EWS Aurum Campus Energy Study

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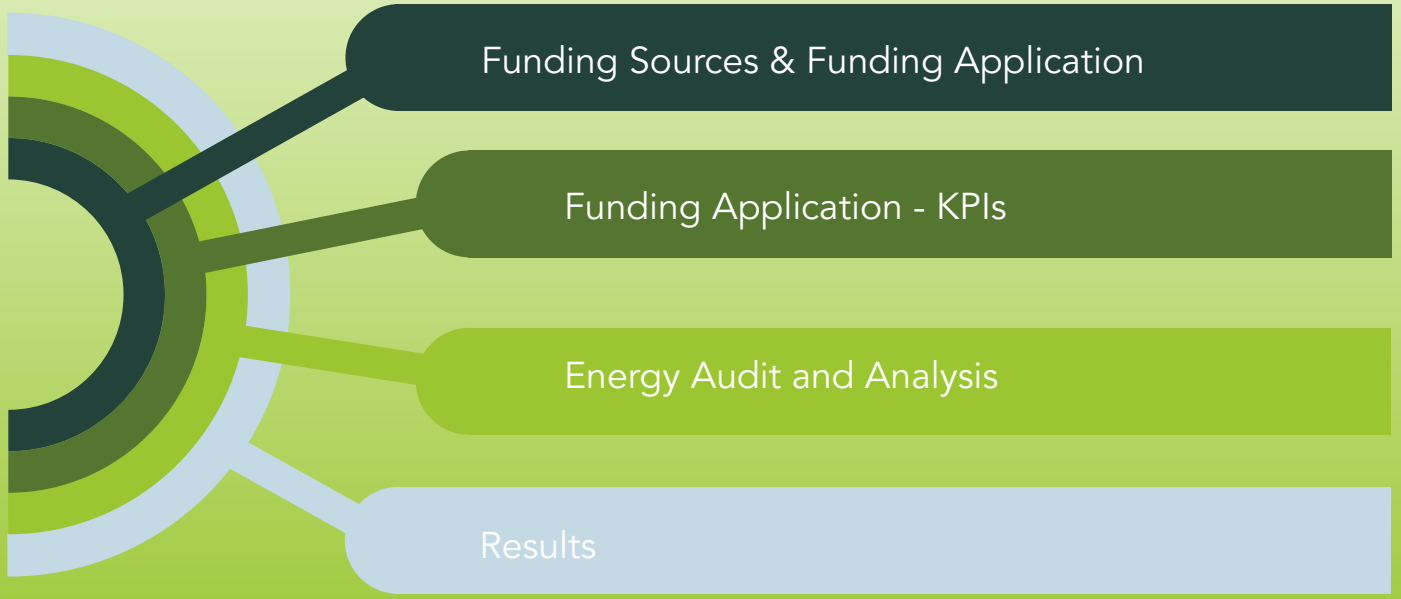
Date: 2025-11-04

Agenda


Funding Sources & Funding Application
Funding Application - KPIs
Energy Audit and Analysis
Results

Green Industrial Facilities and Manufacturing Program (GIFMP)

Goal and Mission

1. Maximize energy performance
2. Reduce greenhouse gas (GHG) emissions
3. Move to an energy efficient and low-carbon future

Eligible Activities

1. Training Energy Management Practitioners
2. Energy Assessment and Audit
3. Energy Managers
4. Energy Management Systems
5. Capital Investment

Funding

Energy Assessment and Audit - $50,000 Study Grant Obtained

Green Industrial Facilities and Manufacturing Program (GIFMP)

