



Good Energy Rebate Program

2007-2014 Program Review

April 2014



Good Energy Rebate Program Review

Contents

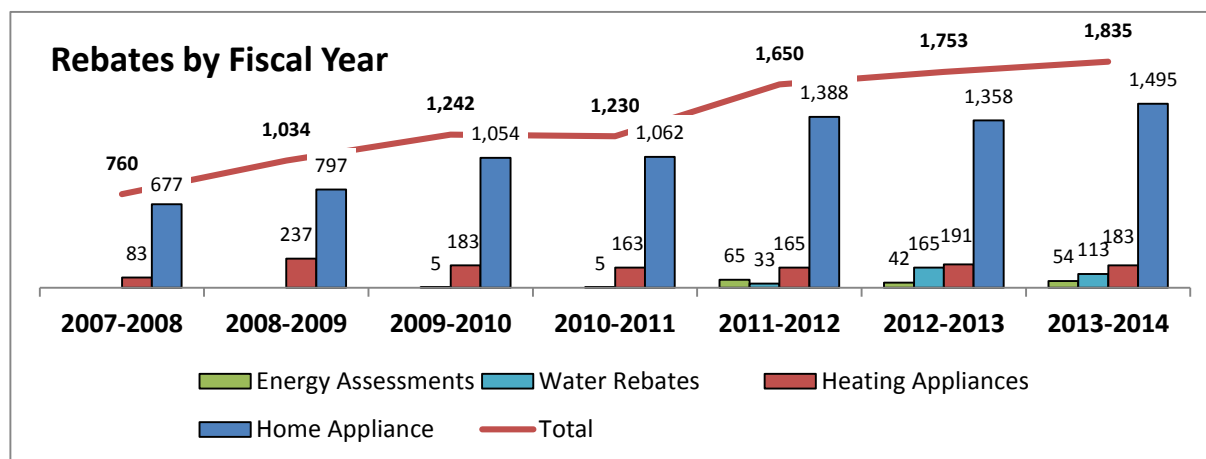
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Overview

Since 2007, the *Good Energy* Rebate Program has reduced household energy loads, GHG emissions and heating and electrical costs through incentivizing the purchase of ENERGY STAR® appliances such as clothes washers, refrigerators and heating systems. Over 9,500 rebates have been issued to 6,600 clients since the inception of the program resulting in significant lifetime program cost savings of \$15,300,000, the displacement of 29,000 tonnes CO_{2e} (equivalent carbon dioxide) and savings of 17,000,000 kWh.

The *Good Energy* Rebate Program is a market transformation program that is designed to change Yukon market behaviour by providing incentives to motivate Yukon residents to purchase energy efficient home appliances, technologies and services. Incentives are offered for the following items:

- Home appliances – clothes washers, refrigerators, freezers and dishwashers;
- Heating appliances – woodstoves, pellet stoves, oil and propane furnaces/boilers and air source heat pumps (ASHP);
- Water heating appliances and technologies – solar thermal hot water systems, drain water heat recovery systems (DWHRS) and water efficient toilets; and
- Residential energy assessments.



As depicted in the chart above, home appliance rebates are the most popular rebates, followed by heating appliance rebates, water rebates and rebates for energy assessments.

The program has evolved since its original launch in spring 2007 when the 2007/2008 Appliance Rebate Program focused on household appliances and oil and propane furnaces and boilers. The most recent additions to the program include incentives for Residential Energy Assessments, water-efficient toilets and air source heat pumps. Incentives for outboard motors and HRVs were dropped in 2010/2011 due to market transformation and the introduction of the Green Building Standards in Whitehorse requiring the installation of heat recovery ventilators (HRVs) in new residential builds. In 2013, the eligibility criteria for heating appliances was updated to reflect the 2012 energy amendment to the 2010 National Building Code which set more stringent efficiency targets for heating systems along with other residential energy efficiency requirements.

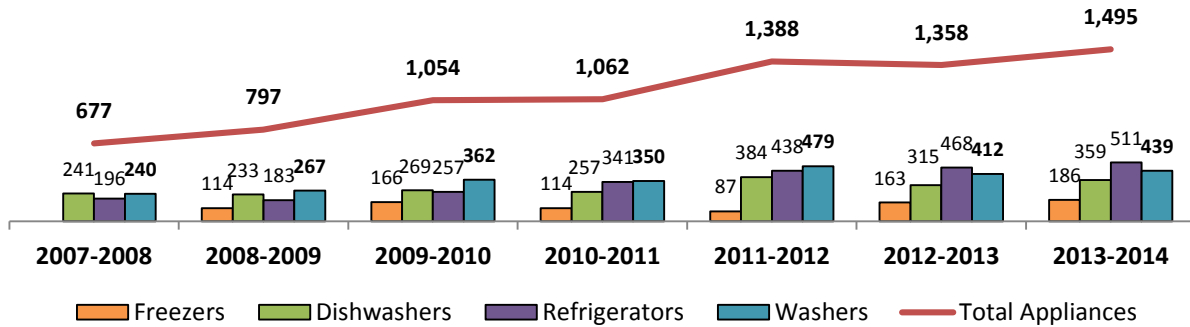
HOME APPLIANCES

Home appliances are the most popular rebates in the *Good Energy* Rebate Program. This is likely due to the lower cost and shorter lifespans of home appliances and general consumer confidence and/or willingness to purchase home appliances when compared to the purchase of a major home heating appliance.

