

ALBERTA ENERGY EFFICIENCY PROGRAM DESIGN PHASE 2 FINAL REPORT

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ABOUT DUNSKY ENERGY CONSULTING

Headquartered in Montreal, Dunsky Energy Consulting supports an array of clients in building a sustainable energy future. Dunsky's clients include leading governments, energy utilities, private firms and non-profit organizations throughout North America.

EXPERTISE

- ▶ **Energy Efficiency** & Demand Management
- ▶ **Renewable Energy** & Distributed Resources
- ▶ **Sustainable Mobility**

SERVICES

- ▶ **Assess** clean energy opportunities
- ▶ **Design** policies, plans, programs and strategies
- ▶ **Evaluate** performance

CLIENTELE

- ▶ Governments
- ▶ Utilities
- ▶ Private firms
- ▶ Non-profits

SELECT CLIENTS



EXECUTIVE SUMMARY

Alberta's Climate Change Office (ACCO) has been tasked with creating Energy Efficiency Alberta (EEA), a new provincial agency responsible for promoting and supporting energy efficiency and community energy systems (including micro-generation and small-scale generation) across the province. While EEA is not yet operational, the intent is for the agency to offer a wide range of programs that will provide options for all Alberta residents, businesses and organizations, and communities.

To support this effort, ACCO retained Dunsky Energy Consulting (Dunsky) to design an initial suite of program offerings for the new agency to launch in early 2017. The programs to be designed were selected during an August 2016 meeting between ACCO, Alberta's Energy Efficiency Advisory Panel, and Dunsky:

- **Residential No-Cost Energy Savings:** This program will offer direct, no-charge installation of low-cost, high-quality energy efficiency products to Alberta homeowners and tenants. Third-party Program Implementation Teams will conduct a high-level (walk-through) assessment of a home's efficiency and install applicable products.
- **Business, Non-Profit and Institutional (BNI) Energy Savings Rebates:** This program will offer incentives to BNI customers (excluding larger emitters) to encourage them to choose high-efficiency products from a comprehensive list.
- **Residential Retail Products:** This program is aimed at residential households and will offer point-of-sale (or coupon-based) rebates for the purchase of energy efficiency measures through participating retailers during spring and fall campaigns, as well as year-round rebates on selected products, such as appliances, that require an immediate purchase.

This report outlines the details of each program, including its target, budget, GHG reductions, and other key metrics. It also includes the contribution of each program to EEA's overall portfolio, providing a higher-level picture of the impact these programs will have in terms of Alberta's future energy and climate-change initiatives.

CONTRIBUTION OF PROGRAMS TO OVERALL PORTFOLIO

Table 1 on the following page provides an overview of each program's contribution to Energy Efficiency Alberta's overall initial portfolio.

Table 1. Program Contributions to Overall Portfolio

	Annual Energy Savings (GJ)	Budget (\$M)	Lifetime Cost Savings (\$M)	Lifetime GHG Reductions (tCO2e)	Abatement Costs (\$/tCO2e)
Residential No-Cost Energy Savings	275,300	21.5	27.8	179,700	-34
BNI Energy Savings Rebates	70,000	13.3	32.8	195,000	-23
Residential Retail Products¹	249,000	8.5	45.4	307,600	-110
Total	594,300	43.3	106.0	682,300	-54

Some of the key highlights of this table are:

- **Overall cost savings to Albertans:** For a one-year investment of just over \$43 million, Albertans will save \$106 million dollars over the lifetime of their energy efficiency upgrades.
- **Overall GHG reductions:** Over 680,000 tonnes of carbon dioxide-equivalent emissions will be reduced as a result of Albertans' efforts through these programs.
- **Total Energy Savings:** As a result of these programs, over 590,000 GJ of energy will be saved. That's the equivalent of powering over 4,000 homes in one year. Over the lifetime of the energy efficiency upgrades, the over 6 million GJ in energy savings from one year of programs will be the equivalent of powering over 42,000 homes.²

