2008 DSM Input Assumptions - Update November 2008

Efficient Equipment & Technologies	Base Equipment & Technologies	Load Type	Resource Savings Assumptions			Equipment Life	Incremental Cost		Free Ridership	Notes	Reference
			Natural Gas m3	Electricity kWh	Water L	Years	Customer Installed	Contractor Installed	%		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	
RESIDENTIAL NEW CONSTRUCTION											
1. Tankless Water Heater	Storage Tank Water Heater	base	237	-	-	20	-	$694	2%	Enbridge	updated
2. Energy Star Home	Home built to OBC 2006	weather	1,018	1,450	-	25	-	$4,701	5%	Union and Enbridge - Values to be used for recording completions under current OBC.	updated
RESIDENTIAL EXISTING HOMES											
1a. Enhanced Furnace (ECM only)	Mid-Efficiency Furnace	weather	(65)	730	-	18	-	$550	15%	Union and Enbridge	EB-2006-0021 Phase II
1b. Enhanced Furnace (Furnace only) & High Efficiency Furnace*	Mid-Efficiency Furnace	weather	385	-	-	18	-	$650	82%	Union and Enbridge - 65% is the 2007 FR rate. 2008 is 82% and 2009 is 90%.	updated
2. Faucet Aerator (kitchen, distributed, 1.5 GPM)*	Average existing stock	base	22	-	7,800	10	$2	-	33% / 31%	Union & Enbridge - Savings per aerator	updated
3. Faucet Aerator (bathroom, distributed, 1.5 GPM)*	Average existing stock	base	6	-	2,000	10	$1	-	33% / 31%	Union & Enbridge - Savings per aerator	updated
4. Low-Flow Showerhead (Per unit, distributed, 1.5 GPM)*	Average existing stock	base	22	-	6,400	10	$4	-	10%	Union	updated
5. Low-Flow Showerhead (Per unit, distributed, 1.25 GPM)*	Average existing stock	base	40	-	10,700	10	$4	-	10%	Union	updated
6a. Low-Flow Showerhead (Per household, installed, 1.25 GPM replacing 2.0 GPM)*	2.0 GPM showerhead	base	33	-	8,900	10	-	$15	10%	Union & Enbridge	updated
6b. Low-Flow Showerhead (Per household, installed, 1.25 GPM replacing 2.1-2.5 GPM)*	2.1 -2.5 GPM showerhead	base	47	-	12,400	10	-	$15	10%	Union & Enbridge	updated
6c. Low-Flow Showerhead (Per household, installed, 1.25 GPM replacing 2.6 + GPM)*	2.6 + GPM showerhead	base	68	-	17,500	10	-	$15	10%	Union & Enbridge	updated
7. Pipe Insulation	Water Heater w/o pipe insulation	base	17	-	-	15	$1	$4	4%	Union & Enbridge	EB-2006-0021 Phase II
8. Programmable Thermostat*	Standard Thermostat	weather	152	26	-	15	$50		43%	Union & Enbridge	updated
9. Tankless Water Heater	Storage Tank Water Heater	base	237	-	-	20	-	$694	2%	Enbridge	updated
10. Reflector Panels	Radiant heat w/o reflector panels	weather	143	-	-	18	-	$213	0%	Enbridge	Enbridge 2007-2009 DSM Plan, updated
LOW INCOME											
1. Faucet Aerator (kitchen, distributed, 1.5 GPM)	Average existing stock	base	22	-	7,800	10	$2	-	1%	Union & Enbridge - Savings per aerator	updated
2. Faucet Aerator (bathroom, distributed, 1.5 GPM)	Average existing stock	base	6	-	2,000	10	$1	-	1%	Union & Enbridge - Savings per aerator	updated
3a. Low-Flow Showerhead (Per household, Installed, 1.25 GPM)	2.0 GPM showerhead	base	33	-	8,900	10	-	$15	1% / 5%	Union & Enbridge	updated
3b. Low-Flow Showerhead (Per household, Installed, 1.25 GPM)	2.1 -2.5 GPM showerhead	base	47	-	12,400	10	-	$15	1% / 5%	Union & Enbridge	updated
3c. Low-Flow Showerhead (Per household, Installed, 1.25 GPM)	2.6 + GPM showerhead	base	68	-	17,500	10	-	$15	1% / 5%	Union & Enbridge	updated
4. Pipe Insulation	Water Heater w/o pipe insulation	base	17	-	-	15	-	$4	1%	Union & Enbridge	EB-2006-0021 Phase II
5. Programmable Thermostat	Standard Thermostat	weather	152	26	-	15	-	$50	1%	Union & Enbridge	updated
6. Weatherization	Existing home sample	weather	1,143	165	-	23	-	$2,600	0%	Union & Enbridge	Enbridge 2007-2009 DSM Plan, updated
COMMERCIAL NEW BUILDING CONSTRUCTION											
1. Condensing Gas Water Heater	Storage Tank Water Heater	base	1,412	-	-	15	-	$4,200	5%	Food services application	EB-2006-0021 Phase II
2. Rooftop Unit	Standard Rooftop Unit	weather	1,275	-	-	20	-	$1,250	5%	Union	EB-2006-0021 Phase II
3. Tankless Water Heater	Storage Tank Water Heater	base	825	-	-	20	-	$2,200	2%	Food services application	EB-2006-0021 Phase II
4a. Infrared Heaters (0 - 49,999 BTUH)	Unit Heater	weather	0.0102 m3/BTUH	312	-	20	-	$15.40/10^3 BTUH	33%	Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
4b. Infrared Heaters (49,9099 - 164,999 BTUH)	Unit Heater	weather	0.0102 m3/BTUH	624	-	20	-	$15.40/10^3 BTUH	33%	Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan

Efficient Equipment & Technologies	Base Equipment & Technologies	Load Type	Resource Savings Assumptions			Equipment Life	Incremental Cost		Free Ridership		Notes	Reference
			Natural Gas m3	Electricity kWh	Water L	Years	Customer Installed	Contractor Installed	%			
4c. Infrared Heaters (>165,000 BTUH)	Unit Heater	weather	0.0102 m3/BTUH	936	-	20	-	$15.40/10^3 BTUH	33%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
5a. Demand Control Kitchen Ventilation (0 - 4999 CFM)	Ventilation without DCKV	weather	3,660	7,229	-	20	-	$5,000	5%		Union & Enbridge - Updated for new OBC	updated
5b. Demand Control Kitchen Ventilation (5000 - 9999 CFM)	Ventilation without DCKV	weather	5,960	22,855	-	20	-	$10,000	5%		Union & Enbridge - Updated for new OBC	updated
5c. Demand Control Kitchen Ventilation (10000 - 15000 CFM)	Ventilation without DCKV	weather	10,910	40,334	-	20	-	$15,000	5%		Union & Enbridge - Updated for new OBC	updated
6. Energy Recovery Ventilators (ERV)	Ventilation without ERV	weather	3.14 m3/CFM	-	-	15	-	$2.50/CFM	5%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
7. Heat Recovery Ventilators (HRV)	Ventilation without HRV	weather	2.92 m3/CFM	-	-	15	-	$3.40/CFM	5%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
8. Condensing Boilers	Non-condensing Boiler (76% estimated seasonal efficiency)	base	0.0119 m3/BTUH	-	-	25	-	$15.40/10^3 BTUH	5%		Union For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
9. Destratification Fans	No destratification fans	weather	6,205	-511	-	15	-	$7,021	10%		Union	Substantiation Documents provided
COMMERCIAL EXISTING BUILDINGS												
1. Condensing Gas Water Heater	Storage Tank Water Heater	base	1,412	-	-	15	-	$4,200	5%		Food services application	EB-2006-0021 Phase II
2a. Faucet Aerator	Average Existing Stock	base	14	-	6,520	10	$2	-	10%		Enbridge program - Savings per aerato	EB-2006-0021 Phase II
2b. Faucet Aerator (kitchen, distributed, 1.5 GPM)*	Average existing stock	base	22	-	7,800	10	$2	-	10%		Union program - Savings per aerator	updated
2c. Faucet Aerator (bathroom, distributed, 1.5 GPM)*	Average existing stock	base	6	-	2,000	10	$1	-	10%		Union program - Savings per aerator	updated
3. High Efficiency Furnace	Mid-Efficiency Furnace	weather	5.1 per 1000 BTUH furnace capacity	-	-	18	-	$650	17.50%		Union - Based on 75,000 BTUH residential application. Scalable m3 from residential base	EB-2006-0021 Phase II
4. Low-Flow Showerhead (Contractor installed per multi-res. Household).	Average Existing Stock	base	115	-	30,966	10	-	15	10%		Enbridge - Recommended Evaluation Priority	EB-2006-0021 Phase II
4. Low-Flow Showerhead (Per unit, distributed, 1.5 GPM)*	Average existing stock	base	22	-	6,400	10	$4	-	10%		Union	updated
5. Low-Flow Showerhead (Per unit, distributed, 1.25 GPM)*	Average existing stock	base	40	-	10,700	10	$4	-	10%		Union	updated
6 a. Pre-Rinse Spray Nozzle (1.6 GPM)	Average Existing Stock	base	2,434	-	432,800	5	-	$100	5%		Enbridge - Food services application, re	EB-2006-0021 Phase II
6b. Pre-Rinse Spray Nozzle (1.24 GPM)	Average Existing Stock	base	3,059	-	544,145	5	-	$100	5%		Union & Enbridge - Based on same approved inputs as 1.6 GPM unit to determine appropriate savings	Union 2007 Evaluation Report
7. Programmable Thermostats	Standard Thermostat	weather	519	921	0	15	-	$50	20%		Union & Enbridge - Per building.	updated
8. Rooftop Unit	Standard Rooftop Unit	weather	1,275	-	-	20	-	$1,250	5%		Union & Enbridge	EB-2006-0021 Phase II
9. Tankless Water Heater	Storage Tank Water Heater	base	825	-	-	20	-	$2,200	2%		Enbridge - Food services application	EB-2006-0021 Phase II
10a. Enhanced Furnace - up to 299 mbtu/h (ECM only)	Mid-Efficiency Furnace	weather	-0.87 per 1000 BTUH	9.7 per 1000 BTUH	-	18	-	$550	10%		Union & Enbridge - Based on 75,000 BTUH residential application	EB-2006-0021 Phase II
10b. Enhanced Furnace - up to 299 mbtu/h (furnace only)	Mid-Efficiency Furnace	weather	5.1 per 1000 BTUH	-	-	18	-	$650	30%		Union & Enbridge - Based on 75,000 BTUH residential application	EB-2006-0021 Phase II
11. Heat Recovery Ventilator (HRV)	Ventilation without HRV	weather	2.92 m3/CFM	-	-	15	-	$3.40/CFM	5%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
12. Energy Recovery Ventilator (ERV)	Ventilation without ERV	weather	3.14 m3/CFM	-	-	15	-	$2.50/CFM	5%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
13. Condensing Boilers	Non-condensing Boiler (76% estimated seasonal efficiency)	base	0.0119 m3/BTUH	-	-	25	-	$15.40/10^3 BTUH	5%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
14a. Infrared Heaters (0 - 49,999 BTUH)	Unit Heater	weather	0.0102 m3/BTUH	312	-	20	-	$15.40/10^3 BTUH	33%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
14b. Infrared Heaters (49,9099 - 164,999 BTUH)	Unit Heater	weather	0.0102 m3/BTUH	624	-	20	-	$15.40/10^3 BTUH	33%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
14c. Infrared Heaters (>165,000 BTUH)	Unit Heater	weather	0.0102 m3/BTUH	936	-	20	-	$15.40/10^3 BTUH	33%		Union - For use with Union Gas Quasi Tool, Updated for new OBC	Union 2007-2009 DSM Plan
15a. Demand Control Kitchen Ventilation (0 - 4999 CFM)	Ventilation without DCKV	weather	3,660	7,319	-	20	-	$5,000	5%		Union & Enbridge	Union 2007-2009 DSM Plan
15b. Demand Control Kitchen Ventilation (5000 - 9999 CFM)	Ventilation without DCKV	weather	9,535	23,180	-	20	-	$10,000	5%		Union & Enbridge	Union 2007-2009 DSM Plan