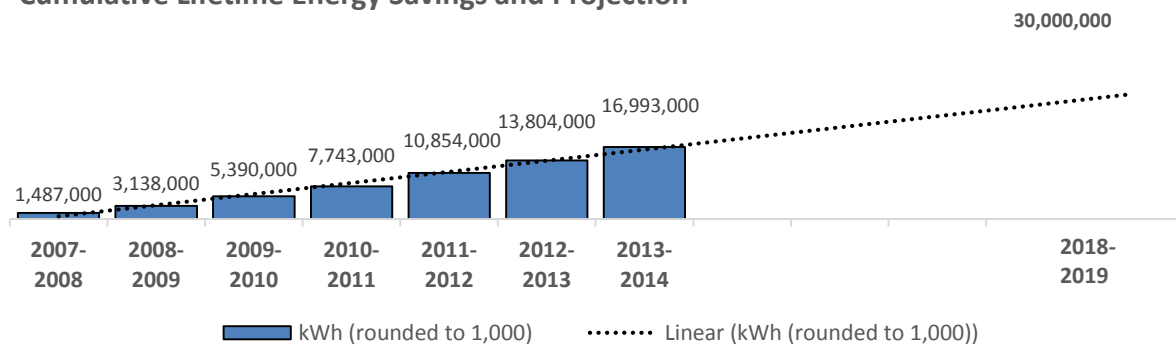
Participation in the *Good Energy* Rebate Program's home appliance rebates has been consistent over the last three years, with an average of 1,414 rebates per year issued from 2011-12 to 2013-14. Clothes washers and refrigerators have been the most popular appliance rebated followed by dishwashers. Freezers were the appliance least rebated. As an incentive to retire refrigerators that are older than five years and still in use, the Energy Solutions Centre offers a companion program to the *Good Energy* Rebate Program, the [Refrigerator Freezer Retirement Program](#).

Total lifetime energy savings for rebated home appliances is projected at 17 million kWh. This is equivalent to the average annual electrical consumption of 1,320 typical Yukon households. The total lifetime client cost savings is projected at \$2,182,000 which translates to \$395 per client. If participation in the *Good Energy* Program were to continue at current levels for another 5 years, 30,000,000 kWh in energy savings and \$3,700,000 in client savings could potentially be realized. Please see [Appendix A – Assumptions](#) for complete breakdowns of the energy and cost calculations for each of the sections in this report.