	Energy Source	Units	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	Lifetime GHG Emissions (2023-31)
This tab will be automatically calculated, converting all energy to GHG emissions based on the emissions factors in the A1 Emission factors tab.	Electricity Grid	tonnes of CO_2e	1,270.07	729.49	691.79	731.42	598.29	552.12	571.74	571.36	**5,716.28**
	Natural gas	tonnes of CO_2e	2,436.26	2,501.47	2,503.47	2,516.01	2,477.89	2,396.13	2,409.17	2,422.21	**19,662.62**
	Select Energy Source	tonnes of CO_2e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO_2e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
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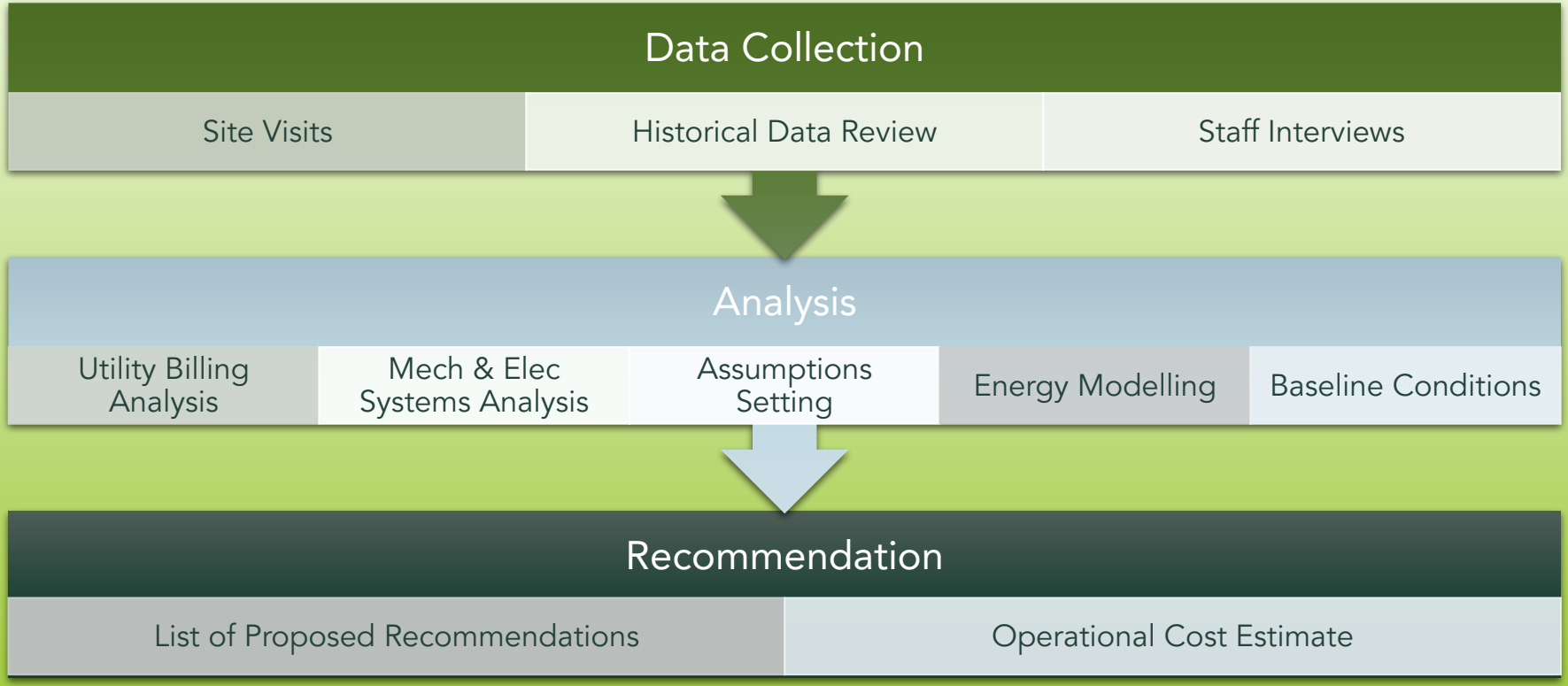
	Select Energy Source	tonnes of CO_2e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO_2e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total GHG Emissions	tonnes of CO2e	**3,706.33**	**3,230.96**	**3,195.26**	**3,247.43**	**3,076.18**	**2,948.25**	**2,980.92**	**2,993.57**	**25,378.91**

Project	Energy Source	Units	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	Lifetime Outcomes (2023-31) tonnes of CO2e
Energy sources	Electricity Grid	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Natural gas	tonnes of CO2 e	17.54	17.54	17.54	17.54	17.54	17.54	17.54	17.54	**140.31**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Select Energy Source	tonnes of CO2 e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total GHG Emissions Reductions	tonnes of CO2 e	**17.54**	**17.54**	**17.54**	**17.54**	**17.54**	**17.54**	**17.54**	**17.54**	**140.31**

Project	2030-2031 Energy Savings GJ		2030-2031 GHG Emissions Reductions	
	Estimated	Low (with uncertainty)	Estimated	Low (with uncertainty)
Energy Assessments and Audits	352.91	317.62	17.54	15.79
Select activity	0.00	0.00	0.00	0.00
Select activity	0.00	0.00	0.00	0.00
Select activity	0.00	0.00	0.00	0.00
Select activity	0.00	0.00	0.00	0.00
Total Project	**352.91**	**317.62**	**17.54**	**15.79**

Year	The Program (NRCan)	Program $ per GJ Savings Estimated	Program $ per GJ Savings (with uncertainty)	Program $ per tonne Reduced Estimated	Program $ per tonne Reduced (with uncertainty)
2030-2031	**$ 50,000.00**	**141.68**	**155.85**	**2850.77**	**3135.85**

Decarbonization Study Workflow



Facility Overview

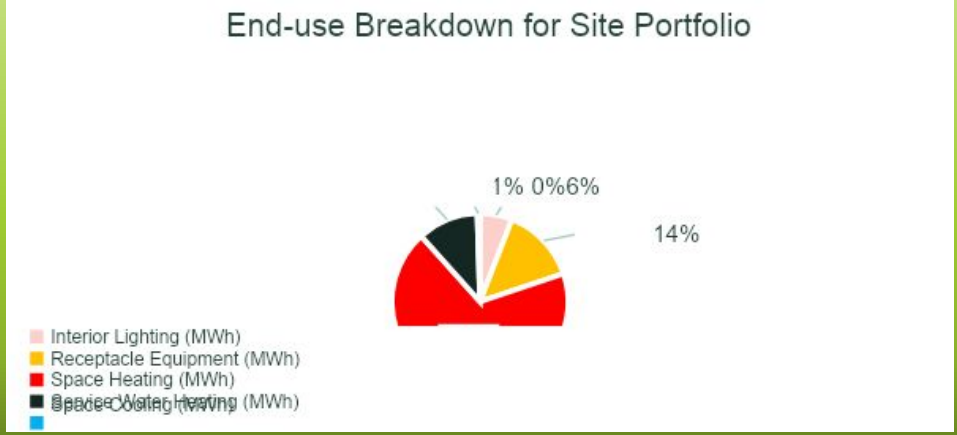
- Multiple facilities on campus
- Multi-purpose buildings to support EWS operations
- 30,171 m^2 of building area
- 40,600 m^2 available parking area suitable for Solar Carport Infrastructure