Efficient Equipment & Technologies	Base Equipment & Technologies	Load Type	Resource Savings Assumptions			Equipment Life	Incremental Cost		Free Ridership		Notes	Reference
			Natural Gas	Electricity	Water		Customer Installed	Contractor Installed				
			m3	kWh	L	Years			%			
15c. Demand Control Kitchen Ventilation (10000 - 15000 CFM)	Ventilation without DCKV	weather	17,455	40,929	-	20	-	$15,000	5%		Union & Enbridge	Union 2007-2009 DSM Plan
16a. Air Curtains (Single Door)		weather	2,118	172	-	15	-	$1,650	5%		Enbridge	Enbridge 2007-2009 DSM Plan - updated
16b. Air Curtains (Double Door)		weather	4,508	1,023	-	15		$2,500	5%		Enbridge	Enbridge 2007-2009 DSM Plan - updated
17. Destratification Fans	No destratification fans	weather	6,205	-511	-	15	-	$7,021	10%		Union - Minimum ceiling height 25'	Substantiation Documents provided
18. Energy Efficient Washers	Conventional top loading washers.	base	342	306	90,790	10		$450	10%		Enbridge	Enbridge 2007-2009 DSM Plan
19a. Prescriptive Schools (Elementary)	Space Heating, Hydronic Boiler with Comb. Eff. Of 80%-82%.	base	10,830	-	-	25		$8,646	100% (net to gross)		Enbridge: net to gross value is consistent with EGD Commercial sector	Substantiation Documents provided
19b. Prescriptive Schools (Secondary)	Space Heating, Hydronic Boiler with Comb. Eff. Of 80%-82%.	base	43,859	-	-	25		$14,470	100% (net to gross)		Enbridge: net to gross value is consistent with EGD Commercial sector	Substantiation Documents provided
COMMERCIAL/INDUSTRIAL CUSTOM PROJECTS												
1. Custom Projects			Actual	Actual	Actual	Actual	-	Actual	By sector from S.B. Report (dated Oct., 2008)			
Union Gas									**Free Ridership**			
Agriculture*									0%		Union	updated: Summit Blue Custom Projects Attribution Study
Industrial*									Results from SB Dec'08 Study		Union	
Commercial*									59%		Union	updated: Summit Blue Custom Projects Attribution Study
Multi-Residential*									42%		Union	updated: Summit Blue Custom Projects Attribution Study
New construction*									33%		Union	updated: Summit Blue Custom Projects Attribution Study
Enbridge Gas									**Net to Gross****			
Agriculture									81%		Enbridge	updated: Summit Blue Custom Projects Attribution Study
Industrial									71%		Enbridge	updated: Summit Blue Custom Projects Attribution Study
Commercial									100%		Enbridge	updated: Summit Blue Custom Projects Attribution Study
Multi-Residential									100%		Enbridge	updated: Summit Blue Custom Projects Attribution Study
New construction									95%		Enbridge	updated: Summit Blue Custom Projects Attribution Study
OTHER MEASURES									**Free Ridership**			
1. CFL (13W)	60W Incandescent	n/a	0	45	0	8	$1.75		24%		Enbridge	Substantiation documents provided
2. CFL (23W)	75W Incandescent	n/a	0	49.7	0	8	$2.00		24%		Enbridge	Substantiation documents provided

Indicates no input assumption update.
New measure
asterisk* Spillover values have been developed for these measures and may be applied to 2008 results pending a policy discussion with Union's Consultative..
asterisk** Net-to-Gross = 1-freeridership + spillover
See also attached Table of Measure Lives

Custom Resource Acquisition Programs

Measure Life Assumptions
October 31, 2008

	Commercial	Industrial	Multi-residential
Boiler Related			
Boilers – DHY	25*	n/a	25*
Boilers - Industrial Process	n/a	20	n/a
Boilers – Space Heating	25*	25*	25*
Combustion Tune-up	5	5	n/a
Controls	15	15	15
Steam pipe/tank insulation	n/a	15	n/a
Steam trap	**13*** **	**13*** **	n/a
Building Related			
Building envelope	25	25	25
Windows	25	25	25
Greenhouse curtains	na	10	na
Double Poly greenhouse	n/a	5	n/a
HVAC Related			
Dessicant cooling	15	n/a	n/a
Heat Recovery	15	15	n/a
Infra-red heaters	10	10	n/a
Make-up Air	15	15	15
Novitherm panels	15	n/a	15
Furnaces (gas-fired)	18**	n/a	18**
Process Related			
Furnaces (gas-fired)	n/a	18**	n/a

Source: RP-2002-0133 Settlement Proposal, Ex N1, Tab 1, Schedule 1, page 70.
Also applied to EB-2005-0001.
*updated in RP-2006-0001 – Source: ASHRAE
**new item - Source: ASHRAE updated in EB-2006-0021
*** Source: Measure Life of Steam Traps Research Study, Enbridge Gas Distribution, November, 2007.

TANKLESS WATER HEATERS

Residential New Construction

Efficient Technology & Equipment Description
Tankless water heater (EF = 0.82)
Base Technology & Equipment Description
Storage tank water heater (EF = 0.58)

Resource Savings Assumptions

Natural Gas	**237 m^3**

Natural gas savings claims are based on Exelon Services Report[1]. The consumption data was validated by Energy Technology based on the following:

1. Hourly gas consumption data for Domestic Hot Water (DHW) from Load Research - 645 m^3/year
2. Calculated average efficiency of sample population using data from Natural Resources Canada (NRCan) - 55% thermal efficiency
3. Calculated average litres of DHW based upon average consumption and efficiencies - 179 L/day
4. Used efficiency figures from the Okaloosa study** - 85.4% for tankless
5. Adjusted energy requirement for colder city water than in Okaloosa - inlet temperature 8°C instead of 23.3°C
6. Calculated gas consumption for tank and tankless water heaters based upon our average DHW usage - 415.9m^3/year for tankless versus 645m^3/year as provided by load research

Assumptions:

1. Load Research sample population is representative of Enbridge Gas Distribution (EGD) franchise
2. NRCan efficiency and market composition data for Ontario adequately approximates the EGD franchise
3. Calculated efficiency is comparable or higher for colder inlet water so using the Okaloosa measured efficiencies for EGD city water temperatures is conservative
4. The load profile for Okaloosa and EGD approximate each other adequately

Electricity	**kWh**
Water	**N/A L**

Other Input Assumptions

Equipment Life	**20 Years**
Tankless water heaters have an estimated service life of 20 years[2]	
Incremental Cost (Contractor Installation)	**$694**

To validate/update installation costs, research was conducted by the Channel Consultants and Market Development (with manufacturers), across our franchise area to obtain installed costs for both Power Vented 50-gallon tank-type water heaters and tankless water heaters in the residential sector. Twenty-two contractors/installers were contacted to provide installed costs for both types of natural gas water heating; as well one retail outlet was visited to validate installation costs if the water heating equipment were purchased through a big box store.

[1] Exelon Services Report, December 2002

[2] C. Aguilar, D.J. White, and David L. Ryan, "Domestic Water Heating and Water Heater Energy Consumption in Canada", CBEEDAC, April 2005

RESULTS

- This research provided average installed costs of:

  Power Vented 50-gallon tank type
  average installed cost $1956
  Tankless average installed cost $3273

- Assuming a purchase of a second conventional tank-type water heater will be required in 12 years*** at a cost in current dollars of approximately $623 (= $1956/[1.1^12]), the incremental cost of a tankless water heater is $3273 - $1956 - $623 = $694

Free Ridership	**2 %**

Free ridership rate will remain as filed.