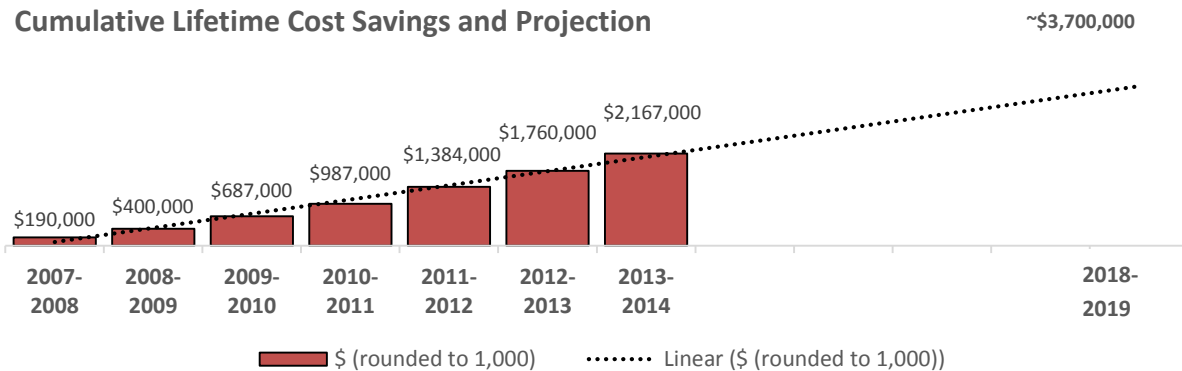
Home Appliance Rebates by Year



Home Appliances Cumulative Lifetime Energy Savings and Projection



Home Appliances Cumulative Lifetime Cost Savings and Projection

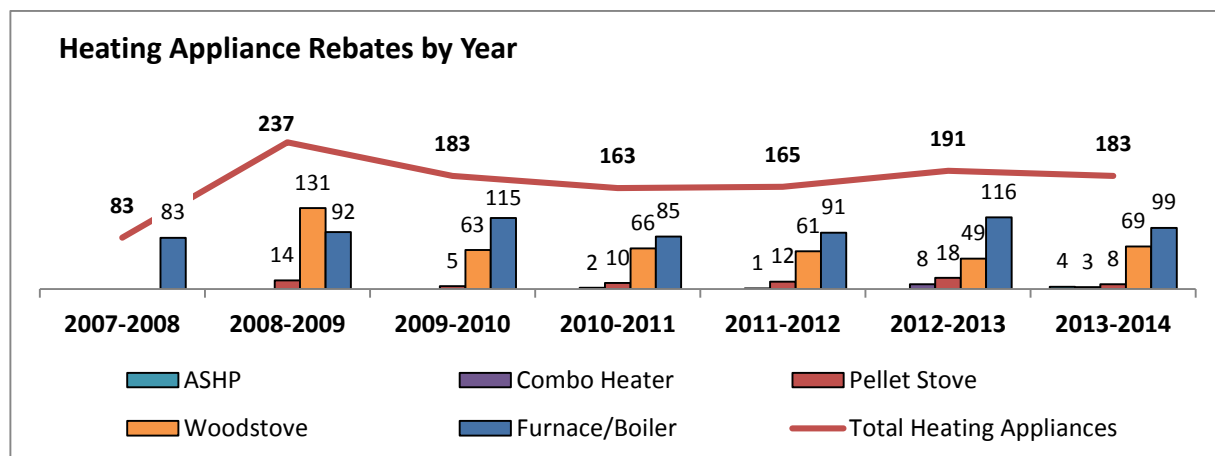


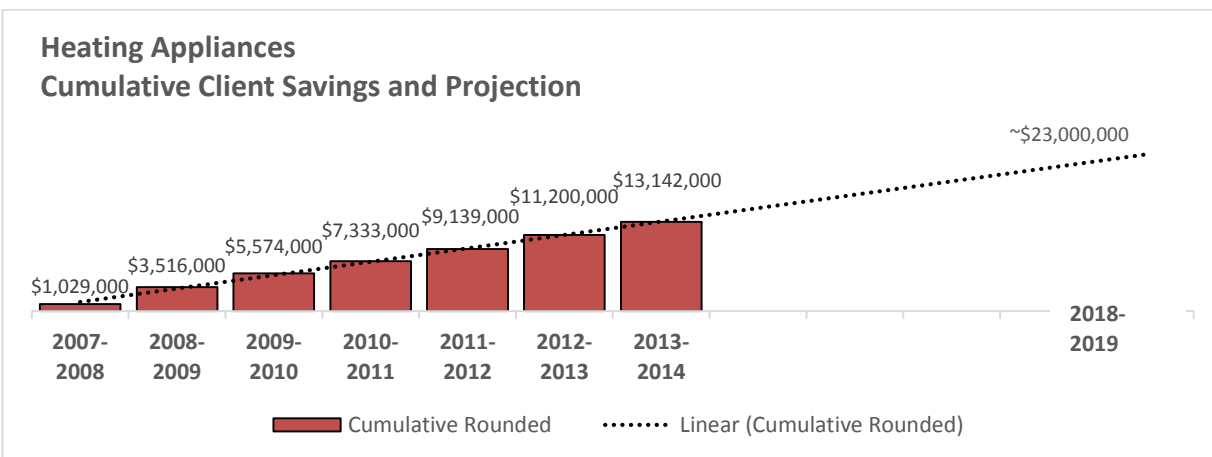
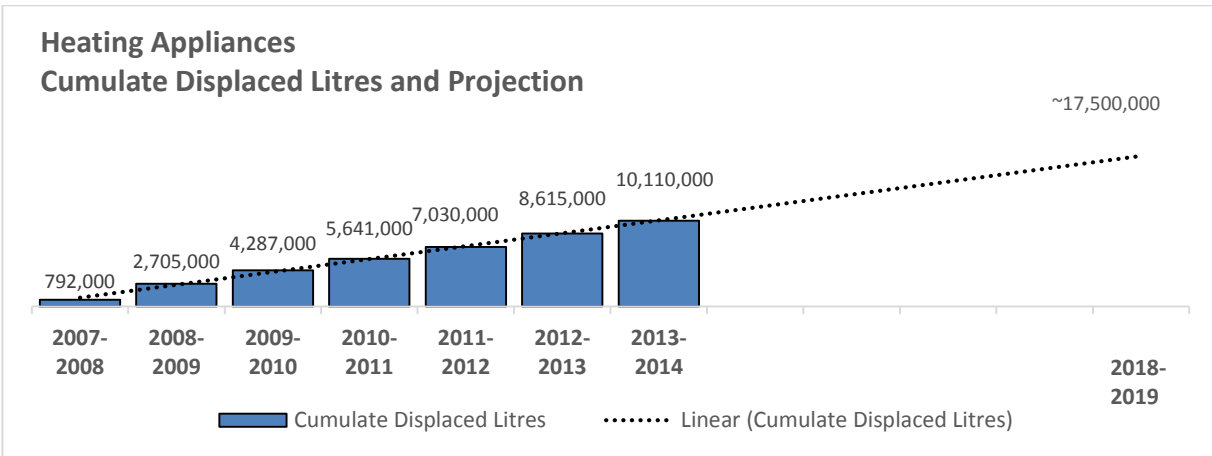
HEATING APPLIANCES

The *Good Energy* heating appliance rebates are second to home appliances in terms of total rebates issued to clients. The heating appliance rebates peaked in 2008-2009 with a rise in the sales of woodstoves. This rise coincided with a jump in the price of oil in 2008. Since 2007-2008, an average of 187 heating appliance rebates has been issued with furnaces, boilers and woodstoves being the most popular heating appliances.

Total lifetime displaced oil due to the *Good Energy* program rebates is projected at 10 million litres which is enough fuel to heat 187 Yukon homes for 20 years. The projected lifetime client cost savings total is \$13 million or \$10,200 per participating client. If client engagement in heating appliance rebates were to continue at current levels for another 5 years, 17.5 million litres of displaced oil and \$23 million dollars in client could potentially be realized.

Incentivizing the purchase and usage of more efficient oil and propane furnaces and boilers leads to more efficient burning of these fuels and less fuel consumed. Incentivizing the purchase and usage of biomass heating systems, such as wood and pellet stoves, promotes the substitution of biomass fuels over more expensive fossil fuels and displaces GHG emissions. The lifetime displaced oil and cost savings calculations are based on an assumed 15 per cent efficiency improvement on furnace and boiler installations, an assumed 50 per cent reduction in fossil fuel use due to biomass heating system installs and are projected over the lifetime of the appliance. Please see [Appendix A – Assumptions](#) for complete a complete breakdowns of the energy and cost calculations.

