

Report

Date November 16, 2022
Subject Crofton Fire Hall Energy Efficiency Analysis

File:

PURPOSE

To consider which options from the Crofton Fire Hall Addition and Renovations Energy Study Council wishes to implement to improve the energy efficiency of the new Crofton Fire Hall building.

BACKGROUND

In January 2022, staff contracted Mallen Gowing Berzins Architecture Inc. (the “Consultants”) to begin preliminary design on the portion of the Crofton Fire Hall that is to be replaced. As part of this work, a detailed analysis of the energy efficiency of the building was undertaken to determine options to meet the Climate Action Energy Plan (CAEP).

In September Council adopted Crofton Fire Hall Loan Authorization Bylaw No. 3863 after elector approval was obtained through an alternative approval process. The Consultants will begin the final design of the building in November.

DISCUSSION

As part of the design of the new building, an energy and emissions impact analysis was undertaken to consider energy efficiency options (Attachment 1). The design objective is to meet or exceed the goals set out in the North Cowichan CAEP. Two goals are applicable to this building as follows:

- **Goal 4:** Achieve net-zero emissions in municipal buildings by 2030
- **Goal 10:** Starting in 2030 at the latest, install net metered solar photovoltaic (PV) systems on all new buildings, supplying at least 10% of their electric load.

A multi-zone heat pump and PV-ready electrical upgrades are proposed for the building to meet the CAEP requirements. Upgrades to the windows, roof, wall and slab insulation are also being proposed. These changes increase the building's efficiency from the National Energy Code of Canada for Building standards by 70%. The modelled greenhouse gas intensity value of the proposed design will align to BC's upcoming Carbon Pollution Standard's zero-carbon ready standard. These costs total the \$175,000 represented as “proposed design” in the following table. The cost for the upgrades to meet the CAEP as outlined below:

- \$50,000 - Multi-zone heat pump
- \$75,000 – PV ready
- \$50,000 – Increased insulation

Energy Efficiency Option	Annual Energy Consumption (MWh)	Energy Saving /year	Capital Cost	Payback / year
National Energy Code of Canada for Building Standard	62.09	\$ -		
Proposed design	18.5	\$ 6,107.00	\$ 175,000.00	29
Option 1 - Roof Insulation R-50	18.2	\$ 43.00	\$ 32,000.00	744
Option 2 - Wall insulation R-26	18.3	\$ 22.00	\$ 60,000.00	2727
Option 3 - 4 Pane Glazing	17.9	\$ 81.00	\$ 35,000.00	432
Option 4 - Energy Recovery Ventilator	17.3	\$ 163.00	\$ 130,375.00	800
Option 5 - Low Flow Fixtures	17.8	\$ 97.00	\$ -	0
Option 6 - Demand Control Ventilation	13.4	\$ 716.00	\$ 29,375.00	41
Option 7 - PV 10%	16.7	\$ 258.00	\$ 20,000.00	78
Option 8 - PV 70%	5.5	\$ 1,810.00	\$ 42,702.00	24
Option 9 - PV 100%	0	\$ 2,585.00	\$ 395,342.00	153

In addition to the CAEP requirements, the Consultant considered costs, payback and emission impacts for nine potential energy conservation measures that would provide an increased level of performance on industry standards. An overview of these options is outlined in the table above.

Staff recommend implementing options 5 and 6 due to the favourable greenhouse gas and energy savings and lower years for payback. The other options will not result in significant greenhouse gas savings. The proposed design includes electrical improvements to make the building PV-ready. While installing the panels will reduce energy costs, greenhouse gas savings are negligible due to the carbon intensity of BC Hydro electricity. An overview of these options is outlined below:

Option 5 – Low Flow Fixtures

Low flow fixtures reduce the rate of heating and cooling that leaves the outlet vents in each room. This reduced flow results in lower annual energy consumption. There is a negligible impact on cost and an energy savings of \$97 per year.

Option 6 – Demand Control Ventilation

This option controls the heat and cooling in each area and can reduce consumption in areas that are not in use. This is a savings of \$716 per year with a capital cost of \$29,375 for installation.

Staff recommend that the CAEP Reserve Fund be used to fund the energy efficiency improvements to the Crofton Fire Hall. The total cost to construct the building to meet the CAEP requirements (the proposed design and demand control ventilation) is \$204,375. Staff recommend that this be structured as a \$135,145 corporate grant and a \$68,230 corporate loan paid back over ten years.