ENERGY STAR FOR NEW HOMES

Residential, New Construction

Efficient Technology & Equipment Description
Energy Star for New Homes, version 3, qualified home
Base Technology & Equipment Description
New Home built in Ontario, compliant to OBC-2006

Resource Savings Assumptions

Natural Gas	**1018 m^3**
Gas savings is based on a simple average of a new reference house, a 1 storey house, and a 2 storey house[3] with London's climate, and another set in North Bay's climate. The sample houses are three houses which represent the mid-range of new homes built in UG Territory. The results were weighted 70% UG South and 30% UG North. The software used for analysis is HOT2000 version 9.34b. This is the same software that is currently in use for application of the EnerQuality Version 3.0 Energy Star Criteria, which is what's mandatory to evaluate homes for ESNH. A mix of 90% AFUE furnace (weighted 80%) and 80% AFUE combo heater (weighted 20%) was assumed as the base case heating system. The upgrade system was a 92% AFUE. A 3.57 ACH50 air leakage was used to describe the simply OBC-2006 houses (default present in HOT2000), which is representative of average new home construction[4]	
Electricity	**1450 kWh**
Electrical savings is based on a simple average of a new reference house, a 1 storey house, and a 2 storey house[3] with London's climate, and another set in North Bay's climate. The sample houses are three houses which represent the mid-range of new homes built in UG Territory.[3] The results were weighted 70% UG South and 30% UG North. The software used for analysis is HOT2000 version 9.34b. This is the same software that is currently in use for application of the EnerQuality Version 3.0 Energy Star Criteria, which is what's mandatory to evaluate homes for ESNH. A 3.57 ACH50 air leakage was used to describe the simply OBC-2006 houses (default present in HOT2000), which is representative of average new home construction[4]	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**25 years**
Energy Star homes have an estimated service life of 25 years (before major renovations are expected).	
Incremental Cost (Cust. / Contr. Install)	**$4,701**
Cost estimates for the upgrade measures were obtained from HVAC Trades and Builders who are actively building energy star homes. The upgrade costs based on a simple average of a new reference house, a 1 storey house, and a 2 storey house[3].	
Free Ridership	**5 %**
Free-Ridership rate adjusted during ADR Settlement – September 2006.	

[3] Based on *Comparison of EnergyStar vs.Ontario Building Code 2006 Energy Use*, spreadsheets, from July and August, 2008, by Bowser Technical Inc.
[4] Conversation with Jennifer Tausman, ESNH files coordinator, NRCAN OEE, July 21, 2008

ENHANCED FURNACE

Residential Existing Homes

Efficient Technology & Equipment Description
High efficiency furnace with ECM.
Base Technology & Equipment Description
Mid efficiency furnace w/o PSC.

Resource Savings Assumptions

Natural Gas	
ECM Only	**- 65 m^3**
Furnace Only	**385 m^3**
Impact on natural gas use from an ECM and the resulting decrease in savings from a high efficiency furnace are based on the Final Report on ECM Motors by the Canadian Centre for Housing Technology. Using the Enbridge high-efficiency furnace savings number of 385m3, the net gas savings are reduced to 320m3.	
Electricity	
ECM Only	**730 kWh**
Furnace Only	**0 kWh**
Canadian Centre for Housing Technology – Final Report on the Effects of ECM Furnace Motors on Electricity and Gas Use: Results from the CCHT Research Facility and Projections.	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**18 years**
Enhanced furnaces have an estimated service life of 18 years.[27]	
Incremental Cost (Contractor Install)	
ECM Only	**$550**
Furnace Only	**$650**
Enhanced furnaces have an estimated incremental cost of $1200	
Free Ridership (Updated)	
ECM Only	**15 %**
Furnace Only	**82 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008

[27] ASHRAE Applications Handbook – 2003, Chapter 36 – Owning and Operating Costs, Table 3

HIGH EFFICIENCY FURNACE

Residential Existing Homes

Efficient Technology & Equipment Description
High efficiency furnace
Base Technology & Equipment Description
Mid-efficiency furnace

Resource Savings Assumptions

Natural Gas	**385 m^3**
Natural gas savings are based on Enbridge research that indicates the average consumption for a mid-efficiency furnace is 2,430 m3 and 2,045 m3 for a high efficiency furnace, suggesting annual savings of 385 m3 as approved in the Decision for the Enbridge 2006 DSM Plan (EB2005-0001).	
Electricity	**n/a kWh**
Water	**n/a L**

Other Input Assumptions

Equipment Life	**18 years**
High efficiency furnaces have an estimated service life of 18 years.[29]	
Incremental Cost (Contractor Install)	**$650**
The incremental cost is based on a pricing survey of 15 contractors in the Union Gas franchise area. The single incremental cost number is weighted average of Union Gas South (70%) and Union Gas North (30%) average incremental costs.	
Free Ridership (Updated)	**82 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008

[29] ASHRAE Applications Handbook – 2003, Chapter 36 – Owning and Operating Costs, Table 3

1.5 GAL/MIN FAUCET AERATOR (Kitchen)

Residential Existing Homes

Efficient Technology & Equipment Description
Faucet Aerator
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas (Updated)	**22 m^3**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	
Electricity	**n/a kWh**
Water (Updated)	**7,800 L**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	

Other Input Assumptions

Equipment Life	**10 years**
Faucet aerators have an estimated service life of 10 years.[28]	
Incremental Cost (Cust. Install) (UG/EGD)	**$2**
* Actual cost per unit of product is $1.49.	
Free Ridership (Updated) (UG/EGD)	**33/31 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

[28] U.S. DOE – FEMP, Energy Cost Calculator for Faucets and Showerheads, http://www.eere.energy.gov/femp

1.5 GAL/MIN FAUCET AERATOR (Bathroom)

Residential Existing Homes

Efficient Technology & Equipment Description
Faucet Aerator
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas (Updated)	**6 m^3**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	
Electricity	**n/a kWh**
Water (Updated)	**2,000 L**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	

Other Input Assumptions

Equipment Life	**10 years**
Faucet aerators have an estimated service life of 10 years.[28]	
Incremental Cost (Cust. Install) (UG/EGD)	**$1**
* Actual cost per unit of product is $0.49.	
Free Ridership (Updated) (UG/EGD)	**33/31 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

[28] U.S. DOE – FEMP, Energy Cost Calculator for Faucets and Showerheads, http://www.eere.energy.gov/femp

1.5 GAL/MIN LOW-FLOW SHOWERHEAD

Residential Existing Homes (Distribution)

Efficient Technology & Equipment Description
Low-flow showerhead 1.5 gal/min.
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas	**22 m^3**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	
Electricity	**n/a kWh**
Water	**6,400 L**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	

Other Input Assumptions

Equipment Life	**10 years**
Low flow showerheads have an estimated service life of 10 years.	
Incremental Cost (Cust. Install)	**$4**
* Actual cost per unit of product is $3.85.	
Free Ridership	**10 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

1.25 GAL/MIN LOW-FLOW SHOWERHEAD

Residential Existing Homes (Distribution)

Efficient Technology & Equipment Description
Low-flow showerhead 1.25 gal/min.
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas	**40 m^3**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	
Electricity	**n/a kWh**
Water	**10,700 L**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	

Other Input Assumptions

Equipment Life	**10 years**
Low flow showerheads have an estimated service life of 10 years.	
Incremental Cost (Cust. Install)	**$4**
* Actual cost per unit of product is $3.39.	
Free Ridership	**10 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

1.25 GAL/MIN LOW-FLOW SHOWERHEAD

Residential Existing Homes (Installed per Household)

Efficient Technology & Equipment Description
Low-flow showerhead 1.25 gal/min.
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas (Updated)	**See Below m^3**

Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.

Participants to be tracked, and gas savings assigned, as per the following table:

Scenerio	Flow rate range of old showerhead (gal/min)	"From" flow rate (i.e. midpont of range) (gal/min)	"To" flow rate (gal/min)	Reduction in flow rate (gal/min)	Gas Savings m3
New Showerhead: Scenario 1	GT 2.5	3.00	1.25	1.75	68.0
New Showerhead: Scenario 2	GT 2.0 to 2.5	2.25	1.25	1.00	47.0
New Showerhead: Scenario 3	EQ 2.0	2.00	1.25	0.75	33.0

Electricity	**n/a kWh**

Water (Updated)	**See Below L**

Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.