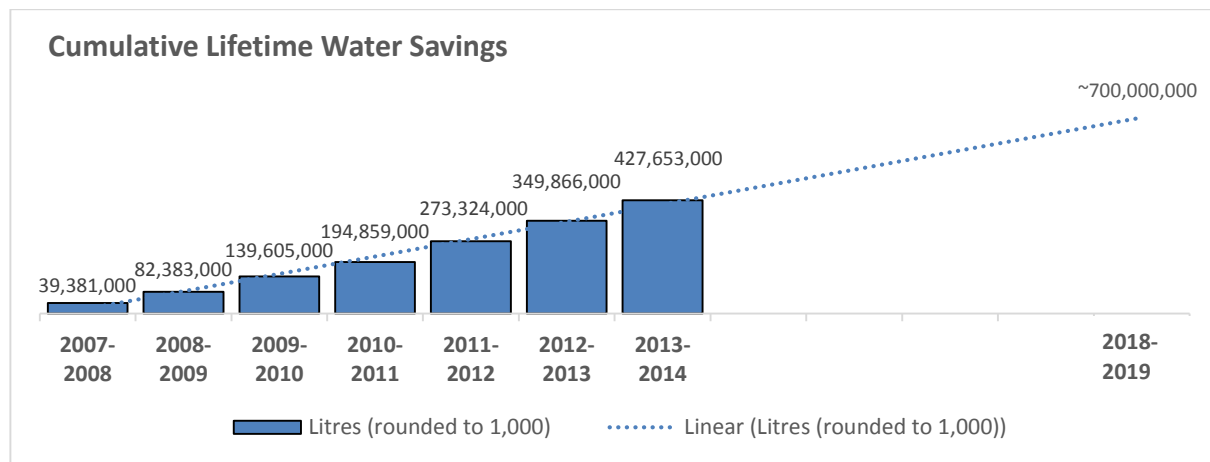
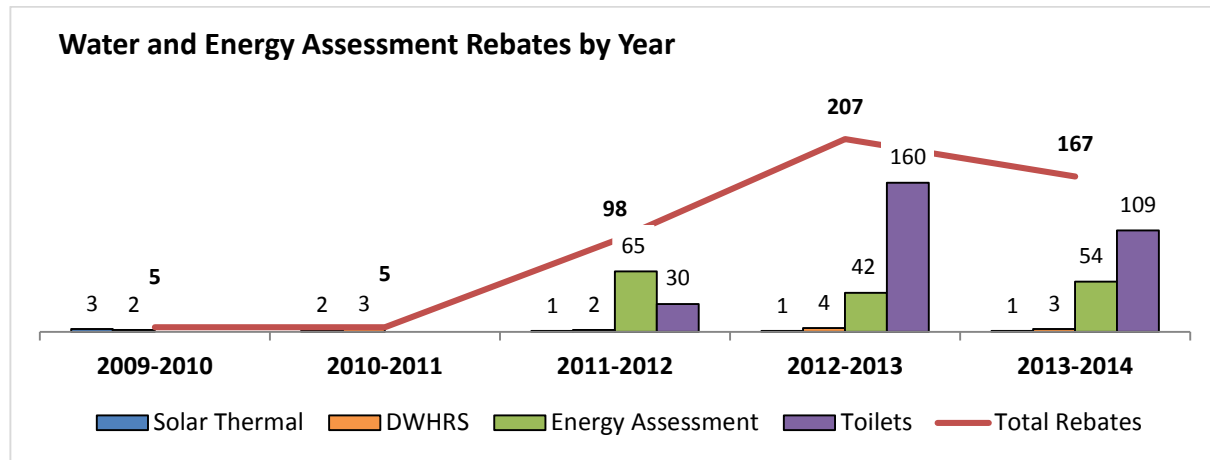




WATER AND ENERGY ASSESSMENTS

The Water and Energy Assessments sections of the *Good Energy Rebate Program* are relatively new. Rebates for solar hot water systems were introduced in 2008-2009 with the first rebates being issued the following year. Rebates for drain water heat recovery systems (DWHRS) – systems that facilitate heat recovery from shower drain water – was introduced in 2009-2010. The rebate for water efficient toilets was announced in 2011-2012 and saw immediate pick-up with 30 rebates being issued that year. A rebate for energy assessments was also introduced that same year and received a positive reception with 65 rebates being issued. The energy assessment rebate complemented the federal EcoEnergy® program, which provided grants for energy assessments and successfully completed energy retrofits. Participation in this rebate has dropped off since 2012-2013 with the cancellation of the federal program.

Total lifetime water savings is projected at 427.6 million litres. If client engagement were to continue at this level of interest for another 5 years, 700 million litres of water savings could be realized. Please see [Appendix A – Assumptions](#) for a complete breakdown of the water savings calculations.