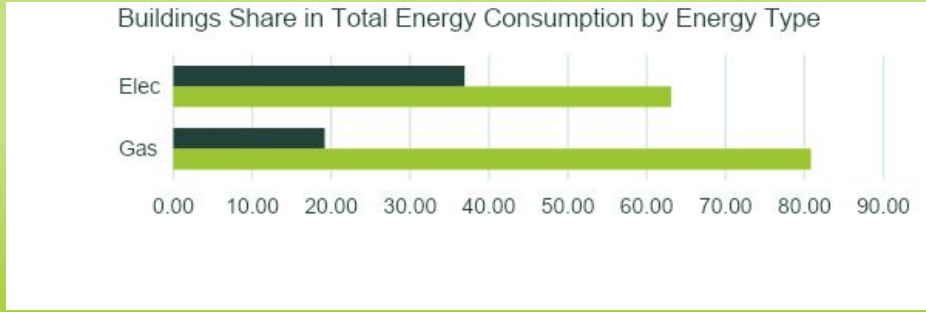
Building #	Building area m2	Function
Building 1	22,110	Vehicle Maintenance /Operations Staff Training and Development, office
Building 2	1,997	Locker & Cafeteria
Building 3	2,220	Office Staff
Building 4	1,500	Fleet Services
Building 5	843	Blue Light Repair/ Water D&T
Building 6	552.35	Heated Storage
Building 7	219	Unheated Storage
Building 8	28	Boiler House for Dump Pad
Building 9	140	Unheated Trailer Storage
Building 10	52	Office
Building 11	510	Unheated Quonset Storage

Baseline Energy Consumption Overview

Energy intensity of the facility is 120% more than the Canadian Median for a comparable facility – great potential for energy efficiency improvement.

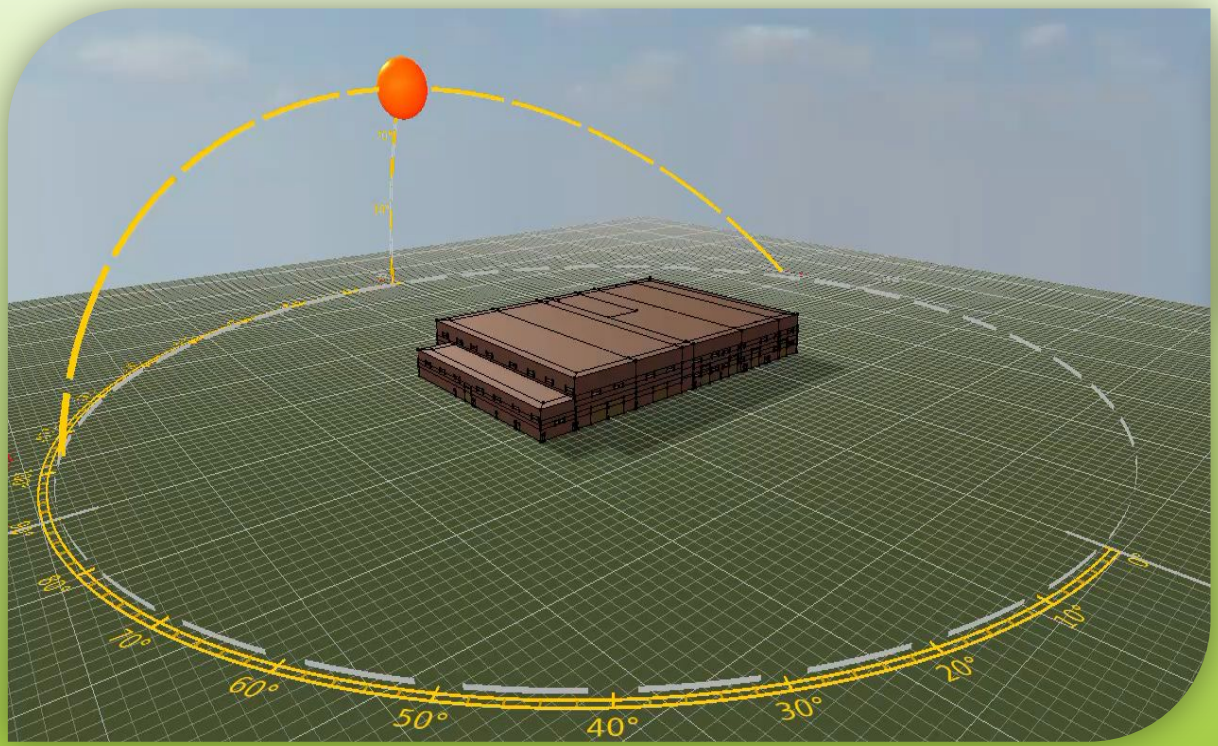
Building 1 accounts for more than 70% total site energy consumption