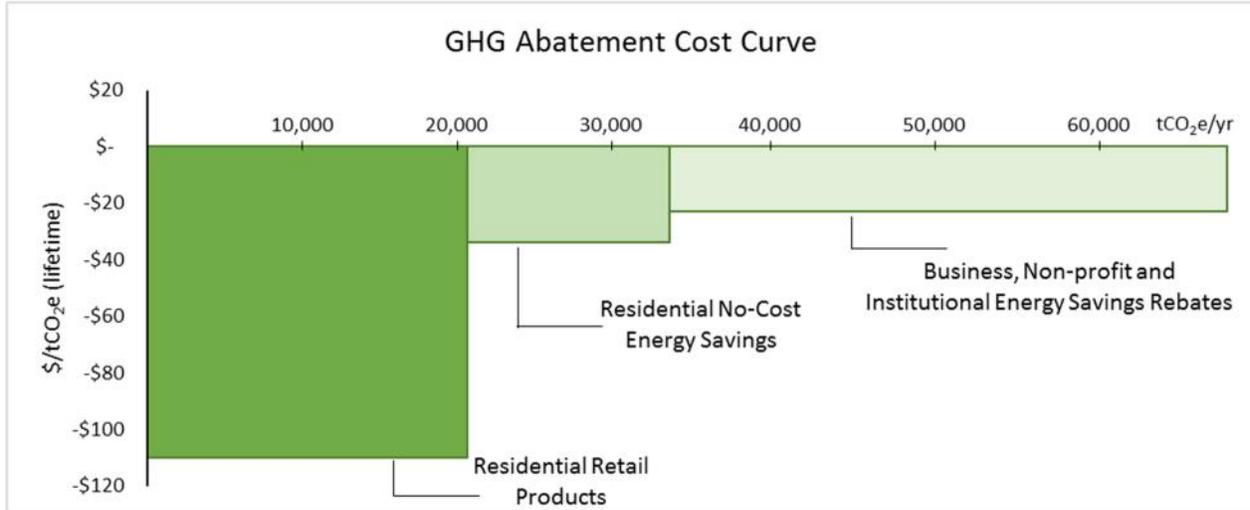
ABATEMENT COSTS

The program portfolio also has negative abatement costs, meaning that energy-related avoided costs are sufficient to cover all (and more) of the program costs. See Figure 1 for a visual representation of these costs.

¹ First-year program results

² Based on average electricity and natural gas use for Albertan homes, according to Alberta's Department of Energy: <http://www.energy.alberta.ca/electricity/682.asp>, Retrieved April 4, 2017
<http://www.energy.alberta.ca/NaturalGas/726.asp>. Retrieved April 4, 2017

Figure 1. GHG Abatement Cost Curve



We note that these values are based on contracted budget dollars and estimated targets. This means that the results do not always align with originally planned values. For example, we would expect the potential incentive budget for the BNI Energy Savings program would lead to savings exceeding target, which would make that program’s abatement costs improve. Should this happen, we would expect the BNI program to have a better abatement cost than Residential No-Cost Energy Savings.

ECONOMIC IMPACT

Energy efficiency is also a labour-intensive industry, as labour is required for the installation of many energy efficiency products, as well as the need for facility audits, evaluation, and other related activities. Economic impacts are therefore expected to grow over time as Energy Efficiency Alberta expands its portfolio of programs.

Nevertheless, the following positive job and macroeconomic impacts can be seen as a result of this initial set of three programs:

Table 2. Portfolio Job and Macroeconomic Benefits

	Program spending (Year 1)	FTEs	Max Annual Employment Increase	GDP Increase*	Max Annual GDP Increase
Program Portfolio	\$43M	884	62	\$159M	\$11M

* Based on 5.1 GDP/\$ spending for electricity EE and 2.3 GDP/\$ spending for gas EE

PROGRAM DETAILS

RESIDENTIAL NO-COST ENERGY SAVINGS

The Residential No-Cost Energy Savings program (Program) is aimed at single family and multifamily (apartments and condominiums) residential property owners, encouraging them to undertake low-cost energy saving improvements.

The Program will offer direct, no-charge installation of low-cost, high-quality energy efficiency products to Alberta homeowners and tenants through third-party Program Implementation Teams, who will conduct a high-level (walk-through) assessment of a home's efficiency and install applicable products.

The Program Implementation Team will install eligible measures in all available opportunities following homeowner consent. An education component is also designed to highlight the benefits of energy efficiency, encouraging homeowners on a path toward deeper energy savings.

The Program design parameters and associated benefits are presented in Tables 3 and 4 on the following pages.