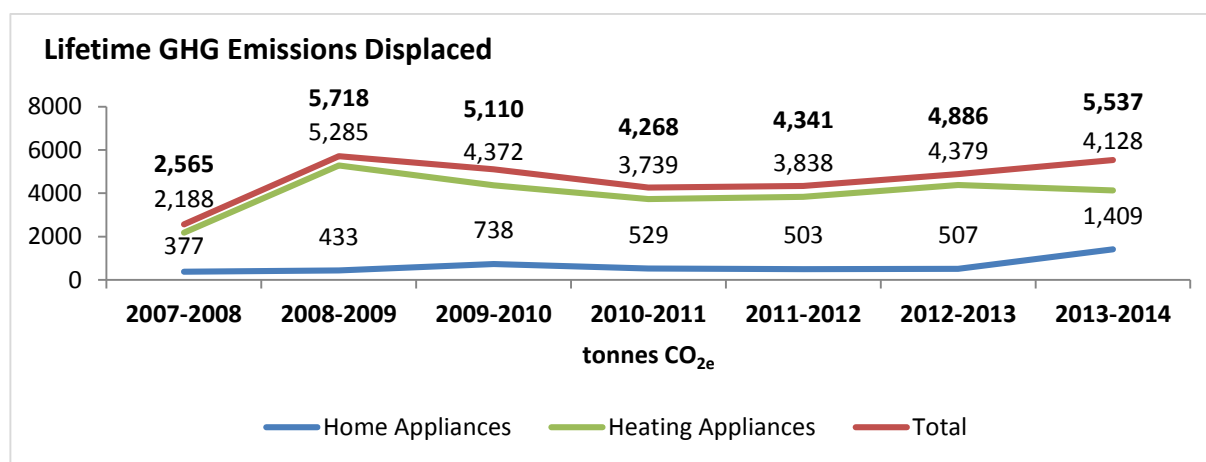


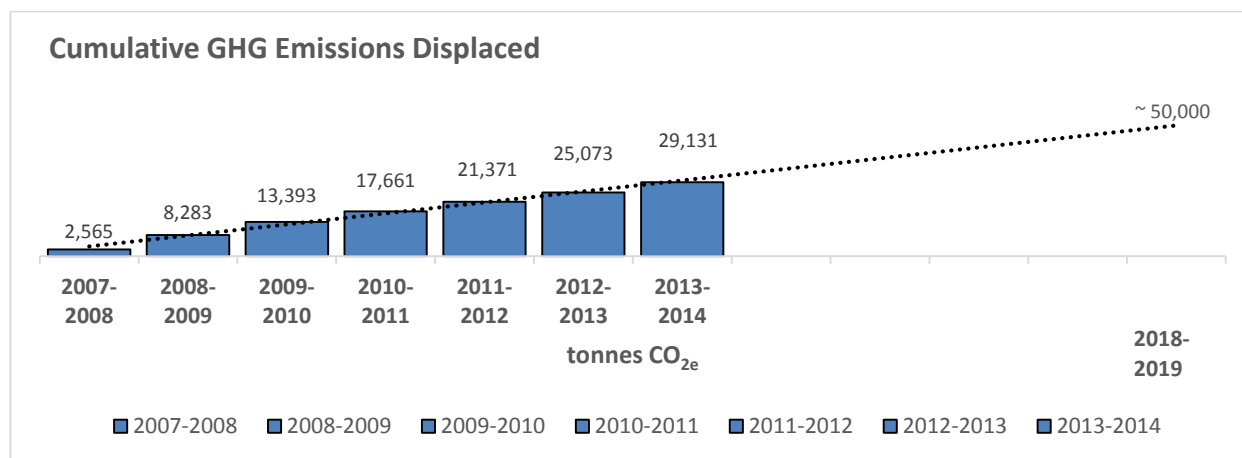
GREENHOUSE GAS EMISSIONS

Since the inception of the *Good Energy* Rebate Program in 2007, close to 30,000 tonnes of CO_{2e} have been displaced by the *Good Energy* Rebate program. The purchase of energy efficient heating appliances account for the bulk of the displacement, with furnace and boiler efficiency gains making up two thirds of the displaced carbon emissions. The remaining carbon emissions displacement involves clients switching to carbon-neutral biomass heating appliances such as wood and pellet stoves.

Home appliance rebates have relatively minor impact on the total emissions displaced due to the low emissions associated with the Yukon Integrated System electric grid which is powered almost exclusively by hydro. It is important to note that 84% of Yukon home appliance emissions are generated by 121 households in diesel communities. Though a small percentage of total emissions, there are substantial emissions reduction opportunities in the diesel communities due to the reliance on diesel for electrical generation.

If client engagement in the Good Energy Program were to continue at current levels for another 5 years, 50,000 tonnes of CO_{2e} could potentially be realized. See Appendix A – Assumptions for complete GHG emissions assumptions.



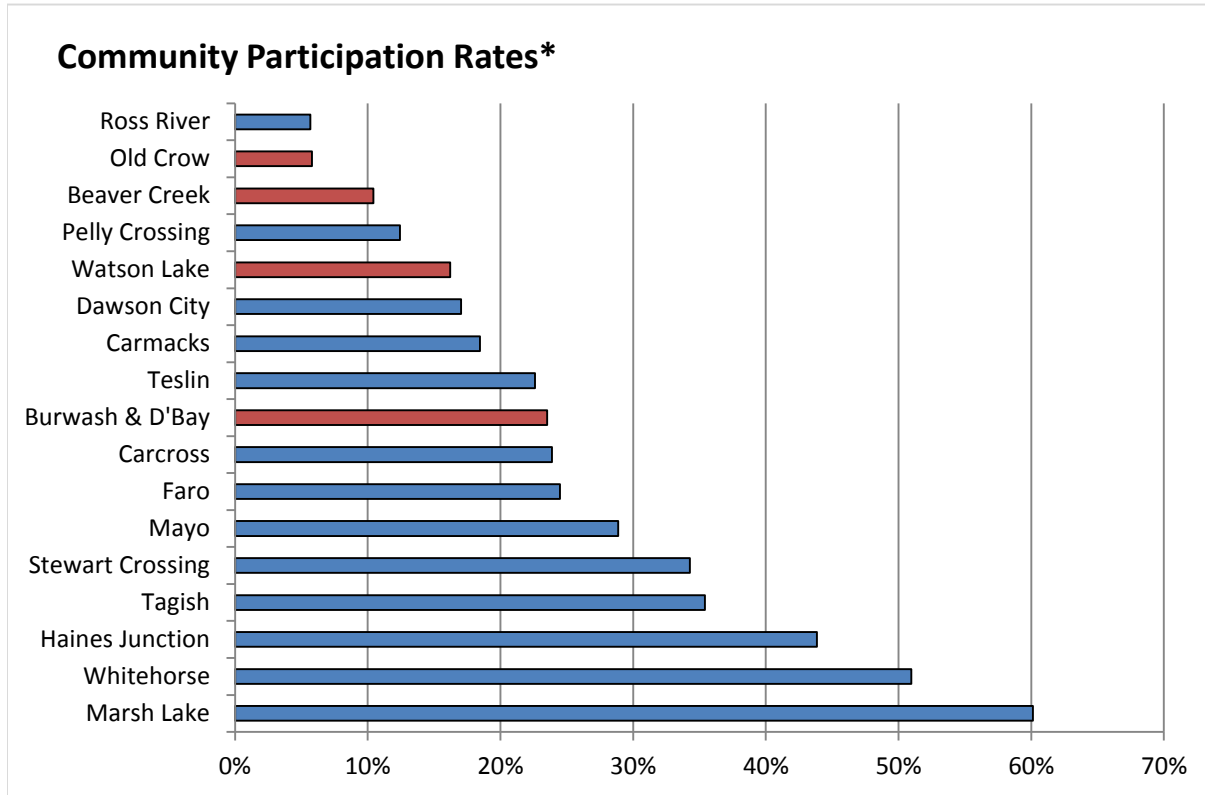


PARTICIPATION

The City of Whitehorse is Yukon's largest urban centre and has the second highest household participation rate in the Good Energy Rebate Program, with close to 50% of all households having received one or more rebates. This participation rate is high for a demand side management program and indicates a mature and successful rebate program.

In hydro-connected communities outside of Whitehorse, 28% of households have participated in the program as compared to 13% of diesel communities. The low participation rate of diesel communities is likely due to their relative geographic isolation, distance from larger retail outlets and limited exposure to program advertising.

In remote communities, individuals may purchase appliances outside of Whitehorse and, therefore, miss the two most effective forms of promotion for Good Energy Rebate Program, which are at point of sale and through word of mouth. Developing community-based marketing programs and/or promoting participation through community energy plans are ways in which participation rates for smaller communities could be increased.



*Community participation is calculated by counting the total number of unique households participating in the rebate program by community and dividing unique households by total households within that community. Note: Diesel communities are shown in red.