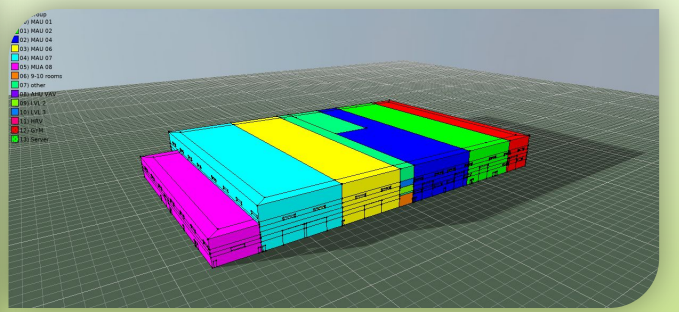


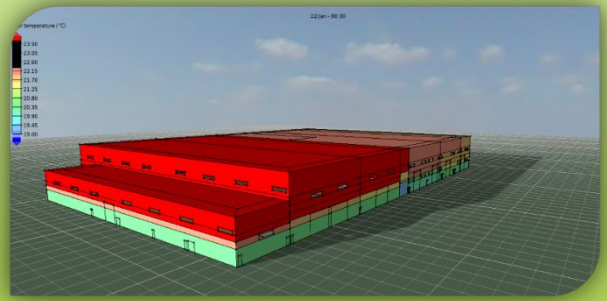


The majority of site energy consumption is attributed to its high heating demand.

Baseline Modeling for B1



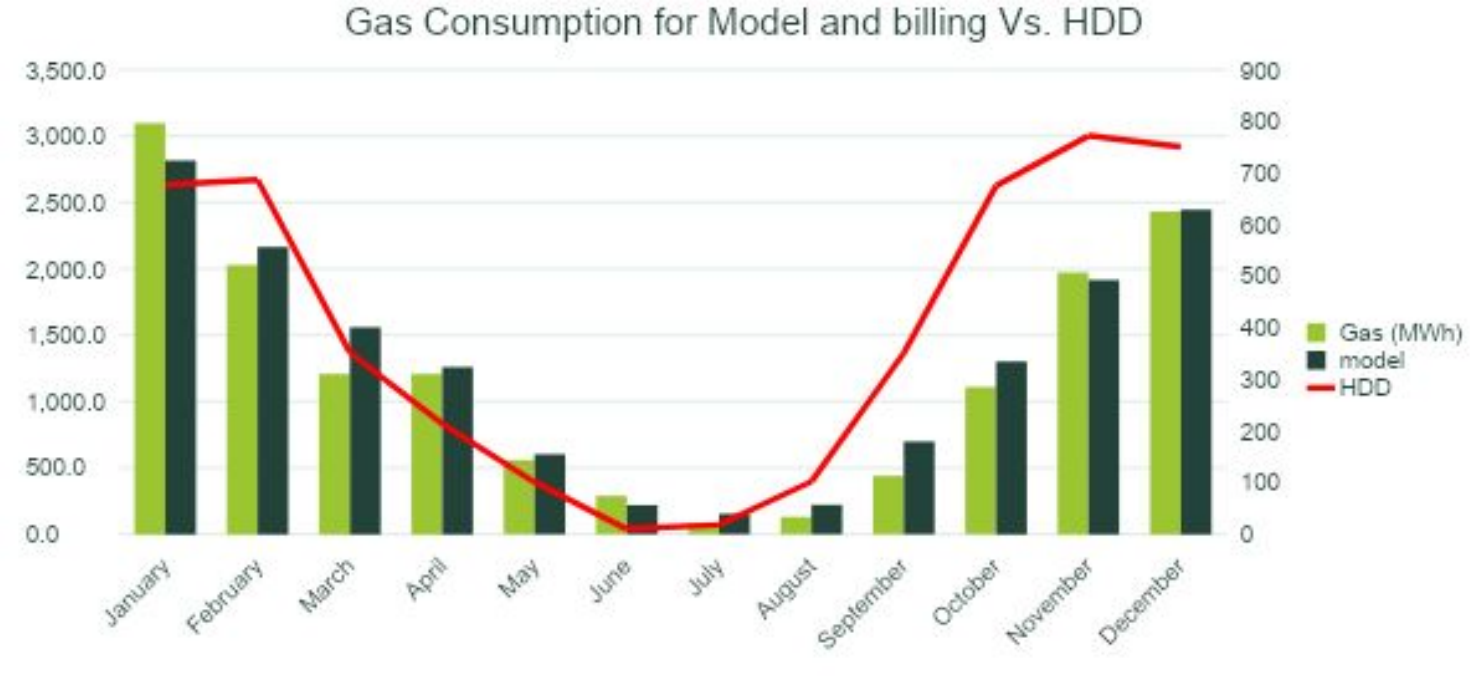




Detailed HVAC zoning

Energy Analysis for B1

- A calibrated energy model was developed to analyze the potential savings from different ECMs

