

# City of Airdrie Corporate Energy and GHG Reduction Strategy

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# City of Airdrie Corporate Energy and GHG Reduction Strategy

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## 1 Introduction

The City of Airdrie is joining municipalities across Alberta and Canada to reduce our environmental impact. In line with federal initiatives, the City is committed to address the urgent challenge of climate change. This Energy and GHG Reduction Strategy outlines our approach to decrease greenhouse gas (GHG) emissions in municipal operations. The objective is a five per cent annual reduction in GHGs from 2024 to 2028, as endorsed by City Council on March 6, 2023.

Over the past decade, Airdrie has demonstrated environmental leadership through various initiatives, including the development of the AirdrieONE sustainability plan in 2012. The City has also leveraged funding opportunities for energy-efficient projects, which range from lighting upgrades to solar power installations (see Appendix 6.1). Environmental protection remains a key focus in Airdrie's strategic plans.

This Strategy provides insights into the City's investment decisions concerning GHG emissions, going beyond the minimum standards set by the Alberta Building Code. The focus is on reducing current operational emissions.

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## 2 Strategy

### 2.1 Moving Away from Business as Usual

The City aims to depart from traditional approaches in building and system design by considering energy-efficient alternatives. When looking at new or replacing old equipment, the City will review its energy consumption and explore more efficient options, taking into account future utility rates and carbon taxes. The Strategy helps the City to make investment decisions that include rising utility rates, effects of carbon taxes, and lifecycle costs.

### 2.2 General Approach

The Strategy is built into the City's 10-year Capital Budget and Plan. This allows us to focus on both large and small-scale energy-saving projects and bundle them together when feasible, while tying less costly measures with the annual Operating Budget. Major upgrades and routine maintenance work present opportunities to make our operations more energy efficient. The Strategy aims to leverage those opportunities for maximum benefit.

This methodology recognizes that significant infrastructure investment and equipment upgrades are important trigger points to implement energy conservation and GHG reduction measures. Equipment lifecycle upgrades and maintenance projects are often the best time to rethink the function of energy-using equipment and systems and consider their lifecycle costs. This includes an equipment efficiency, operating schedule and controls, maintenance requirements, as well as to explore energy waste recovery and renewable energy options.

The following schematic summarizes how the City will make decisions around infrastructure and equipment addition or renewal that impact energy use and GHG emissions.