Staff have not completed a detailed analysis of the work required to bring the existing Crofton Fire Hall Annex building (the section of the building that is not being demolished) in compliance with the CAEP. The existing buildings contribute roughly 20 tonnes of CO₂e per year. With the renovations and addition, the total emissions of the Fire Hall will be 11 tonnes of CO₂e/year, produced by the heating system in the Annex Building. The funding available for the Crofton Fire Hall building replacement is not

sufficient to undertake upgrades to the Annex building. Staff will be considering upgrades to this building and other municipal buildings to achieve the CAEP in the future, and propose that a pathway to zero carbon energy study be developed in 2023 to better understand costs and requirements.

Staff have investigated funding opportunities that are available from BC Hydro within their new construction program. The program has a requirement to provide at least 400 tonnes of CO₂e lifetime GHG savings. The estimated GHG savings for the new building will be only 200 tonnes and, therefore is not eligible for any grant funding from BC Hydro.

OPTIONS

1. **(Recommended Option)** THAT Council:
 - (1) Approve a corporate grant of \$135,145 and a loan of \$68,230, totalling \$204,375 from the Climate Action and Energy Plan Corporate Reserve Fund; and,
 - (2) Direct staff to proceed with the proposed design, substantively as described in the Crofton Fire Hall Addition and Renovations Energy Study attached to the October 4, 2022 report from the Director of Operations, and include the options for low flow fixtures, demand controlled ventilation, and electrical improvements to make the Crofton Fire Hall building photovoltaic ready, to improve the building's energy efficiency.
2. THAT Council approve a corporate grant of \$175,000 from the Climate Action and Energy Plan Corporate Reserve Fund and direct staff to proceed with the proposed design, substantively as described in the Crofton Fire Hall Addition and Renovations Energy Study attached to the October 4, 2022 report from the Director of Operations.

IMPLICATIONS

Option 1

Recommended options 5 and 6 are over and above the CAEP requirements but have sound justification. Using the CAEP reserve fund for these costs may result in other projects not being able to be completed due to insufficient funding in the reserve due to future demands for electric fleet conversion and municipal building retrofits that will be presented to Council in their next term.

Option 2

If the CAEP reserve fund does not cover the total cost for energy efficiency upgrades, it may be necessary to utilize the project contingency for the building.

The CAEP Reserve Fund balance as of December 31, 2021, along with contributions from 2022, total \$787,355. With committed withdrawals from the Reserve Fund totalling \$352,000, the fund balance will be \$435,355 at the end of 2022. Approval of the staff recommendation will update the committed withdrawals to \$555,375 and the new fund balance of \$231,980.

	<u>2022 Budget</u>
Carry over balance	\$603,355
Contributions	
Tax contribution Estimate (deposited December 2022)	\$173,000
Previous project loan repayments	\$11,000
	<u>\$184,000</u>
Committed Withdrawals	
Implementing actions from environmental policy review	\$30,000
District energy feasibility study	\$25,000
Climate risk and vulnerability assessment	\$100,000
Cowichan Green Community for Development Permit fees grant	\$82,000
Crofton Fire Hall emissions study and electric conversion of small outdoor equipment	\$50,000
BC Energy Step Code incentive program	\$15,000
Clean BC Better Homes renovation program	\$40,000
Circular economy – Synergy project with CVRD	\$10,000
	<u>\$352,000</u>
Year end balance	<u>\$435,355</u>

RECOMMENDATION

THAT Council:

- (1) Approve a corporate grant and loan totalling \$204,375 from the Climate Action and Energy Plan Corporate Reserve Fund; and,
- (2) Direct staff to proceed with the proposed design, substantively as described in the Crofton Fire Hall Addition and Renovations Energy Study attached to the October 4, 2022 report from the Director of Operations, and include the options for low flow fixtures, demand controlled ventilation, and electrical improvements to make the Crofton Fire Hall building photovoltaic ready, to improve the building's energy efficiency.

Report prepared by:

Shawn Cator

Shawn Cator
Director, Operations
Community Services

Report reviewed by:

George Farkas

George Farkas
General Manager, Planning, Development and

Approved to be forwarded to Council:



Ted Swabey
Chief Administrative Officer

Attachment: 2022-08-18 Crofton Fire Hall updated Energy Report