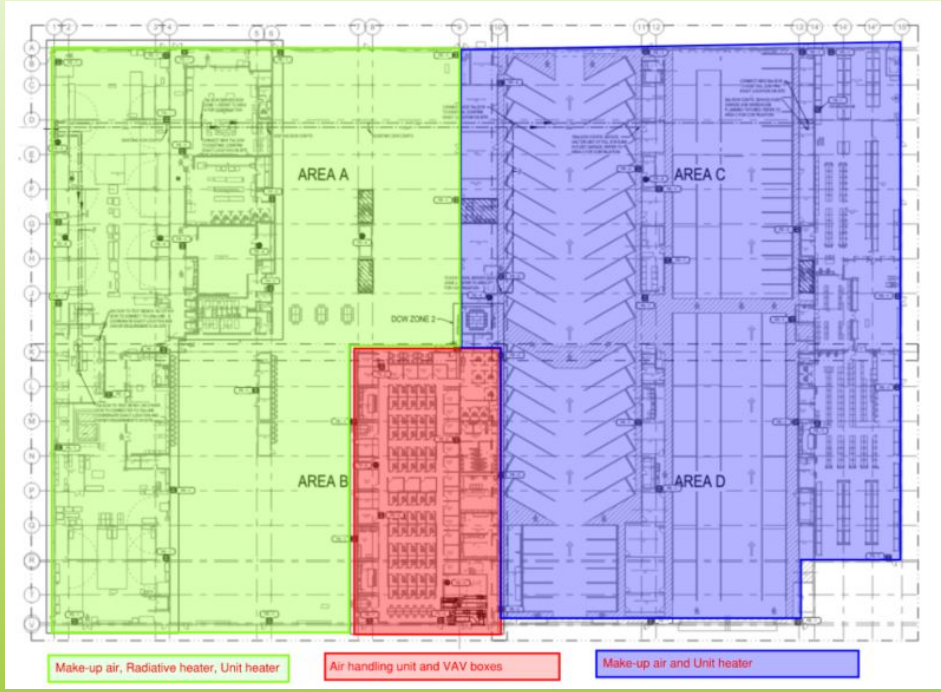


Advanced Analysis – Mechanical Systems and Operations for B1

• **Ventilation:** 67,000 L/s total fresh air via constant-volume MUAs (18 °C supply below 5 °C). Exhaust through decentralized/process fans. Offices served by AHUs (1,997 L/s) and RTUs (430 L/s).

• **Heat Recovery:** 376 L/s, 63 % sensible and 56 % latent efficiency.

• **Heating:** Gas-fired systems provides heating via a combination of central heating coils in MUAs and local equipment such as radiant heaters, unit heaters.



Advanced Analysis – Mechanical Systems ECMs for B1

• ECM 1: The HVAC system currently runs 24/7 on weekdays regardless of occupancy. Adjusting the schedule to operate only during occupied or required periods will reduce energy waste while maintaining comfort This will be achieved by updating the BMS schedules.

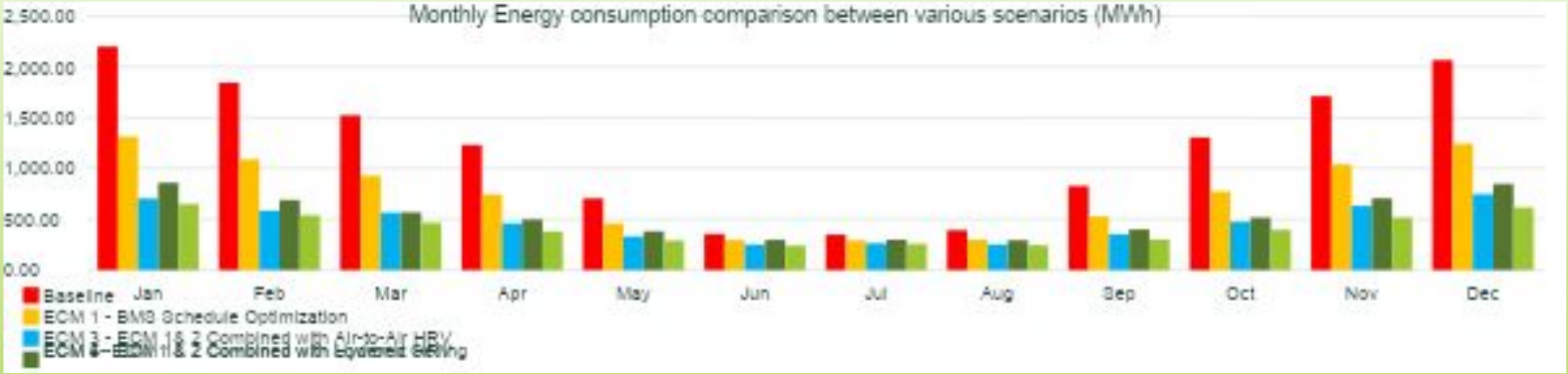
• ECM 2: Destratification in high-ceiling workshops helps prevent hot air from accumulating near the roof, ensuring more uniform temperatures throughout the space This will be achieved by installing proper ceiling fans.

• ECM 3: Building exhausts treated air to the outside without any recovery By ducting the exhaust to the supply, enabling the installation of heat recovery

• ECM 4: Because of the potential costs and technical limitations of installing major ducts, another heat recovery solution was proposed. In this approach, air-to-water heat exchangers will recover the heat at the exhaust side and transfer it to the supply side.

• ECM 5: This ECM evaluates adding a perforated ceiling to limit heat rise to upper levels This allows the upper zone to be maintained at 18 °C while the occupied zone remains comfortable with radiant heating. By keeping most of the volume at a lower temperature, this strategy reduces heating energy demand while still ensuring occupant comfort at working height.