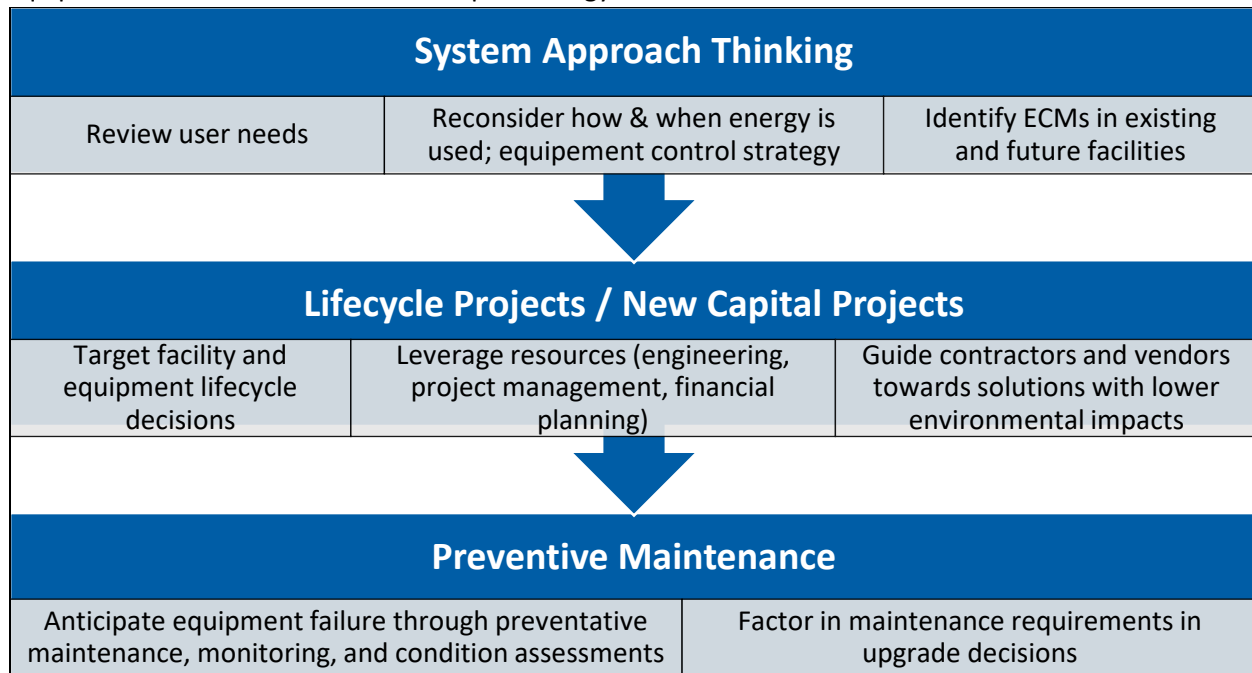


Table 1: Strategy Stakeholders and Energy Conservation Measures Development

Instrument Level	Who / Team	Assessments / Data Analysis	City Processes	Internal Tools / Policies	External Policies / Standards
<b>ECM Identification and Screening</b>	All City staff MEA Team Leaders & Facility Managers	Building condition assessments <sup>1</sup> Energy scans (internal) Energy audits (external consultant) Deep carbon retrofit & engineering studies	Energy and GHG Reduction admin procedures Vertical Asset Management and Maintenance Staff engagement activities	AirdrieONE Engineering calculations / energy modeling ECMs register Green/Sustainable Procurement Policy Sustainable Building Construction Policy / Guidelines	Carbon Zero Standard ASHRAE Guidelines and Standards Several other sources
<b>ECM Business Case Development and Budgeting</b>	MEA Team Leaders & Facility Managers Finances	Energy modeling	Procurement Annual budgeting	Energy and GHG Reduction Strategy and Plan	
<b>ECM Implementation Decision</b>	Team Leaders Directors	Annual budgeting		Energy and GHG Reduction Strategy	-
<b>ECM Planning</b>	Team Leaders Capital Projects & Infrastructure Building Operations	CPO processes Building Operations procedures and activities			Building codes
<b>Performance Monitoring and Reporting</b>	MEA & EM Program Executive Sponsor Asset Management, Fleet and Building Maintenance Corporate Strategy, Efficiency and Performance Council	EM tools	Annual progress report to Council Strategy deployment review and budget approval by Council	EM tools	-

## 2.3 Energy and GHG Reduction Plan

The Energy and GHG Reduction Plan incorporates a variety of tactics, ranging from simple changes in daily operations to more complex engineering solutions at each facility. These initiatives are designed to be cost-effective and the outcomes and GHG emission reductions will be reported to Council on an annual

<sup>1</sup> Facility condition assessments are typically completed every 6 to 8 years by technical consultants.

basis in the spring, using data from the previous calendar year. The City will ensure new facilities are designed cost-effectively and minimize increases in the City's corporate emissions.

## 2.4 Energy and GHG Emissions Tracking

To set an annual five per cent GHG reduction target and keep track of our progress, we need to clearly define which facilities and activities are included and which are not. Facilities that are 'in scope' are mainly existing buildings that we plan to keep using for the foreseeable future. Table 2 provides the City's energy and GHG data for 2019. It shows emissions from large buildings, as well as electricity usage in broad activities such as Parks Services and Water Services. In 2019, 'in scope' emissions amounted to 13,319 tons of GHGs. This makes up 84 per cent of City corporate energy use and 82 per cent of all the City's corporate emissions that we have data for. Out of scope emissions include refrigerants and emissions from waste management. However, we could add these to our tracking in the future. The list of buildings included in the 'in scope' emissions is presented in Appendix 6.2.

