation review and interviews with program staff, marketing is completed through sources such as brochures, customer meetings, training workshops, communication initiatives, and case studies. All these marketing initiatives are necessary to reach the different groups of individuals, although account managers are the most frequently cited way participants learned of the rebates offered through the program.

The staff interviews identified two opportunities for AIMS related to marketing. The first opportunity is for the system to collect information that would be useful for a market segmentation approach. Union Gas staff discussed the need to continue to increase the segmentation marketing approach, potentially using AIMS or another customer tracking system as a tool to identify the appropriate market segments. Although AIMS is not intended to be a marketing tool, it houses a significant amount of data on Union Gas' customers.

The second opportunity is for the system to track customer contacts to increase participation. One of the issues discussed by a number of interviewees was the fact that it is not easy to track the contacts that take place within organizations via AIMS, thereby making it difficult to follow up with customers with whom marketing efforts have been directed. Staff discussed that there is inconsistent follow-up

[9] This estimate excludes one outlier that said they spent 150 hours collecting information. Including the outlier increases the average time participants collect information to nine hours.

with customers that received some level of technical assistance through the program without following through to implement the project.

Staff and time resources

Internal time constraints are an issue for a number of staff interviewed. They do not feel like they (or other staff) have the time to provide effective project management and keep projects moving through the system. Several staff also discussed the need for more time to properly market the program. In addition, the auditing process has increased in burden to staff.

Compound all these issues with the fact that the average custom project is decreasing in size in terms of energy savings, thereby requiring account managers to attempt to reach more customers to meet their goals. In addition, these customers do not always have the resources on-staff to help move projects through.

Increasing the resource capacity for the program is an obvious solution. One interviewee discussed how increasing the back office staff for another program relieved the administrative burden substantially. But this solution requires increased funds and budget.

Customer Experiences

Customers' decision-making processes

At the crux of every customers' decision making process is the financials. When it comes to upgrades in capital improvement projects, there needs to be sufficient payback period to justify the project. Program staff interviewed discussed their perceptions of the required payback period for their customers. The estimates ranged from a low of one to three years (for commercial customers) to a high of six years.

Both Commercial and Distribution Contract customers are concerned about the return on investment, but Distribution Contract customers are significantly more so. Half of Distribution Contract participants said that return on investment was a barrier for completing capital improvement project, compared with 17 percent of Commercial customers said that return on investment was an issue.

One means for reducing payback period is via the incentives offered through the program. Staff perception regarding the influence the incentive had on customers' purchasing decisions varied. Program participants verified the importance of the payback on investment, but rated the value of the incentives relatively low in terms of importance in their decision-making processes. It appears from participants' responses, the availability of the rebate in and of itself made more of an impact on their decisions.

Perception of timeframe from application to payment

One of the bi-products of the application and documentation requirements is an elongated timeframe between the project initiation and incentive payment. Throughout both phases of the evaluation the timeframe for incentive payments was raised as an issue for program staff.

The survey conducted with program participants investigated their perceptions of the timeframe of the project, asking participants to assess the amount of time from application to payment and whether the timeframe was reasonable. Participants are for the most part satisfied with the amount of time it takes

from the application to the rebate process. And the vast majority of participants (93 percent, n=58) believed the timeframe from application to payment was reasonable although the Commercial participants were slightly less likely to say the timeframe was reasonable than the Distribution Contract participants. The three Commercial customers that thought the timeframe was unreasonable said the project took ten weeks (one respondent) and 24 weeks (two respondents).

Program Satisfaction

From the customers' perspective, the program is operating satisfactorily. Distribution Contract customers generally rate their level of satisfaction higher than Commercial customers.

The customers clearly place value on technical assistance, such as technical assessments provided by Union Gas or information provided by their contractor. These in-person and hands-on services are even more influential than rebate values provided through the program and received the highest average satisfaction rating from the program participants.

Nearly all participants said the program met or exceeded their expectations. There were no significant differences observed between Distribution Contract and Commercial participants.

Recommendations

Although the program is operating well in its current form, the evaluation team developed a number of recommendations for Union Gas consideration. These recommendations are based on evaluation activities and findings documented within this report. The recommendations are bulleted below. We refer the reader to Section 4 for more detailed discussion on these recommendations.

Understanding and Servicing Your Customers

Continue to investigate barriers to program participation through a targeted nonparticipant study. The scope of work for this process evaluation initially included a nonparticipant survey, which was removed for a variety of reasons. We again strongly recommend that a nonparticipant survey be completed to assess the awareness of the program and barriers for program participation. Additional survey research that may help Union Gas think through the barriers raised in this memorandum include focus groups and in-depth interviews with program participants.

Continue to leverage the technical assistance and other personal communications to enhance customers' program experiences. The customer survey results found that customers valued the personal services offered by Union Gas. Union Gas is currently doing this well, and should continue to provide the service to both Commercial as well as Distribution Contract customers.

Provide sufficient staff resources and services for Commercial as well as Distribution Contract customers. Commercial customer projects are typically smaller in scale than Distribution Contract projects. Understandably, the Distribution Contract customers receive more attention from the program. However, interviews with program participants indicate that Commercial customers are somewhat less satisfied with the program services and were significantly more likely to say that the age of the retrofitted equipment was important in their decision to participate. With a customer service perspective in mind, Commercial customers could benefit from additional personal services from Union Gas. These relationships may become more important as the program continues to need more projects to meet its goals.

Assess Internal Processes

Considering adding back office staff to assist in various project and/or administrative tasks. Resource constraints are clearly an issue for the program. Considerable staff resources are consumed by fulfilling extensive documentation requirements and entering participant data into the cumbersome AIMS database. As a result staff are focusing on administrative duties rather than sales. One recommendation made by an individual who works with another Union Gas program is to hire junior engineering staff to assist in these activities which could have numerous benefits. With this said, we recognize that additional staff means additional program cost. However, we believe the additional resources could increase the program's capability to continue to meet goals more cost-effectively.

Improve the reporting functionality in AIMS. This report documented a number of limitations to the AIMS database. Absent a database redesign, it would be useful for the utility to develop queries or reports that will assist with staff marketing and tracking efforts. A number of suggestions were documented within the report. Union Gas staff should have input into which reports are necessary, prioritizing those reports that could either increase customer savings or enhance marketing efforts.

Develop and deliver a systematic training on the AIMS system. Several staff mentioned that they believe staff would benefit from a systematic training on the AIMS tracking system.

Identify a means for tracking and targeting customers that received a technical assessment but did not move forward with projects. The technical assessment is an expensive undertaking. But it is oftentimes necessary to sell projects to customers. The program loses cost-efficiencies when a customer that receives a technical assessment does not continue with a program. Program staff indicated that it is either difficult or not possible to identify participants that received an assessment but did not move forward with a projects through AIMS. This is a reporting need for the data tracking system.

Create a means for communicating customer progress to Account Managers and other program staff. A number of Account Managers expressed frustration that they do not know where their customers are in the sales cycle. Staff discussed creating an automated email system to notify others of where the customers is in the review process, and when an action is required for that customer. According to staff, this recommendation was being set into motion at the time of the interviews.

Work with staff to refine the documentation and process checklist so that it is usable and reasonable. At the time of the process interviews, staff discussed the development of a checklist that illustrates the type of information that needs to be obtained by the customer. At the time of the interviews the checklist was being finalized. Staff should be open to pilot testing the checklist and refining as necessary.

Review Audit and Verification Methods and Requirements

Ensure that the free-ridership methodology is reviewed in light of customer perspectives relayed within this process evaluation report. We did not review the free-ridership study as part of this process evaluation. However, we did use the customer survey to provide insight into a number of concerns raised by program staff. If not done so already, the current free-ridership methodology should take into consideration the technical assistance or information provided by the program, previous program participation, and ensuring the correct individuals are contacted.

Continue to understand requirements for audit and savings verification, and document and identify a consistent forum to communicate changes to program requirements. Aside from the AIMS database, one of the most frequently mentioned issue by program staff was the application requirements. A separate activity under this evaluation is to review the necessary documentation to fulfill audit requirements and provide any recommendations for improvement that can be identified. Whatever the result of the report, it would behoove Union Gas to clearly communicate any changes in documentation or program requirements to program staff. Staff recommended that Union Gas develop a portal or systematic process to communicate these issues (such as a program intranet).

Appendix G: Executive Summary

Market Study of Natural Gas Fired Infrared Heaters

Union retained Nexant, Inc (Nexant), to complete a market study detailing the individual market share of gas fired IR heaters. To accomplish the study objectives, Nexant focused on and completed the following tasks:

1. Performed secondary research on the technology in question.
2. Performed surveys of key market players within the construction industry to assess the current market share of IR Heaters.

This study was conducted for Union Gas Ltd. (Union) to assess the current market status of three different Infrared (IR) heating technologies within Union's service territory. Results were obtained through telephone interviews with market actors that included equipment manufacturers, distributors, contractors, and engineers.

The three types of IR heaters considered for this study were single stage, two stage, and high intensity. During research it was found that high intensity heaters, when installed indoors, require the use of additional mechanical ventilation devices to comply with Canada's building code. This constraint appears to influence the market share of high intensity heaters. Upon completion of the surveys it was found that the single stage heaters account for the largest segment of the market with the other two types having a substantially smaller market share. The results of the surveys are available in Figure 0-1.

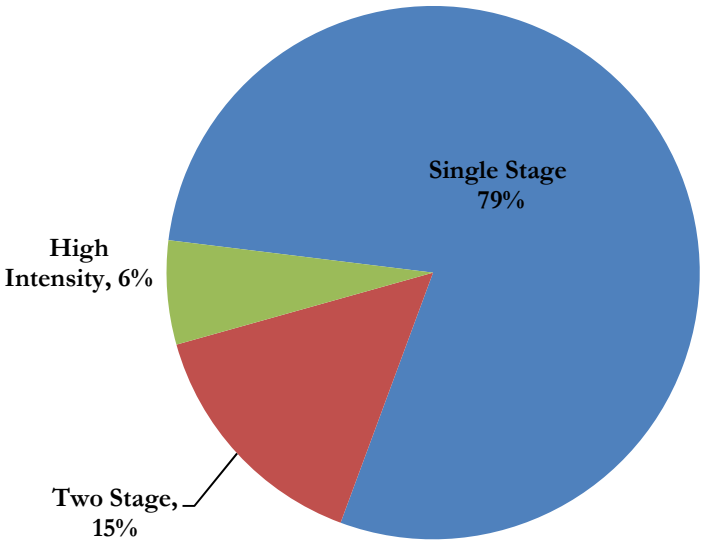


Figure 0-1: IR Heater Market Segmentation

Appendix H: GDS Report – Union's Long Term Market Transformation Strategy (DWHR)

Introduction

This document presents a market transformation strategy for Union Gas Limited's (Union's) Drain Water Heat Recovery Program, and contains the following sections:

1. Program Description
2. Ultimate Goals
3. Market Barriers
4. Market Participants
5. Program Activities (Delivery Method)
6. Review of Market Effects of Program to Date
7. Program Inputs and Potential External Influences
8. Drain Water Heat Recovery in Ontario
9. Market Transformation Strategy Diagram and Outputs, Indicators & Data Sources for the Short, Intermediate & Long Term

In order to develop this Market Transformation Strategy, a thorough review was conducted of the documents presented in the table below.

Table 1 – Relevant Documents Reviewed

Union Gas Limited. EB-2008~0346, 2010 Demand Side Management (DSM) Plan, Section 3.4., as filed May 29, 2009
Union Gas Limited. Drain Water Heat Recovery for Residential New Home Construction: Residential single-family new home housing survey results, as presented on January, 10, 2008
Union Gas Limited. DWHR Market Transformation spreadsheet
Union Gas Limited. Drain Water Heat Recovery for Residential New Home Construction, as presented on December 3, 2007
Union Gas Limited. 2010 Builder and HVAC Satisfaction Survey. April 2010
Union Gas Limited. 2010 Builder Satisfaction Survey. April 2010
Enbridge Gas Distribution. Drain Water Heat Recovery Program Logic Model, 1/20/2010
Nexant. External Audit of Union Gas Demand Side Management 2007 Evaluation Report. June 12, 2008.
ECONorthwest. Audit Report on Union Gas 2008 Annual Report. June 24, 2009.

SECTION 1: PROGRAM DESCRIPTION

Based on review of relevant documents, below is a description of Union Gas Limited's Drain Water Heat Recovery Program, and how the program fits into Union's long term market transformation plans.

Union has offered Drain Water Heat Recovery (DWHR) systems in new home construction since 2007, and will continue to focus on DWHR in 2010 through at least 2012. The technology allows cold incoming water in a home to be pre-heated by outgoing grey water before entering a water heater or storage device, thus realizing substantial energy savings of up to 30% of water heating costs by reclaiming the heat from drain water generated from processes such as showering, laundry, and dish washing. DWHR systems are compatible with a wide range of fuel types (i.e. gas, oil, electric, geo-thermal, solar, etc.), though Union's program focuses only on its natural gas applications. This technology currently has a growing market share but could have even greater penetration, as DWHR has the potential to yield significant gas savings benefits to customers.

Union's DWHR Program engages manufacturers of the technology in addition to plumbers, builders, and customers. In addition, the company's program has and will continue to facilitate the sales process between manufacturers and home builders, work cooperatively to identify opportunities to reduce per unit costs, and encourage the development of a competitive marketplace for DWHR. In January 2010, the program began working with distributors as well, in order to facilitate the addition of a second manufacturer to the program. In June 2010, Union altered the incentive structure and now provides incentives to manufacturers, who pass on savings to builders as an on-bill rebate. Previously, the program offered rebates to builders directly, but they were not paid until after the builder had bought the unit and submitted proof of their purchase to the program. This new incentive structure encourages the development of relationships between market participants and increases their accountability, furthering the evolution toward a non-utility supported market for DWHR systems.

Direct communication vehicles such as mail campaigns and brochures are utilized to provide information and training to builders and plumbers, leading to increasingly widespread knowledge of proper installation, drain stack design needs, and effective marketing of DWHR technology. Union seeks to increase customer awareness of DWHR through marketing materials and other campaigns which target new home buyers. Additionally, Union's DWHR program engages other key organizations such as: Enbridge Gas, the Ontario Ministry of Housing, the Ontario Home Builders' Association, the Ontario Power Authority, the Canadian Standards Association, Natural Resources Canada, EnerQuality, the Social Housing Services Corporation, and Habitat for Humanity. These activities will continue to remove barriers to market penetration, drive an accelerated adoption of energy efficiency technology, and influence transformation of the market.

SECTION 2: GOALS

Short and Intermediate Goals:

- Increase market penetration
- Assist in the development of a non-utility supported competitive marketplace for the technology

Ultimate Goal:

- Succeed in having DWHR added as a standard to the Ontario Building Code.

SECTION 3: MARKET BARRIERS

This section identifies the potential market barriers that may impede the program's ability to achieve certain program goals, identified as either common to similar programs operating in this space or unique to Union's DWHR Program.

A wide range of barriers may be encountered that hinder widespread adoption of greater efficiency systems, behavioral changes and the use of new energy technologies within the residential housing sector. These barriers can be broken down into three general categories: barriers affecting the supply side, mid-market/infrastructure barriers, and barriers affecting demand side (and associated end-use) market participants. Supply-side and mid-market/ infrastructure barriers include business practices and policies that deter the development or delivery of energy efficient products and services, or indicate an insufficient availability of, or commitment to, such energy-efficient products/services. Demand-side barriers primarily revolve around building owners, developers, plumbers and home owners. Table 2 presents a list of potential market barriers for DWHR in the new homes market. The barriers are labeled "S" (for supply), "M" (for mid-market/infrastructure) and "D" (for demand).

Table 2 – Market Barriers and Associated Market Participants for DWHR[10]

Market Area	Barriers	Market Participants
Supply-side (upstream participants)	S1 – Lack of awareness among manufacturers and suppliers regarding the market for DWHR systems* S2 – High production costs* S3 – Limited distribution channels†* S4 - Commodity price risks (copper) S5 – Limited manufacturer Research and Development activities	Manufacturers/Suppliers Distributors
Market infrastructure / policy (midstream participants)	M1 – Hassle, information and incremental transaction costs* M2 – Lack of product knowledge* M3 – Organizational practices or customs* M4 – Drain stack design by builders/architects* M5 – Performance and installation uncertainties* M6 – Availability of technical support in remote regions†	Builders Contractors/Plumbers Sales agents Other utilities
Demand side (downstream	D1 – Incremental cost*	New home and potential

[10] Union Gas Limited. EB-2008~0346, 2010 Demand Side Management (DSM) Plan, Section 3.4.4.