Participants to be tracked, and water savings assigned, as per the following table:

Scenerio	Flow rate range of old showerhead (gal/min)	"From" flow rate (i.e. midpont of range) (gal/min)	"To" flow rate (gal/min)	Reduction in flow rate (gal/min)	Water Savings litres
New Showerhead: Scenario 1	GT 2.5	3.00	1.25	1.75	17.500
New Showerhead: Scenario 2	GT 2.0 to 2.5	2.25	1.25	1.00	12.400
New Showerhead: Scenario 3	EQ 2.0	2.00	1.25	0.75	8.900

Other Input Assumptions

Equipment Life	**10 years**
Low flow showerheads have an estimated service life of 10 years.	
Incremental Cost (Contr. Install) (UG/EGD)	**$15**
$5.00 for product, $10 for installation.	
Free Ridership	**10 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

PROGRAMMABLE THERMOSTAT

Residential Existing Homes

Efficient Technology & Equipment Description
Programmable thermostat
Base Technology & Equipment Description
Standard manual thermostat

Resource Savings Assumptions

Natural Gas (Updated)	**152 m^3**
Savings adjustment recommended by auditor, during the Enbridge 2007 Audit.[1]	
Electricity (Updated)	**26 kWh**
Savings adjustment recommended by auditor, during the Enbridge 2007 Audit.[1]	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
Equipment life recommended by Summit Blue Consulting and incorporated in 2008, on agreement with Union Gas 2007 Evaluation Audit Committee.	
Incremental Cost (Contr. Install) (UG/EGD)	**$50**
Based on average thermostat cost from Union survey of hardware chains.	
Free Ridership (Updated)	**43 %**
Free Ridership rate recommended by Summit Blue Consulting[2], excluding spillover, a value negotiated with the 2007 Evaluation Audit Committee.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

TANKLESS WATER HEATERS

Residential Existing Homes

Efficient Technology & Equipment Description
Tankless water heater (EF = 0.82)
Base Technology & Equipment Description
Storage tank water heater (EF = 0.58)

Resource Savings Assumptions

Natural Gas	**237 m^3**

Natural gas savings claims are based on Exelon Services Report[1]. The consumption data was validated by Energy Technology based on the following:

1. Hourly gas consumption data for Domestic Hot Water (DHW) from Load Research - 645 m^3/year
2. Calculated average efficiency of sample population using data from Natural Resources Canada (NRCan) - 55% thermal efficiency
3. Calculated average litres of DHW based upon average consumption and efficiencies - 179 L/day
4. Used efficiency figures from the Okaloosa study** - 85.4% for tankless
5. Adjusted energy requirement for colder city water than in Okaloosa - inlet temperature 8°C instead of 23.3°C
6. Calculated gas consumption for tank and tankless water heaters based upon our average DHW usage - 415.9m^3/year for tankless versus 645m^3/year as provided by load research

Assumptions:

1. Load Research sample population is representative of Enbridge Gas Distribution (EGD) franchise
2. NRCan efficiency and market composition data for Ontario adequately approximates the EGD franchise
3. Calculated efficiency is comparable or higher for colder inlet water so using the Okaloosa measured efficiencies for EGD city water temperatures is conservative
4. The load profile for Okaloosa and EGD approximate each other adequately

Electricity	**kWh**

Water	**N/A L**

Other Input Assumptions

Equipment Life	**20 Years**
Tankless water heaters have an estimated service life of 20 years[2]	
Incremental Cost (Contractor Installation)	**$694**

To validate/update installation costs, research was conducted by the Channel Consultants and Market Development (with manufacturers), across our franchise area to obtain installed costs for both Power Vented 50-gallon tank-type water heaters and tankless water heaters in the residential sector. Twenty-two contractors/installers were contacted to provide installed costs for both types of natural gas water heating; as well one retail outlet was visited to validate installation costs if the water heating equipment were purchased through a big box store.

RESULTS

[1] Exelon Services Report, December 2002

[2] C. Aguilar, D.J. White, and David L. Ryan, "Domestic Water Heating and Water Heater Energy Consumption in Canada", CBEEDAC, April 2005

- This research provided average installed costs of:

  Power Vented 50-gallon tank type
  average installed cost $1956
  Tankless average installed cost $3273

- Assuming a purchase of a second conventional tank-type water heater will be required in 12 years*** at a cost in current dollars of approximately $623 (= $1956/[1.1^12]), the incremental cost of a tankless water heater is $3273 - $1956 - $623 = $694

Free Ridership	**2 %**

Free ridership rate will remain as filed.

HEAT REFLECTOR PANELS

Residential Existing Homes

Efficient Technology & Equipment Description
A saw tooth panel made of clear PVC with a reflective surface reducing heat losses behind radiators and convectors located on poorly insulated exterior walls.
Base Technology & Equipment Description
Existing housing with radiant heat with no reflector panels.

Resource Savings Assumptions

Natural Gas (Updated)	**143.2 m^3**
Based on a 2008 Enbridge Gas Distribution Load Research Study of boiler sites where the panels were installed. The study concluded that the panels, on average, reduced consumption by 4.1%. A 2006 Enbridge Gas load research study showed that average boiler consumption is 3,978m3. A 90% confidence interval for the average resulted in a lower value of 3,493m3. Applying the average change in consumption from the panel load research study to the lower value of average boiler consumption resulted in recommended savings of 143.2m3.	
Electricity	**kWh**
Water	**L**

Other Input Assumptions

Equipment Life	**18 years**
Based on average space heat measure life.	
Incremental Cost (Customer Install)	**$213**
Free Ridership	**0 %**
Product not currently available to end-use consumers through typical retail channels.	

1.5 GAL/MIN FAUCET AERATOR (Kitchen)

Low Income (Distributed)

Efficient Technology & Equipment Description
Faucet Aerator
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas (Updated)	**22 m^3**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	
Electricity	**n/a kWh**
Water (Updated)	**7,800 L**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	

Other Input Assumptions

Equipment Life	**10 years**
Faucet aerators have an estimated service life of 10 years.[28]	
Incremental Cost Customer Install	**$2**
Actual cost per unit of product is $1.49.	
Free Ridership	**1 %**
Free Ridership rate adjusted during ADR Settlement – September 2006.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[28] U.S. DOE – FEMP, Energy Cost Calculator for Faucets and Showerheads, http://www.eere.energy.gov/femp

1.5 GAL/MIN FAUCET AERATOR (Bathroom)

Low Income (Distributed)

Efficient Technology & Equipment Description
Faucet Aerator
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas (Updated)	**6 m^3**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	
Electricity	**n/a kWh**
Water (Updated)	**2,000 L**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	

Other Input Assumptions

Equipment Life	**10 years**
Faucet aerators have an estimated service life of 10 years.[28]	
Incremental Cost Customer Install	**$1**
Actual cost per unit of product is $0.49.	
Free Ridership	**1 %**
Free Ridership rate adjusted during ADR Settlement – September 2006.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[28] U.S. DOE – FEMP, Energy Cost Calculator for Faucets and Showerheads, http://www.eere.energy.gov/femp

1.25 GAL/MIN LOW-FLOW SHOWERHEAD

Low Income (Installed per Household)

Efficient Technology & Equipment Description
Low-flow showerhead 1.25 gal/min.
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas (Updated)	**See Below m^3**

Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.

Participants to be tracked, and gas savings assigned, as per the following table:

Scenerio	Flow rate range of old showerhead (gal/min)	"From" flow rate (i.e. midpont of range) (gal/min)	"To" flow rate (gal/min)	Reduction in flow rate (gal/min)	Gas Savings m3
New Showerhead: Scenario 1	GT 2.5	3.00	1.25	1.75	68.0
New Showerhead: Scenario 2	GT 2.0 to 2.5	2.25	1.25	1.00	47.0
New Showerhead: Scenario 3	EQ 2.0	2.00	1.25	0.75	33.0

Electricity	**n/a kWh**

Water (Updated)	**See Below L**

Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.

Participants to be tracked, and water savings assigned, as per the following table:

Scenerio	Flow rate range of old showerhead (gal/min)	"From" flow rate (i.e. midpont of range) (gal/min)	"To" flow rate (gal/min)	Reduction in flow rate (gal/min)	Water Savings litres
New Showerhead: Scenario 1	GT 2.5	3.00	1.25	1.75	17.500
New Showerhead: Scenario 2	GT 2.0 to 2.5	2.25	1.25	1.00	12.400
New Showerhead: Scenario 3	EQ 2.0	2.00	1.25	0.75	8.900

Other Input Assumptions

Equipment Life	**10 years**
Low flow showerheads have an estimated service life of 10 years.	
Incremental Cost (Contr. Install) (UG/EGD)	**$15**
$5.00 for product. $10 for installation.	
Free Ridership (UG/EGD)	**1/5 %**
Free rider rate for low income adjusted to 5% in EB-2001-0021 DSM Generic Issues.	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

PROGRAMMABLE THERMOSTAT

Low Income

Efficient Technology & Equipment Description
Programmable thermostat
Base Technology & Equipment Description
Standard manual thermostat

Resource Savings Assumptions

Natural Gas (Updated)	**152 m^3**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	
Electricity (Updated)	**26 kWh**
Savings adjustment recommended by both Union and Enbridge auditors, during their respective 2007 Audits.[1]	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
Equipment life recommended by Summit Blue Consulting and incorporated in 2008, on agreement with Union Gas 2007 Evaluation Audit Committee.	
Incremental Cost (Contr. Install) (UG/EGD)	**$50**
Based on average thermostat cost from Union survey of hardware chains.	
Free Ridership	**1 %**
Free Ridership rate adjusted during ADR Settlement – September 2006	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

WEATHERIZATION

Low Income

Energy audits to identify and implement the most cost-effective energy retrofit to improve building envelope efficiencies.

Resource Savings Assumptions

Natural Gas (Updated)	**1,143 m^3**
Based on the results from pilot of 61 homes in 2007	
Electricity (Updated)	**165 kWh**
Based on the results from pilot of 61 homes in 2007	
Water	**N/A L**

Other Input Assumptions

Equipment Life (Updated)	**23 years**
Based on average measure life of measures installed in 61 2007 program participant homes. Measures included attic insulation, wall insulation, door and weather stripping and caulking	
Incremental Cost (Contr. Install) (Updated)	**$2,600**
Based on average of 2007 actual results of 61 program participants including the cost of the audit	
Free Ridership	**0 %**
As per Generic Proceeding Decision Phase 3	

INFRARED HEATERS

Commercial New Building Construction

Efficient Technology & Equipment Description
Infrared Heater
Qualifier/Restriction (UPDATED)
OBC 2006 requires infrared heaters for unenclosed spaces excluding loading docks with air curtains. Therefore, the infrared heaters are not applicable to these conditions. (Caneta Research, Inc. August, 2008)
Base Technology & Equipment Description
Unit Heater

Resource Savings Assumptions

Natural Gas	**0.0102 m^3 / Btu/hr**

The infrared heater gas savings were based on the analysis procedures previously created by Agviro Inc. for Union. The analysis was supplemented by adding a 20% oversizing factor on the equipment in the analysis. A generic rate of savings of 0.0102 m3 / Btu/hr of capacity was determined from this analysis. The single savings number is weighted average of Union Gas South (70%) and Union Gas North (30%) savings estimates.