Table 2: City Corporate Energy and GHGs Scorecard 2019

Within Climate Mitigation Plan	Energy Source		Energy Use	% Energy	Cost (\$)	% Cost	GHG Emissions	% GHG
Yes	Natural Gas	Buildings (adjusted baseline)	104,766 GJ	57%	\$568,550	11%	5,395 tons CO2e	33.3%
Yes	Electricity	In Scope Buildings, except Parks and Water Services (adjusted baseline)	9,815,739 kWh 35,337 GJeq	19%	\$1,114,703	21%	5,656 tons CO2e	34.9%
Yes		Parks Services	489,658 kWh 1,763 GJeq	1.0%	\$126,718	2.4%	282 tons CO2e	1.7%
No		Street Lights	2,355,970 kWh 8,481 GJeq	5%	\$2,271,017	43.5%	1,358 tons CO2e	8.4%
No		Traffic Lights & Communications	210,518 kWh 758 GJeq	0.4%	\$55,159	1.1%	121 tons CO2e	0.7%
Yes		Water Services	3,623,290 kWh 13,044 GJeq	7%	\$634,172	12.2%	2,088 tons CO2e	12.9%
No		Other Buildings	274,355 kWh 0,988 GJeq	0.5%	\$44,692	0.9%	158 tons CO2e	1.0%
Yes		Solar Electricity Production (-)	-177,823 kWh -0,640 GJeq	-0.4%	(included in Buildings elect. cost)		-102 tons CO2e	-0.6%
-		Total	16,591,707 kWh 59,730 GJeq	33%	\$4,246,461	81%	9,560 tons CO2e	59%
No	Transportation Fuels	Diesel	12,987 GJ	7.1%	\$289,225	5.5%	907 tons CO2e	5.6%
		Gasoline	5,344 GJ	2.9%	\$111,189	2.1%	355 tons CO2e	2.2%
		Total	18,331 GJ	10.0%	\$400,414	7.7%	1,261 tons CO2e	7.8%
-	Total Energy Use (adjusted baseline) 2019		182,828 GJ	100%	\$5,215,424	100%	16,217 tons CO2e	100%
Yes	In Scope, Climate Mitigation Plan		154,269 GJ	84%	\$2,444,142	47%	13,319 tons GHG/yr	82%

## 2.5 ECM Budgeting

Starting in 2025, ECMs will be part of the 10-year Capital Budget and Plan. We'll look at a range of projects, including equipment upgrades for moderate GHG reductions and larger system changes for more significant emission cuts. Any project not in the 10-year Capital Budget and Plan will be brought to Council separately. We'll provide estimates for extra funds needed to achieve additional GHG reductions at that time.

### 2.5.1 External Funding Opportunities

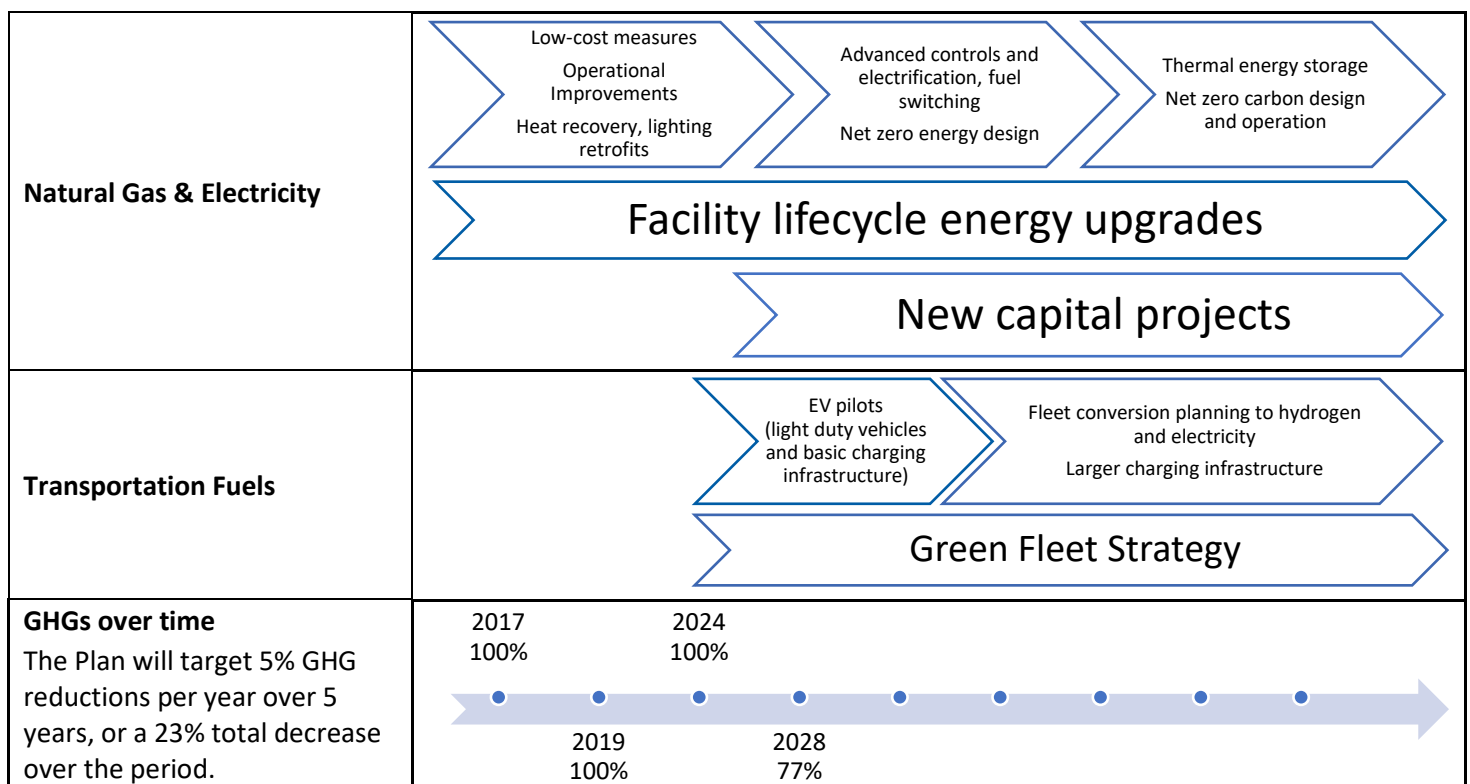
There are several external funding options we are considering to help fund ECMs that lower both corporate emissions and utility costs:

- Infrastructure Canada's Green and Inclusive Community Buildings (GICB): application submitted in March 2023 for 6 ECMs at Genesis Place.
- Federation of Canadian Municipalities' Green Municipal Fund GHG Reduction Pathways.
- Infrastructure Canada's Low Carbon Economy Challenge (LCEC).
- Provincial funding from the Municipal Climate Change Action Centre and/or other organizations.

Staff will continue to monitor the availability of funding programs to leverage financing opportunities.

## 3 Implementation Timeline

The timeline for rolling out the Strategy is shown below. It indicates that our five per cent GHG reduction target over five years will amount to a 23 per cent drop in emissions during that time. We'll go over the specifics of Energy Conservation Measures (ECMs) with Team Leaders and those who manage facilities, starting with the 2025 Capital Budget and Plan. Transportation fuels are shown separately from traditional utilities like natural gas and electricity. As we start adding electric vehicles to the City's fleet, electricity use will increase. This will also affect the cost and planning for electrical charging station setups at various facilities.



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## 4 Other Strategic GHG Emissions Reduction Considerations

In addition to making changes at individual buildings, we are also looking at ways to cut GHGs across the City. Some options include:

- Building a city-owned renewable energy project that provides clean power to several corporate facilities (example<sup>i</sup>).
- Signing a corporate renewable energy power purchase agreement (reference<sup>ii</sup>).
- Switching the type of fuel we use, for example, moving from diesel to biodiesel, or from gasoline and natural gas to clean electricity.
- Using energy performance contracts to make buildings more efficient (reference<sup>iii</sup>).

As we keep developing our Energy and GHG Reduction Plan, those solutions will be considered at a later stage, with a goal to lower emissions at multiple City facilities at once.

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## 5 Glossary & Acronyms

Acronym	Full name
BAU	Business-as-usual
CPO	City's Capital Projects Office
ECM	Energy conservation measure
EM	Energy management
GHG	Greenhouse gas
MEA	City's Municipal Energy Advisor or equivalent role
NPV	Net Present Value
PV	Photovoltaics