Market Area	Barriers	Market Participants
participants)	D2 – Lack of product knowledge* D3 – Performance uncertainties*	new home buyers

*Barriers actively addressed by the Drain Water Heat Recovery Program

†Barriers unique to Union Gas Limited

SECTION 4: MARKET PARTICIPANTS

This section identifies all relevant market participants, including those directly targeted by the program and those who may be less directly involved with program delivery and activities.

The DWHR Program's marketing efforts directly target a broad spectrum of market participants. Builders and sales agents are engaged through workshops and educational materials promoting the marketing value of DWHR provided by Union's DWHR Program. Union encourages the training of plumbers and builders in order to educate them on the proper installation and benefits of DWHR. Financial incentives are also provided to further generate interest among manufacturers and new home builders. In addition, Union works with manufacturers and distributors in order to reduce per unit and transaction costs. Union also seeks to increase customer awareness of the technology through educational materials, inclusion of DWHR in model homes, trade advertising, home shows, and through activities of other organizations operating in this area, such as utilities (Enbridge Gas), Ontario Ministry of Municipal Affairs and Housing, Ontario Home Builders' Association, Ontario Power Authority, EnerQuality, Social Housing Services Corporation (SHSC), Habitat for Humanity and other trade organizations (Canadian Standards Association, Natural Resources Canada).

SECTION 5: PROGRAM ACTIVITIES (DELIVERY METHOD)

In this section, general areas of program activity are identified. Activities within Union's current DWHR Program have been designed to work strategically with supply, mid-market/infrastructure and demand–side market participants to help address key barriers. The activities associated with Union's DWHR Program elements are classified into five areas as follows:

1. Working cooperatively with manufactures, distributors and builders;
2. Developing educational materials and training workshops for builders, plumbers and sales agents;
3. Providing financial incentives to builders through the manufacturer: $400 to manufacturer per unit DWHR installed;
4. Promoting DWHR to new home buyers and sales agents; and
5. Working and facilitating meetings with key stakeholders and policy makers to change the Ontario Building Code.

Table 3 lists the program activities of the DWHR Program, grouped along the supply-demand continuum. The market transformation model for the DWHR Program, in Section 9 below, is diagrammed from left to right to correspond with this continuum.

Table 3 –Activities for the Drain Water Heat Recovery Program

Working cooperatively with manufacturers, distributors and builders (Supply)
• Facilitate sales process between manufacturers, distributors and builders • Identify opportunities to reduce per unit and transaction costs for DWHR technology
Providing financial incentives (Mid-Market/Infrastructure)
• Union Gas to provide $400 per unit to manufacturers given to builder as an on bill rebate
Developing educational materials and training workshops for builders/contractors (Mid-Market/Infrastructure)
• Training sessions designed and held for builders, plumbers and contractors to learn installation techniques, design needs, Union Gas incentives and benefits of the DWHR systems
Promoting DWHR to new home buyers and sales agents (Demand-side)
• Increasing customer awareness of DWHR through incentives, inclusion of the technology in model homes, marketing materials explaining the benefits of DWHR and training of sales agents • Providing joint promotion opportunities with builders as well as leveraging programs from energy service companies to increase market adoption of the product. • Utilizing internal communication tools, such as uniongas.com/builder for builders and uniongas.com/DWHR for homeowners
Working and facilitating meetings with key stakeholders and policy makers to change the Ontario Building Code
• Conducting outreach and providing information to key stakeholders and policy makers regarding the benefits associated with wide-scale implementation of DWHR systems • Assisting with development of language appropriate for incorporation into the Ontario Building Code to mandate DWHR as standard practice

SECTION 6: REVIEW OF MARKET EFFECTS TO DATE

This section describes the current state of the market, and puts it in context of specific market effects of the DWHR program. Market effects observed since program inception are detailed under this section. This section draws from the outputs, outcomes and indicators developed as part of this project (see Section 9). Documentation of any market effects is based solely on review of readily available secondary data sources (existing reports/studies and program records) in addition to interviews with Union Gas staff. No primary research (telephone surveys or field data collection) was conducted as part of this effort.

Thus far, evaluations of Union's DWHR Program have demonstrated steady increases in market penetration. Between 2007 and 2009, the number of participating builders grew from 20 to 100, a

fivefold increase. The number of DWHR system installations grew by 75% between 2007 and 2009 (from 906 to 1,563), representing a 3.7% increase in new builds equipped with DWHR technology. Despite a decline in the housing market between 2008 and 2009, the overall number of DWHR installations increased as a percentage of housing starts. Surveys of builders indicate that as of 2009, 10% of builders offer DWHR units as standard installation.[11]

Builder and customer awareness[12] has demonstrated variability; both grew substantially between 2007 and 2008, from 58% to 75% and from 23% to 32%, respectively. However, in 2009 awareness levels declined slightly below their 2008 levels. It is likely that external influences (listed in the Section 7) led to the reported declines in awareness levels. It should be noted that despite the decreases in customer and builder awareness between 2008 and 2009, the number and percentage of builders enrolled in the program, as well as the percentage of new builds equipped with DWHR systems, continued to grow at an increasing rate. In addition, the percentage of builders that "thoroughly understood the technology and its benefits" increased from 16% to 54%, while the percentage of builders that had never heard of the program declined from 45% to just 1%, verifying the success of Union's builder workshops and other outreach activities.

In order to drive the development of a competitive market place, the program has also expanded its outreach to manufacturers. When the program began in 2007, only one manufacture, Renewability Energy, supplied the DWHR units. In 2010, the program added a second supplier, EcoInnovation, and facilitated the development of the associated distribution infrastructure.

Currently, the DWHR Program has not yet generated discussion to include the technology as part of the Ontario Building Code (OBC). In order to achieve the inclusion of DWHR in the OBC, GDS Associates suggests that Union consider working with key stakeholders and policy makers, conducting outreach and providing information regarding the benefits of wide-scale implementation of DWHR systems. As shown in the diagram in Section 9 of this report, through these efforts, we would expect awareness and support for code changes to increase among key stakeholders and policy makers. Therefore, GDS also suggests that Union initiate discussions with the appropriate parties for the purpose of developing language for incorporating DWHR systems as standard practice within the OBC for new residential construction activities. Such discussions would be quite effective in developing a sustainable market for DWHR systems without the long-term need for utility program subsidies.

SECTION 7: PROGRAM INPUTS AND POTENTIAL EXTERNAL INFLUENCES

The ability of DWHR Program efforts to accomplish a level of outputs that will, in turn, cause the anticipated outcomes and the associated causal chain leading to the program's ultimate goals is dependent on the level, quality, and effectiveness of the inputs that go into these efforts. There are also

[11] Union Gas Limited. 2010 Builder & HVAC Satisfaction Study (April 2010, pg7)

[12] The data presented in this paragraph, after further evaluation, did not achieve statistical significance, See External Audit of Union Gas Demand Side Management 2007 Evaluation Report and Audit Report on Union Gas 2008 Annual Report.

external influences that can assist with the development of the required outcomes or hamper them. Key program inputs and potential external influences are presented in Tables 4 and 5.

Table 4 –Key Inputs for the Drain Water Heat Recovery Program

Drain Water Heat Recovery Program Inputs
Market transformation budget for materials, promotional activities, and incentives Staff resources and experience implementing earlier energy efficiency programs • Union's relationships and reputation with manufacturers, plumbers and builders • Existing awareness of Union and DWHR among market participants • Expertise of trade allies and contractors

Table 5 –Potential External Influences for the Drain Water Heat Recovery Program

Drain Water Heat Recovery Program External Influences and Other Factors
Commodity Pricing (Copper) Manufacturer Research and Development Changes in political priorities • Local, regional and national energy policies • Perceptions of energy and global climate change issues • Codes and standards Weather and associated impacts on customer actions and energy bills Broad economic conditions that affect capital investment and energy costs (rapidly changing economic conditions) • Number of housing starts • Energy prices and regulation (changes in fuel and energy prices) • Perceptions of the value of "green" homes • Activities of public and institutional purchasers and projects • Low interest rates • The recession and its associated impacts on Ontario's and the country's economic well-being (which can limit up-front funds available for energy efficiency enhancements and decrease the perception of the ability of consumers to make these investments) • Activities of other organizations operating in this area, such as utilities (Enbridge Gas), Ontario Ministry of Municipal Affairs and Housing, Ontario Home Builders' Association, Ontario Power Authority, EnerQuality, Social Housing Services Corporation (SHSC), Habitat for Humanity and other trade organizations. (Canadian Standards Association, Natural Resources Canada)

SECTION 8: DRAIN WATER HEAT RECOVERY IN ONTARIO

Union Gas has been delivering the DWHR Market Transformation program within Ontario since 2007 and has established strong relationships with participating builders, manufacturers, channel partners, plumbers, and related representative associations. As of 2009, Enbridge Gas Distribution Company (Enbridge) began offering a similar market transformation program as a part of its DSM efforts, essentially presenting a united front on the benefits of DWHR across the province. Although there are differences in how Union and Enbridge's programs are implemented within the market, it is important to note that Enbridge will be able to leverage existing partnerships and awareness already established by Union's DWHR program. This section describes the key differences between the program approaches for Union and Enbridge's DWHR programs, as well as the potential impacts and implications of the different delivery systems.

The primary difference between the two utility programs is the directness of information exchange between the utility and market participants. Enbridge funds promotional activity through water heater rental service providers (such as Direct Energy, Reliance Home Comfort and National Home Services) who, in turn, promote the technology to the builder market. These activities support Enbridge's goals of increasing the market penetration of DWHR units and the number of builders/contractors trained to install them, ultimately increasing the overall efficiency of the housing stock. Union's program interacts directly with a broader spectrum of market participants in order to increase demand for DWHR system both through cost reduction strategies and awareness campaigns for builders, sales agents and consumers. Union has nine Account Managers dedicated to program delivery and managing relationships with builders. By interacting directly with market participants, Union may avoid market barriers related to the rental provider reputation with builders/contractors and improve the public image of the utility.

Another difference between the Union and Enbridge programs relates to incentives. Under Union's program, incentives are provided through the manufacturers as an on-bill rebate, instead of directly to builders.

A summary of important franchise and DWHR program differences between Union and Enbridge is provided in Table 6 below.

Table 6 – Summary of key differences between Union Gas Limited and Enbridge Gas Distribution's DWHR Programs[13]

Program Component	Union Gas	Enbridge	Implication
Franchise Operating Territory	• Collection of large and small builders • Less housing starts (12,677 in 2009) – approximately 1/3 of Ontario • Larger land area and lower population density	• Contains more of the larger builders who are already involved in Union's DWHR program • More housing starts (23,203 in 2009) – approximately 2/3 of Ontario • Smaller land area and higher population density	• Union has the ability to make more market movement • Union's larger Franchise Operating Territory and lower population density makes it more difficult and more resource intensive to reach builders and end users
Program Delivery	• Targeting multiple market actors including Direct-to-Manufacturer approach (new as of June 15, 2010) • Utilizes 9 Union Gas Account Managers throughout Union's territory delivering the program	• Direct-to-Rental Service Providers (DE, Reliance, National Home Services) • Utilizes all external staff to deliver the program	• Union uses more internal resources to reach and educate builders • Enbridge uses external resources (employees of rental service providers)
Program Maturity	• Program launched in 2007 • Has evolved from direct-to-builder approach into a direct-to-manufacturer approach • Retains outreach to demand and mid-market actors as well	• Program launched in 2009	• Experience designing and implementing market transformation strategies • Greater diffusion of Union's DWHR program awareness among market participants • Enbridge able to benefit from Union's efforts to date

[13] Adapted from a Union Gas & Enbridge – Key DWHR Program Differences Memo.

Incentive	• Incentives provided through manufacturers to builders	• Incentives provided to builders	• Union engages supply-side market participants in addition to building awareness and demand among mid-market and end-user participants, while Enbridge focuses on mid-market and demand-side participants.

Union's DWHR program activities support an ultimate goal of adjusting the Ontario Building Code standards to include DWHR technology. Market transformation will likely be achieved by coordinating activities among the supply-side, mid-market and demand-side participants, working directly with them to increase customer and builder demand as well as manufacturer production capabilities and efficiency. Union's program approach reflects concerns that in order for transformation to occur, all sectors of the market must be engaged, instead of relying on the gradual spread of market impacts from mid-market participants. In addition, the maturity of Union's program suggests more staff experience developing and implementing activities, as well as greater program awareness among manufacturers, distributors, builders/plumbers, sales agents and new home buyers.

Due to the breadth of Union's service territory those market participants, such as builders and plumbers who also operate in Enbridge's territory, are already aware of the benefits of DWHR due to Union's efforts. Typically smaller builders operating in Enbridge's territory do not build in Union's territory, however there are some larger builders that participate in Union's DWHR program that also build in Enbridge's territory. This enables Enbridge to benefit from the outreach, awareness and training Union's program has provided since 2007.

SECTION 9: DWHR MARKET TRANSFORMATION STRATEGY DIAGRAM AND ASSOCIATED OUTPUTS INDICATORS AND DATA SOURCES FOR THE SHORT, INTERMEDIATE AND LONG TERM

The following page displays Union's DWHR Market Transformation Strategy model diagram, showing the linkages between activities, outputs and outcomes, and identifying inputs and potential external influences. The diagram presents the key features of the program. The diagram presented here is at a slightly higher level than the tables in this report, aggregating some of the outcomes, in order to make the model easier to read. (Evaluation research should use the more detailed tables, in addition to the diagram, in examining the anticipated linkages and performance through the various outcomes.)

Program Inputs:

- Market transformation budget for materials, promotional activities, and incentives
- Staff resources and experience implementing earlier energy efficiency programs
- Union Gas relationships and reputation with manufacturers and builders

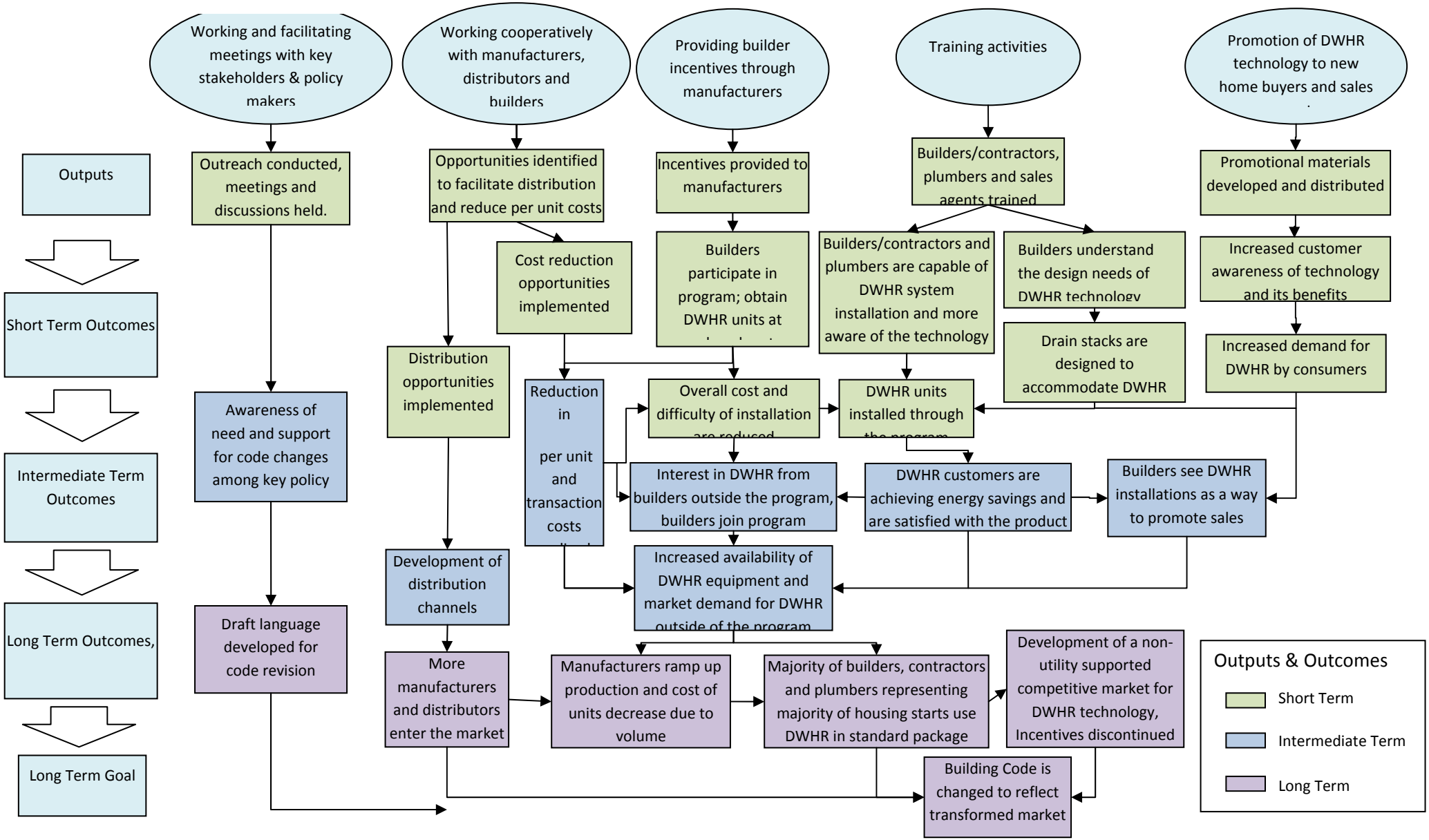
Drain Water Heat Recovery Program

Market Transformation Strategy

September 2010

Program Externalities:

- Commodity Pricing (Copper)
- Manufacturer Research and Development
- Changes in political priorities
- Weather and associated impacts on customer actions and energy bills
- Broad economic conditions that affect capital investment and energy costs (rapidly changing economic conditions)



It is important to distinguish between outputs and outcomes. For the purposes of this document, outputs are defined as the immediate results from specific program activities. These results are typically easily identified and can be counted, often by reviewing program records.