Electricity (UPDATED)	**312 kWh**	**0-49,999 Btu/hr**
	624 kWh	**49,999 – 164,999 Btu/hr**
	936 kWh	**> 165,000 Btu/hr**

Electricity savings are determined from the difference in electricity consumption of the infrared heater and a comparable unit heater.

		Blower Motor		Infrared		Operating Hours (hrs)		
Capacity		hp	kW	hp	kW	Unit Heater	Infrared	Electrical Savings (kWh)
less than	50000	0.167	0.124	0.042	0.031	2509	2133	312
less than	165000	0.333	0.249	0.042	0.031	2509	2133	624
greater than	165000	0.500	0.373	0.042	0.031	2509	2133	936

*Electricty savings based on Solaronics models that use a 1/24 hp motor.

Water	**n/a L**

Other Input Assumptions

Equipment Life	**20 years**
Infrared Heaters have an estimated service life of 20 years.[1]	
Incremental Cost	**$15.40 / 10^3 Btu/hr**
An incremental cost of $350 was used based on past input assumptions filed by Union.[2]	
Free Ridership	**33 %**
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211.[3]	

[1] "Prescriptive Incentives for Select Natural Gas Technologies", Prepared for Enbridge Consumers Gas and Union Gas Ltd., Prepared by: Jacques Whitford Environment Limited, Agviro Inc., and Engineering Interface Ltd., September 27, 2000.
[2] EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005
[3] "Demand Side Management Research to Establish Free Ridership Rates for Infra-Red Tube Heaters among End Users and Channel Partners", marketPower Research, February 14, 2005.

DEMAND CONTROL KITCHEN VENTILATION (DCKV)

Commercial New Building Construction

Efficient Technology & Equipment Description
Ventilation with DCKV
Qualifier/Restriction
None
Base Technology & Equipment Description
Ventilation without DCKV

Resource Savings Assumptions

Natural Gas (UPDATED)	**3,660 m3**	**0 – 4999 CFM**
	5,960 m3	**5000-9999 CFM**
	10,910 m3	**10000-15000 CFM**
The demand control kitchen ventilation savings were determined using the methodology described in the Detailed Energy Savings Report (www.melinkcorp.com). The savings were generated for three ranges of total range hood exhaust: 0 – 4999 CFM, 5000 – 9999 CFM, and 10,000 – 14,999 CFM. The midpoint of each exhaust range was used to generate the savings (both gas and electrical). The inputs for the savings calculations were supplied by MELINK as typical for each application range. These gas values were modified to take into account OBC-2006: Modified so that 50% of the Makeup Air is conditioned to (i.e., 50% of the exhaust air is offset with unconditioned makeup air) for 5000-9999 CFM and 10000-15000 CFM savings assumptions. The 0-4999 CFM gas savings was unmodified[4], [5].		
Electricity (UPDATED)	**7,229 kWh**	**0 – 4999 CFM**
	22,855 kWh	**5000-9999 CFM**
	40,334 kWh	**10000-15000 CFM**
(see Natural Gas) All capacity categories were modified to reflect the OBC-2006 increase in minimum efficiency of the air conditioning COP from 3.0 to 3.81 (SEER = 13)[5]		
Water	**n/a L**	

Other Input Assumptions

Equipment Life	**20 years**	
DCKV has an estimated service life of 20 years.		
Incremental Cost	**$5,000**	**0 – 4999 CFM**
	$10,000	**5000-9999 CFM**
	$15,000	**10000-15000 CFM**
Typical costing information was provided by MELINK.		
Free Ridership	**5 %**	
A free ridership value of 5% will be used until a more definitive value can be determined from evaluation.		

[4] from Ontario Building Code (OBC) 2006 via ASHRAE 90.1-2004 clause 6.5.7.1
[5] Caneta Research Inc, Quasi-Tool Changes and Commentary, August, 2008

ENERGY RECOVERY VENTILATOR (ERV)

Commercial New Building Construction

Efficient Technology & Equipment Description
Ventilation with ERV
Qualifier/Restriction (UPDATED)
1) Restriction for New Building Construction: This measure is not applicable to systems >=5,000 CFM with >=70% OA ratio because energy recovery is required by OBC 2006 2) Restriction for New Building Construction: This measure is not applicable to systems serving health care spaces indicated in Table 1 because heat recovery is required by CSA Z317.2-01

Table 1 - Health Care Spaces Not Eligible

Anaesthetic gas scavenging	Cart and can washers	Areas using hazardous gases
Animal facilities	Chemical storage	Isolation rooms
Autopsy suite	Cooking facilities	Perchloric hoods
Biohazard and fume hoods	Ethylene oxide	Radioisotope hoods

Base Technology & Equipment Description
Ventilation without ERV

Resource Savings Assumptions

Natural Gas	**3.14 m^3 / CFM**

The ERV and HRV gas savings are determined from engineering calculations utilizing inputs such as air flow, indoor/outdoor temperatures, indoor/outdoor and relative humidity. The operating hours of the equipment are based on typical values for the following commercial market sub-segments: Multi-Family, Hotel, Restaurant, Retail, Office, School, Health Care, Nursing Home, and Warehouse.

Building Occupancy	Typical Hrs of Operation per week
Multi-Family	168
Hotel	168
Restaurant	108
Retail	108
Office	60
School	84
Health Care	168
Nursing Home	168
Warehouse	168

Retail was used for the claim because it's close to the simple average of occupancy rates above

Electricity	**n/a kWh**
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
ERVs have an estimated service life of 15 years.[6]	
Incremental Cost	**$2.50 / CFM**
The incremental costs are based on relative scaling of incremental costs $2500 / 1000 CFM.[6]	
Free Ridership	**5 %**
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211.[7]	

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

[7] EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

HEAT RECOVERY VENTILATOR (HRV)

Commercial New Building Construction

Efficient Technology & Equipment Description

Ventilation with HRV

Qualifier / Restriction (UPDATED)

1) Restriction for New Building Construction: This measure is not applicable to systems >=5,000 CFM with >=70% OA ratio because energy recovery is required by OBC 2006

2) Restriction for New Building Construction: This measure is not applicable to systems serving health care spaces indicated in Table 1 because heat recovery is required by CSA Z317.2-01

Table 1 - Health Care Spaces Not Eligible

Anaesthetic gas scavenging	Cart and can washers	Areas using hazardous gases
Animal facilities	Chemical storage	Isolation rooms
Autopsy suite	Cooking facilities	Perchloric hoods
Biohazard and fume hoods	Ethylene oxide	Radioisotope hoods

Base Technology & Equipment Description

Ventilation without HRV

Resource Savings Assumptions

Natural Gas	**2.92 m^3 / CFM**

The ERV and HRV gas savings are determined from engineering calculations utilizing inputs such as air flow, indoor/outdoor temperatures, indoor/outdoor and relative humidity. The operating hours of the equipment are based on typical values for the following commercial market sub-segments: Multi-Family, Hotel, Restaurant, Retail, Office, School, Health Care, Nursing Home, and Warehouse.

Building Occupancy	Typical Hrs of Operation per week
Multi-Family	168
Hotel	168
Restaurant	108
Retail	108
Office	60
School	84
Health Care	168
Nursing Home	168
Warehouse	168

Retail was used for the claim because it's close to the simple average of occupancy rates above.

Electricity	**n/a kWh**

Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
HRVs have an estimated service life of 15 years.[8]	
Incremental Cost	**$3.40 / CFM**
The incremental costs are based on relative scaling of incremental costs $1700 / 500 CFM.[6]	
Free Ridership	**5 %**
Previous free-Ridership rate as per 2005 ADR Settlement – EB-2005-0211 was 0%. Union will use a value of 5% will be used until a more definitive value can be determined from evaluation.	

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

CONDENSING BOILERS

Commercial New Building Construction

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

Resource Savings Assumptions

Natural Gas	**0.0119 m^3 / Btu/hr**
The natural gas savings are based on the reduction in space heating gas consumption from using a condensing boiler relative to a non-condensing boiler. The principle assumption in the calculation of the savings is that the condensing boiler is properly oversized by 20%. The heating load for the entire heating season can be determined from the installed capacity and boiler seasonal efficiency using degree day analysis. A generic rate of savings of 0.0119 m3 / Btu/hr of capacity was determined from this analysis. The single savings number is weighted average of Union Gas South (70%) and Union Gas North (30%) savings estimates.	
Electricity	**n/a kWh**
Water	**n/a L**

Other Input Assumptions

Equipment Life	**25 years**
Condensing boilers have an estimated service life of 25 years.[9]	
Incremental Cost	**\$15.40 / 10^3 Btu/hr**
A generic incremental cost of \$14,000 per million Btu / hr (adjusted for the US/CDN exchange by a factor of 1.10) was used based on information recently published in the ASHRAE Journal.[10]	
Free Ridership	**5 %**
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211.[11]	

[9] ASHRAE Applications Handbook – 2003, Chapter 36 – Owning and Operating Costs, Table 3.
[10] "Boiler System Efficiency", Thomas H. Durkin, ASHRAE Journal - July 2006
[11] EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

DESTRATIFICATION FAN

Commercial New Building Construction

Efficient Technology & Equipment Description
Destratification Fan (per fan)
Qualifier/Restriction
For fans of 20' diameter and larger and in locations that have forced air space heating including unit heaters in warehousing, manufacturing, industrial, and retail buildings with ceiling heights of 25' and higher.
Base Technology & Equipment Description
Nothing