Table 3. Residential No-Cost Energy Savings Program Summary

Program Design Consideration	Inclusion	Details		
		Total (GJ)	Single Family (GJ)	Apt/Condo (GJ)
Target (First-Year)	Province-Wide	275,300	255,000	20,300
	Central Zone	34,990	33,600	1,390
	Calgary Zone	101,600	93,700	7,900
	Edmonton Zone	85,400	76,600	8,800
	North Zone	31,850	30,600	1,250
	South Zone	21,470	20,500	970
	Total Program Budget³	\$21,500,000		
GHG Reductions	Annual	Lifetime		
	37,000 tCO ₂ e	185,000 tCO ₂ e		
Abatement Costs	-\$34/tCO₂e			
Cost Savings (lower utility bills for Albertans)	\$27,800,000 (lifetime savings from the first year of the program)			
Target Market	Existing residential properties in Alberta: <ul style="list-style-type: none"> • Homeowners • Property managers • Building owners • Tenants 			
Eligibility Criteria	Existing residential properties in Alberta, regardless of heating type, are eligible: <ul style="list-style-type: none"> • Single-Family detached and attached homes • Townhouses • Mini-homes • Rowhouses • Apartment buildings • Condominiums • Housing Cooperatives 			
Eligible Measures	Products to be included in the Program include: <ul style="list-style-type: none"> • Light Emitting Diode (LED) lamps • LED nightlights • Faucet aerators • Low-flow showerheads • Advanced power strips for audiovisual equipment • Smart Thermostats (automatically adjusting) Common areas of apartments and condominiums properties will also include the following eligible measures: <ul style="list-style-type: none"> • LED lamps • LED Fixtures (common areas/exterior) 			

³ Budget contracted to achieve the target, not including payments if target is exceeded.

Table 4. Residential No-Cost Energy Savings Benefits and Bill Savings

MONEY		NOTES
GOV PERSPECTIVE		
Program Cost	\$21.5 M	Year 1 only
PARTICIPANT PERSPECTIVE		
Participant Cost	\$0 M	No cost to the participant
Gross Consumer Savings	\$27.8 M	Lower utility bills for Albertans <i>Discounted present value of energy bill savings, over the life of the measures</i>
Net Consumer Savings	\$27.8 M	Money back in Albertans' pockets <i>As above, since no cost to the participant</i>
ALBERTA PERSPECTIVE		
Total Cost (prog+part.)	\$21.5 M	Carbon levy funds
Total Savings	\$27.8 M	See above.
Net Benefit	\$6.3 M	Net money back in Albertans' pockets , accounting for every penny they put in.
Benefit/Cost	1.3	<i>Albertans save \$1.3 for every \$1 they put in.</i>

CARBON		NOTES
Carbon Savings	185,000 tCO₂e	Over the lifetime of the measures; <i>roughly the equivalent of removing over 26,000 personal vehicles from the road for 1 year</i>
Govt's Abatement Cost	\$117/tCO ₂ e	This does <u>not</u> account for Albertans' energy bill savings
	-\$34/tCO₂e	This accounts for the full (<i>net</i>) cost to Albertans. It's negative because the program itself is a net benefit for the pocketbook (see 1.3 B/C ratio above). Efficiency is basically the only investment that can produce negative carbon reduction costs (it almost always does).

ECONOMY		NOTES
Jobs	435 FTEs	Over the lifetime of the measures, based on a macroeconomic impact study commissioned for Government of Canada under Conservatives.

BUSINESS, NON-PROFIT AND INSTITUTIONAL ENERGY SAVINGS REBATES

The Business, Non-Profit and Institutional (BNI) Energy Savings Rebates program will offer incentives to BNI energy users to encourage them to choose high-efficiency products rather than ones that operate at the market baseline.

The Program will use a prescriptive approach, meaning that fixed per-unit rebates specific to each measure will be provided to eligible participants. **Eligible participants include all business, non-profit and institutional customers serviced by an Alberta electric or gas utility**, except for large emitters (as defined under the Alberta's Specified Gas Emitters Regulation) and municipalities. Examples of eligible customers include, but are not limited to:

- Institutions such as schools, hospitals, universities, and colleges;
- Office buildings;
- Shopping malls;
- Individual small or medium businesses (e.g. tenants within the above types of buildings, or standalone businesses);
- Big box stores;
- Car dealerships;
- Hotels; and
- Industries such as agri-food, manufacturing, and resource extraction.

Tables 5 and 6 on the following pages provide a summary of the highlights and benefits of the BNI Energy Savings Rebates program.