Energy Conservation Measure Highlights for B1

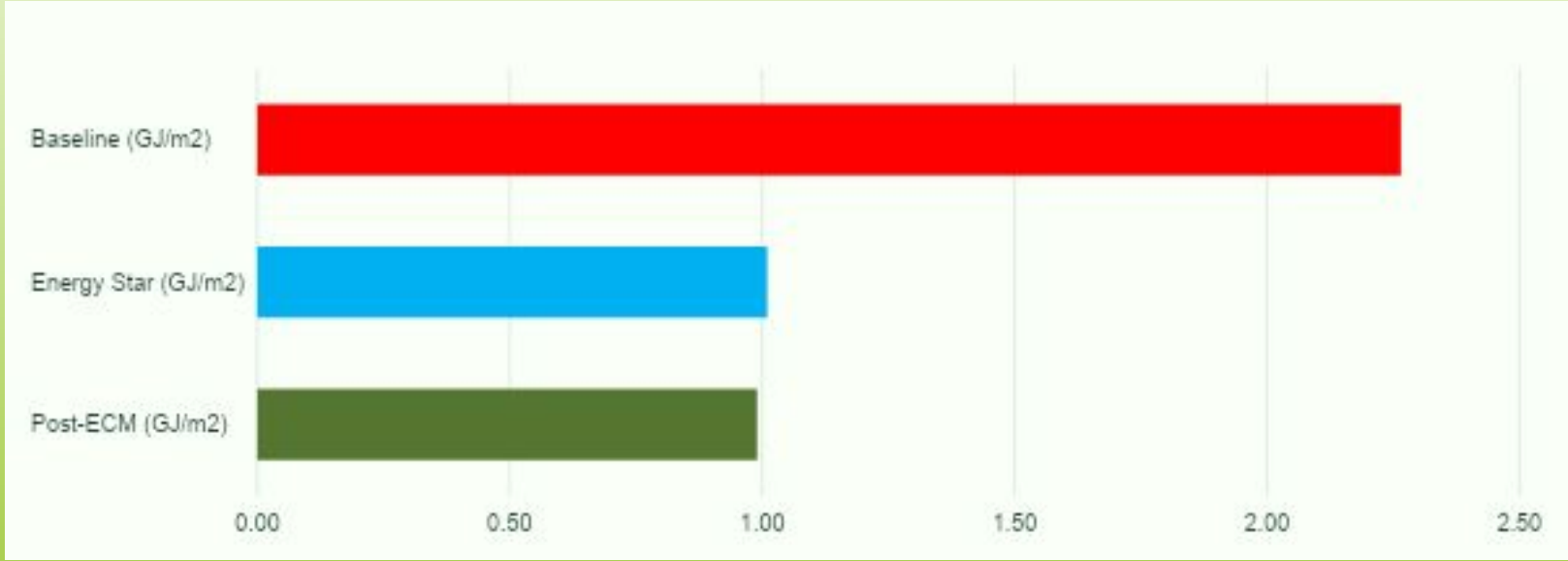


ECM #	Description	GHG Reduction (%)	Energy Reduction (%)	Annual Energy Costs Savings ($)
Baseline	-	0	0	0
ECM 1	BMS Schedule Optimization	32.8	37.9	275,922.5
ECM 2	De-stratification	**- 3.1**	0.8	21,795.4
ECM 3	**Combining ECM 1 & 2 with Air-to-Air Heat Recovery**	49.2	61.3	417,315.3
ECM 4	**Combining ECM 1 & 2 with Hydronic Heat Recovery**	37.8	56.2	328,803.9
ECM 5	**Combining ECM 1 & 2 with Lowered Ceiling**	54.0	66.3	456,746.5

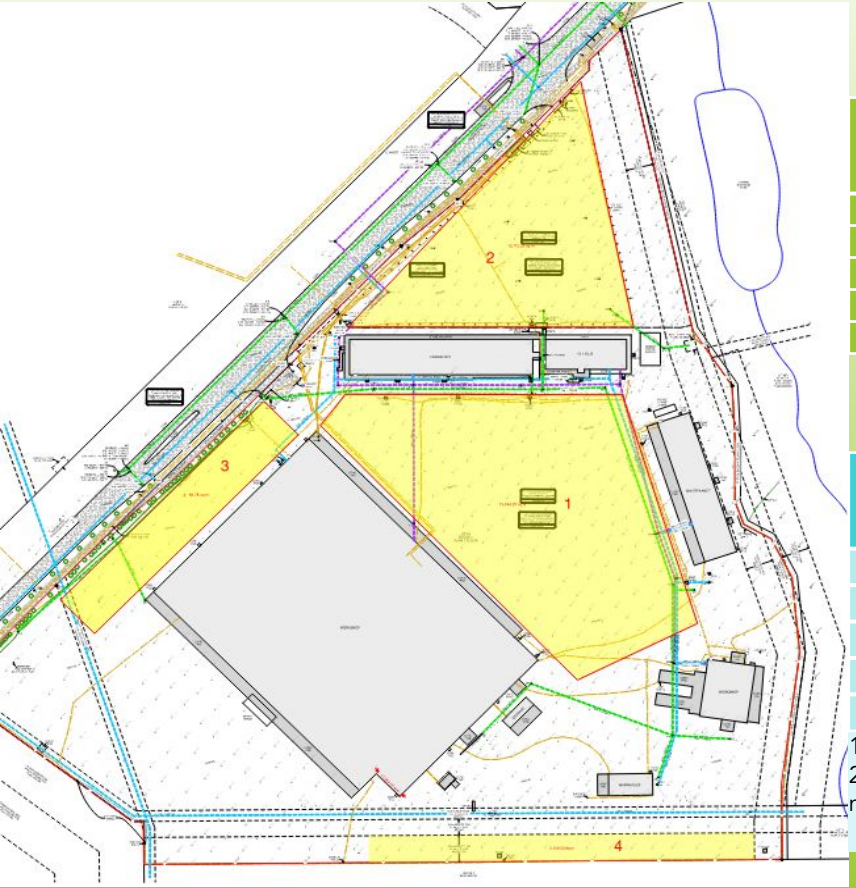
Energy Conservation Measure Highlights for B2~B5