BUDGET

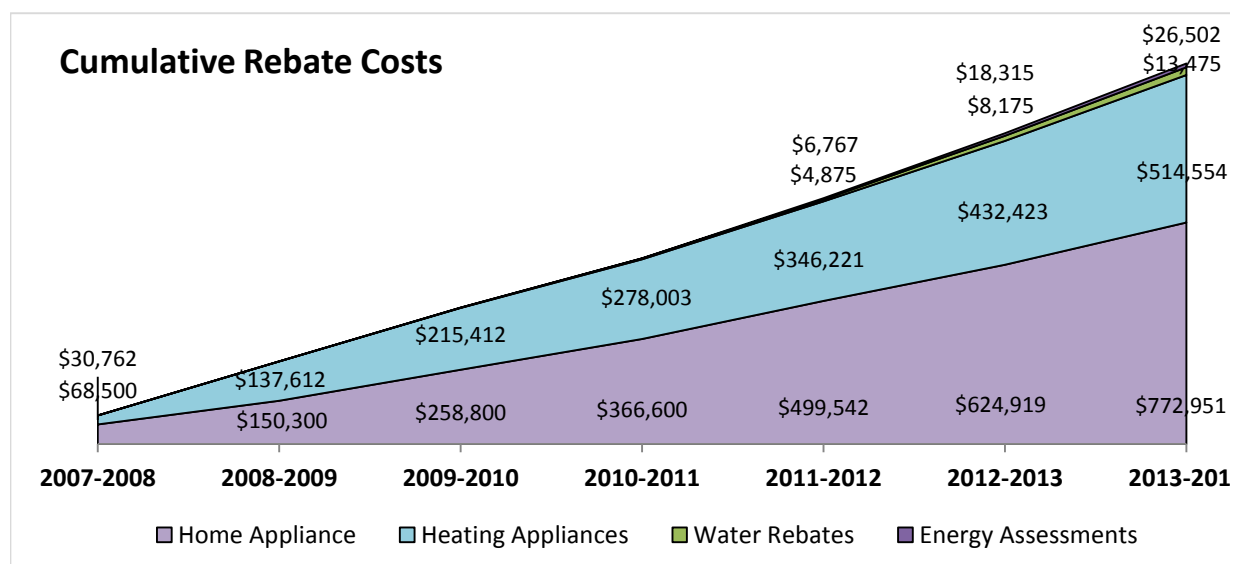
Total expenditures for the *Good Energy* Rebate Program have remained steady, averaging \$230,500 over the last six fiscal years. Rebates per fiscal year average 89% of total program costs with the remainder expended as promotion and advertising. The last fiscal year, 2013-2014, had the highest program expense which corresponded with the highest number of rebates issued in program history. Total cumulative costs for the *Good Energy* Rebate Program amount to \$1.3 million dollars since 2007.

Based on the energy, GHG emissions and cost savings associated with the program and the strong and continued interest in the program detailed in the preceding sections, it is

recommended that the current budget for the Good Energy Rebate Program be maintained or increased to include rebates for other energy efficiency sectors such as new housing builds, retrofits and/or transportation.

Budget per Fiscal Year

Fiscal Year	Promotion	Rebates	Total Budget	Rebate per Total Expense
2007-2008	\$8,740	\$99,262	\$108,002	92%
2008-2009	\$26,677	\$188,650	\$215,327	88%
2009-2010	\$27,026	\$188,000	\$215,026	87%
2010-2011	\$36,512	\$171,877	\$208,389	82%
2011-2012	\$21,371	\$209,616	\$230,987	91%
2012-2013	\$24,376	\$226,427	\$250,803	90%
2013-2014	\$19,242	\$243,650	\$262,892	93%
Total	\$163,944	\$1,327,482	\$1,491,426	

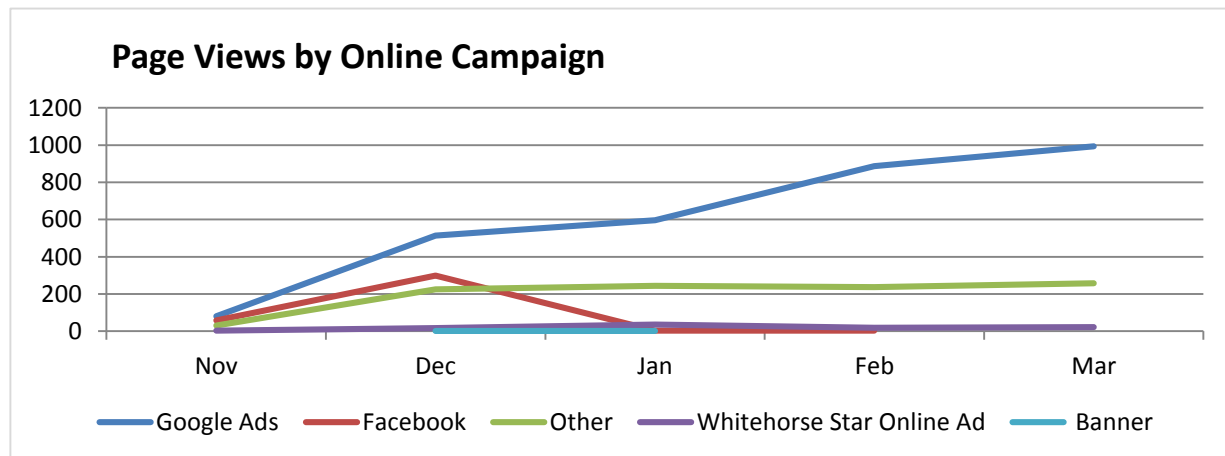
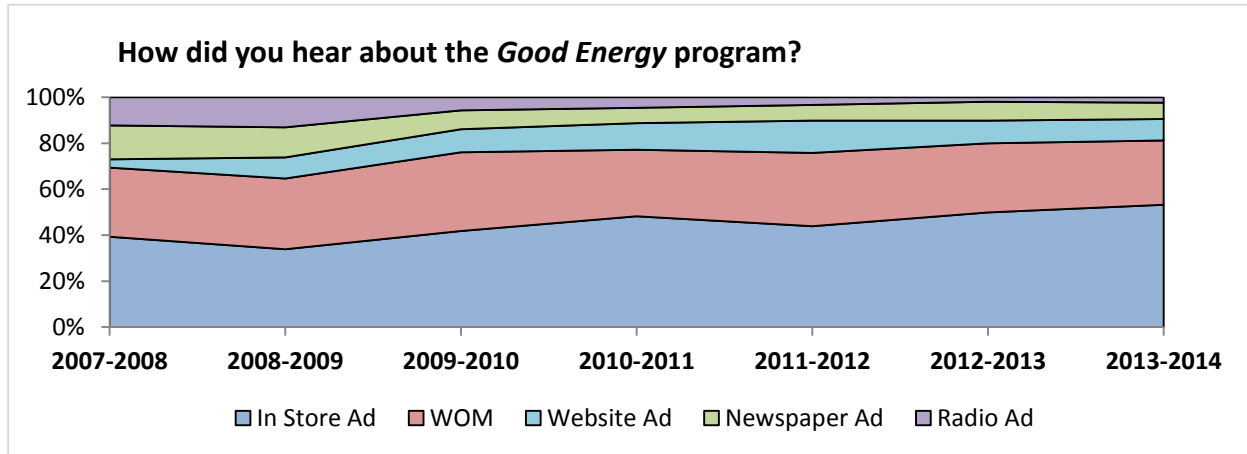