## 6 Appendices

### 6.1 Energy and GHG Reduction Saving Projects Implemented 2017-2021

Table 3: Energy and GHG Reduction Saving Projects Implemented 2017-2021

Facility #	GHG-emitting Portfolio	<a href="#">Energy-saving Upgrades Implemented (Year)[i]</a>
11	Genesis Place	<b>Rooftop solar array, a solar carport, electric ice resurfacer, and upgraded lighting: 2019 &amp; 2021</b> Project Cost: \$2.8M; Savings: \$158,737/yr MCCAC Funding: \$1.4M, GHG Reductions: 995 tons CO <sub>2</sub> e/yr <a href="https://mccac.ca/project-showcase/city-of-airdrie-genesis-place/">https://mccac.ca/project-showcase/city-of-airdrie-genesis-place/</a>
13	Town & Country Centre	<b>Lighting Retrofit: 2017</b> Project Cost: \$5,499, Electricity Savings: 17,160 kWh/yr, Savings: \$1,900/yr, MCCAC Funding: \$2,500, GHG Reductions: 11 tons CO <sub>2</sub> e/yr <a href="https://mccac.ca/project-showcase/airdrie-town-and-country-centre-efficient-lighting/">https://mccac.ca/project-showcase/airdrie-town-and-country-centre-efficient-lighting/</a>
17	15 East Lake Hill NE	<b>Lighting upgrade in Fleet Maintenance Shop, Water Utilities &amp; Procurement Shop</b> Electricity: 15,000 kWh/yr, Savings: \$1,650/yr GHG Reductions: 8.3 tons GHG/yr
18	23 East Lake Hill NE	<b>Lighting Retrofit: 2017</b> Project Cost: \$27,116, Savings: 189,418 kWh/yr MCCAC Funding: \$13,770, GHG Reductions: 121 tons CO <sub>2</sub> e/yr <a href="https://mccac.ca/project-showcase/airdrie-23-east-lake-hill-efficient-lighting/">https://mccac.ca/project-showcase/airdrie-23-east-lake-hill-efficient-lighting/</a>
19	Ron Ebbesen Twin Arena	<b>Lighting Retrofit: 2021</b> Project Cost: \$114,416, Savings: \$8,151, 78,372 kWh/yr MCCAC Funding: \$75,694, GHG Reductions: 44 tons CO <sub>2</sub> e/yr <a href="https://mccac.ca/project-showcase/city-of-airdrie-ron-ebbesen-arena-lighting-retrofit/">https://mccac.ca/project-showcase/city-of-airdrie-ron-ebbesen-arena-lighting-retrofit/</a>
26	Airdrie Transit Operations Centre (Commissioned Dec. 2020)	<b>409.6 kW Rooftop solar array: 2021</b> Project Cost: \$2.8M, Savings: \$M1.008/yr, 410, 624 kWh/yr MCCAC Funding: \$245,760, GHG Reductions: 234 tons CO <sub>2</sub> e/yr <a href="https://mccac.ca/project-showcase/city-of-airdrie-transit-and-maintenance-facility-solar-pv/">https://mccac.ca/project-showcase/city-of-airdrie-transit-and-maintenance-facility-solar-pv/</a>
	<b>Total GHG reductions, without facility #26</b>	<b>1,184 tons GHG/yr</b>
	<b>Total GHG reductions, all facilities listed</b>	<b>1,418 tons GHG/yr</b>

### 6.2 Facilities List for GHG Emissions Tracking

Our five-year Energy and GHG Reduction Plan aims for a five per cent annual cut in GHGs from corporate buildings.



**In scope:** Buildings equipped with both natural gas and electricity meters are part of the five per cent reduction target.

**Out of scope:** Facilities not included in the reduction target still get monitored. This category includes other electrical meters and buildings that may be added or removed over time.

We base our 2019 GHG baseline on the in-scope facilities listed in Table 4. Although some new facilities aren't in scope for the five per cent target, they will still be monitored because they affect the City's overall GHG emissions and energy costs.