Building	Baseline Energy (MWh/yr)	Combined ECM Savings (MWh/yr)	Main ECMs Implemented	Notes / Additional Potential	Total Energy Reduction (%)
B2	2,899	1,005	Heat recovery, HVAC schedule optimization, heating & DHW electrification, hot water heat pump	DCV yields an extra 20% savings	65%
B3	845	468	Heat recovery, window upgrade, heating & DHW electrification	DCV adds 10–12 % savings	44%
B4	484	377	Efficient lighting, heat recovery, heating & DHW electrification	DCV adds 20–30 % savings	22%
B5	223	133	Heat recovery, fresh-air optimization, heating & DHW electrification	DCV adds 20–30 %	40%

Energy Performance Projections – Post-ECM



Solar Generation Potential – Aurum Campus



Solar Capacity Potential

Location	Net Area* (m^2)	Installed capacity (kW)	Energy Generation (MWh/yr)	Abated GHG Emission (tCO_2e/yr)
1	19,000	2,661	4,122	2,061
2	10,700	1,499	2,321	1,161
3	4,100	662	1,026	513
4	3,100	501	776	388
Total	36,900	5,323	8,244	4,122

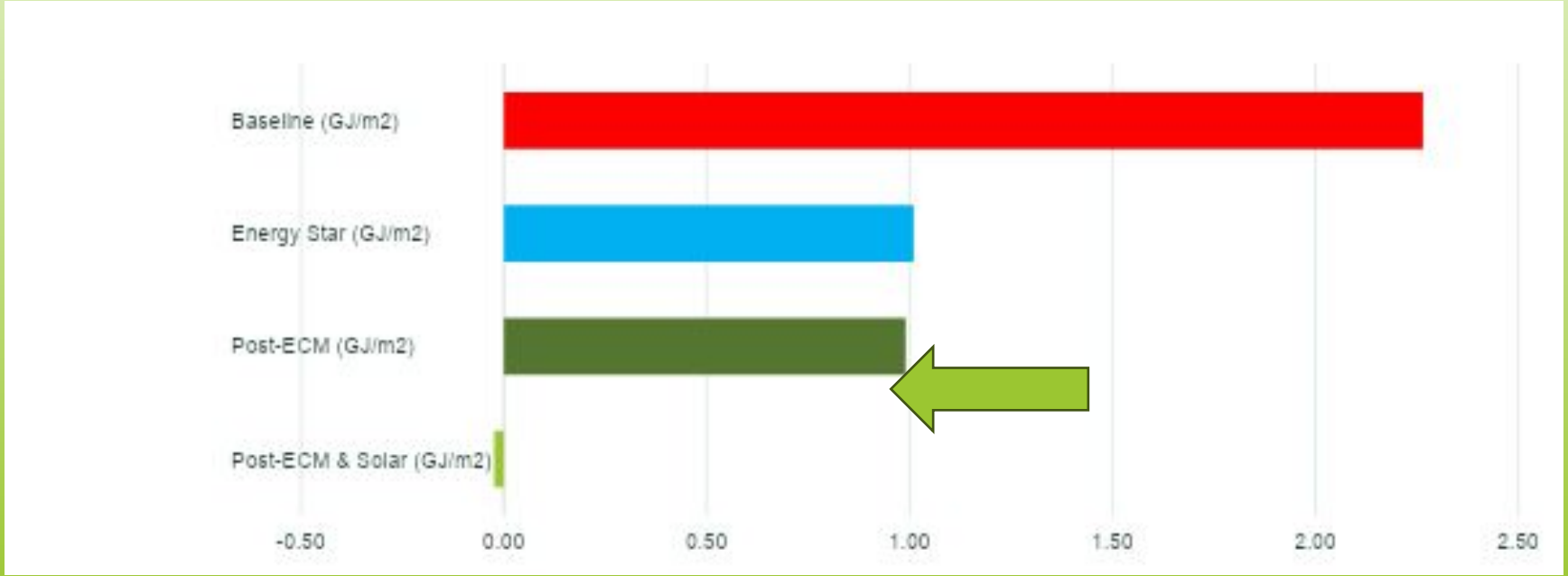
Financial Analysis

Location	Capital Costs ($)	Energy Value ($)	Avoided Carbon Charge ($)	ROI
1	13,872,000	494,640	350,370	16
2	7,813,000	278,520	197,285	16
3	3,169,000	123,120	87,210	15
4	2,397,000	93,120	65,960	15
Total	27,251,000	989,280	494,640	-