ADVERTISING

Based on client responses from the questionnaire section of the *Good Energy* rebate application form, the two most important ways that clients become informed of the program are through point of purchase and word of mouth (53% and 28% respectively in 2013-2014).

Paid forms of advertising, such as website, newspaper and radio ads, were identified by

significantly fewer clients as their source for program awareness (18% combined for 2013-2014). The questionnaire provides a general impression of client rationale. For instance, radio was identified as being an influence despite radio ads being discontinued two years ago. Since November, page views of online ads have been tracked. Google and Facebook ads were strong performers and merit further attention and investment.



Conclusion

Since its launch, the *Good Energy* Rebate Program has facilitated substantial energy and cost savings and greenhouse gas emissions reductions for Yukon residents. Total lifetime energy savings to date are projected at 17 million kWh with the potential to save an additional 13

million kWh over the next five years if participation in the program remains at current levels. Total displaced litres of oil due to the purchase of higher efficiency furnaces and boilers and fuel-switching to biomass is projected at 10 million litres to date with the potential for an additional 7.39 million litres to be realized over the next five years. Total cost savings to Yukoners are estimated to be \$15.3 million dollars or \$2,800 per participating client. If the *Good Energy* Program were to continue with current levels of participation for the next five years an additional \$11.4 million dollars are projected to be realized. In addition to these energy and cost savings, 29,000 tonnes of CO_{2e} have been offset through energy efficiency and fuel displacement with the potential for an additional 21,000 tonnes of CO_{2e} to be offset over the next five years. Finally, 427 million litres of water is estimated to have been saved through improved appliance efficiency, with the potential to achieve an additional 273 million litres in the next five years.

The *Good Energy* Program has generated significant energy, cost, GHG emissions and water savings in the Yukon since 2007. It has also experienced very strong and consistent participation rates in the capital city and surrounding communities. There is, however, opportunity for program improvement. It is recommended that the following items be considered as additions and/or revisions to the *Good Energy* Program.

- Expanding the program to include incentives for building new homes and retrofitting existing homes to high performance energy standards.
- Expanding the program to include residential lighting incentives.
- Targeting an increase in participation rates of remote and/or diesel communities.
- Simplify data collection by having clients enter details online or at a kiosk computer at the Energy Solutions storefront. Allow those clients without computer access to continue using paper forms to submit applications.
- Collecting more specific details such as appliance types (specifically heating systems), date purchased (for tracking advertising impacts) and costs of appliances (to review local retailer/contractor costs and purchasing trends).
- Evaluating the potential to host the *Good Energy* database on SharePoint and/or use SharePoint to provide live monitoring and the ability to generate *Good Energy* reports.
- Developing an Evaluation, Monitoring and Verification (EMV) reporting system to provide a detailed evaluation of the economic impact and continuing viability of the program.

The *Good Energy* Program has had significant impact in reducing residential energy demand loads in Yukon through the promotion of energy efficient home appliances and heating

systems. The program has saved Yukoners millions of dollars through increased efficiency and fuel switching and has resulted in the offsetting of thousands of tonnes of GHG emissions. It is the final recommendation of this report that the program be extended with a detailed EMV report to be delivered within the next three years.

Appendix A – Assumptions

HOME APPLIANCES

Assumptions

- The energy savings factors summarized below reflect the difference in electrical consumption between ENERGY STAR® and non-ENERGY STAR® appliances based on [“Energy Saving Calculators from Energy Star.”](#)
- Appliance life expectancy comes from the [“2011 Energuide Appliance Directory.”](#)
- Total energy, GHG and cost savings calculations take into account the expected lifetime of the appliances. Therefore the total lifetime energy savings associated with purchasing an ENERGY STAR® refrigerator is assumed to be 2,304 kWh.
- The average annual electricity use per home in Yukon is assumed to be 12,870 kWh based on the Yukon Electricity Conservation and Demand Management Potential Review (CPR 2011), Residential Sector Final Report, 9 January 2012.
- Each rebate issued is assumed to have influenced the purchase of an ENERGY STAR® appliance.

	Dishwashers	Freezers	Refrigerators	Clothes Washers
Energy Savings (kWh)	26	41	128	284
Expected Lifetime of	13	19	18	14
Lifetime Energy Savings	338	779	2,304	3,976

ENERGY STAR Appliance Calculators

http://www.energystar.gov/buildings/sites/default/uploads/files/appliance_calculator.xlsx?7224-046c=&7224-046ceiling_fan_calculator_xlsx=&0f32-6b9e&0f32-6b9e

http://www.energystar.gov/buildings/sites/default/uploads/files/appliance_calculator.xlsx?7224-046c=&7224-046ceiling_fan_calculator_xlsx=&0f32-6b9e&0f32-6b9e

http://www.energystar.gov/buildings/sites/default/uploads/files/appliance_calculator.xlsx?7224-046c=&7224-046ceiling_fan_calculator_xlsx=&0f32-6b9e&0f32-6b9e

http://www.energystar.gov/buildings/sites/default/uploads/files/appliance_calculator.xlsx?7224-046c=&7224-046ceiling_fan_calculator_xlsx=&0f32-6b9e&0f32-6b9e

HEATING APPLIANCES

Assumptions

- The chart below summarizes the assumptions made in calculating the fuel consumption, GHG and cost savings associated with the purchase of ENERGY STAR® furnaces and EPA certified wood and pellet stoves.
- Each rebate issued is assumed to have influenced the purchase of an ENERGY STAR® appliance.