Resource Savings Assumptions

Natural Gas	**6,205 m^3**
Based on Caneta's report[12], which was based largely on destratification savings methodology published by ASHRAE[13] and DOE2.1E building modeling software Weighted average of savings from 20' & 24' diameter fans, based on market share[14] Weighted average ceiling height of 29 ft based on market share[15] Average 20 ft heater height from floor[16],[17],[18]; Temp setpoint of 70 degF (estimated) Space heating Gas usage data based on energy intensity for commercial buildings from NRCAN data[19]. Used a mix of 70% London and 30% North Bay's climate & destratification of 0.625 degF/ft.[20]	
Electricity	**(511) kWh**
Based on Caneta's report**Error! Bookmark not defined.** and the same input parameters as above.	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
The estimated equipment life for destratification fans is 15 years [SEED Program Guidelines. J-20. December. 2004]. This value is also supported by ASHRAE [ASHRAE Handbook, HVAC Applications SI Edition. Chapter 36 -Table 4. Pg. 36.3. 2007], which lists the service life for propeller fans as 15 years.	
Incremental Cost (Cust. / Contr. Install)	**$ 7,021**
Weighted average of 20' and 24' diameter fans based on market data**Error! Bookmark not defined.** and cost data[21]	
Free Ridership	**10 %**
based on market & total sales data for Ontario[22] and building type data from UG's Customer database	

[12] "Energy Savings Associated with De-stratification Fans in Buildings with High Ceilings", by Caneta Research Inc., October 2007
[13] "Saving Heating Costs in Warehouses." Richard Aynsley. ASHRAE Journal. Pg. 46.December 2005
[14] email from EnviraNorth, July 8, 2008, with fan sales data by fan diameter
[15] Weighted average based upon sales data associated with 25 ft to 35 ft ceilings EnviraNorth
[16] 20' (email from Richard Aynsley, Big Ass Fan Company, July 2, 2008, to Pete Koepfgen);
[17] 16-25' depending on age, New Box stores (retail) 30-35', Large high bays with crane are more like 50' (email from Bill Davies, Union Gas, 31 yrs experience, July 3, 2008 to Pete Koepfgen).
[18] between 18' and 30', average is 20' - email from EnviraNorth, July 8, 2008
[19] NRCAN - NEUD - Comprehensive Energy Use data tables - by end use warehouse & transportation average of data between 1990-2005
[20] average between 0.5 and 0.75 - "Technology Evaluation of Thermal Destratifiers and other Ventilation Technologies." Joel C. Hughes. Naval Facilities Engineering Service Center. and "Re-circulating Warm Air – Energy Tips from the Experts" ComEd An Exelon Company. 2002
[21] Targeted Market Study. HVLS fans on Wisconsin Dairy Farms. State of Wisconsin Department of Administration Division of Energy. June 12, 2006., RSMeans. Mechanical Cost Data - 29th Annual Edition. 2006, and communications with Manufacturers.
[22] Email from Joan Wood (EnviraNorth) to Victoria Falvo (UG), May 30, 2008

1.5 GAL/MIN FAUCET AERATOR (Kitchen)

Commercial Building Retrofit (Distribution)

Efficient Technology & Equipment Description
Faucet Aerator
Base Technology & Equipment Description
Average existing stock

Resource Savings Assumptions

Natural Gas (Updated)	**22 m^3**
Savings adjustment based on Summit Blue's study, June 2008.[1]	
Electricity	**n/a kWh**
Water (Updated)	**7,800 L**
Savings adjustment based on Summit Blue's study, June 2008.[1]	

Other Input Assumptions

Equipment Life	**10 years**
Faucet aerators have an estimated service life of 10 years.[1]	
Incremental Cost (Cust. Install)	**$2**
$2 a product used by Union Gas.	
Free Ridership	**10 %**
Free ridership – EB-2006-0021 Phase II	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

1.5 GAL/MIN FAUCET AERATOR (Bathroom)

Commercial Building Retrofit (Distribution)

Efficient Technology & Equipment Description
Faucet Aerator
Base Technology & Equipment Description
Average existing stock

Resource Savings Assumptions

Natural Gas (Updated)	**6 m^3**
Savings adjustment based on Summit Blue's study, June 2008.[1]	
Electricity	**n/a kWh**
Water (Updated)	**2,000 L**
Savings adjustment based on Summit Blue's study, June 2008.[1]	

Other Input Assumptions

Equipment Life	**10 years**
Faucet aerators have an estimated service life of 10 years.[28]	
Incremental Cost (Cust. Install)	**$1**
$1 a product used	
Free Ridership (Updated)	**10 %**
Free ridership – EB-2006-0021 Phase II	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

[28] U.S. DOE – FEMP, Energy Cost Calculator for Faucets and Showerheads, http://www.eere.energy.gov/femp

1.5 GAL/MIN LOW-FLOW SHOWERHEAD

Commercial Building Retrofit (Distribution)

Efficient Technology & Equipment Description
Low-flow showerhead 1.5 gal/min.
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas	**22 m^3**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	
Electricity	**n/a kWh**
Water	**6,400 L**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	

Other Input Assumptions

Equipment Life	**10 years**
Low flow showerheads have an estimated service life of 10 years.	
Incremental Cost (Cust. Install)	**$4**
* Actual cost per unit of product is $3.85.	
Free Ridership	**10 %**
As per EB-2006-0021 Phase II	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

1.25 GAL/MIN LOW-FLOW SHOWERHEAD

Commercial Building Retrofit (Distribution)

Efficient Technology & Equipment Description
Low-flow showerhead 1.25 gal/min.
Base Technology & Equipment Description
Average existing stock.

Resource Savings Assumptions

Natural Gas	**40 m^3**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	
Electricity	**n/a kWh**
Water	**10,700 L**
Savings recommended by Summit Blue Consulting.[1] Savings assumptions to be used for an interim period until additional load research is completed.	

Other Input Assumptions

Equipment Life	**10 years**
Low flow showerheads have an estimated service life of 10 years.	
Incremental Cost (Cust. Install)	**$4**
* Actual cost per unit of product is $3.39.	
Free Ridership	**10 %**
As per EB-2006-0021 Phase II	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

PRE-RINSE SPRAY NOZZLE (1.24 GPM)

Commercial Existing Buildings

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

Resource Savings Assumptions

Natural Gas	**3059 m^3**
Natural gas savings claims are based on the reduction of hot water use achieved by switching from a standard flow pre-rinse spray nozzle (3 USGPM)[1] to a low-flow pre-rinse spray nozzle(1.24 USGPM). Savings are based on the assumption of 3.75 hours of use per day[2] , 363 days per year. Savings were determined using the Pre-Rinse Spray Nozzle Savings spreadsheet[3] which provides consistent results with the Food Service Technology Centre's "Pre-Rinse Spray Valve Calculator".[4]	
Electricity	**n/a kWh**
Water	**544,145 L**
Water savings claims[5,6] are based on the reduction of water use achieved by switching from a standard flow spray nozzle (3 USGPM) to a low-flow spray nozzle (1.24 USGPM).	

Other Input Assumptions

Equipment Life	**5 years**
Pre-rinse spray nozzles have an estimated service life of 5 years.[2,5]	
Incremental Cost (Cust. / Contr. Install)	**$100**
The incremental cost is assumed to be $100 – the cost of the spray nozzle and installation. This is comparable to the incremental cost of $60 reported by the Region of Waterloo[6]	
Free Ridership	**5 %**
A free ridership rate of 5% is based on Enbridge's consultation with distributor.	

[1] "How to Buy a Low Flow Pre-Rinse Spray Valve", DOE Bulletin WS-5, September 2004.
[2] Enbridge market survey of average usage
[3] Pre-Rinse Spray Nozzle Savings Assumptions rev1.xls, Union Gas
[4] www.fishnick.com/tools/watercost/
[5] CEE Commercial Kitchens Initiative - Program Guidance on Pre-Rinse Spray Valves
[6] "Region of Waterloo – Pre-Rinse Spray Valve Pilot Study – Final Report", Veritec Consulting Inc., January 2005

PROGRAMMABLE THERMOSTAT

Commercial Existing Buildings

Efficient Technology & Equipment Description
Programmable thermostat
Base Technology & Equipment Description
Standard manual thermostat

Resource Savings Assumptions

Natural Gas (Updated)	**519 m^3**
As approved in EB-2006-0021 Phase II	
Electricity (Updated)	**921 kWh**
As approved in EB-2006-0021 Phase II	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
Equipment life recommended by Summit Blue Consulting and incorporated in 2008, on agreement with Union Gas 2007 Evaluation Audit Committee.	
Incremental Cost (Contr. Install) (UG/EGD)	**$50**
Based on average thermostat cost from Union survey of hardware chains.	
Free Ridership (Updated)	**20 %**
As approved in EB-2006-0021 Phase II	

[1] "Resource Savings Values In Selected Residential DSM Prescriptive Programs", Summit Blue Consulting, June 2008.

[2] "Residential Measure Free Ridership And Inside Spillover Study - Final Report", Summit Blue Consulting, June 2008.

HEAT RECOVERY VENTILATOR (HRV)

Commercial Existing Buildings

Efficient Technology & Equipment Description
Ventilation with HRV
Qualifier / Restriction
None
Base Technology & Equipment Description
Ventilation without HRV

Resource Savings Assumptions

Natural Gas	**2.92 m^3 / CFM**

The ERV and HRV gas savings are determined from engineering calculations utilizing inputs such as air flow, indoor/outdoor temperatures, indoor/outdoor and relative humidity. The operating hours of the equipment are based on typical values for the following commercial market sub-segments: Multi-Family, Hotel, Restaurant, Retail, Office, School, Health Care, Nursing Home, and Warehouse.