Outcomes are distinguished from outputs by their less direct (and often harder to quantify) results from specific program activities. Outcomes represent anticipated impacts associated with Union's program activities and will vary depending on the time period being assessed. On a continuum, program activities will lead to immediate outputs that, if successful, will collectively work toward achievement of anticipated short-, intermediate- and long-term program outcomes.

The following tables list outputs (Table 8) and outcomes (Table 9), taken directly from the market transformation model, and associated measurement indicators. For each indicator, a proposed data source or collection approach is presented. Items in these tables should be prioritized and subsequently considered as potential areas for investigation as part of a formal program evaluation plan.

Table 8 – DWHR Program Outputs, Associated Potential Indicators and Potential Data Sources

Outputs	Indicators	Data Sources and Potential Collection Approaches
Outputs from Working Cooperatively with Manufacturers, Distributors and Builders		
Opportunities identified to facilitate distribution and reduce per unit and transaction costs	Number and type of distribution facilitation and cost reduction opportunities identified Number and types of market participants involved in distribution and cost reduction opportunities	Program records/coordination with manufacturers and distributors
Outputs from Providing Financial Incentives to Builders through Manufacturers		
Incentives provided to manufacturers for use in reducing cost to builders, contractors and plumbers	Amount of funds made available Amount of incentive payments made to each manufacturer	Program records
Outputs from Activities for Builder/Contractor Training Activities		
Builders/contractors, plumbers and sales agents trained	Number of builder/contractor, plumber and sales agent trainings held Dollars spent on development and distribution of direct	Program records

Outputs	Indicators	Data Sources and Potential Collection Approaches
	communication vehicles Number of builders/contractors and plumbers and sales agents trained to install DWHR Geographic distribution of trained builders/contractors, plumbers and sales agents	
Outputs from Promoting DWHR Technology to New Home Buyers and Sales Agents		
Promotional materials developed and distributed	Number and types of promotional materials developed and distributed (by type and target audience) Number of home buyers and sales agents reached	Program records
Outputs from Working and facilitating meetings with Key Stakeholders & Policy Makers		
Outreach conducted, meetings and discussions held	Number of meetings conducted. Number and type of outreach activities conducted.	Program records.

Table 9 DWHR Program Outcomes, Associated Indicators, and Potential Data Sources

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short Term		
Cost reduction opportunities implemented	Number and type of cost reduction opportunities implemented for each manufacturer including who (Union Gas or the manufacturer) identified each opportunity and was responsible for implementing it.	Program records/coordination with manufacturers
Distribution opportunities implemented	Number and type of distribution opportunities implemented	Program records/coordination with distributors

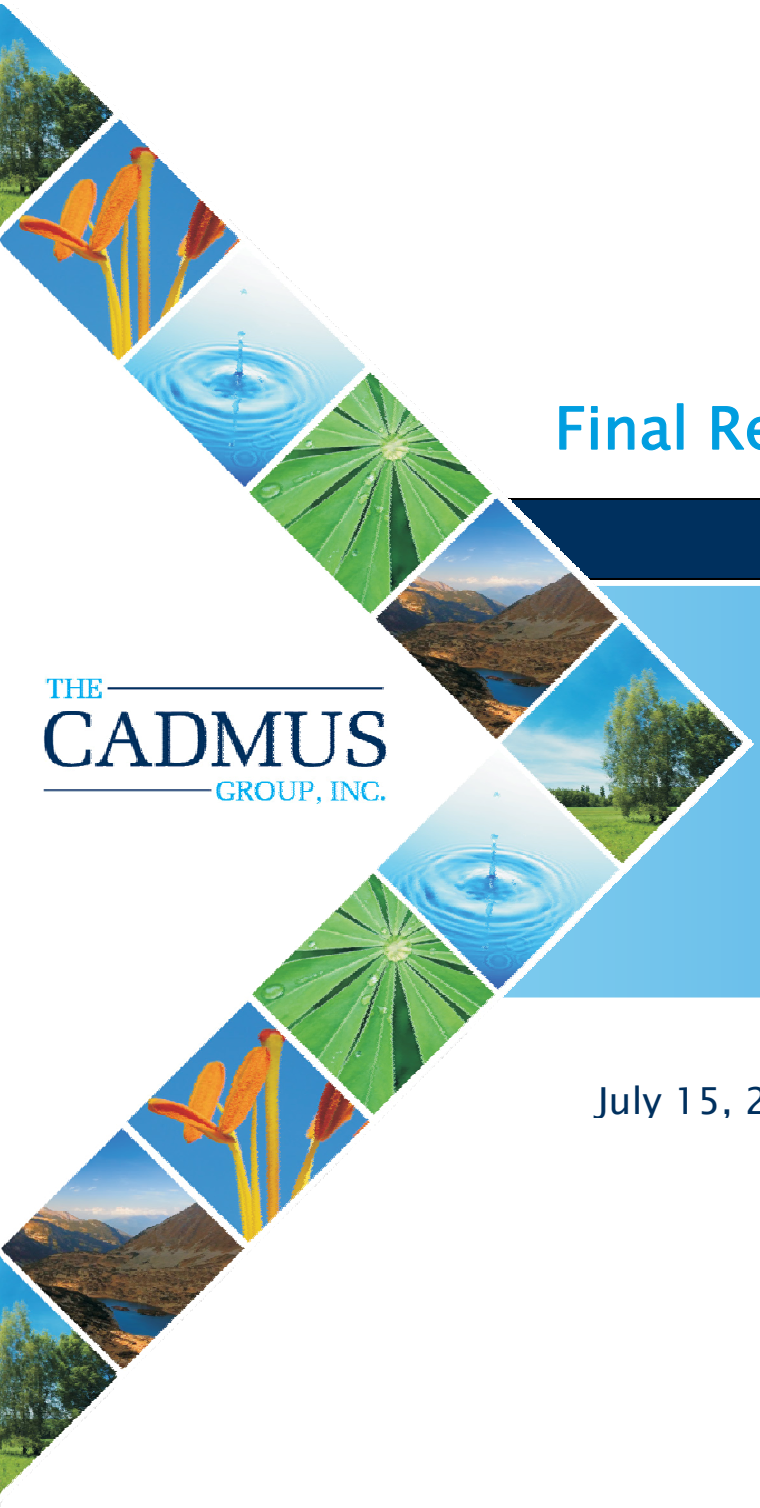
Outcomes	Indicators	Data Sources and Potential Collection Approaches
Builders/contractors and plumbers participate in program, and obtain DWHR units at reduced cost	Number of participating builders/contractors and plumbers purchasing DWHR units through the program. Number of DHWR units purchased through the program Number and geographic distribution of builders/contractors and plumbers purchasing DWHR units through the program Magnitude (quantification of manufacturer discount/program buy-down) of cost reduction being realized by builders/contractors and plumbers for DWHR equipment (over time, the cost reductions should be determined through comparison against initial program base year) Builder/contractor, plumber and manufacturer satisfaction with process	Program records Builder/contractor, plumber and manufacturer surveys
Overall installation costs (and associated cost barriers)are reduced and ease of installation is improved	Change in the price charged for system installation Change in the proportion of customers citing cost or difficulty of installation as a barrier to adoption of DWHR technology	Builder/contractor and plumber surveys Customer surveys

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Builders/contractors and plumbers are capable of DWHR system installation and more aware of the technology and program offerings	Change in the proportion of builders/contractors and plumbers that are aware and knowledgeable of the program and technology Change in the number of builders, contractors and plumbers reporting confidence in their capabilities for installing DWHR systems	Builder/contractor and plumber surveys
Builders, contractors and plumbers understand design needs of DWHR technology	Change in the proportion of builders, contractors and plumbers that are aware of DWHR units' design needs	Builder, contractor and plumber surveys
Drain stacks are designed to accommodate DWHR units	Number and geographic distribution of housing starts designed and built to accommodate DWHR systems (one drain stack vs. many drain stacks)	Surveys (site visits) of new residential construction projects
Increased awareness among home buyers and sales agents of DWHR technology and its benefits	Change in the proportion of homebuyers and sales agents that are aware of DWHR technology and its benefits (by type of actor and geography)	Survey of home buyers and sales agent and comparison against baseline
Increased demand for DWHR technology by consumers	Change in the number of consumers (home buyers and sales agents) asking for incorporation of DWHR systems into the homes being constructed/sold	Survey of home buyers and sales agent and comparison against baseline Interviews with builders, contractors and plumbers

Outcomes	Indicators	Data Sources and Potential Collection Approaches
DWHR units installed through the program	Change in the number of units installed (new builds) through the program, by builder/contractor and plumber Change in the proportion of homes with DWHR in Union's territory	Program records Market assessment study compared to baseline
Intermediate Term		
Awareness of need and support for code changes among key policy makers.	Key stakeholders and policy makers demonstrate interest in the inclusion of DWHR systems as an OBC standard.	Legislative tracking Program records
Per unit and transaction cost reductions realized	Change in price of DWHR units from manufacturers and distributors in the program	Market surveys/observations
Development of distribution channels	Number of distributors involved in program and changes over time Extent of geographic range covered by distributors Number and types of distribution channels that have been developed or exist within the market for DWHR systems Evidence of strong relationships and increased accountablity between manufacturers, distributors and builders	Program Records Distributor surveys Survey data indicating increase coordination of market participant activities Manufacturer, distributor and builder surveys
Increased interest in DWHR from builders/contractors and plumbers outside the program Builders, contractors and	Change in the proportion of builders, contractors, and plumbers, not receiving incentives, that are knowledgable and/or	Builder/contractor and plumber surveys of non-participants

Outcomes	Indicators	Data Sources and Potential Collection Approaches
plumbers join program	interested in DWHR technology Change in the number of builders/contractors and plumbers that join the program as participants	Program Records
DWHR customers are achieving energy savings and are satisfied with the product	Change in the proportion of customers that are satisfied with the product	Customer satisfaction survey
Builders/contractors and plumbers see DWHR installations as a way to promote sales	Change in the proportion of builders, contractors and plumbers that report promoting the installation of DWHR systems as part of their regular business practices	Builder/contractor and plumber surveys
Increased availability of DWHR equipment and market demand for DWHR outside of the program	Change in the perceived and actual availability of DWHR equipment within Union's service territory Change in the number of inquiries to builders/contractors and plumbers to have DWHR installed, outside of the program	Market surveys (including mystery shopper site visits) Customer, builder/contractor, plumber and distributor surveys (participants and non-participants)
Long Term		
Draft language developed for code revision	Discussion to include DWHR technology as an OBC standard. Discussion among key stakeholders and policy makers regarding the development of specific language for code revision.	Legislative tracking Program records
More manufacturers enter the market.	Change in the number and geographic distribution of manufacturers supplying DWHR units to Union's	Program records and broader market study

Outcomes	Indicators	Data Sources and Potential Collection Approaches
	Franchise Operating Territory.	
Manufacturers ramp up production and cost of units decreases due to volume	Change in the number of units being produced annually, by manufacters both inside and outside the program Change in the average unit cost for purchasing DWHR systems	Program records Manufacturer records and plans Market surveys Sales data
Majority of builders, contractors and plumbers representing majority of housing starts use DWHR in standard package	Change in the number and proportion of builders/contractors and plumbers reporting that installation of DWHR systems is part of their standard package when constructing a new home (regardless of utility program rebates)	Customer and builder/contractor and plumber surveys Market surveys
Development of a non-utility supported competitive market for DWHR technology, Incentives discontinued	Builders, contractors, plumbers, distributors and manufacturers report sustained high demand for DWHR units without need for utility program incentives Sustianed high levels of customer satisfaction associated with DWHR systems installed within their homes	Manufacturer, builder, plumber, distributor, sales agent and customer surveys
Building Code is changed to reflect transformed market.	Change in the number and type of pending legislative bills aiming to work DWHR into building code Change in local and regional building code rules regarding DWHR	Building codes Legislative bill tracking



THE CADMUS GROUP, INC.

Final Report

Independent Audit of 2010 DSM Program Results

July 15, 2011

Prepared by:
The Cadmus Group, Inc. / Energy Services
720 SW Washington Street, Suite 400
Portland, OR 97205
503.228.2992

Prepared for:
Union Gas Ltd.
777 Bay Street, Suite 2801
Toronto, ON M5G 2C8

Prepared by:
Brian Hedman
Ben Bronfman, Ph.D.

Corporate Headquarters:
57 Water Street
Watertown, MA 02472
Tel: 617.673.7000
Fax: 617.673.7001

An Employee-Owned Company
www.cadmusgroup.com

720 SW Washington St.
Suite 400
Portland, OR 97205
Tel: 503.228.2992
Fax: 503.228.3696

TABLE OF CONTENTS

Introduction and Overview

The Cadmus Group (Cadmus) was retained by Union Gas (Union), in consultation with the Evaluation Audit Committee (EAC), to conduct an audit of the Union Gas 2010 Demand Side Management Annual Report. Cadmus staff reviewed calculations and assumptions, background material and supporting documentation, and internal Union processes and procedures.

Approach to the Scope of Work

Our approach to the scope of work addresses five concerns:

- Are the inputs to the savings financial calculations based on approved assumptions? Are they gathered and documented in a reliable manner?
- Are market effects adequately tracked and attributable? Are baseline data collected and available?
- Are the economic and financial calculations (including LRAM, SSM and TRC) accurate and based on agreed-upon rules, protocols and procedures? If not, where are the differences and to what can the deviations be attributed?
- Are third-party commercial and distribution contract custom project savings verification reports and DSM program evaluations done in a manner consistent with industry norms?
- How can the calculations be improved? Where are the tracking and assumptions lacking, and where and how can better data be used, going forward? (These assumptions may include adjusted gross, unit savings, measure life and incremental cost assumptions, program tracking, and, in some cases, program design.)

Approach to the Audit

The Cadmus approach to this audit involved the following general activities:

- Review of documents including memos, reports, filings and third-party assessments.
- Review and verification of EAC recommendations and Union responses from 2009.
- In-person and telephone discussions with Union staff.
- Weekly teleconference with Union and the EAC.
- Detailed, in-person "walkthroughs" of program participation processes and quality assurance procedures.
- Follow-on telephone discussions and email exchanges with Union staff and report authors, as necessary.