Table 4: Facilities List

5-y Energy & GHG Reduction	Facility #	Facility Name	Capital Project #, if available	Facility Category	Facility area (m2)	GHGs 2019 (tons GHG/y)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Yes	1	Veterans Fire Station		Fire/Police	720 m2	123.7																	
	2	Reunion Terrasse Lift Station		Water Utility	31 m2	37.6																	
	3	Windsong Pumphouse-40 Ave SW Res.		Water Utility	410 m2	475.9																	
	4	Kings Heights Fire Station		Fire/Police	939 m2	108.9																	
	5	West Lift Station		Water Utility	149 m2	610.7																	
	6	City Hall Sat. Offices 204+205-304 Main St		Office	204 m2	7.8																	
	7	Sierra Spring Lift Station		Water Utility	102 m2	185.4																	
	8	RCMP Building		Office	3,939 m2	597.0																	
	9	Airdrie Fire Dept Headquarters		Fire/Police	3,217 m2	353.2																	
	10	Highland Park Pumphouse		Water Utility	311 m2	151.7																	
	11	Genesis Place		Rec Center	39,122 m2	5,441.0																	
	12	Plainsmen Arena		Ice/Curling Rink	3,014 m2	255.8																	
	13	Town & Country Centre		Community/Ice/Curl	4,108 m2	480.5																	
	14	Fletcher Park North Reservoir		Water Utility	40 m2	7.1																	
	15	Main Reservoir & Pump Station		Water Utility	136 m2	640.7																	
	16	Main Lift Station		Water Utility	93 m2	223.3																	
	17	15 East Lake Hill NE		Office/Maintenance	3,847 m2	489.6																	
	17.1	West Barn Expansion	000915A	Maintenance	297 m2	36.9																	
	17.2	New Washbay	000915B	Maintenance	231 m2	28.7																	
	18	23 East Lake Hill NE		Maintenance	3,763 m2	541.6																	
	19	City Hall		Office	3,732 m2	426.6																	
	20	Bulk Water Building (19 East Lake Hill NE)		Water Utility	54 m2	21.0																	
	21	Recycling Depot Facilities (21 East Lake Hill NE)		Office/Maintenance	1,001 m2	134.5																	
	22	Ron Ebbesen Twin Arena		Ice/Curling Rink	6,257 m2	1,082.3																	
	23	Sunridge Lift Station		Water Utility	31 m2	11.6																	
	24	Edwards Way Lift Station		Water Utility	9 m2	7.3																	
	25	Building Operations (819 East Lake Blvd)		Maint	387 m2	29.0																	
	26	Airdrie Transit Ops Centre		Warehouse/Office	5,160 m2	462.0																	
	27	Chinook Winds Parks Operations Building		Maintenance	370 m2																		
	27.1	Expanded Chinook Winds Parks Building	000666	Office/Maintenance	1,121 m2	97.7																	
No		809 Main Street South - Storage																					
		805 Main Street South - Old Firehall		Maintenance	1,207 m2																		
		Holyk Property = Airdrie Daycare = 272166 RR 293 NE		Office	200 m2																		
		South Regional Lift Station	000215	Water Utility	TBD																		
		Airdrie Multiuse Facility and Library	000389	Library/Office	TBD																		
		Parks - Artificial Turf Field - Ed Eggerer Sports Field	001305	Other	TBD																		
		Public Works Satellite Site Development North Airdrie	001312	Maintenance	TBD																		
		Water Supply from South Windsong Reservoir	001200	Water Utility	TBD																		
		Highland Park Fire Station	000505	Fire/Police	TBD																		
		Main Lift Station Interconnection to Lift Station 8	001344	Water Utility	TBD																		
		Northeast Regional Park	001279	Park/Maintenance	TBD																		
		Southwest Rec Centre	000271	Rec Center	TBD																		
		West Reservoir Pumphouse	001274	Water Utility	TBD																		
		Wastewater Lift Station 4 - Qualico Lands	001308	Water Utility	TBD																		
		West Reservoir Storage	001342	Water Utility	TBD																		
		South East Reservoir Storage	001340	Water Utility	TBD																		

Legend:

	In scope, baseline year
	In scope, included through adjusted baseline
	In scope, monitoring period
	In scope, pre baseline
	Not in scope
<i>#s in italic</i>	Estimate
	Not constructed yet, or demolished
	No utility data available, pre baseline

## 6.3 ECM Implementation Decision and Financial Parameters

### 6.3.1 Rising Utility Costs

Historically, the projection in the future of utility rates was based on past rates, adjusted for inflation. The introduction of an escalating federal carbon tax from 2023 to 2030 significantly alters this approach. Additionally, the impending electrification of transportation and heating systems is expected to exert upward pressure on electricity rates beyond the rate of inflation. However, the precise impact remains uncertain.

For cost-benefit analyses related to energy conservation measures (ECMs), natural gas rates, as delineated in Figure 1, shall be employed. Given the legislative increase in carbon tax, a deviation from business-as-usual practices is necessitated. Planning for capital and operational projects should incorporate a natural gas saving rate of \$16/GJ to \$18/GJ by the year 2030.