Building Occupancy	Typical Hrs of Operation per week
Multi-Family	168
Hotel	168
Restaurant	108
Retail	108
Office	60
School	84
Health Care	168
Nursing Home	168
Warehouse	168

Retail was used for the claim because it's close to the simple average of occupancy rates above

Electricity	**n/a kWh**
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
HRVs have an estimated service life of 15 years.[7]	
Incremental Cost	**$3.40 / CFM**
The incremental costs are based on relative scaling of incremental costs $1700 / 500 CFM.[7]	
Free Ridership	**5 %**
Previous free-Ridership rate as per 2005 ADR Settlement – EB-2005-0211 was 0%. Union will use a value of 5% until a more definitive value can be determined from evaluation.	

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

ENERGY RECOVERY VENTILATOR (ERV)

Commercial Existing Buildings

Efficient Technology & Equipment Description
Ventilation with ERV
Qualifier / Restriction
None
Base Technology & Equipment Description
Ventilation without ERV

Resource Savings Assumptions

Natural Gas	**3.14 m^3 / CFM**

The ERV and HRV gas savings are determined from engineering calculations utilizing inputs such as air flow, indoor/outdoor temperatures, indoor/outdoor and relative humidity. The operating hours of the equipment are based on typical values for the following commercial market sub-segments: Multi-Family, Hotel, Restaurant, Retail, Office, School, Health Care, Nursing Home, and Warehouse.

Building Occupancy	Typical Hrs of Operation per week
Multi-Family	168
Hotel	168
Restaurant	108
Retail	108
Office	60
School	84
Health Care	168
Nursing Home	168
Warehouse	168

Retail was used for the claim because it's close to the simple average of occupancy rates above

Electricity	**n/a kWh**
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
ERVs have an estimated service life of 15 years.[8]	
Incremental Cost	**$2.50 / CFM**
The incremental costs are based on relative scaling of incremental costs $2500 / 1000 CFM.[7]	
Free Ridership	**5 %**
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211.[9]	

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

[9] EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

CONDENSING BOILERS

Commercial Existing Buildings

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

Resource Savings Assumptions

Natural Gas	**0.0119 m^3 / Btu/hr**
The natural gas savings are based on the reduction in space heating gas consumption from using a condensing boiler relative to a non-condensing boiler. The principle assumption in the calculation of the savings is that the condensing boiler is properly oversized by 20%. The heating load for the entire heating season can be determined from the installed capacity and boiler seasonal efficiency using degree day analysis. A generic rate of savings of 0.0119 m3 / Btu/hr of capacity was determined from this analysis. The single savings number is weighted average of Union Gas South (70%) and Union Gas North (30%) savings estimates.	
Electricity	**n/a kWh**
Water	**n/a L**

Other Input Assumptions

Equipment Life	**25 years**
Condensing boilers have an estimated service life of 25 years.[10]	
Incremental Cost	**\$15.40 / 10^3 Btu/hr**
A generic incremental cost of \$14,000 per million Btu / hr (adjusted for the US/CDN exchange by a factor of 1.10) was used based on information recently published in the ASHRAE Journal.[11]	
Free Ridership	**5 %**
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211.[12]	

[10] ASHRAE Applications Handbook – 2003, Chapter 36 – Owning and Operating Costs, Table 3.
[11] "Boiler System Efficiency", Thomas H. Durkin, ASHRAE Journal - July 2006
[12] EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005

INFRARED HEATERS

Commercial Existing Buildings

Efficient Technology & Equipment Description
Infrared Heater
Qualifier/Restriction
None
Base Technology & Equipment Description
Unit Heater

Resource Savings Assumptions

Natural Gas	**0.0102 m^3 / Btu/hr**

The infrared heater gas savings were based on the analysis procedures previously created by Agviro Inc. for Union. The analysis was supplemented by adding a 20% oversizing factor on the equipment in the analysis. A generic rate of savings of 0.0102 m3 / Btu/hr of capacity was determined from this analysis. The single savings number is weighted average of Union Gas South (70%) and Union Gas North (30%) savings estimates.

Electricity	**312 kWh**	**0-49,999 Btu/hr**
	624 kWh	**49,999 – 164,999 Btu/hr**
	936 kWh	**> 165,000 Btu/hr**

Electricity savings are determined from the difference in electricity consumption of the infrared heater and a comparable unit heater.

		Blower Motor		Infrared		Operating Hours (hrs)		
Capacity		hp	kW	hp	kW	Unit Heater	Infrared	Electrical Savings (kWh)
less than	50000	0.167	0.124	0.042	0.031	2509	2133	312
less than	165000	0.333	0.249	0.042	0.031	2509	2133	624
greater than	165000	0.500	0.373	0.042	0.031	2509	2133	936

*Electricty savings based on Solaronics models that use a 1/24 hp motor.

Water	**n/a L**

Other Input Assumptions

Equipment Life	**20 years**
Infrared Heaters have an estimated service life of 20 years.[13]	
Incremental Cost	**\$15.40 / 10^3 Btu/hr**
An incremental cost of \$350 was used based on past input assumptions filed by Union.[14]	
Free Ridership	**33 %**
Free-ridership rate as per 2005 ADR Settlement – EB-2005-0211.[15]	

[13] "Prescriptive Incentives for Select Natural Gas Technologies", Prepared for Enbridge Consumers Gas and Union Gas Ltd., Prepared by: Jacques Whitford Environment Limited, Agviro Inc., and Engineering Interface Ltd., September 27, 2000.
[14] EB-2005-0211, Union Gas Settlement Agreement, April 7, 2005
[15] "Demand Side Management Research to Establish Free Ridership Rates for Infra-Red Tube Heaters among End Users and Channel Partners", marketPower Research, February 14, 2005.

DEMAND CONTROL KITCHEN VENTILATION (DCKV)

Commercial Existing Buildings

Efficient Technology & Equipment Description
Ventilation with DCKV
Qualification/Restriction
None
Base Technology & Equipment Description
Ventilation without DCKV

Resource Savings Assumptions

Natural Gas	**3,660 m3**	**0 – 4999 CFM**
	9,535 m3	**5000-9999 CFM**
	17,455 m3	**10000-15000 CFM**
The demand control kitchen ventilation savings were determined using the methodology described in the Detailed Energy Savings Report (www.melinkcorp.com). The savings were generated for three ranges of total range hood exhaust: 0 – 4999 CFM, 5000 – 9999 CFM, and 10,000 – 14,999 CFM. The midpoint of each exhaust range was used to generate the savings (both gas and electrical). The inputs for the savings calculations were supplied by MELINK as typical for each application range.		
Electricity	**7,319 kWh**	**0 – 4999 CFM**
	23,180 kWh	**5000-9999 CFM**
	40,929 kWh	**10000-15000 CFM**
(see Natural Gas)		
Water	**n/a L**	

Other Input Assumptions

Equipment Life	**20 years**	
DCKV has an estimated service life of 20 years.		
Incremental Cost	**$5,000**	**0 – 4999 CFM**
	$10,000	**5000-9999 CFM**
	$15,000	**10000-15000 CFM**
Typical costing information was provided by MELINK.		
Free Ridership	**5 %**	
Union will use a free-ridership value of 5% until a more definitive value can be determined from evaluation.		

SINGLE AIR DOOR INSTALLATION

Commercial Existing Buildings

Efficient Technology and Equipment Description
Installing a single air barrier on an exterior entrance door in a retail facility to maintain indoor air temperature

Resource Savings Assumptions

Natural Gas	**2,118 m^3**
In 2007, Enbridge implemented air door projects at various small commercial sites. Savings for each 2007 project were developed using a savings calculator and the results averaged to result in a prescriptive savings value. The Air Door Calculator was developed by Agviro, an independent engineering consultant. Inputs to the Calculator include: • Door size and location • Seasonal and daily operating schedules for the opening • Building heating and cooling loads • Heat loss through the opening • ASHRAE values for air curtain effectiveness	
Electricity	**172 kWh**
As above. The Air Door Calculator includes the impact of additional electricity use by the device in calculating net electricity savings.	
Water	**N/A L**

Other Input Assumptions

Equipment Life	**15 years**
Developed in conjunction with equipment manufacturers	
Incremental Cost (Contractor Installation)	**$1,650**
Developed in conjunction with equipment manufacturers	
Free Ridership	**5 %**
As per Generic Proceeding Decision Phase III	

DOUBLE AIR DOOR INSTALLATION

Commercial Existing Buildings

Efficient Technology and Equipment Description
Installing a double air barrier on an exterior entrance door in a retail facility to maintain indoor air temperature.