Key Meetings and Discussions

The Cadmus team met with Union staff and the EAC on March 2, 2011, to review the scope of work, to collect initial documents, and to gain an overview of the Union DSM programs, data collection methodologies and systems, and the audit function.

Subsequent to that meeting, Cadmus, Union staff and the EAC conducted weekly or bi-weekly status-update phone calls, and communicated via e-mail on a regular basis. Cadmus submitted numerous requests for information and clarification to Union during the course of the audit, and Union was diligent in providing timely response to the requests. Additionally, we found the documentation for Commercial and Industrial Markets projects to be sufficient for audit review, representing an improvement from prior audit reviews.

On March 10, 2011, Cadmus staff submitted the final work plan. Following that meeting, weekly conference calls with Union staff and the EAC were conducted to discuss audit issues as they arose during report preparation.

The Cadmus team reviewed all programs included in the Total Resource Cost (TRC) calculation. We prioritized the review according to the total claimed savings by the program and any issues identified in past audits. We also compared the prescriptive savings with weather-adjusted savings for like measures in other jurisdictions.

Based on this initial review, we identified the following programs, measures and issues for more in-depth analysis:

- Verification of the TRC spreadsheet including a review of all calculations performed in the tracking database
- Appropriate documentation of the custom program engineering reports
- Assuring Board approved prescriptive savings and freeridership are applied

Basic inputs such as number of measures installed reported by the DSM tracking systems were not independently verified. Discussions with Union staff indicated that these systems have sufficient controls in place to assure accuracy. Further, assumptions for savings parameters such as measure life were accepted as reported with the exceptions noted below.

Findings and Opinion

For the calendar year ended December 31, 2010, Cadmus has audited the following:

- Demand-Side Management (DSM) Annual Report
- TRC (Total Resource Cost) savings
- Shared Savings Mechanism (SSM)
- Lost Revenue Adjustment Mechanism (LRAM)
- Demand Side Management Variance Account (DSMVA)

The DSM Annual Report and the calculations of TRC, SSM, LRAM, and DSMVA are the responsibility of Union's management. Our responsibility is to provide an opinion on these amounts, based on our audit.

We conducted our audit in accordance with the rules and principles set down by the OEB in its Decision with Reasons, dated August 6, 2006, in EB-2006-0021. We followed directions given to us by the Evaluation and Audit Committee of Union Gas with respect to the scope, depth, and focus of our audit. The audit included examining evidence (on a test basis) that supported the amounts and disclosures in the DSM Annual Report as well as the calculations used to determine the numbers proposed for TRC, SSM, LRAM, and DSMVA. The audit also included assessing assumptions used and methods for recording and documenting information. Details of the steps taken in this audit process are set forth in the audit report that follows, and this opinion is subject to the details and explanations described there.

In our opinion, and subject to the qualifications set forth above, the following figures are calculated (1) using reasonable assumptions, based on data gathered and recorded via methods that are reasonable and accurate in all material respects, and (2) following rules and principles established by the OEB and applicable to the 2009 DSM programs of Union Gas Distribution:

TRC Savings	$284,132,964
SSM Amount Recoverable (Resource Acquisition)	$6,576,235
SSM Amount Recoverable (Market Transformation)	$500,000
LRAM (Recoverable from Ratepayer)	$634,304
DSMVA Amount Recoverable	$(1,094,637)

Table 1 lists specific adjustments made.

Table 1. SSM/LRAM Adjustment Detail

Audit Recommendations	2010 Draft Report	Audited			Comment
Measure	Adjustment Factor	Adjustment Factor	TRC Impact ($)	LRAM Impact (m3)	
EXISTING RESIDENTIAL					
ESK - Install - Showerhead - 1.25gpm	81.7%	69.6%	$ (19,501.92)	(2,916.90)	(1)
ESK - Install - Showerhead - 1.25gpm exist 2.0-2.5	81.7%	69.6%	$ (463.24)	(69.99)	(1)
ESK - Install - Showerhead - 1.25gpm exist 2.6+	81.7%	69.6%	$ (3,983.74)	(679.02)	(1)
ESK - Pull - Faucet Aerator - Bath - 1.5pgm	49.0%	44.1%	$ (64,895.72)	(9,348.59)	(2)
ESK - Pull - Faucet Aerator - Kitchen - 1.5gpm	63.4%	57.0%	$ (324,876.77)	(46,336.90)	(2)
ESK - Pull - Pipe Insulation - 2m	60.9%	54.8%	$ (115,041.81)	(49,927.94)	(2)
ESK - Pull - Showerhead - 1.25gpm	56.5%	50.8%	$ (709,610.33)	(106,136.34)	(2)
ESK - Push - Faucet Aerator - Bath - 1.5gpm	36.6%	33.0%	$ (24,314.84)	(3,502.69)	(2)
ESK - Push - Faucet Aerator - Kitchen - 1.5gpm	50.5%	45.4%	$ (129,754.23)	(18,506.73)	(2)
ESK - Push - Pipe Insulation - 2m	58.4%	52.6%	$ (55,322.45)	(24,009.84)	(2)
ESK - Push - Showerhead - 1.25gpm	39.6%	35.7%	$ (249,629.24)	(37,337.02)	(2)
LOW INCOME					
HHC - Faucet Aerator - Bath - 1.0gpm	90.0%	84.6%	$ (54,617.44)	(7,721.23)	(3)
HHC - Faucet Aerator - Kitchen - 1.5gpm	94.0%	88.4%	$ (130,629.54)	(18,631.58)	(3)
HHC - Pipe Insulation - 2m	100.0%	94.0%	$ (35,825.74)	(15,548.31)	(3)
HHC - Showerhead - 1.25gpm exist 2.0-2.5	88.5%	83.2%	$ (69,103.02)	(10,440.44)	(3)
HHC - Showerhead - 1.25gpm exist 2.6+	88.5%	83.2%	$ (273,257.96)	(46,575.93)	(3)
Multi-Family					
HWC - Shower Head - 1.25gpm	100.0%	69.0%	$ (1,803,830.91)	(255,173.97)	(4)
Infrared Heaters Unit Savings Adjustment					
Infrared Heating - 1-20 to 100 MBtu/hr			n/a	15,628.55	(5)
Infrared Heating - over 100 MBtu/hr			n/a	35,112.69	(5)
Commercial Thermostats			n/a	(1,053,643.40)	(6)
Custom Projects			$ 14,170,906.57	(116,728.77)	(7)
Total Impact			$ 10,106,247.67	(1,772,494.33)	

(1) Adjusted for 85.22% persistence based on Beslin reports
(2) Adjusted for natural gas 90% DWH saturation based on Beslin reports
(3) Adjusted for natural gas 94% DWH saturation based on Beslin reports
(4) Adjusted for 81% installation rate and 85.22% persistence based on Enbridge Multi-family study and revised savings
(5) Adjusted for Nexant market study and correction of Navigant error
(6) Adjusted to reflect Enbridge Gas Distribution revised savings
(7) Adjusted for measure life changes

Table 2 illustrates the calculation of the SSM amount.

Table 2. SSM Calculation

	Original	Adjusted for Audit
2010 Actual TRC	$274,026,717	$284,132,964
2010 TRC Target	$240,256,491	$240,256,491
Percent of Actual	1.14	1.18
Base Target	75%	75%
Percent over 75%	39.06%	43.26%
$ per 1/10 of 1 %	10,000.00	10,000.00
SSM @ 75%	$2,250,000	$2,250,000
$ @ 10,000 per 1/10 of 1 % over 75%	$3,905,591	$4,326,235
Total Program Related	$6,155,591	$6,576,235
Market Transformation	$500,000	$500,000
Total SSM	**$6,655,591**	**$7,076,235**
Market Transformation Detail		
Drain Water Heat Recovery	$500,000	$500,000
Total	$500,000	$500,000

Review of Shared Savings Mechanism (SSM) Calculations

Cadmus reviewed the SSM from two perspectives. The first was whether calculations in the Total Resource Cost (TRC) spreadsheet were correct (that is, we checked for any mechanical errors in the spreadsheet).The second was whether inputs to the TRC spreadsheet were accurate and reasonable. Discussion of the inputs follows in individual program sections below.

TRC Spreadsheet Calculations

Cadmus reviewed the individual cells in the spreadsheet to assure the mathematical formulations were correct in that:

- Gross savings were a product of participation and unit savings.
- Net savings for prescriptive measures were a function of gross savings, free-ridership, and verification survey reduction factors for deemed-savings measures.
- Net savings for custom projects were a function of gross savings, the realization rate determined by the commercial and industrial studies, and the free-ridership rate.
- Total benefits were the net present value of the product of net savings and the appropriate avoided cost value, based on the project's characteristics:
    - Gas, electricity and water.
    - Measure life.
    - Dominant end use (water heat, space heat, combined or industrial).
- Net incremental participant costs were calculated as the product of the number of participants, the per-unit incremental costs, and the free-ridership rate
- Net TRC benefits were calculated as the difference between the avoided costs and the sum of net incremental participant costs, direct program costs and costs associated with market transformation, program development and market research.

Review of DSMVA Calculations

We compared the budgeted and actual expenditures as reported in the Annual Report. Table 3 presents the calculation of the DSM variance account impact. We did not test the financial systems underlying the actual expenditures.

Table 3. DSMVA Calculation

2010 Budget	$ 22,627,000.00
2010 Expenditures	$ 21,532,363.00
DSMVA	$ (1,094,637.00)

Review of LRAM

Cadmus reviewed the LRAM spreadsheet provided by Union. Cadmus reviewed the individual classification of projects to assure that projects were assigned to the correct rate schedule. We reviewed the measure savings estimates and current evaluation studies and conclude that no adjustment to measure savings is warranted. We incorporated the audit changes noted in Table 1 above and find the LRAM spreadsheet accurately calculates the LRAM adjustment. Table 4 reflects the audit adjusted LRAM.

Table 4. Audit Adjusted LRAM

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2010 Unaudited Results

Line No.	Particulars	Audited Volumes (10^3 m^3)	2010 Delivery Rates ($/$10^3$ m^3)	Revenue Impact ($)
		(a)	(b)	(a) x (b) x 50%
	South			
1	M1 Residential	4,105	$ 44.749	$ 91,854
2	M1 Commercial	4,920	$ 44.749	$ 110,081
3	M1 Industrial	36	$ 44.749	$ 809
4	M2 Commercial	4,505	$ 40.470	$ 91,153
5	M2 Industrial	3,515	$ 40.470	$ 71,124
6	M4 Industrial	7,254	$ 8.545	$ 30,992
7	M5 Industrial	8,174	$ 14.783	$ 60,420
8	M7 Industrial	11,495	$ 2.411	$ 13,857
9	T1 Industrial	32,818	$ 0.884	$ 14,506
10		76,822		$ 484,796
	North			
11	01 Residential	843	$ 96.673	$ 40,767
12	01 Commercial	666	$ 90.054	$ 29,986
13	10 Commercial	706	$ 64.910	$ 22,897
14	10 Industrial	298	$ 59.486	$ 8,859
15	20 Industrial	6,759	$ 3.404	$ 11,504
16	100 Industrial	35,022	$ 2.027	$ 35,495
17		44,294		$ 149,508
18	Total	121,116		$ 634,304

Review of 2011 Target

Cadmus reviewed the calculation of the 2011 TRC target. The determination of the 2011 TRC target relies on the LRAM adjusted TRC from the 2008, 2009 and 2010 programs. This TRC calculation reflects best available information for savings and incremental costs and the Company's most recent avoided cost determination for natural gas, electricity and water. We verified that the methodology employed adheres to the methodology outlined in the Ontario Energy Board's August 25, 2006 Decision with Reasons in docket EB-2006-0021. Table 5 reflects the audit adjusted 2011 TRC Target.

Table 5. Audit Adjusted 2011 TRC Target

2011 TRC Target		
$ 252,652,675		
2008 Audited Results with 2011 Avoided Costs	**2009 Audited Results with 2011 Avoided Costs**	**2010 Audited Results with 2011 Avoided Costs**
$ 211,207,502	$ 211,255,119	$ 236,631,314

TRC Inputs

Avoided Costs

Union updated the avoided costs used for all programs in 2010. We reviewed the avoided cost methodology and found it to be consistent with the Enbridge Gas Distribution methodology which was adopted by Union Gas in 2007.

Prescriptive Savings Programs

Commercial Prescriptive Measures

In the residential sector we reviewed the following programs:

- New Homes Construction
- Home Retrofit
- Low Income

During the audit of the 2008 Enbridge Gas Distribution programs we conducted a measure-by-measure comparison of the deemed values with savings assumptions used in other jurisdictions, most notably from Iowa (where Cadmus completed a statewide DSM potential study and program design effort in 2008) and, to a lesser extent, the California Database for Energy Efficient Resources (DEER). The savings for weather-dependent measures were adjusted to reflect the difference in heating degree days between Iowa and Ontario. We relied on the results of that analysis to confirm the reasonableness of the savings and measure life assumptions in the current audit. Except where noted below, we found the savings, free-ridership, adjustment factors[1], and measure lives to be consistent with both OEB-approved assumptions and the assumptions employed in other jurisdictions.

ESK Program

The Beslin reports indicate 90% natural gas domestic hot water participant saturation for the ESK push and pull program. The reports also indicate 94% saturation for the low income participants. The draft Annual Report did not include an adjustment for natural gas saturation. We have modified the SSM and LRAM adjustment factors for hot water measures by these saturation rates.

The direct install showerhead measures for single and multi-family households assumed a 100% persistence rate. The Beslin reports found a persistence rate for the pull program of 85.22%. We find that this persistence rate should also be applied to the direct install program.

Enbridge Gas Distribution conducted a study of their multi-family showerhead program that indicated 81% of the showerheads were installed. We have adopted that installation rate for the Union Gas multi-family showerhead program.

We reviewed the application for a programmable thermostat to determine if participants may be using the program to replace existing programmable thermostats rather than manual thermostats. The rebate coupon states "This offer is not valid for customers that already have a programmable

[1] Union calculates an adjustment factor on a program specific basis based on participant surveys. The adjustment factor adjusts savings for measure installation, usage and removal.

thermostat installed". While it is unlikely a customer would replace a programmable thermostat the application could be strengthened by recording the make and model of the replaced thermostat.

Commercial Prescriptive Measures

In 2010 Prescriptive and Quasi-prescriptive measures were installed in the following commercial programs:

- New Building Construction
- Building Retrofit

Except where noted below, we found the savings, free-ridership, adjustment factors, and measure lives to be consistent with OEB-approved assumptions and common industry practices.

Thermostats

We have adopted the revised Enbridge Gas Distribution savings estimates for thermostats as best available information for LRAM. Table 6 illustrates the changes.

Table 6. LRAM Thermostat Savings

Measure	Original Savings (m^3)	Revised LRAM Savings (m^3)
Thermostat - Programmable - Ware, Ind, Rec, Agr	538	108
Thermostat - Programmable - Multifamily, Food Service	223	67
Thermostat - Programmable - Office, Institution, Education	211	50
Thermostat - Programmable - Retail, Hotel	82	13

Quasi-prescriptive Measures

Cadmus requested project level detail for the quasi-prescriptive measures. These measures have an OEB approved savings and cost on a per unit basis. For example condensing boiler savings are based on the size of the unit in BTUH, Energy Recovery Ventilator savings are based on the size of the unit in CFM. Cadmus reviewed the calculations for approximately two-thirds of the 678 measures installed. The review encompassed all measure types and confirmed the calculations.

Infrared Heaters

In March of 2010 Enermodal Engineering submitted a study of infrared heater savings and concluded that the energy usage of comparable sized unit heaters and infrared heaters was nominally identical but savings associated with the use of infrared heaters derives from the lower BTUH required for to heat identical space. Consequently, we made no adjustment to the infrared heating savings per unit assumption on the basis of the Enermodal report.

In August of 2010 Nexant submitted a study of the market share of single-stage, two-stage and high intensity heaters. The study concluded that 79% of the market is single stage, 15% of the market is two-stage and 6% of the market is high intensity. We reviewed the original savings calculations provided by Navigant and determined that the original savings were based on equal market shares for the three technologies. We have reweighted the average savings based on the share determined by Nexant.