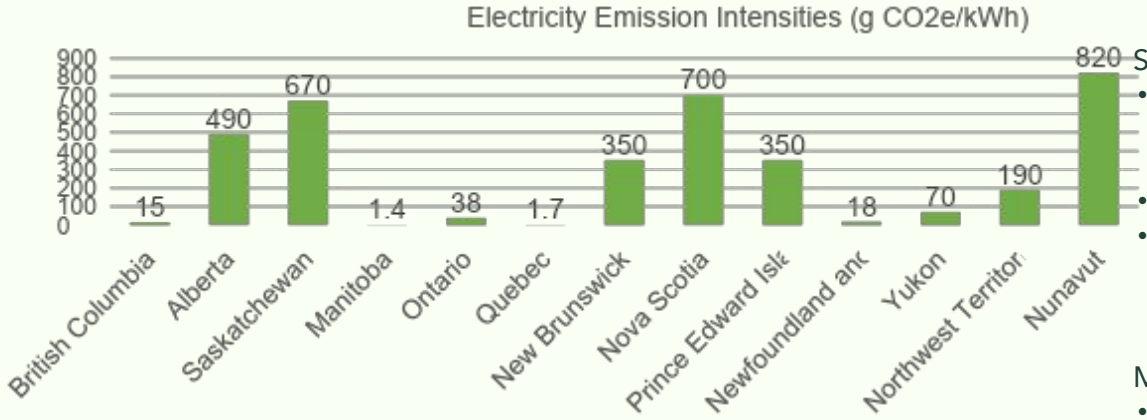
1. Carbon charge is assumed to be $170/Tco2;
2. Consider federal incentives such as the Clean Technology ITC (30%) or carbon credit monetization under Alberta's TIER/offset system could bring the ROI down to 10–12 years.

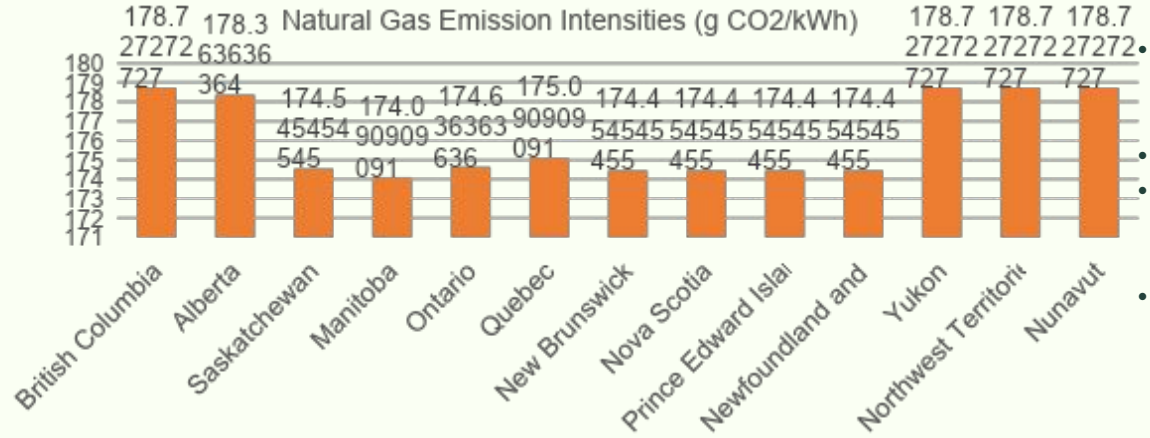
* Available area after accounting for area loss due to solar panel spacing, fire lane, etc.

Energy Performance Projections – All ECMs Combined



Decarbonization Pathway Strategies





Short Term (2024–2030)

- Focus on **energy efficiency, demand reduction, and system optimization** before full electrification.
- Implement **heat recovery.**
- Use **hybrid heating systems** (gas + electric heat pump) to switch between fuels depending on grid emissions or temperature.

Medium Term (2030–2040)

- Plan for **progressive electrification** as Alberta's grid decarbonizes (near-zero by 2035).
- Replace gas-fired systems with **high-efficiency electric equipment** during capital renewal cycles.
- Design **electrification-ready infrastructure**
- Pair with **on-site renewables** (solar PV or solar thermal) to offset grid electricity and lower lifecycle emissions.
- Adjust operations to **maximize electric use** as the grid becomes cleaner.

Lessons Learned

- Start Early, Share Visions and Grant Exploration
- Communication Between Client and Consultant
- Updated Inventory List and Virtual Tour
- The Importance of Sub-metering

Decarbonization Fundings

Federation of Canadian Municipalities – Green Municipality Fund

Grants are available for planning, studies and pilot projects. Loans are available for capital projects, and most recipients receive an additional grant of up to 15% of their loan amount.

Activity	Grant/Loans
Study: New construction of municipal and community buildings	Grant for up to 50%* of eligible costs. Up to a maximum of $200,000.
Study: Retrofit pathway for municipal buildings	Grant for up to 50%* of eligible costs. Up to a maximum of $65,000 for a single building, up to $200,000 for multiple buildings.
Capital project: Construction of new sustainable municipal and community buildings	Combined grant and loan for up to 80% of eligible costs. Combined grant and loan up to a maximum of $10 million.
Capital project: Retrofit of existing municipal buildings	
Capital project: Net-Zero Transformation	
Capital project: Municipal Fleet Electrification	

CIMA+ assisted the Town of Petrolia to obtain $ 59,000 for a GHG reduction pathway study Grant.

Decarbonization Fundings

Green Industrial Facilities and Manufacturing Program

Government of Canada

GIFMP provides financial assistance to support the implementation of energy efficiency and energy management solutions designed to:

- maximize energy performance
- reduce greenhouse gas (GHG) emissions
- increase competitiveness for industry in Canada

The Industrial Facility track offers financial assistance for projects that enhance energy efficiency.

• Invest in energy management training	Up to $50,000
• Conduct energy assessments and audits	Up to $50,000
• Hire or retain energy managers	Up to $100,000
• Implement energy management systems	Up to $50,000 - $250,000
• Invest in energy efficiency-focused capital retrofits	Up to $10 million

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