Table 5. BNI Energy Savings Rebates Program Summary

Program Design Consideration	Inclusion/Requirement	
Target (First-Year)	70,000 GJ	
Total Program Budget⁴	\$13,300,000	
GHG Reductions	Annual	Lifetime
	13,000 tCO ₂ e	195,000 tCO ₂ e
Abatement Costs	-\$23/tCO₂e	
Cost Savings (lower utility bills for Albertans)	\$32,800,000 (lifetime savings from the first year of the program)	
Target Market	Non-residential customers serviced by an Alberta electric or gas utility, with the exception of large emitters and municipalities	
Eligibility Criteria	All customers on a general, commercial, or industrial (i.e., non-residential) utility rate are eligible	
Initial Eligible Measures (List will be expanded over time)	<ul style="list-style-type: none"> • Efficient lighting products: LED T8s, LED bulbs, LED low/medium/high-bay fixtures, LED exterior fixtures, T5HO high-bay fixtures, occupancy controls, etc. • Efficient Heating, Ventilation and Air Conditioning (HVAC) equipment: Commercial warm air furnaces, hot water commercial packaged boilers • Efficient water heating equipment: Condensing water heaters, tankless water heaters 	

⁴ Budget contracted to achieve the target, not including payments if target is exceeded.

Table 6. BNI Energy Savings Benefits and Savings

MONEY		NOTES
GOV PERSPECTIVE		
Program Cost	\$13.3 M	Year 1 only
PARTICIPANT PERSPECTIVE		
Participant Cost	\$15.0 M	This is the out-of-pocket money participants will spend. <i>E.g. If the boiler costs \$1,000 more than a non-efficient one, the incentive will cover \$400 and participants will cover the remaining \$600.</i>
Gross Consumer Savings	\$32.8 M	Lower utility bills for Albertans <i>Discounted present value of energy bill savings, over the life of the measures</i>
Net Consumer Savings	\$17.8 M	Money back in Albertans' pockets As above, but after accounting for the money consumers will have spent on their own
ALBERTA PERSPECTIVE		
Total Cost (prog+part.)	\$28.2 M	Carbon levy funds + voluntary spending from participants
Total Savings	\$32.8 M	See above.
Net Benefit	\$4.5 M	Net money back in Albertans' pockets , accounting for every penny they put in.
Benefit/Cost	1.2	<i>Albertans save \$1.2 for every \$1 they put in.</i> <i>Note that if we only look at money funded by the carbon levy, it's 2.5 B/C.</i>

CARBON		NOTES
Carbon Savings	195,000 tCO₂e	Over the lifetime of the measures; <i>roughly equal to removing 30,000 personal vehicles from the road for 1 year</i>
Govt's Abatement Cost	\$68/tCO ₂ e	This does <u>not</u> account for Albertans' energy bill savings
	-\$23/tCO₂e	This accounts for the full (<i>net</i>) cost to Albertans. It's negative because the program itself is a net benefit for the pocketbook (see 1.2 B/C ratio above). Efficiency is basically the only investment that can produce negative carbon reduction costs (it almost always does).

ECONOMY		NOTES
Jobs	279 FTEs	Over the lifetime of the measures, based on a macroeconomic impact study commissioned for Government of Canada under Conservatives.

RESIDENTIAL RETAIL PRODUCTS

Homeowners and tenants have tremendous opportunities to improve the energy efficiency of their dwellings and reduce their utility bills by replacing older, less efficient lighting and appliances with more efficient options.

The Residential Retail Products program will offer point-of-sale rebates for the purchase of a wide range of energy efficiency measures at participating retailers during spring and fall campaigns, each lasting from four to six weeks. The Program will also offer year-round rebates on selected measures that necessitate a timely purchase, such as appliances and insulation.

Due to timing considerations, it is anticipated that some rebates may initially need to be offered via coupons, with the intent of offering point-of-sale (instant) rebates as soon as retailers' systems can process them.

In addition to offering rebates on energy-efficient measures, the Program will promote these measures in collaboration with retailers through marketing campaigns, in-store events, enhanced availability and visibility of measures in stores, and other promotional activities. Services are expected to follow a full turnkey approach.

Tables 7 and 8 on the following pages provide a summary of the program design settings and benefits of the program.