During the review of the original Navigant savings we discovered a calculation error. Navigant calculated savings per year for each of three categories (0-63,750; 64,600 – 127,500 and 128,350 - 250,000). Navigant also calculated savings per btu/hr/year. However, the savings per btu/hr/year

are being calculated using the base equipment btu (e.g. 75,000) not the more efficient infrared btu (e.g. 63,750).Navigant states that the savings per btu/hr/year should be applied to the efficient measure input btu. This is inconsistent with the calculation of the savings. We have recalculated the savings per btu/hr/year using the efficient equipment to be consistent with the Navigant instructions and the application in the TRC calculator. Table 7 reflects the revised average savings incorporating both the correction to the Navigant calculation and the updated market share based on the Nexant report. We have adjusted LRAM to reflect these changes.

Table 7. Revised Infrared Heater Savings

	single stage	2 stage	high intensity	Average
63,750	920	1,545	920	1,128
127,500	1,833	3,091	1,833	2,252
250,000	3,679	6,180	3,679	4,513
Infrared Tier		Revised Calculation		Average
63,750	0.0144	0.0242	0.0144	0.0177
127,500	0.0144	0.0242	0.0144	0.0177
255,000	0.0144	0.0242	0.0144	0.0177
Weighted by Nexant market estimate				
	79%	15%	6%	
63,750	0.0114	0.0036	0.0009	0.0159
127,500	0.0114	0.0036	0.0009	0.0159
255,000	0.0114	0.0036	0.0009	0.0159

We recommend that the infrared heater measure be evaluated to verify that proper sizing is occurring and that the program participation market shares match the overall market shares reported in the Nexant study.

We note that – while this is a prescriptive program – the issue of proper sizing of equipment is not directly addressed in program requirements. If existing equipment is oversized, a simple replacement would still be oversized, while a correctly sized retrofit would substantially increase savings. For this reason we recommend that Union collect equipment size information on the replaced unit as part of the application process.

Condensing Water Heaters

Cadmus reviewed the qualification guidelines Condensing Water Heaters, including the segment criteria and the backup documentation. The criteria and guidelines appear effective in screening installations to prevent low-usage applications from qualifying for the measure. We take no issue with the screening criteria, but if this continues to be an issue, we recommend that Union consider a separate evaluation.

Energy Recovery Ventilators

Cadmus reviewed the exclusion rules as defined by ASHRAE 90.1 (6.5.6.1) and referenced in the Ontario Building Code, and takes no issue with ERV/HRV procedures associated with this measure: Union engineers must verify and sign off for exceptions to the OBC.

Custom Savings Programs

Our approach to auditing the verification claims for these programs is based on three questions: 1) are the data available that would allow our Senior Engineers to independently estimate savings if requested, 2) are incremental costs reasonable[2] and 3) do the results and the reasons for acceptance or variance make sense from an engineering perspective and on face validity. We do not attempt to comprehensively replicate program or proponent calculations nor do we check the calculations for mathematical errors.

Our approach is composed of four steps:

- A review of the proponents' verification reports and development of a list of questions or concerns regarding individual projects which is sent to the proponent.
- Discussion with the proponent – with the person responsible for the individual project verification – focusing on the submitted questions
- Request for additional data or information on concerns outstanding, and
- Documentation of resolution of issues and a final assessment of the claims.

The main reason for taking this approach is that while complete and organized files are undoubtedly useful (and were available), some detailed engineering backup and calculation is typically supplemental, but should be available on a case-by-case basis when identified by the Auditor and verification engineer. We have found this to be the case, and have concluded that our approach – while it does not obviate the need for complete and organized record-keeping – meets our auditing criteria for data acquisition.

Incremental costs were reviewed for reasonableness as part of the verification process. The verification contractors recommended changes in only two cases. One, COM-0082, was adjusted down by 50%, because only one of the two units installed was actually in use. The other – COM-0239 – was adjusted down by 4.5 percent based on verification of the actual invoice amount, which was less than the original amount. Since neither of these adjustments represent systematic errors in estimating incremental costs, no changes in underlying incremental cost values are recommended.

We note that Union is using the same free-ridership estimates that were developed by Summit Blue Consulting (Navigant) in 2008 using 2007 participants. Free-ridership estimates are a function of the participating cohort. If the mix of customers changes annually, the free-rider estimates will also change. Further, cohort characteristics will have a profound effect on savings-weighted free-ridership. A large saver with a high free-ridership score will bring down the overall program performance, but the same participant with a low free-ridership score will raise the accomplishments. For this reason we recommend implementing annual free-ridership surveys on a

[2] The methodology employed by the custom project verification contractors to verify incremental cost was not reviewed in detail.

statistically valid sample of participating customers, and the annual calculation of savings-weighted free-ridership scores.

Custom Program Sampling Methodology

During 2008 Navigant (then Summit Blue) developed a sampling methodology for the commercial and distribution contract custom projects. The sampling methodology was designed to provide a 90% confidence that the realization rates for gas savings were +/- 15% of the true rate. Navigant employed the sampling methodology to select the commercial and distribution contract projects for independent verification. At the completion of the verification process, Navigant calculated the achieved confidence and precision. Table 8 was prepared by Navigant and illustrates that the confidence and precision achieved by the sample meets the targeted level. Cadmus reviewed the approach, formulae and calculations embedded in the Table, and accepts the results.

Table 8. Custom Project Confidence and Precision[3]

Union Gas 2010 Custom Projects Sample Results

	Savings	Population Size (N)	Coefficient of Variation (σ/μ)	Samples (n)	T - Value	Relative Precision @ CI	Overall Relative Precision @ CI	Estimated Realization Rate (RR)	Minimum RR at Confidence Interval	Maximum RR at Confidence Interval
(DC) Inudstrial - Gas Savings (m3)	228,683,453	311	0.214	13.0	1.771	10.3%	0.3%	110.9%	99.5%	122.3%
(NC) Commercial - Gas Savings (m3)	4,145,695	250	0.444	26.0	1.706	14.1%	0.0%	75.8%	65.1%	86.4%
Total Custom - Gas Savings (m3)	232,829,149	561		39.0	1.645		9.4%	110.3%	99.9%	120.6%
(DC) Inudstrial - Electricity Savings (kWh)	31,326,286	50	0.201	7.0	1.895	13.5%	0.4%	98.2%	85.0%	111.5%
(NC) Commercial - Electricity Savings (kWh)	1,933,665	149	0.456	18.0	1.734	17.5%	0.0%	88.3%	72.8%	103.8%
Total Custom - Electricity Savings (kWh)	33,259,950	199		25.0	1.708		11.4%	97.7%	86.5%	108.8%
(DC) Inudstrial - Water Savings (L)	670,008,573	70	0.230	7.0	1.895	15.8%	0.6%	123.5%	104.0%	142.9%
(NC) Commercial - Water Savings (L)	48,982,658	153	0.084	8.0	1.860	5.4%	0.0%	99.5%	94.1%	104.9%
Total Custom - Water Savings (L)	718,991,231	223		15.0	1.753		13.5%	121.9%	105.4%	138.3%
Confidence Interval	90%	0.9	CI Type							
Z - value (number of σ)	1.6445		2	1 = one sided						
				2 = two sided						

[3] From Navigant Consulting memo to Union Gas dated July 6, 2011.

Custom Commercial Programs

Cadmus reviewed the verification report and accompanying backup submitted by Michaels Engineering for the sample of 26 sites selected for verification. A list of questions and concerns was generated and submitted to Michaels, and follow-up conversations were undertaken with the Michaels Engineering staff directly involved in the verifications. A list of questions and the complete findings document are contained in Appendix B of this Report.

Project files and supporting data were readily available. While we only have the prior audit reports as a comparison, we can only conclude that project documentation and file retention is improved from prior years, and commend Union Gas for their effort in this area.

We take no exception to the findings and adjustments made by Michaels Engineering and included in the Union Gas Draft DSM 2010 Annual Report.

Custom Distribution Contract Programs

Cadmus reviewed the verification report and accompanying backup submitted by Diamond Engineering for the sample of 13 sites selected for verification. A list of questions and concerns was generated and submitted to Diamond, and follow-up conversations were undertaken with the Diamond Engineering staff directly involved in the verifications. A list of questions and the complete findings document are contained in Appendix C of this Report.

We take no exception to the findings and adjustments made by Diamond Engineering and included in the Union Gas Draft DSM 2010 Annual Report.

Issues Arising from Audit of Custom Commercial and Custom Distribution Contract Programs

1. *Effective Useful Life (EUL) adjustments*. Effective Useful Life estimates are used to estimate total lifetime savings, and represent a median estimate where fifty percent of the measures have been replaced. Both Michaels Engineering and Diamond Engineering recommended a change to some EUL's used by UGL, and our Audit accepts these revisions. The EUL recommendations were of two types: generally applicable changes to the EUL estimate, and project-specific changes. The recommended generally applicable changes to EUL assumptions are listed in the recommendation section below. Project specific changes were due to exceptional circumstances at individual facilities. There were two such instances in the DC projects, and each of these projects was adjusted. The impacts of the generally applicable EUL changes on SSM were calculated by applying the generally applicable changes identified in the sample to the population of participants. The impacts of the site-specific changes on SSM were calculated on the individual projects, removed from the extrapolation process, and added back at the end.

2. *Custom Commercial Program Site Visits*. Site visits were not part of the Custom Commercial verification process. Verification site visits for custom commercial and industrial programs are considered normal current practice in North America. Union should conform to this standard. This is especially true for large, complex projects, as well as for identifying site-specific anomalies or exceptions that would affect individual EUL's as cited above. A site visit protocol could be developed that identifies projects that warrant visits and the nature of the on-site verification to minimize cost. Criteria would include complexity of the project,

variability of the savings potential (for example, variation in operating hours) and overall magnitude of the project.

Market Transformation Programs

Drain Water Heat Recovery System Market Transformation Program

Cadmus reviewed the project details for the Drain Water Heat Recovery Market Transformation program, as well as the program scorecard and performance metric claims. Cadmus notes that two variables were removed from the scorecard due to issues with statistical significance of changes in awareness. The remaining two metrics – number of participating builders and units installed as a percentage of residential new attachments – are both appropriate and legitimate indicators of market transformation trajectory. Cadmus did not review the internal Union database used to calculate the two metrics. However, we take no exception to the scorecard results.

We question the removal of builder and homeowner awareness from the program evaluation (though not necessarily from the scorecard). Awareness is a key leading indicator of market transformation and lack of statistical significance over a one-year time-frame does not necessarily mean that the medium or long-term progress of market transformation is faltering. We recommend that Union consider re-instituting the surveys – especially the homeowner survey – to track this key market transformation indicator, irrespective of whether it is re-introduced into the scorecard.

Recommendations

Based upon the Audit of the 2010 programs, the Auditors make the following recommendations:

1. *Union should refine the ESK installation, DHW saturation and persistence questions in conjunction with the survey firm.* Currently Union relies on its survey firm to design and administer the ESK surveys. While we found that while the necessary information was collected and presented, a more collaborative effort to refine the questionnaire would result in better organization of the data and more useful information.

2. *We recommend that the Infrared Heater measure be fully evaluated to verify that proper sizing is occurring and that the program participation market shares match the overall market shares reported in the Nexant study*. In preparation for this evaluation, we recommend that Union revise the Infrared Heater application form to include the Mbtu/hr and age of the replaced equipment.

3. *We recommend that Union revise the residential thermostat application to include the type and/or model of the thermostat replaced.* While it is unlikely a customer would replace a programmable thermostat the application could be strengthened by recording the make and model of the replaced thermostat

4. *Union should require the Commercial and Industrial Custom Project Verification contractor to include site visits in their verification study*. Site visits are industry best practices, and should be part of any C&I verification process. It is probably not necessary to visit all sites – some verification (steam leaks, dishwashers) can be done by telephone. But other, more complex installations – especially those involving interactive effects and new construction – would greatly benefit from site visits.

5. *Union should revise their current EULs for C&I and DC measures according to the recommendations made by the verification contractors and the Audit, namely:*

    - *Tank Insulation* (Appendix B, project COM-0132): Decrease from 20 to 15
    - *EMS System* (Appendix B, project COM-0415): Increase from 10 to 15
    - *Infiltration Controls* (Appendix B, project COM-0081, (project COM-0097 is correct): Decrease from 20 to 15
    - *Exhaust Fan Controls* (Appendix B, project COM-0042,): Decrease from 20 to 15
    - *Steam Leak Repair* (Appendix C, projects IND-0053, 0054): Increase from 7 to 20
    - *Efficient Large Process Dryer* (Appendix B, project IND-0267): Decrease from 30 to 20 years.

    Other adjustments to EULs were made on a case-by-case basis, considering a specific installation only. These are discussed in the individual project reviews in Appendix B and C and are only applicable to those projects, but they involve exemplary behavioral practices that are not typical of the industry. They are, projects IND-0147 (increase from 20 to 30 years), and project IND-0382, increase from 10 to 15 years.

6. *Union should consider implementing annual free-ridership surveys for Commercial and Industrial customers.* Free-ridership estimates are a function of the participating cohort. If the mix of customers

changes annually, the free-rider estimates will also change. Further, cohort characteristics will have a profound effect on savings-weighted free-ridership. A large saver with a high free-ridership score will bring down the overall program performance, but the same participant with a low free-ridership score will raise the accomplishments. The long-term average proposed by Summit Blue Consulting (Navigant) was also calculated on a single annual cohort. We cannot assume the same distribution of participants in future years.

7. *Union should consider re-instituting the annual awareness surveys for the Drain Water Heat Recovery Market Transformation Program*. Awareness is a key leading indicator of market transformation, and short-term changes are not as critical as longer-term trends. The metric was dropped from the scorecard due to lack of statistical significance in annual changes. We do not question this decision, but maintain that track of awareness will have a long-term pay-off for this program.

Appendix A: Documents Reviewed

OEB Documents

Decision in Docket EB-2006-0021 (August 2006)
Decision Phase III EB-2006-0021 - January 2007
Market Transformation Revision – February 2007
2010 Approved Assumptions EB-2010-0182
2010 Revised DSM Measure Filing
Navigant Report: Measures and Assumptions for Demand Side Management (DSM Planning)
Navigant Report: Appendix C: Substantiation Sheets

2009 Annual Report and Audit

2009 Audit Comments

2010 DSM Draft Annual Report

EB-2009-0166 - Union Gas Limited - 2010 Demand Side Management Plan

EB-2009-0166 - Union Gas Limited - 2010 Demand Side Management Plan – Low-Income

Research Studies

Nexant: Market Study of Natural Gas Fired Infrared Heaters
Seeline: Boiler Base Case Efficiency Study
Enermodal Engineering: Evaluation of Natural Gas Fired Infra-red Heaters

Verification Studies

SAS: 2010 Impacts on Showerheads – hand calc
Michaels Engineering: Union Gas 2010 Commercial and Industrial Markets Project Verification Final Report
Diamond Engineering: 2010 Evaluation of Distribution Contract Custom Projects
UG Audits 2011--ESKRes10-Pull--Beslin Final Report--Feb11
UG Audits 2011--ESKRes10-Push--Beslin Final Report--Feb2011
UG Audits 2011--ESK-Res10-HHC-LI--Beslin Final Report--Feb11
Showerhead and Aerator Audit Study Multi-Residential Rental Buildings Conducted For: Enbridge Gas Distribution (Gfk Research Dynamics presentation)

Other

Process Evaluation Findings for the Commercial and Distribution Contract Custom Project Programs (Tetra Tech report)
Union Gas 2010 Custom Projects Sample Selection REVISED (Navigant memo)
Enbridge Gas Distribution Inc. ("Enbridge") EB-2011-0254 -2011 DSM Measures (EGD filing)

UPDATED - Confidence and Precision for Realization Rates for Gas, Electricity and Water for 2010 Custom Projects (Navigant memo)

Appendix B – Commercial and Industrial Markets Verification Audit Results

Cadmus' approach to auditing the verification claims for the 2010 Commercial and Industrial Markets Project Verification by Michaels Engineering is based on the following questions:

1) Is there sufficient data available that would allow our Cadmus' Senior Engineers to independently estimate savings?
2) Do the results and the reasons for acceptance or variance make sense from an engineering perspective and seem reasonable?