Furnace Assumptions	
Mbtu consumed per year per house	100
Mbtu per gallon of heating oil	0.14
Gallons of heating oil required to heat 100 Mbtu house	714
Litres of heating oil required to heat 100 Mbtu house	2,704
Litres required to heat 100 Mbtu house with 100% efficient furnace	2,704
Litres required to heat 100 Mbtu house with 85% efficient furnace	3,110
Difference	406
Cost per litre of heating oil	\$ 1.305
Biomass Appliance Assumptions	
Mbtu displaced oil heat	50
Displaced litres of oil per year per client	357
kWh/litre diesel	3.80
GHG Emissions Assumptions	
g CO2 per litre of heating oil	2,752
g CO2 per kg wood fuel	848
2012 Climate Registry Default Emissions Factors	

WATER APPLIANCES

Assumptions

- The chart below summarizes the assumptions made in calculating the water savings associated with the purchase of EnergyStar® dishwashers, clothes washers and WaterSense-certified toilets.
- Each rebate issued is assumed to have influenced the purchase of an ENERGY STAR® or WaterSense-certified appliance.

	Toilet	
post-1994 toilet (litres per flush)	6	
EPA Water Sense Toilet* (litres per flush)	5	
Difference (litres)	1	
4 Flushes per Person per Day x 365 Days/Year**	1,768	
2.4 per household***	4,244	
Annual Water Savings (litres)	4,244	
* Watersense Calculator	http://www.epa.gov/watersense/our_water/how_works.html#assumptions	
** Environment Canada Wiser Water Use	http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=F25C70EC-1	
*** Yukon Bureau of Stats	http://www.eco.gov.yk.ca/pdf/families06.pdf	

GHG EMISSIONS

Assumptions

- The chart below summarizes the assumptions made in calculating the GHG emissions associated with the energy used to power home appliances and heating systems.

Fuel Source	Efficiency Factor	CO2 Emission Factor (g CO2)	Methane Emission Factor (g CH4)	Nitrous Oxide Conversion Factor (g N2O)	CH4 to eCO2 Conversion Factor	N2O to eCO2 Conversion Factor
Grid Electricity*	1	40	0.002	0.01	21	310
Diesel*	0.287631	2752.55	0.026	0.031	21	310
Lifetime GHG Emissions Calculations						
Total Energy Use = Lifetime Energy Savings (kWh) / Efficiency Factor						
Lifetime GHG Emissions Diesel Communities (tonnes eCO2) = (Total Energy * CO2 Emission Factor) + (Total Energy Use * N2O Emission Factor * CH4 to eCO2 Conversion Factor) + (Total Energy Use * N2O Conversion Factor * N2O to eCO2 Conversion Factor) / 1000000						
* 2013 Climate Registry Default Emissions Factors						

Appendix B – 2013/14 *Good Energy* Rebate Program Eligibility Criteria

Category	Eligible energy efficient product	Rebate available	Eligibility Criteria
Home Appliances	Refrigerator	30% of the pre-tax purchase cost up to \$300 in non-hydro communities 15% of the pre-tax purchase cost up to \$100 in hydro communities	Energy Star® Energy Star®
	Freezers	30% of the pre-tax purchase cost up to \$300 in non-hydro communities 15% of the pre-tax purchase cost up to \$100 in hydro communities	Energy Star® Energy Star®
	Clothes Washers	30% of the pre-tax purchase cost up to \$300 in non-hydro communities	Energy Star®

Category	Eligible energy efficient product	Rebate available	Eligibility Criteria
		15% of the pre-tax purchase cost up to \$100 in hydro communities	Energy Star®
	Dish Washers	30% of the pre-tax purchase cost up to \$300 in non-hydro communities 15% of the pre-tax purchase cost up to \$100 in hydro communities	Energy Star® Energy Star®
Heating Appliances	Woodstove, wood furnaces/boilers	20% of pre-tax purchase price up to \$300	Wood Stove/Furnaces:EPA 40 CFR Part 60 or CSA - B415.1-M92 approved; Wood Boilers: EPA Phase II White Tag certified
	Wood Pellet stoves,	20% of the pre-tax purchase price up to \$600	ULC safety certified
	Wood Pellet furnaces/boilers	20% of pre-tax purchase price up to \$800	ULC safety certified
	Oil Furnaces and Boilers	\$600 – oil furnace/boiler	Energy Star® 92% AFUE or better
	Propane furnaces/boilers	\$600 propane furnace/boiler	Energy Star® 95% AFUE or better

Category	Eligible energy efficient product	Rebate available	Eligibility Criteria
	Combo Heating System	20% of the pre-tax purchase price up to \$600	Water heater with an energy factor of 0.85 or greater
	Air Source Heat Pumps	\$600 - Air Source Heat Pump	Energy Star® 7.0 HSPF or better
Water Heating	Solar Hot water heating systems	15% of the Solar Water Heating system costs to a maximum of \$1200	See eligibility list at: http://canmetenergy.nrcan.gc.ca/renewables/solar-thermal/publications/1343 .
	Drain Water Heat Recovery System (DWHRS)	\$150	See eligibility list at www.esc.gov.yk.ca
Water Saving	Water Efficient Toilet	20% of the purchase price up to \$65	EPA WaterSense® Certified
Residential Energy Assessment	EnerGuide Residential Audits	\$100	Completion of Energy Assessment conducted by a Yukon Housing Corp. certified Energy Advisor