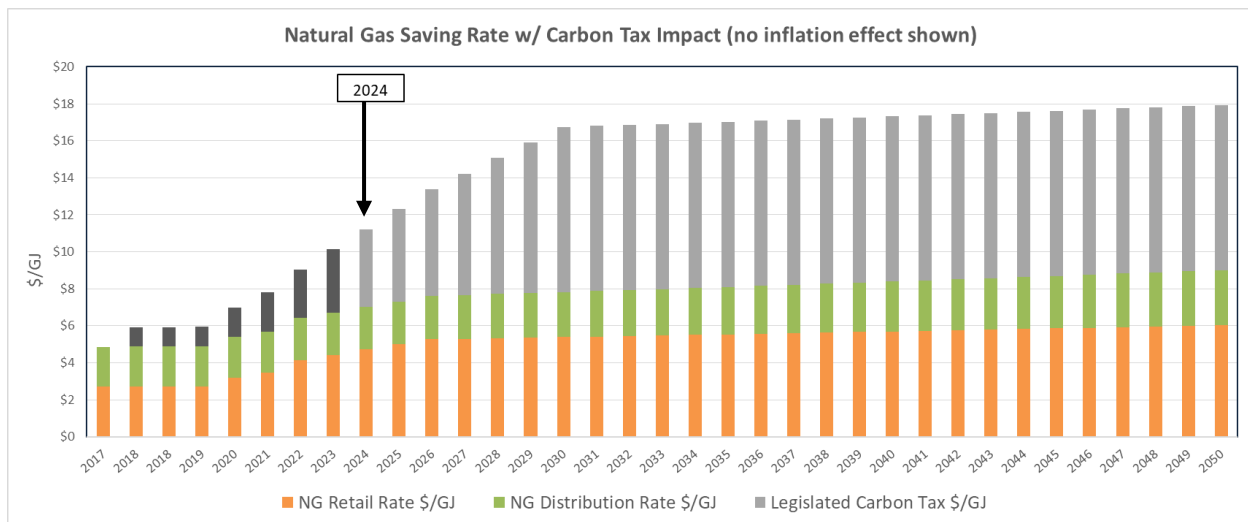


Figure 1: Increase in Natural Gas Rates 2017 to 2050 through Market Adjustments and Carbon Cost Impacts, Before Inflation

Figure 2 combines the rise in electricity and natural gas rates on a single graph prior to inflation effects. Liquid natural gas (LNG) exports from BC starting around 2026 will further drive up the costs of both natural gas and electricity, but uncertainty remains about how significant the impacts will be.

Projects demonstrating a positive Net Present Value (NPV) and receiving approval from facility managers and technical consultants will be considered for inclusion in future budgets. A positive NPV indicates that the project will generate a revenue equivalent by avoiding future utility and/or maintenance costs.

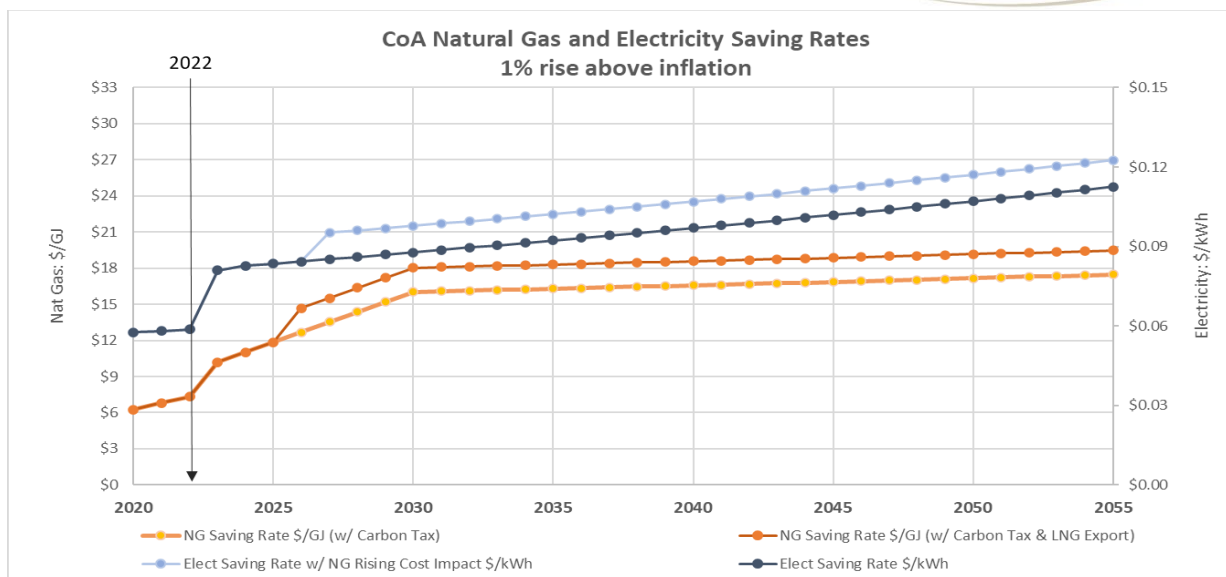


Figure 2: Expected Rise in Electricity and Natural Gas Rates, Before Inflation

### 6.3.2 ECM Sample Business Case

Initial investments in energy-efficient technologies or low-carbon solutions yield long-term operational cost savings, equivalent to future cash flows or avoided costs. Table 5 and Figure 3 serve as examples, detailing the financial parameters of a large-scale energy upgrade designed to reduce GHG emissions.