Cadmus did not attempt to replicate energy calculations nor check the calculations for mathematical errors. Cadmus developed a list of questions on a case by case basis and then reviewed these questions with the audit staff at Michaels Engineering. When necessary, additional project data, such as billing history was requested.

Commercial Projects

These projects included energy efficiency measures related to building envelope, heating ventilating and air conditioning (HVAC), domestic hot water (DHW), control systems, integrated design (new construction/LEED), renewable energy systems (solar), heat recovery and industrial processes. The building envelope measures were related to infiltration controls and roof insulation. The HVAC measures included demand control ventilation, boiler systems, HVAC controls and pipe insulation. The DHW measures included new low flow dishwasher system and laundry systems. The industrial measures included a boiler burner replacement, agriculture commodity dryers, asphalt tank roof insulation and exhaust fan control system.

Cadmus discussed each project in detail with Michaels Engineering (consultant) including baseline conditions, variances in energy savings, realization rates, energy savings calculation procedures, results of the phone interviews and EUL life. These projects were discussed in two meetings and grouped into six categories related by technology. The results of these meetings and Cadmus' recommendations are outlined below.

1) Projects COM-0103, COM-0148, COM-0194, COM-0201, and COM-0247 – Dishwasher Systems

There were five (5) projects which had reduced water dishwasher systems installed. The energy savings is related to the reduced water heating load. The original energy saving calculation was developed through a spreadsheet tool provided by Union Gas. Michaels Engineering reviewed the calculation tool and confirmed the proper engineering equations were employed. The differences in the energy savings were not related to energy saving calculation errors but based on differences in the pre and post case assumptions. This information was gathered from the phone interviews and included data on the number of dishwashers and/or loads per day. The EUL life used on all dishwasher projects was 15 years. Cadmus reviewed each project with Michael's Engineering staff and has no objections to the energy savings values or realization rates. Michaels Engineering accepted the dishwasher EUL at 15 years based on the 2009 Natural Gas Technologies Report entitled *DSM Opportunities Associated with Commercial Dishwashers*, but noted that a literature review

suggested the typical EUL is 11 years. Cadmus researched this further and noted that the Energy Star Website has a EUL for "push-through" counter-top commercial dishwashers at 15 years. Cadmus therefore accepts the UGL assumption and recommends no changes.

2) Projects COM-0118, COM-0167, COM-0241 – Laundry Systems

There were three (3) projects which installed reduced water consuming laundry systems. The energy savings is related to the reduced water consumption and water heating loads. Like the dishwasher projects, the original energy saving calculations was developed through a spreadsheet tool provided by Union Gas. The differences in the energy savings were based on information gathered during the phone interviews and varied from the baseline conditions and included data about the number of laundry systems, operating hours and loads per day. The EUL life used on all laundry systems was 10 years. Cadmus reviewed each project and has no objections to the energy savings values or realization rates. The energy savings calculations could be duplicated with appropriate information provided from each project file. The EUL of 10 years for commercial laundry systems seems slightly low. The DEER database provides a EUL of 11 years for commercial laundry systems. However, Cadmus does not consider this a significant difference and accepts the UGL estimate of 10 years.

3) Projects COM-0071, COM-0072, COM-0081, COM-0097 – Building Envelope Measures

There were four (4) projects related to building envelope improvements. Projects 0081 and 0097 involved a reduction in infiltration loads. Projects 0071 and 0072 involved the addition of ceiling insulation. These measures resulted in reduced HVAC loads. The original energy saving calculations was developed either through a vendor (product manufacturer) or through a facility/design engineer. Cadmus discussed each of these projects with the consultant. These observations are summarized below. No adjustments to EUL are proposed.

A) Projects COM-0071 and COM-0072 – Ceiling Insulation

Two (2) projects were related to energy savings through the installation of roof insulation. Both projects were similar and owned by the same building owner. The realization rates were lowered for each project based on observation determined during the phone interview. The revised energy savings was calculated based upon a simplified bin analysis procedure. Cadmus does not dispute the revised findings. Cadmus believes these calculations could be duplicated with complete project data. The EULs for each a project was 20 years. Cadmus does not dispute the EUL of 20 years for roof insulation and this agrees with the DEER database.

B) Projects COM-0081 and COM-0097 – Infiltration Controls

The energy savings from these two projects was related to installation of infiltration control devices (air curtains and dock door seals). Michaels Engineering recalculated the estimated energy savings through the use of infiltration calculations defined by the American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE). On project 0081, the original calculations did not consider the fan energy associated with air curtain therefore there was a penalty of electrical usage (minus 3,276 kWh per year). On project 0097, the savings was de-rated because the original assumptions did not use an "average" wind speed and the wind direction is not always perpendicular to the door (North elevation). Cadmus agrees with consultants approach to the energy savings methodology and calculations used to determine the adjusted energy savings and final realization rates. The estimated EUL for infiltration controls was 20 and 15 years for projects 0081 and 0097,

respectively. Cadmus recommends the value of 15 years should be used (typical life of fan for air curtain).

4) Projects COM-0027, COM-0030, COM-0160 – HVAC – Demand Control Ventilation

There were three (3) projects which included the installation of HVAC demand control ventilation. The energy savings and realization rates for each project varied. On project 0027, the energy savings was reduced from the initial calculations because the savings from existing heat recovery system was never included in the analysis. On project 0030, a billing regression analysis showed similar savings and no adjustments were made to the energy savings. On project 0160, a billed regression model was used and determined significantly lower energy savings than estimated by the vendor. Cadmus does not dispute the revised energy savings analysis or realization rates. The EULs for all three projects was 15 years which is accurate for HVAC systems in the DEER database.

5) Projects COM-0039, COM-0042, COM-0239, COM-0315, COM-0377, COM-0415, COM-0428 – HVAC Measures

There were eight (8) projects which included HVAC energy efficiency measures. Each project varied considerably. Each project is discussed in detail below.

A) Project COM-0039 – HVAC - Insulation of Bare Pipe in Conditioned Space

This project is related to the installation of insulation on about 900 feet or bare hot water piping. Preliminary and final energy savings estimates were based on using the 3E Plus heat loss calculator tool. The variance is based on the fact that the pre-condition (heat loss from bare pipe) was heating the conditioned space. The revised energy savings determined the energy savings from the pipe insulation and deducted the added heat required to heat the space (after pipe insulation was installed). Cadmus agrees with the revised energy savings numbers. The EUL life for the pipe insulation is 20 years and was verified by the DEER database.

B) Project COM-0042 – HVAC - New Exhaust Fan Control Strategy

This project is related to the installation of new control strategy for exhaust fans in a facility. The original energy savings estimates were very crude and performed by the customer who used average daily savings before and after the installation of the control system. Michaels Engineering calculated the reduced fan operation due to new operating hours and determined the reduced building load based on a billed regression model. Cadmus does not dispute the energy savings values and believes the calculations could be duplicated with complete data from the project file. The EUL for the project was 20 years. Cadmus recommends the EUL should be revised to 15 years for HVAC control systems based on the DEER database.

C) Project COM-0239 – HVAC - Solar Thermal Systems With Heat Recovery

This is a fairly complicated project which includes both a solar thermal heating systems and heat recovery. The consultant indicated the information on this project was limited. A billed regression model was used by the consultant to approximate the energy savings and they determined a similar energy savings estimate. A realization rate of 100% for both gas and electric savings was claimed. The EUL for this project was 20 years. Cadmus does not dispute the revised energy savings estimates, realization rates, or EUL values. However, Cadmus suggests that on complicated projects like these a site inspection should be warranted to insure interactive energy savings are achieved and sustained.

D) Project COM-0315 – HVAC - Boiler Controls

This project was for the installation of optimization controls for four (4) existing boilers. The system efficiencies were gained through outdoor air temperature reset and night/weekend temperature setback. Michaels Engineering used a regression model to determine final savings numbers. The EUL for this project was 15 years. Cadmus does not dispute the energy savings, realization rates or EUL for this project.

E) Project COM-0377 - HVAC and Building Envelope - New Construction

This project was for a newly constructed ice rink which received a LEED Silver rating. The energy savings measures included building envelope, HVAC and refrigeration heat recovery systems. The energy savings was determined through a detailed DOE2/eQuest model which was provided to Michaels Engineering. They reviewed the input and output of the DOE2 models and compared the savings to actual bills. Actual bills were within 7% of the energy model and thus the savings estimates were not revised resulting in a 100% realization rate. Cadmus does not dispute the energy savings or realization rates. An average EUL for the entire project was 15 years. However, Cadmus suggests on complicated projects, especially new construction using computer models, a site inspection should be warranted to insure interactive energy savings are achieved and sustained. The EUL for integrated design projects is 16 years according to the DEER Database. However, Cadmus does not consider this difference to be significant and recommends retaining the current EUL estimate.

F) Project COM-0415 – HVAC – New Automatic Control System

This project consisted of new building automation controls (BAS) to control ventilation, air handlers, and dehumidifiers and exhaust fans. A RETScreen energy model was used to calculate the energy savings. Michaels Engineering determined the outside air estimates used in the original energy analysis were over stated. They revised the RETScreen energy model using more accurate ventilation and exhaust air flow rates. Cadmus does not dispute the energy savings or realization rates. Cadmus agrees with the EUL life of 15 years.

G) Project COM-0428 – HVAC Boiler Modulation Controls

This project consisted of new modulating boilers. The original energy saving estimates did not account variations in weather data properly on boiler efficiency levels. Michaels Engineering used a proprietary energy analysis tool (developed by Michaels Engineering) to determine efficiency levels based on upon boiler turn down ratios. Cadmus does not dispute the energy savings or realization rates and believes the energy savings could be duplicated with project file data. An average EUL for the entire project was 20 years. The turn down controls are an integrated part of the boiler assembly and the EUL life of 20 years is justified.

6) Projects COM-0100, COM-0082, COM-0132, COM-0267 – Industrial Measures

There were four projects which included industrial measures. Each project varied considerably so they are described in detail below.

A) Project COM-0100 – Boiler Burner Replacement

This project is related to the replacement of an older burner with a modern burner using servomotors and parallel positioning which allows to independently controlling air to fuel ratios at

the burner head. Cadmus agrees with the revised energy savings numbers. The EUL life for the pipe insulation is 20 years, which is consistent with the DEER database.

B) Project COM-0082 – Direct Contact Water Heater

This project involves the installation of direct contact water heaters each rated at 5.1 million btus and 98% combustion efficiency. The original calculations were completed by Union Gas. The consultant revised the energy savings estimates based on actual operating conditions determined during the phone interview. Cadmus believes the savings could be duplicated with complete data from the project and does not dispute the revised numbers. The EUL for the project was 20 years, and Cadmus has no issue with this estimate

C) Project COM-0132 –Large Exterior Tank Insulation

This project was to replace insulation on an asphalt tank. The E3Plus energy savings tool was used in the analysis. The original estimate underestimated the thermal properties of tank and insulation levels and thus energy savings increased and resulted in a higher realization rate. Cadmus does not dispute the revised energy savings estimates or realization rates. The EUL for this project was only rated at 10 years. Michaels Engineering recommended a revision to 15 years for this measure. A EUL of 15 to 20 years seems more reasonable but there is no data available for this technology in the DEER database at this time. Cadmus recommends accepting the Michaels revision.

D) Project COM-0267 – Energy Efficient Large Process Dryer

This project was for the installation of a more efficient top agriculture commodity dryer. The dryer is used to reduce water content in product. The older unit uses about 2,260 Btus/Lb while the new more efficient unit uses only 1,250 Btus/Lb. ME calculated and determined a slightly higher energy savings estimate than the original estimate. Cadmus does not dispute the revised energy savings or realization rates. The EUL for this project was 30 years. The EUL for this measure seems high. The DEER database generally caps all EULs at 20 years. A water moisture removal system would employ the principles of HVAC systems generally have a EUL of 15 to 20 years. And Cadmus recommends changing the EUL from 30 to 20 years. In the absence of site visit, we cannot definitively ascertain circumstances that would lead to the 30-year estimate.

Appendix C – Distribution Contract Custom Projects Verification Audit Results

Cadmus' approach to auditing the verification claims for the 2010 Evaluation of Distribution Contract Custom Projects by Diamond Engineering is based on the following questions:

3) Is there sufficient data available that would allow our Cadmus' Senior Engineers to independently estimate savings?

4) Do the results and the reasons for acceptance or variance make sense from an engineering perspective and seem reasonable?

Cadmus did not attempt to replicate energy calculations nor check the calculations for mathematical errors. Cadmus developed a list of questions on a case by case basis and then reviewed these questions with the audit staff at Diamond Engineering. Issues discussed included baseline conditions, variances in energy savings, realization rates, energy savings calculation procedures, and EUL lives. When necessary, additional project data, such as billing history was requested.

The twelve industrial projects included energy efficiency measures related to steam leak repair and steam trap replacement, process heat recovery applications, flare gas recovery, and air handling system improvements. In heavy industrial applications, energy consumption and related energy savings are significantly dependent on plant production cycles and operations. A snapshot in time for verification or evaluation purposes can only provide a reasonable estimate of energy savings given this variable nature.

1. Projects IND-0006, 0044 – IND-Steam Trap Replacement

a) Project IND-0006

This project was to replace 57 leaking steam traps in the medium pressure (260 psig) main distribution lines, hot mill, and steel making areas; which is about 13% of total traps. It is reasonable to have a 10% failure rate. The assumed EUL was verified at 7 years, which is within the typical EUL range of 5-15 years. Annual steam operation was stated as continuous duty, or 8760 hours/year, which is appropriate.

The project documentation was sufficiently complete to support the calculated savings in the audit. Enough information was available to replicate the estimated savings using standard steam loss charts. All steam distribution lines were insulated and had a metal covering.

b) Project IND-0044

This project was to replace 815 leaking steam traps throughout the medium pressure (125 psig) system; which is about 10% of total traps. It is reasonable to have a 10% failure rate. The assumed EUL was verified at 7 years, which is within the typical EUL range of 5-15 years. Annual steam operation was stated as continuous duty, or 8760 hours/year, which is appropriate.

2. Projects IND-0053, IND-0054, IND-0165 – Steam Leak Repair

a) Project IND-0053

This project was to repair 620 steam leaks for the medium pressure (125 psig) system and high pressure (615 psig) system. Determination of the steam leak rates used a steam plume length method, corrected for ambient temperature and steam pressure. The original application used a EUL of 7 years; however, the auditor recommended a EUL of 20 years due to the permanent nature of the measure (piping vs. devices). Annual steam operation was stated as continuous duty, or 8760 hours/year, which is appropriate. Cadmus recommends changing the EUL for steam leak repair to 20 years.

Using a thermal imaging camera to 'see' the length of the leak plume and recording the ambient air temperature would improve the plume length measurement, and hence the savings calculation accuracy.

b) Project IND-0054

This project was to repair 165 steam leaks in the chemical refinery for the medium pressure (125 psig) system and high pressure (615 psig) system. The approach and calculation methodology used was the same as for Project 0053.

c) Project IND-0165

This project was to repair a single steam control valve at the power house of the facility. This project has enough information to support the calculated savings in the audit. The savings are in a range of 20% between high and low savings estimated. The original application used a EUL of 5 years; however, the auditor suggested a EUL of 10 years due to the customer's maintenance of high quality feed water. Cadmus agrees with the auditor's recommendation and recommends the EUL change for this facility, and any facility where high quality feed water can be verified.

3. Project IND-0055 – Air Handling System Improvements

This project involved an HVAC system retrofit consisting of converting air handling terminal units from CAV to VAV, installing VFDs on 28 refurbished air handling units, and installing a new DDC control system for overall improved system efficiency and performance.

The project documentation was complete enough to support the calculated savings in the audit to determine reasonableness; however, complexities such as operation of the combined heat and power (CHP) system blended with purchased utilities, and the staggered completion of ongoing energy retrofit projects make it difficult to accurately verify energy savings. Cadmus reviewed the monthly utility billing of natural gas for 2009 versus 2010, which showed an overall increase in consumption for the year 2010, and higher usage in the summer months versus the winter months. With the installation of the CHP system, it is unclear from the billing data how much the CHP operation impacts the energy savings.