Table 7. Residential Retail Products Program Parameters

Program Design Consideration	Inclusion/Requirement	
	Year 1	Year 2
Target	249,000 GJ	663,000 GJ
Total Program Budget ⁵	\$8,500,000	\$21,400,000
GHG Reductions from Year 1 of the program	Annual	Lifetime
	20,700 tCO ₂ e	307,600 tCO ₂ e
Abatement Costs	-\$110/tCO ₂ e	
Cost Savings (lower utility bills for Albertans)	\$45,400,000 (lifetime savings from the first year of the program)	
Target Market	All Albertans	
Eligibility Criteria	<ul style="list-style-type: none"> • There are no specific eligibility criteria for most measures in this Program aside from the need for products to be sold by an official program partner for a participant to receive a rebate. • The exception is for building envelope measures (insulation and windows), for which eligibility is limited to homeowners of existing, principal residences for which energy efficiency retrofits are not already underway. 	
Eligible Measures	<ul style="list-style-type: none"> • LED lighting • Smart thermostats • Smart power bars • Heavy duty timers • Insulation material • Triple glazed low-e argon windows • Water saving products • Appliances • Tankless water heaters 	
Key Delivery Strategies	<ul style="list-style-type: none"> • Mail-in and instant in-store rebates • Seasonal retailer campaigns • In-store events (including customer education) 	

⁵ Budget contracted to achieve the target, not including payments if target is exceeded. Year 1 and 2 breakouts are estimated and may be higher or lower in any given year, as the contract period is over two years.

Table 8. Residential Retail Benefits and Savings

MONEY		NOTES
GOV PERSPECTIVE		
Program Cost	\$8.6 M	Year 1 only
PARTICIPANT PERSPECTIVE		
Participant Cost	\$2.9 M	This is the out-of-pocket money participants will spend. <i>E.g. If the fridge costs \$80 more than a non-efficient one, the incentive will cover \$60 and participants will cover the remaining \$20.</i>
Gross Consumer Savings	\$45.4 M	Lower utility bills for Albertans <i>Discounted present value of energy bill savings, over the life of the measures</i>
Net Consumer Savings	\$42.6 M	Money back in Albertans' pockets As above, but after accounting for the money consumers will have spent on their own
ALBERTA PERSPECTIVE		
Total Cost (prog+part.)	\$11.5 M	Carbon levy funds + voluntary spending from participants
Total Savings	\$45.4 M	See above.
Net Benefit	\$34.0 M	Net money back in Albertans' pockets , accounting for every penny they put in.
Benefit/Cost	4.0	<i>Albertans save \$4 for every \$1 they put in.</i> <i>Note that if we only look at money funded by the carbon levy, it's 5.3 B/C.</i>

CARBON		NOTES
Carbon Savings	307,600 tCO2e	Over the lifetime of the measures; <i>roughly equal to removing 41,000 personal vehicles from the road for 1 year</i>
Govt's Abatement Cost	\$28/tCO2e	This does <u>not</u> account for Albertans' energy bill savings
	-\$110/tCO2e	This accounts for the full (<i>net</i>) cost to Albertans. It's negative because the program itself is a net benefit for the pocketbook (see 4.0 B/C ratio above). Efficiency is basically the only investment that can produce negative carbon reduction costs (it almost always does).

ECONOMY		NOTES
Jobs	170 FTEs	Over the lifetime of the measures, based on a macroeconomic impact study commissioned for Government of Canada under Conservatives.

CONCLUSION AND NEXT STEPS

As this report demonstrates, the Government of Alberta's investment in energy efficiency is cost-effective; will have benefits for Albertans through GHG reductions, abatement costs, and job impacts; and is a positive start to putting the province in a position of leadership in Canada.

Regarding future enhancements and plans, there is little market data on energy efficiency potential in Alberta. Primary research, including detailed penetration and saturation studies, as well as baseline studies, would be appropriate to increase knowledge of the Albertan market and inform future program design.

In addition, regular program evaluation is critical for revising and enhancing program opportunities and to ensure programs are continuing to generate maximum opportunities for Albertans. We recommend that Energy Efficiency Alberta's programs undergo a full independent process and impact evaluation on a regular basis (at least every three years). Between evaluation cycles, the programs can be monitored using "rapid-fire" surveys (in this case, intercept surveys to evaluate participant satisfaction and freeridership, and general population surveys for brand awareness).

Overall, we believe that the Government of Alberta is on the right track with its program offerings. We look forward to seeing how the next few years unfold in the province.