Table 5: Typical GHG-reducing Energy Upgrade

Net initial cost to the City	\$525,000
External GHG Reduction Funding (30% as example)	\$225,000
Total Investment	\$750,000
Overall project life	15 years
Discount Rate	3%
Energy Use Reduction	26% (21% from NG, 5% from electricity)
GHG Reduction	20% (12% from NG, 8% from electricity)
NPV without GHG reduction funding	\$60,000
NPV with GHG reduction funding	\$265,000
Annual Discounted Energy Savings/Cashflows	\$75,000 (Year 1) ... \$38,000 (Year 15)
Equivalent Annual Net Revenue (with external funding)	\$19,000
Equivalent Annual Net Revenue (no external funding)	\$4,000
NPV / Net initial cost (for project prioritization)	\$265,000 / \$525,000 = 0.50

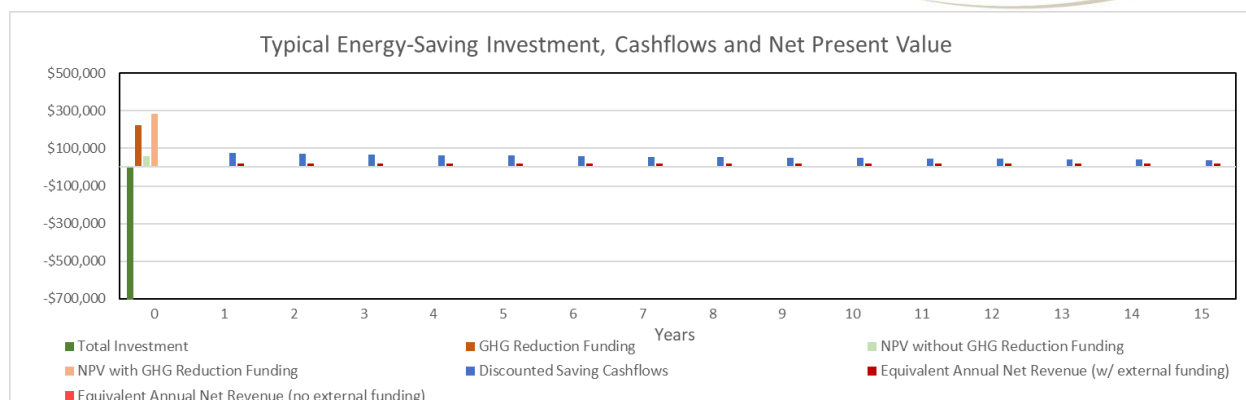


Figure 3: Typical Energy-Saving Investment Financial Parameters

In the scenario shown in Table 5, an initial investment of \$750,000 is made by the City for an energy upgrade—reduced to \$525,000 if 30 per cent external funding is available. This investment aims to decrease annual greenhouse gas (GHG) emissions by 20 per cent and achieve energy savings of 26 per cent. The project yields a Net Present Value (NPV) of \$60,000, or \$285,000 if external funding is procured, equating to an annual net revenue of \$4,000 over a 15-year period (\$19,000 per annum with external funding).

In contrast, should the City opt against investment in low-carbon technologies and continue with a business-as-usual (BAU) strategy, we would incur an average annual loss of \$4,000, or \$60,000 in cumulative, long-term utility costs. Hence, the adoption of a GHG emission reduction plan not only constitutes a sound business strategy, it also generates net annual revenues through avoided utility costs.

This example serves to illustrate that a GHG reduction strategy can be both profitable when augmented by federal funding and cost-effective even in its absence. It is imperative to evaluate the worth of energy and GHG reduction measures over their expected lifespan. While the future savings on utility costs remain intrinsically uncertain, they can be approximated through the application of reasonable assumptions.

## 7 References

<sup>i</sup> MCCAC (2022), *Town of Viking Net Zero Electric Solar PV*, <https://mccac.ca/project-showcase/town-of-viking-net-zero-electric-solar-pv/>

<sup>ii</sup> BRC-Canada (2023), *Global Momentum on Power Purchase Agreements: Putting Alberta in Context*, <https://businessrenewables.ca/resource/global-momentum-power-purchase-agreements-putting-alberta-context>

<sup>iii</sup> Econoler, *SUPER ESCO: An Innovative Approach to Unlock Energy Efficiency Potential*, [https://econoler.com/wp-content/uploads/2021/01/The-Econoler-Series\\_SuperESCO.pdf](https://econoler.com/wp-content/uploads/2021/01/The-Econoler-Series_SuperESCO.pdf)