4. Project IND-0086 – HVAC System Optimization

This project achieved an HVAC system optimization by installing VFD controls and zone dampers to provide for a variable air volume system to allow reduced airflows for heating and cooling during unoccupied and partially occupied hours.

The project documentation has sufficient information to at least duplicate the savings shown in the audit report. Missing information included a spread sheet showing the changes made in the operation of the HVAC systems.

A review of the utility history of natural gas usage for 2008 and 2009 versus 2010 does show a decrease in consumption, which tends to support the audit savings.

5. Project IND-0382 – Air Dryer Optimization

The project documentation and files were complete to support the calculated savings in the audit. The savings calculations are based on production information from the customer's data acquisition system. The detailed breakdown of the reduction in product scrap and its associated energy savings provides the basic documentation to support the identified savings.

A review of the utility history of natural gas usage for 2009 versus 2010 shows a significant decrease in natural gas consumption, which tends to support the savings estimate. The overall difference in consumption appears greater than the estimated savings. The EUL was increased from 20 to 30 years due to exceptional the Operation and Maintenance protocol by the proponent, reflected not only in this piece of equipment, but in other equipment inspected at the verification site visit.

6. Project IND-0205 – Waste Heat Recovery

This project consisted of a more efficient steam production system consisting of two new, co-located turbines utilizing the recovered waste heat to generate high pressure steam (800 psig) and medium pressure steam (110 psig) for process and building loads, and to produce electricity. Medium pressure (125 PSIG) steam from new high efficiency auxiliary boilers is used to supplement the process and heating loads. This new system replaced three old high pressure steam boilers, that was then reduced for process and building heating loads.

The project documentation and files were complete enough to support the calculated savings in the audit. The audit calculations are based on information which was included in the files submitted for review.

The verification audit properly adjusted the base case natural gas heating requirements for the medium pressure steam (110 psig) system by using a more representative time period (full heating season). A higher value for the base case would tend to increase the gas savings estimate.

No metered natural gas meter data was available for this customer that was usable.

7. Project 0206 – IND-Stripper Off Gas Recovery

This project was to install the equipment necessary to improve the quality of the stripper off gases (SOGs), a process byproduct which has a significant heating value, in order to re-use rather than dispose of by incineration.

The savings calculations are based on production information from the customer's data acquisition system, which have a high degree of confidence. The project documentation and files were relatively complete to support the calculated savings in the audit.

A review of the metered natural gas usage for 2008, 2009 versus 2010 shows a significant decrease in natural gas usage. The overall savings appears greater than the savings estimate; however, Cadmus does not know if other retrofit projects have been completed which would impact the savings.

8. Project IND-0348 – Energy Reclaim Loop

This project reduced the need for alternately heating (steam) and cooling (chilled water) the dairy products during processing. This was accomplished by installing a heat recovery system to use reclaimed water for heating the incoming milk, then precooling the dairy product (whey) and the water returning to the chiller.

Of note was the audit adjustment of the refrigeration efficiency factor (it should be kW/ton, not kWh/ton) to 1.025 kW/ton, which is a reasonable value for this type of refrigeration equipment.

A review of the monthly metered natural gas usage shows a decrease in consumption for the year 2010. Using the average for 2010 meter data, the projected savings increased by about 30% over the audit value, assuming that production stayed relatively constant during that time period.

9. Project IND-0375 - Flare Gas Heat Recovery

The installation of a Flare Gas Recovery Unit (FGRU) allows waste gas to be recovered and re-used rather than being burned in a flare to the atmosphere, thus reducing the amount of natural gas purchased.

The project documentation and files were complete to support the calculated savings in the audit. The use of the daily flare gas recovered and the supplemental heating value of the gas provided the natural gas savings for the 5 warmer months of the year.

A review of the monthly metered natural gas usage for 2009 versus 2010 shows a decrease in natural gas consumption overall for the period June to October; however, no reduction was observed during the colder months. This lack of savings during the colder weather is most likely due to a noted liquid condensate problem with the flare gas recovery system which deactivates recovery. This reduced recovery operation was accounted for in the savings calculations.

10. Project IND-0408– Industrial Furnace Gas Storage

This furnace project allows the furnace flare gas to be re-used in the boiler plant. This offsets the purchased natural gas by utilizing the flare gas for heating applications.

The project documentation and files were relatively complete to support the calculated savings in the audit. The calculations are based on production information captured from the customer's data acquisition system.

A review of the monthly natural gas usage for 2009 versus 2010 was made which indicated an increase in natural gas consumption.

The saving in natural gas was documented for two 30-day periods in 2 furnaces (#5 and #6). The documentation was of the pre and post measurement of the gas streams, as recorded by individual gas meters.

The savings for an additional two furnaces (#7 and #8) were developed using the revised engineering algorithm, which used current production as a baseline. The savings were achieved by when the natural gas meter showed the use of natural gas needed when exceeding the process equipment gas supply. This analysis confirmed the original savings estimates.

Note that this upgrade was to store excess process gas and then use this gas to augment the other heating gas by releasing the stored process gas when a change in charge occurs every 4 minutes. Also the flare gas controls were upgraded to support this improvement in operation, and to minimize the amount of natural gas that needed to be procured.

While the savings are large, the verification and audit issues were straightforward, and measurements in gas usage could be directly seen at the gas meter. From what is submitted, and the pre and post meter documentation provided, the saving provided are accurate, and could easily be replicated.

Summary Results and Responses to the Audit of Union's 2010 DSM Annual Report

July 29, 2011

The purpose of this document is to outline the process followed for the Audit the 2010 DSM Annual Report; provide a summary of Union's responses to the Auditor's recommendations, recalculate the corresponding impacts to the 2010 DSM savings claims, and present audit process issues brought forward by the Evaluation and Audit Committee (EAC).

Audit Process

Selection of Evaluation and Audit Committee (EAC) members

The Evaluation and Audit Committee (EAC) was comprised of three Consultative representatives and two Union Gas representatives (Victoria Falvo and Leslie Kulperger).

The Consultative elected three EAC members, at the Consultative Meeting on November 26 2009, to represent the group through the Audit process. These representatives were:

- Kai Millyard – Green Energy Coalition
- Jay Shepherd – Schools Energy Coalition
- Vince DeRose – Canadian Manufacturers and Exporters

Information Exchange

The Consultative, including the members of the EAC, and Cadmus reviewed the Draft 2010 Annual Report circulated by Union Gas on April 1, 2011.

Other than comments from members of the EAC, no additional comments were received from members of the Consultative.

Union's 2010 DSM Annual Draft Final Audit report was completed by Cadmus on June 23, 2011 and circulated to the EAC for review. Fifteen joint meetings with the EAC, Cadmus, and Union were held between March 2, 2011 and July 5, 2011 to initiate the audit process, review the Draft 2010 Annual DSM Report, the Draft Audit Report, and the Draft Final Audit Report.

Following these discussions, Cadmus delivered the final version of the 2010 Audit of Union's DSM Annual Report on July 8, 2011.

Auditor's Recommendations

The recommendations outlined in the Audit Report are documented below, along with a corresponding resolution for each. Also included in this report are issues raised by members of the EAC with respect to the Audit process accompanied by proposed methods to resolve the issues for future Audit processes.

The Audit recommendations were focused in several areas that affected financial results for 2010 including:

- Proposed changes to TRC and LRAM
- Proposed changes to LRAM only

In addition, the Auditor provided recommendations, including:

- Commercial & Distribution Contract Custom Project verification studies
- Application of EUL adjustments from Custom Project verification studies to Draft TRC claim
- Free-ridership studies for Custom Projects
- Market Transformation Awareness surveys
- Infrared heater program evaluation

Auditor's Recommended Changes to TRC & Recalculation of SSM

Subject to the recommendations set out below, the Auditor's opinion is that Union's 2010 SSM claims are correctly calculated using reasonable assumptions, based on data that has been gathered and recorded using reasonable methods, is accurate in all material respects, and follows the rules and principles set down by the Ontario Energy Board.

Commercial Prescriptive Recommendations

Recommendation #1

Apply an 81% installation rate based on Enbridge multi-family TAPS program verification study and 85.22% persistence rate based on the Beslin Verification of Union's ESK program for Union's multi-family Hot Water Conservation program.

Resolution:

Union accepts the Auditor's recommendation. This results in a $1,803,831 decrease in TRC net benefits and a $6,331 decrease in the LRAM claim.

Residential Recommendations

Recommendation #2

Apply the persistence rate of 85.22% to Union's Energy Savings Kit (ESK) "Install" program based on the ESK Verification Study results for the ESK pull program.

Resolution:

Union accepts the Auditor's recommendation. This results in a $23,949 decrease in TRC net benefits and a $111 decrease in the LRAM claim.

Recommendation #3

Apply a 90% adjustment to all ESK "Push" and "Pull" measures to reflect the percentage of homes with natural gas domestic hot water heaters based on information gathered through the ESK Verification study.

Resolution:

Union accepts the Auditor's recommendation. This results in a $1,673,445 decrease in TRC net benefits and an $8,630 decrease in the LRAM.

Recommendation #4

Apply a 94% adjustment to all Low Income Helping Homes Conserve (HHC) measures to reflect the percentage of homes with natural gas domestic hot water heaters based on information gathered through the HHC Verification study.

Resolution:

Union accepts the Auditor's recommendation. This results in a $563,434 decrease in TRC net benefits and a $2,234 decrease in the LRAM claim.

Commercial Custom Program

Recommendation #5

Adopt the adjustments on measure lives proposed for the 2010 Commercial Markets Project Verification by Michaels Engineering to the Commercial Custom Program.

Resolution:

Union accepts the Auditor's recommendation. This results in a reduction of $567,549 in TRC net benefits.

Distribution Contract Custom Program

Recommendation #6

Apply the two EUL adjustments based on measures of a more systemic nature proposed in the 2010 Distribution Contract Custom Projects Verification by Diamond Engineering to all DC custom projects.

Resolution:

Union accepts the Auditor's recommendation. This results in a $14,501,075 increase in TRC net benefits.

Recommendation #7

Apply the two additional EUL adjustments on measure lives for projects IND-0382 and IND-0165, which are of a more unique nature, as proposed in the 2010 Distribution Contract Custom Projects Verification by Diamond Engineering directly to the specific projects and not to the program at large.

Resolution:

Union accepts the Auditor's recommendation. This results in an increase of $237,381 in TRC net benefits and a $278 decrease in the LRAM claim.

TRC Calculation

The seven recommended adjustments to TRC increased Union's 2010 pre-Audit TRC claim of $274,026,717 by $10,106,247, to $284,132,964.

The Table below outlines the TRC net benefits 2010 pre and post Audit results:

Program Segment	**Pre-Audited Claimed Savings**	**Audited Savings**
New Home Construction	$ 23,559	$ 23,559
Home Retrofit	$ 17,387,382	$ 15,689,988
Residential Program Costs	$ (1,046,921)	$ (1,046,921)
Net Residential TRC	**$ 16,364,021**	**$ 14,666,627**
Low Income	$ 10,539,764	$ 9,976,330
Low Income Program Costs	$ (231,834)	$ (231,834)
Net Low Income TRC	**$ 10,307,930**	**$ 9,744,496**
New Building Construction	$ 6,836,929	$ 6,781,063
Building Retrofit	$ 30,419,695	$ 28,104,181
Commercial Program Costs	$ (487,883)	$ (487,883)
Net Commercial TRC	**$ 36,768,741**	**$ 34,397,361**
Distribution Contract	$ 217,705,954	$ 232,444,409
Distribution Contract Program Costs	$ (366,878)	$ (366,878)
Net Distribution Contract TRC	**$ 217,339,076**	**$ 232,077,531**
Salaries	$ (5,437,067)	$ (5,437,067)
Research & Evaluation	$ (1,288,649)	$ (1,288,649)
Administration	$ (27,335)	$ (27,335)
Total Other Program Costs	**$ (6,753,051)**	**$ (6,753,051)**
Net TRC	**$ 274,026,717**	**$ 284,132,964**

SSM Calculation

The seven recommended adjustments to TRC net benefits increased Union's 2010 pre-Audit SSM claim of $6,155,591 to $6,576,235

SSM = {[(Net TRC – (Range End Percentage x Target TRC)) / (Payout Increment Percentage x Target TRC)] x Incremental Payout} + Base Payout

= {[(Net TRC – (75% x $240,256,491)) / (0.1 % x $240,256,491)] x $10,000} + $2,250,000

= {[($284,132,964 - $180,192,368)/$240,256] x $10,000} + $2,250,000

= $432.62 x $10,000 + $2,250,000

= $6,576,235

UNION GAS LIMITED
Shared Savings Mechanism
2010 Audited Results

Line No.	Particulars	Amount[1] ($)
	South	
1	M1 Residential	$ 480,235
2	M1 Commercial	$ 346,809
3	M1 Industrial	$ 845
4	M2 Commercial	$ 299,172
5	M2 Industrial	$ 253,075
6	M4 Industrial	$ 504,301
7	M5 Industrial	$ 393,687
8	M7 Industrial	$ 574,902
9	T1 Industrial	$ 1,418,964
10		$ 4,271,989
	North	
11	01 Residential	$ 96,323
12	01 Commercial	$ 65,610
13	10 Commercial	$ 48,396
14	10 Industrial	$ 10,467
15	20 Industrial	$ 348,229
16	100 Industrial	$ 1,735,221
17		$ 2,304,246
18	Total	$ 6,576,235

[1] The allocation is based on 2010 TRC achieved by rate class

Auditor's Recommended Changes to LRAM only

Recommendation #8

Apply the revised Enbridge Gas Distribution savings estimates for Commercial Programmable Thermostats for LRAM purposes as best available information.

Resolution:

Union accepts the Auditor's recommendation. This results in a $25,928 decrease in the LRAM claim. Union will update this measure substantiation document in a post-audit filing with the OEB and adopt these values for 2011.

Recommendation #9

Adopt results from the Nexant Infrared Market Share Study to reweight the average savings. The auditor also recommended that Union adjust the Infrared Heater savings values due to a calculation error by Navigant where the savings were inconsistent with measure input capacity. The Auditor recommended recalculating the savings using the efficient equipment to be consistent with the Navigant instructions and the application in the TRC calculator.

Resolution:

Union accepts the Auditor's recommendation. This results in a $1,084 decrease in the LRAM claim. Union will include this measure update in its post-audit update to measures with the OEB and adopt these values for 2011.

LRAM Calculation

The two recommended adjustments to LRAM decreased Union's 2010 pre-Audit LRAM claim of $676,732, by $42,428, to $634,304.

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2010 Unaudited Results

Line No.	Particulars	Audited Volumes (10^3 m^3)	2010 Delivery Rates ($/$10^3$ m^3)	Revenue Impact ($)
		(a)	(b)	(a) x (b) x 50%
	South			
1	M1 Residential	4,105	$ 44.749	$ 91,854
2	M1 Commercial	4,920	$ 44.749	$ 110,081
3	M1 Industrial	36	$ 44.749	$ 809
4	M2 Commercial	4,505	$ 40.470	$ 91,153
5	M2 Industrial	3,515	$ 40.470	$ 71,124
6	M4 Industrial	7,254	$ 8.545	$ 30,992
7	M5 Industrial	8,174	$ 14.783	$ 60,420
8	M7 Industrial	11,495	$ 2.411	$ 13,857
9	T1 Industrial	32,818	$ 0.884	$ 14,506
10		76,822		$ 484,796
	North			
11	01 Residential	843	$ 96.673	$ 40,767
12	01 Commercial	666	$ 90.054	$ 29,986
13	10 Commercial	706	$ 64.910	$ 22,897
14	10 Industrial	298	$ 59.486	$ 8,859
15	20 Industrial	6,759	$ 3.404	$ 11,504
16	100 Industrial	35,022	$ 2.027	$ 35,495
17		44,294		$ 149,508
18	Total	121,116		$ 634,304

Evaluation Recommendations

Recommendation #10

Refine the ESK, natural gas Domestic Water Heater (DWH) saturation and persistence questions for the verification survey such that the results are tabulated in the report.

Resolution:

Union will work with the verification consultants to tabulate the DWH results in the verification report.

Recommendation #11

Revise the application forms for Infrared Heaters to include the Mbtu/hr and age of the replaced equipment.

