MUNICIPAL FACILITY DECARBONIZATION

Optimizing a High-Performance Municipal Facility

Energy and GHG Retrofit Roadmap — Slave Lake Government Centre & Library

CLIENT	CONSULTANT	PROJECT
Town of Slave Lake, Alberta	**Applied Energy Consulting Inc.**	**Energy, GHG & Climate Retrofit Assessment**

Slave Lake Government Centre & Library — a LEED®-certified civic facility reconstructed following the 2011 wildfire.

PROJECT OVERVIEW

The Slave Lake Government Centre & Library is a central civic facility housing municipal administration, library functions, provincial offices and court functions. Reconstructed following the 2011 Slave Lake wildfire and achieving LEED® certification, it entered this study as a relatively modern and comparatively energy-efficient building — a starting point that defined the engineering challenge.

THE CHALLENGE

The objective was not equipment replacement. It was to determine how much additional performance could be extracted from an already-efficient facility through operational optimization, improved controls, ventilation refinement, tighter system integration, targeted capital improvements and longer-term renewable-energy planning.

The calibrated baseline established a site EUI of approximately **0.83 GJ/m²·yr (229.61 ekWh/m²·yr)**, with an annual fuel split of roughly **54% natural gas / 46% electricity**.

AEC'S TECHNICAL APPROACH

AEC conducted a whole-building engineering investigation: utility-data analysis and benchmarking; site investigation; review of architectural, mechanical and electrical documentation; mechanical and electrical systems assessment; BAS/control review; building-envelope assessment; infrared thermography; calibrated RETScreen Expert energy modelling; energy and GHG quantification; financial evaluation of Energy Conservation Measures; and development of an implementation-oriented retrofit roadmap.

HEADLINE RESULTS — MODELED

38%
MODELED ENERGY REDUCTION
EFFICIENCY ECMS (EXCL. PV)

~1,846 MWh/yr
BASELINE MODELED ENERGY USE

~1,146 MWh/yr
AFTER EFFICIENCY ECMS

88%
LONG-TERM REDUCTION
INCLUDING ROOFTOP SOLAR PV

~849 t CO_2e/yr
GHG REDUCTION, FULL PACKAGE

20
ECMS EVALUATED

Model calibration: the baseline RETScreen Expert model was brought to approximately **±5% agreement** with annual utility consumption — an accepted tolerance for existing-building energy modelling.

MODELED ENERGY PERFORMANCE PATHWAY

BASELINE	AFTER EFFICIENCY ECMS	EFFICIENCY + SOLAR PV
1,846 MWh/yr	→ **1,146** MWh/yr	→ **226** MWh/yr
	38% reduction	**88% modeled**

The 38% reduction is achieved by energy-efficiency measures alone. The 88% figure is a longer-term modeled scenario that adds rooftop solar PV.

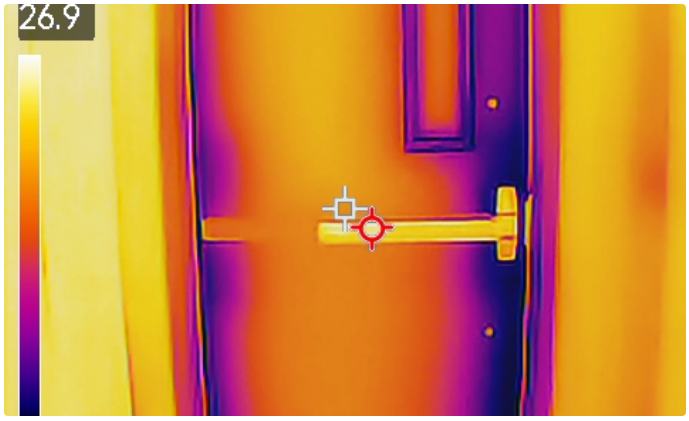
WHERE THE SAVINGS WERE FOUND

Substantial opportunity was identified by optimizing existing systems rather than immediate wholesale replacement. Representative measures included:

- Occupied/unoccupied temperature setback optimization
- BAS schedule & override governance; optimal start/stop
- Ventilation optimization & heat-recovery verification
- Make-up-air supply-temperature & heating-water reset
- Boiler sequencing; hydronic differential-pressure reset
- Fan-coil / terminal heating-control optimization
- Zone control & thermostat calibration
- Lighting controls; exterior photocell correction
- Entrance infiltration & targeted envelope remediation
- Plumbing efficiency; rooftop solar PV feasibility

Illustrative operational economics (simple payback):

1.87 yr	0.50 yr	1.96 yr
TEMP. SETBACK OPTIMIZATION	MAU SUPPLY-AIR RESET	FAN-COIL / TERMINAL CONTROL



Infrared thermal scan — exterior door assembly. *The scan recorded surface temperatures ranging from approximately 2.8 °C to 26.9 °C, demonstrating a substantial thermal gradient across the assembly. Field investigation identified significant air leakage at entrance doors, making these assemblies among the lowest-performing envelope components observed.*

ENVELOPE & FIELD INVESTIGATION

Infrared thermography and field observations identified localized envelope vulnerabilities at roof assemblies, glazing interfaces, door assemblies and roof-to-wall transitions. These were folded into the longer-term retrofit and asset-management strategy — rather than treated in isolation — so that envelope work can be coordinated with roof rehabilitation and capital renewal.

IMPLEMENTATION ROADMAP

NEAR TERM

Operational Optimization

Controls, schedules, ventilation, temperature resets, optimal start/stop, heat recovery and terminal-system optimization — relatively low-cost measures.

MEDIUM TERM

Targeted Capital Improvements

Lighting controls, entrance/infiltration reduction and selected envelope improvements, coordinated with planned asset renewal.

LONG TERM

Deep Retrofit & Renewables

Coordinate roof rehabilitation, envelope work and rooftop solar PV — ~8,000 m² total roof area supports an estimated 600–750 kW, subject to detailed structural, electrical, roof-condition and interconnection assessment.

PROJECT OUTCOME

Even a relatively modern, already-efficient municipal building can hold substantial untapped energy and GHG reduction opportunity — when operational performance, controls, envelope condition and capital planning are investigated together.

AEC provided the Town with a staged, technically defensible roadmap: low-cost operational measures are prioritized first, while larger capital and renewable-energy investments are coordinated with future asset renewal and funding opportunities.