Resource Savings Assumptions

Natural Gas	**4,508 m^3**
In 2007, Enbridge implemented air door projects at various small commercial sites. Savings for each 2007 project were developed using a savings calculator and the results averaged to result in a prescriptive savings value. The Air Door Calculator was developed by Agviro, an independent engineering consultant. Inputs to the Calculator include: • Door size and location • Seasonal and daily operating schedules for the opening • Building heating and cooling loads • Heat loss through the opening ASHRAE values for air curtain effectiveness	
Electricity	**1,023 kWh**
As above. The Air Door Calculator includes the impact of additional electricity use by the device in calculating net electricity savings.	
Water	**N/A L**

Other Input Assumptions

Equipment Life	**15 years**
Developed in conjunction with equipment manufacturers	
Incremental Cost (Contractor Installation)	**$2,500**
Developed in conjunction with equipment manufacturers	
Free Ridership	**5 %**
As per Generic Proceeding Decision Phase III	

DESTRATIFICATION FAN

Commercial Existing Buildings

Efficient Technology & Equipment Description
Destratification Fan (per fan)
Qualifier/Restriction
For fans of 20' diameter and larger and in locations that have forced air space heating including unit heaters in warehousing, manufacturing, industrial, and retail buildings with ceiling heights of 25' and higher.
Base Technology & Equipment Description
Nothing

Resource Savings Assumptions

Natural Gas	**6,205 m^3**
Based on Caneta's report[16], which was based largely on destratification savings methodology published by ASHRAE[17] and DOE2.1E building modeling software Weighted average of savings from 20' & 24' diameter fans, based on market share[18] Weighted average ceiling height of 29 ft based on market share[19] Average 20 ft heater height from floor[20],[21],[22]; Temp setpoint of 70 degF (estimated) Space heating Gas usage data based on energy intensity for commercial buildings from NRCAN data[23]. Used a mix of 70% London and 30% North Bay's climate & destratification of 0.625 degF/ft.[24]	
Electricity	**(511) kWh**
Based on Caneta's report[16] and the same input parameters as above.	
Water	**n/a L**

Other Input Assumptions

Equipment Life	**15 years**
The estimated equipment life for destratification fans is 15 years [SEED Program Guidelines. J-20. December. 2004]. This value is also supported by ASHRAE [ASHRAE Handbook, HVAC Applications SI Edition. Chapter 36 -Table 4. Pg. 36.3. 2007], which lists the service life for propeller fans as 15 years.	
Incremental Cost (Cust. / Contr. Install)	**$ 7,021**
Weighted average of 20' and 24' diameter fans based on market data[18] and cost data[25]	
Free Ridership	**10 %**
based on market & total sales data for Ontario[26] and building type data from UG's Customer database	

[16] "Energy Savings Associated with De-stratification Fans in Buildings with High Ceilings", by Caneta Research Inc., October 2007
[17] "Saving Heating Costs in Warehouses." Richard Aynsley. ASHRAE Journal. Pg. 46.December 2005
[18] email from EnviraNorth, July 8, 2008, with fan sales data by fan diameter
[19] Weighted average based upon sales data associated with 25 ft to 35 ft ceilings EnviraNorth
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[21] 16-25' depending on age, New Box stores (retail) 30-35', Large high bays with crane are more like 50' (email from Bill Davies, Union Gas, 31 yrs experience, July 3, 2008 to Pete Koepfgen).
[22] between 18' and 30', average is 20' - email from EnviraNorth, July 8, 2008
[23] NRCAN - NEUD - Comprehensive Energy Use data tables - by end use warehouse & transportation average of data between 1990-2005
[24] average between 0.5 and 0.75 - "Technology Evaluation of Thermal Destratifiers and other Ventilation Technologies." Joel C. Hughes. Naval Facilities Engineering Service Center. and "Re-circulating Warm Air – Energy Tips from the Experts" ComEd An Exelon Company. 2002
[25] Targeted Market Study. HVLS fans on Wisconsin Dairy Farms. State of Wisconsin Department of Administration Division of Energy. June 12, 2006., RSMeans. Mechanical Cost Data - 29th Annual Edition. 2006, and communications with Manufacturers.
[26] Email from Joan Wood (EnviraNorth) to Victoria Falvo (UG), May 30, 2008

ENERGY EFFICIENT WASHERS

Commercial Existing Buildings

Efficient Technology & Equipment Description
High Efficiency Front Load Washers for application in the Multi-residential sector.
Base Technology & Equipment Description
Conventional top loading vertical axis washers.

Resource Savings Assumptions

Natural Gas	**342 m^3**
Source: City of Toronto Pilot Project[27] and communication from the Consortium for Energy Efficiency (CEE) re: dryer savings associated with change out to energy efficient washers. The City of Toronto conducted a study at six multi-residential sites to assess the savings from high efficiency front load washers. The sites were chosen to represent a wide range of usage patterns and included 945 suites and 39 clothes washers. Hot and cold water consumption was monitored at each site before and after washer change out and the results used to derive gas savings per washer. Data from CEE showed associated savings for a gas dryer. Savings for gas dryers were prorated to correspond to the market share in the Enbridge franchise (40% gas dryers and 60% electric dryers). Total gas savings are 342m3 per washer per year.	
Electricity	**306 kWh**
Data from CEE showed associated savings for an electric dryer. Savings for electric dryers were prorated to correspond to the market share in the Enbridge franchise (40% gas dryers and 60% electric dryers). Total electric savings are 306kWh per washer per year.	
Water	**90,790 L**
City of Toronto Pilot Project.	

Other Input Assumptions

Equipment Life	**10 years**
Incremental Cost (Cust. / Contr. Install)	**$450**
Free Ridership	**10 %**

[27] City of Toronto Works Department and the Toronto Housing Company, Draft Report – Multi Residential High Efficiency Clothes Washer Pilot Project, 2001.

PRESCRIPTIVE SCHOOLS - ELEMENTARY

Commercial Existing Buildings

Efficient Technology & Equipment Description
Space Heating, Hydronic Boiler with Combustion Efficiency of 83% or higher
Base Technology & Equipment Description
Space Heating, Hydronic Boiler with Combustion Efficiency of 80% to 82%.

Resource Savings Assumptions

Natural Gas	**10,830 m^3**
Source: Elementary Schools Prescriptive Savings Analysis Report, Agviro Inc., November 23, 2007. The AgViro study analyzed the gas usage of 859 elementary schools based on 2006 billing records. The analysis determined: • The consumption and size of an average elementary school • The size of boiler required to heat the typical elementary school • The manufacturer's suggested retail price for boilers based on the determined size • The savings of higher efficiency boilers versus a base case of 80 to 82% efficiency • Incremental costs associated with the higher efficiency boiler Based on Enbridge project records the study found that 2 smaller boilers are typically installed (2 X 400 MBH boilers for elementary schools). Also, based on project records, the study found that boiler upgrades will be weighted 89% towards the efficiency range of 85% to 88% and 11% towards boilers with combustion efficiencies ranging from 83% to 84%. Using this data from project records, the resulting analysis provided a weighted average savings 0f 10,830m3 per elementary school.	
Electricity	**N/A kWh**
Water	**N/A L**

Other Input Assumptions

Equipment Life	**25 years**
As per Enbridge 2007-2009 Multi-year plan	
Incremental Cost (Contractor Install)	**$8,646**
Source: Elementary Schools Prescriptive Savings Analysis Report, Agviro Inc., November 23, 2007. Incremental costs are based on the weighted average of boiler types as noted above.	
Net to Gross	**100 %**
Source: Custom Projects Attribution Study – Summit Blue Consulting, 2008.	

PRESCRIPTIVE SCHOOLS - SECONDARY

Commercial Existing Buildings

Efficient Technology & Equipment Description -
Space Heating, Hydronic Boiler with Combustion Efficiency of 83% or higher
Base Technology & Equipment Description
Space Heating, Hydronic Boiler with Combustion Efficiency of 80% to 82%.

Resource Savings Assumptions

Natural Gas	**43,859 m^3**
Source: Secondary Schools Prescriptive Savings Analysis Report, Agviro Inc., November 23, 2007. The AgViro study analyzed the gas usage of 147 secondary schools based on 2006 billing records. The analysis determined: • The consumption and size of an average elementary school • The size of boiler required to heat the typical elementary school • The manufacturer's suggested retail price for boilers based on the determined size • The savings of higher efficiency boilers versus a base case of 80 to 82% efficiency • Incremental costs associated with the higher efficiency boiler Based on Enbridge project records the study found that 2 smaller boilers are typically installed (2 X 1500 MBH boilers for secondary schools). Also, based on project records, the study found that boiler upgrades will be weighted 89% towards the efficiency range of 85% to 88% and 11% towards boilers with combustion efficiencies ranging from 83% to 84%. Using this data from project records, the resulting analysis provided a weighted average savings 0f 43,859m3 per elementary school.	
Electricity	**N/A kWh**
Water	**N/A L**

Other Input Assumptions

Equipment Life	**25 years**
As per Enbridge 2007-2009 Multi-year plan	
Incremental Cost (Contractor Install)	**$14,470**
Source: Secondary Schools Prescriptive Savings Analysis Report, Agviro Inc., November 23, 2007. Incremental costs are based on the weighted average of boiler types as noted above.	
Net to Gross	**100 %**
Source: Custom Projects Attribution Study –Summit Blue Consulting, 2008.	

CFL SCREW-IN (13W)

Efficient Technology & Equipment Description
CFL screw-in 13W
Base Technology & Equipment Description
60W Incandescent

Resource Savings Assumptions

Natural Gas (Updated)	**0 m^3**
Electricity	**45 kWh**
Substantiation provided by the OPA, dated September 23, 2008.	
Water (Updated)	**0 L**

Other Input Assumptions

Equipment Life	**8 years**
Substantiation provided by the OPA, dated September 23, 2008.	
Incremental Cost Customer Install	**1.75 $**

- Average cost of 60 W incandescent bulb = $0.75 / bulb based on Canadian Tire website (2007).
- Average cost of 13 W CFL = $4.75 / bulb based on 2007 EKC distributor sales data and average bulb per coupon

8 years x .75 = $6.00 - $4.75 = $1.25

$1.25 + .50 (Contractor Installation) = $1.75

Free Ridership	**24 %**
Based on the results of an OPA program evaluation.	

CFL SCREW-IN (23W)

Efficient Technology & Equipment Description
CFL screw-in 23W
Base Technology & Equipment Description
75W Incandescent

Resource Savings Assumptions

Natural Gas (Updated)	**0 m^3**
Electricity	**49.7 kWh**
Substantiation provided by the OPA, dated October 17, 2008.	
Water (Updated)	**0 L**

Other Input Assumptions

Equipment Life	**8 years**
Substantiation provided by the OPA, dated October 17, 2008.	
Incremental Cost Customer Install	**2.00 $**
• Average cost of 75 W incandescent bulb = $0.75 / bulb based on Canadian Tire website (2007). • Average cost of 23 W CFL = $4.50 (OPA, October 9, 2008 data) 8 years x .75 = $6.00 - $4.50 = $1.50 $1.50 + .50 (Contractor Installation) = $2.00	
Free Ridership	**24 %**
Based on the results of an OPA program evaluation.	