Resolution:

Union will consider the Auditor's recommendation.

Recommendation #12

Conduct an evaluation study to inform the program design for the Infrared Heater Program. The evaluation should assess the cost effectiveness and market saturation of each infrared technology.

Resolution:

Union will consider undertaking an infrared evaluation study along with other evaluation priorities in consultation with the EAC.

Recommendation #13

Conduct on-site visits for Commercial Custom Project Verification for more complex installations.

Resolution:

Union will consider the Auditor's recommendations to conduct on-site verification on sampled Commercial Custom projects that are of a more complex nature or of high value.

Recommendation #14

Conduct annual Free-ridership studies for a statistically valid sample of participating customers for Commercial and Distribution Contract Custom programs.

Resolution:

Union will work with the EAC to establish a new free-ridership study for Commercial and Distribution Contract Custom Programs depending on the approval and structure of the programs by the OEB for 2012 as well as in consideration of 2012 Evaluation Budget.

Recommendation #15

The Auditor recommended re-instituting both the builder and homeowner annual awareness surveys for the Drain Water Heat Recovery Market Transformation Program as proxy for long-term pay-off for the program.

Resolution:

Union will consider the auditor's recommendation based on budget and the value of conducting the annual awareness study.

EAC Evaluation and Audit Process Issues

Issue #1: *Evaluation Budget*

EAC Request:
EAC members have requested increased levels of evaluation spending.

Union's Response:
Union recognizes the growing trend towards more rigorous evaluation, and will consider increasing its evaluation budget in relation to current spending levels and industry best practices. Union will consult with intervenors for the development of the new 2012 – 2014 DSM Plan period, and will include the Evaluation Budget during that consultation process.

Issue #2: Evaluation Priorities

Comment:
Evaluation priorities are established in consultation with the EAC. The EAC currently provides input on the selection of Evaluation Priorities and receives related RFPs and bidder lists for review before RFPs are released. Final evaluation results are provided in the form of Executive Summaries in Union's DSM Annual Reports.

EAC Request:
The EAC has requested consultation with them during the evaluation study process, in particular at the review stage of a Draft Evaluation Report as well as the complete Final Evaluation Report.

Union's Response:
For the remainder of 2011 and under the current framework, Union will continue to work with the EAC in the RFP development process and take EAC input under advisement.
For 2012, Union and the consultative will work through the Terms of Reference to establish a process for intervenor engagement for the 2012 – 2014 DSM Plan.

Issue #3: Information Sharing

Comment:
There is currently no systematic approach to when and with which stakeholders evaluation studies or reports are to be shared. This has led to asymmetric information sharing between Union, the EAC and/or the Auditor.

EAC Request:
The EAC has requested that they receive information at the same time that it is provided to the auditor.

Union's Response:
For 2012, the new Gas DSM Guidelines requires the gas utilities to provide all evaluation and other relevant research documents with the Annual Report. Assuming satisfactory confidentiality requirements are in place as necessary, Union will use this approach for its 2011 Annual Report and Audit.

Issue # 4: A Process for Managing New Measures and/or Measure updates from Enbridge

Comment:
Both Union and the EAC acknowledge that a process has not been officially established to deal with information arising in one audit that may have implications for the other LDC, which often result in prescriptive measures changes.

Union's Response:
Union and other EAC members agree that the process needs to improve and be reciprocal with Enbridge. The parties agree to work towards developing a process which includes

Enbridge and all stakeholders for the LDCs during consultation for the 2012 – 2014 DSM Plan.

Issue #5: Applying Adjustment Factors to Draft Savings Claims

Comment:
There is currently no systematic approach to when LRAM adjustments should be applied (e.g. in the Draft Annual DSM Report or upon Auditor recommendation in the Final Annual DSM Report). This has led to inconsistency in applying adjustments to claims.

EAC Request:
The EAC has requested that Union apply the impact from all evaluation and verification studies at the Draft Annual Report stage of the Audit.

Union's Response:
Union agrees to apply evaluation and verification adjustments in the Draft Annual Report phase for all stakeholders and the auditor to review.

Appendix A: 2010 Audit of DSM Annual Report RFP

uniongas
A Spectra Energy Company

REQUEST FOR PROPOSAL

Independent Audit of 2010 DSM Annual Report

December 9, 2010

Background

Union Gas Limited (Union) has delivered Demand Side Management (DSM) initiatives since 1997 to its broad customer base. DSM activities include planning, developing, implementing and evaluating energy efficiency initiatives for residential, commercial and distribution contract markets. 2010 serves as the fourth year under the constructs of the extended 2007 – 2009 DSM Plan, which was approved by the Ontario Energy Board (OEB) during a DSM Generic Proceeding in 2006. Annual program results are presented in a detailed annual report which is then subject to a third party audit.

As a result of the 2002 Customer Review Process, and reconfirmed in the DSM Generic Proceeding, Union has established a **DSM Evaluation and Audit Committee (EAC)** made up of representatives from Union and the DSM Consultative (please refer to Appendix A for the list of DSM Evaluation and Audit Committee members). All Interveners in Union's most recent rate case are able to participate as members of the consultative. Although Union is technically a member of the EAC, **for the purpose of this RFP, the "EAC" will be considered intervener consultative representatives only, and will not include Union Gas.**

Both Union and the EAC will be accessible to the Auditor to ensure a comprehensive review of the 2010 DSM Annual Report.

Union's DSM plan aims to achieve quantifiable savings, measured by Total Resource Cost (TRC) analysis. Union receives a Shared Savings Mechanism (SSM) based on the DSM portfolio program results, as well as a Lost Revenue Adjustment Mechanism (LRAM). In addition, DSM spending is tracked in a DSM Variance Account (DSMVA).

In 2010, Union operated six energy efficiency programs:

Residential

- Existing Homes
- Low Income

Market Transformation

- Drain Water Heat Recovery

Commercial and Industrial

- New Building Construction
- Existing Buildings

Distribution Contract

- Industrial Process Improvements

A variety of delivery channels are used to promote the uptake of cost-effective energy efficient technologies through information and incentives. Programs are designed around measures for which input assumptions have been filed and approved by the OEB in accordance to the current DSM Framework.[1] All programs within the DSM portfolio are subject to evaluation based on the priorities identified in the year. SSM savings claimed through prescriptive and quasi-prescriptive measures are based on pre-approved input assumptions. Unlike prescriptive programs, Commercial and Distribution Contract custom project claimed savings are subject to verification by a third party, reports for which will be provided to the Auditor for review. LRAM savings are based on best available information at the time of the audit; Union will provide evaluation studies for review for LRAM purposes.

Union's DSM Plans and Annual Reports are reported and filed with the OEB as part of the regulatory process.

Objective

The primary objective of the audit is to provide an independent opinion to DSM stakeholders (i.e., the OEB, Intervener consultative members, and the Utility), that serves to determine if the SSM incentive calculation, Market Transformation incentive calculation, and LRAM calculation are appropriate.

As an initial requirement upon selection, the Auditor will meet with Union and the EAC to determine the priorities for the audit, and to set the audit approach to be followed to achieve the objective stated above. The deliverable will be a written report outlining the principles of the audit, the methodology followed, and the findings and recommendations of the audit.

The Auditor will provide an unbiased opinion on the SSM, LRAM, DSMVA, and the following year's TRC Target as presented in the Annual Report. If any adjustments to the calculations are recommended, Union will provide the revised values for a final SSM, LRAM, DSMVA, and 2011 TRC Target review by the Auditor to ensure they accurately reflect the Auditor's recommendation. A final Auditor opinion will indicate whether the data that has been gathered and recorded applies reasonable methods, is accurate in all material respects, and is consistent with the OEB rules and principles applicable to Union's 2010 DSM programs as outlined in EB2006-021 Decision with Reasons.[2]

[1] EB2006-021 Decision with Reasons: Generic Proceeding for DSM.
[2] ibid

Scope of Work

The following list outlines activities that are expected to be carried out for the purpose of this audit. The Auditor is encouraged to propose other tasks that they believe would be helpful in reaching the study objective.

1. Provide a detailed work plan and present to Union at the Launch Meeting. The Launch Meeting will allow the Auditor, Union, and the EAC to finalize the communication protocols that will be established and strictly adhered to for the duration of the 2010 Audit.
2. Attend, via teleconferencing, weekly audit status meetings to discuss Auditor processes, requirements, findings, and concerns with the EAC and Union.
    a. The Auditor will work closely with Union to satisfy all questions and concerns prior to releasing the Draft Audit Report.
3. Audit the draft 2010 DSM Annual Report to identify if there are claims made by Union that have not been substantiated.
4. Review Union's procedures for tracking program participants and determine whether they lead to accurate counts.
5. Verify that Union's claimed input assumptions for SSM are accurate and consistent with the OEB filed and approved SSM input assumptions.
6. Verify that Union's claimed savings for LRAM are accurate and based on best available information at the time of the audit.
    a. Changes to measure inputs must be based on 'best available information' established through Union's evaluation research or other relevant research. If alternative values are presented, the Auditor will discuss any derivation with Union before rendering any opinions in regard to the alternatives. Proposed alternative values will be presented with a plausible range of values with full documentation from publicly available research made available for the EAC and Union to review at the time of the audit.[3]
7. Verify that the calculation methodology used to determine the SSM incentive and the LRAM amount adheres to the OEB approved method.
8. Review third party verification of commercial and distribution contract custom projects for reasonableness. This review will not duplicate the detailed third party analysis of savings estimates and evaluation findings. Instead, the audit review will provide an opinion on the methods and parameters used in consideration of the OEB framework under which the programs operate.
    a. In addition to reviewing the verification reports, the Auditor may speak with the third party verification consultants and seek clarification as needed with either the verification consultant and/or Union Gas to ensure the Auditor has all the relevant information before forming any opinions.

[3] In accordance with the OEB 2006-021 Decision with Reasons, changes to prescriptive measure inputs may impact LRAM but will not be retroactively applied to TRC or SSM.

9. Verify the calculation of the Market Transformation incentive payout.
10. Review and provide an opinion on the DSMVA account.
11. Review technology impact evaluation studies conducted in support of the DSM portfolio and provide recommendations on priority evaluations for 2011.
12. Prepare a Draft Audit Report on the findings of these activities, including recommendations for future evaluation work. The Auditor will be expected to communicate the essence of recommendations put forward in the Draft Audit Report during weekly status update calls to ensure the EAC and Union are aware of, and have an opportunity to respond to, recommendations that it proposes.
13. Prepare and submit a Draft Final Audit Report. The purpose of the Draft Final Audit report is to allow all parties to review the report and ensure it accurately reflects the findings and discussions after the Draft Audit Report.
14. Prepare and submit a Final Audit Report.

To assist the Auditor in conducting the audit, the following will be made available to the Auditor:

- Access to the company's tracking system and documentation of program participants;
- Access to the company's cost-effectiveness screening model;
- Access to all previous DSM Annual Reports, (previously called Evaluation Reports) which outline terms of evaluation and objectives;
- Access to all evaluation research conducted during 2010;
- Access to 2010 verification studies of custom projects
- Comments from members of the DSM Intervener consultative members will be forwarded; and,
- Support from Union staff, as required.

While Union is the "client" for the purpose of the audit, the EAC will be included in all communiqués with respect to the audit report.[4] The Auditor will be provided with copies of comments submitted by all customer intervener stakeholders. Relevant comments should be addressed in the audit report.

Any discussion of key findings and drafts of the audit report will be delivered directly to Union and the EAC for review and comment (email addresses are included in Appendix A).

Schedule

[4] In the event that customer sensitive data must be discussed, an alternate arrangement may be necessary to gain the information required.

Following an OEB Directive, the independent audit of DSM results is to be completed and a recommendation filed with the OEB by the last day of the sixth month after the financial year end.

Due to the importance in meeting the OEB imposed deadlines, the Auditor will be contractually bound to meet the deadlines outlined in this RFP. Refer to the schedule presented in the table below. Failure to meet the deadlines will result in a payment penalty of $700 per diem, with a maximum penalty not to exceed the value of the work. This penalty is contingent on receiving feedback on the Draft Audit Report from Union and the EAC by May 31, 2011; each business day feedback from Union and the EAC is delayed, a day will be applied to the Final Report deadline (i.e. if feedback on the Draft Report from Union and the EAC is received on May 31, the Final Report deadline will be June 10, 2011).

AUDIT SCHEDULE	
Activity	**Due**
RFP Dissemination	December 09, 2010
Proposals due	January 14, 2011 - 3:00 p.m.
Contract awarded	on or before January 28, 2011
Launch Meeting	Week of February 28, 2011
Auditor work plan	Week of February 28, 2011
DSM Annual Report sent to Auditor	**on or before – April 1, 2011**
Draft Audit Report	on or before May 16, 2011
Response from Union and EAC	on or before May 30, 2011
Final Draft Audit Report	on or before June 6, 2011
Final Audit Report	June 10, 2011

Qualifications and Experience Requirements

Union is seeking Auditors with demonstrated knowledge of, or experience in, the following areas:

- Current regulatory framework as established by the Ontario Energy Board in its Decision with Reasons EB-2006-021;
- Energy efficiency/DSM, marketing program evaluation and market transformation evaluation;
- A range of research capabilities;
- A range of methodological approaches including qualitative and quantitative assessments; and,
- Providing evaluations in a performance-based regulatory environment.

The criteria listed below will be considered in the evaluation of all proposals received:

- Clarity and comprehensiveness of the proposed approach to the audit;

- Experience in energy efficiency/DSM program evaluation and other relevant areas (as outlined above) and in all market sectors (residential, commercial, and industrial);
- Experience with gas utility DSM is essential, experience in Ontario and/or other parts of Canada will be considered an asset;
- Relevant engineering and/or technical experience;
- Knowledge of the Ontario regulatory framework;
- Demonstrated ability to work with (and be viewed as credible and objective by) a variety of different types of stakeholders, including utilities, environmental groups, consumer groups and industry; and,
- Reasonableness of the cost proposal.

Reporting Structure

The independent Auditor will be selected by Union and the EAC. The launch meeting with the Auditor will be held with all members of the EAC and representatives from Union to ensure a consistent understanding among all parties of the scope and expectations of the independent audit.

Throughout the period of the audit, the Auditor may contact the EAC and Union via email and as needed, however all correspondence must be sent to each person identified in "Appendix A". Weekly conference calls between the EAC, Union, and the Auditor will be arranged for group discussion and progress reporting.

The independent Auditor will be required to discuss all material concerns with the EAC and Union prior to presenting the Draft Audit Report and Draft Final Audit Report. Union and the EAC will review the Draft Audit Report and request any necessary revisions. The final Audit Report will be circulated with the entire DSM Intervener Consultative Group. Since portions of the Audit Report may be used to update Union's Annual Report and tables contained therein, please submit the Draft and Final Audit Report in editable MS Word and MS Excel files in addition to a non-editable 'pdf.'

Evaluation of Proposals

The following components are required in all proposals in order to be reviewed and considered:

1. Description of the planned approach to the audit, including an outline of the audit principles that will guide the work (LIMIT 4 PAGES);
2. Description of the project team assembled to execute the project, including an outline of each individual's qualifications;
3. An outline of the firm's background in the areas listed above;
4. Cost proposal.

Contact

Victoria Falvo
Manager, DSM Strategy & Evaluation
Union Gas Limited
777 Bay Street 28th Floor, Suite 2801
Toronto, Ontario
M5G 2C8

Phone: (416) 496-5246
Fax: (416) 496-5331
Email: vicfalvo@uniongas.com

Deadline for Proposals

Proposals should be received no later than 3:00pm on January 14, 2010. All proposals should be forwarded via email to ensure prompt distribution to each of the three EAC members and two representatives from Union. Email addresses are listed in Appendix A.

Appendix A – Audit Contacts

Union Gas

Victoria Falvo
Union Gas
vicfalvo@uniongas.com

Leslie Kulperger
Union Gas
lkulperger@uniongas.com

Evaluation and Audit Committee

Jay Shepherd
Schools Energy Coalition
jay.shepherd@canadianenergylawyers.com

Kai Millyard
Green Energy Coalition
kai@web.ca

Vince DeRose
Industrial Gas Users Association
vderose@blgcanada.com