



To: General Purposes Committee

Date: July 20, 2020

From: Peter Russell MCIP RPP
Director, Sustainability and District Energy

File: 10-6125-05-01/2020-
Vol 01

Re: Library Cultural Centre Mechanical Upgrade Project

Staff Recommendation

That the Conventional Equipment Replacement described as Option 1 on page 4 in the staff report titled “Library Cultural Centre Mechanical Upgrade Project”, dated July 20, 2020, from the Director, Sustainability and District Energy, be approved.

Peter Russell
Director, Sustainability and District Energy
(604-276-4130)

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Finance Department	<input checked="" type="checkbox"/>	
Arts, Culture and Heritage Services	<input checked="" type="checkbox"/>	
Library	<input checked="" type="checkbox"/>	
Facilities & Project Development	<input checked="" type="checkbox"/>	
REVIEWED BY SENIOR STAFF REPORT REVIEW	INITIALS:	APPROVED BY CAO

Staff Report

Origin

In June 2016, Council endorsed a target to reduce greenhouse gas (GHG) emissions from civic buildings by 65% from 2007 levels by 2020. Achieving this target requires the replacement of equipment in existing buildings and/or the full replacement of existing facilities using low carbon mechanical systems. Consistent with this objective, the Minoru Centre for Active Living was constructed with double the amount of space of the facilities it replaced with no increase in energy consumption. In this context, the Library Cultural Centre (LCC) was identified as a project with potential to reduce GHG emissions because equipment renewal is required. On this basis, Council approved \$1,870,000 in September 2018 to complete the LCC Equipment Renewal and Greenhouse Gas (GHG) Reduction Project. Project funding includes a \$750,000 grant from the Federation of Canadian Municipalities. The City subsequently received approval for a \$200,000 grant from CleanBC and \$40,000 from Fortis BC to be applied to the project bringing the total available funding to \$2,110,000.

This report supports Council's Strategic Plan 2018-2022 Strategy #2 A Sustainable and environmentally Conscious City:

1.1 Continued leadership in addressing climate change and promoting circular economic principles.

The purpose of this report is to update Council on the status of the project and advise that the Equipment Renewal and GHG Reduction Project is not financially viable. The report provides an overview of emergent challenges staff faced in developing the project and outlines the recommended Conventional Mechanical Retrofit. Given the condition of the equipment, a decision must be rendered at this time so that work can commence as soon as possible.

Analysis

The LCC is an essential cultural hub for residents of Richmond, with community and school programs, and public events hosted at this facility throughout the year. The LCC includes the City's Main Library Branch, the Arts Centre and Media Lab, the Richmond Art Gallery, the Richmond Museum, the Performance Hall, and the City of Richmond Archives.

The current heating, ventilation and air conditioning system was installed in 1992 and has exceeded its service lifespan of 15 to 25 years. The building's equipment consists of three boilers for space heating and domestic hot water and 2 chillers for cooling. Of these, one boiler and one chiller are shut down and beyond repairable condition. New chillers will need to include CFC-free refrigerants since the R-22 refrigerant was phased out in January 1, 2020. The replacement of LCC's mechanical system will ensure the reliability and continuity of the facility's heating and cooling services.

Equipment Renewal and GHG Reduction Project

Following the funding approval in September 2018, rigorous design reviews and rounds of value engineering were carried out with the objective of maintaining GHG emission reductions required for grant funding. The resulting design includes: replacement of the heating and cooling system with an air source heat pump, chiller, condensing gas boilers; electric boilers; installation of heat recovery equipment to capture waste heat from exhausted air; a new building automation system; and, more efficient pumps. The original scope of work was expected to yield a 90% reduction in GHGs. The resulting design forecasts a 60% GHG reduction (or 160 tonnes of GHGs) annually.

A 2020 BC Hydro study has shown that a recent group of similar projects have been delivered for a cost of \$340 per tonne of avoided GHGs, when incentive and grant funding are not included. The Equipment Renewal and GHG Reduction Project cost is \$440 per tonne of avoided GHGs, making it higher than recent comparators. The full cost of avoided GHGs is \$1206 per tonne. This cost for the avoided GHGs represents considerable less value when prioritizing this project over others.

In order to ensure that cost estimates were accurate, the City issued a Request for Proposal (RFP) 6742P for the Richmond Library & Cultural Centre Mechanical Upgrade was posted to BC Bid on April 22, 2020 and closed on May 27, 2020. The bids have since been evaluated resulting in a qualified proponent with proven past experience of undertaking the work. Based on the bids, an additional \$1,540,000 is required to complete the project. The Mechanical Engineer and Quantity Surveyor advised that the variance from the approved budget is due to the current uncertainty within the construction market, industry volatility and cost escalation. A contract for this scope of work will only be awarded if this option is chosen.

Completing the project per the current FCM funding agreement and timeline will be difficult. FCM has advised that a potential implication is that 20% of the \$750,000 grant may be at risk. FCM is still hopeful an extension can be provided but to be conservative, the FCM grant has reduced by \$150,000 bringing the total available funding to \$1,960,000. If FCM determines that the full grant can be provided, City funding requirements will be reduced by \$150,000.

The City's longstanding efforts to reduce GHGs from civic operations and buildings have been very effective and decarbonizing buildings will still be needed. The LCC project was triggered by the pending need to replace equipment but staff will continue to pursue GHG savings opportunities in future building retrofits and new construction projects as they arise. Staff access programs, services and grants offered by major utility companies and senior governments to ensure the City applies best practices and maintains its leadership position.

Conventional Mechanical Retrofit Project

The current heating and cooling equipment can be replaced with new but similar equipment. The proposed scope includes the replacement of three mid-efficiency boilers and two chillers. New boilers will improve efficiency by 15%. The chillers will be equipped with advanced technology, boosting equipment efficiency and reliability. CFC-free refrigerant R-134a will be used in these new chillers, which are also upgradable to operate with the next-generation, low global warming

potential (GWP) refrigerant R-513A in the future. As part of the equipment replacement, a new building automation system will be implemented to optimize operation.

Options

Option 1: Conventional Mechanical Retrofit Project [Recommended]

Replace the current mechanical system for a cost of \$1,050,000 with new but similar equipment using approved capital funding. This option would see GHG emissions reduced by 10% compared to the current system. This option does not create an operational budget impact (OBI). If this option is approved, the City would forego capital grant funding. Unspent funds will be returned to the Carbon Tax Provision.

Option 2: Equipment Renewal and GHG Reduction Project [Not Recommended]

Implement a deep greenhouse gas emission and energy-efficient retrofit of heating and cooling systems using an additional \$1,540,000 in capital funding with forecasted 60% GHG reduction (or 160 tonnes of GHGs annually compared to the current system). An OBI increase of \$53,500 for utility and maintenance expenses is also required and can be considered in the 2021 budget process. If this option is approved, staff will award the contract to the lead proponent. In order to commence this work in 2020, an existing Council approved capital project can be utilized as a temporary funding source until the additional \$1,540,000 can be funded by the Gas Tax Provision (\$465,000) and Capital Building and Infrastructure Reserve (\$1,075,000) and included as an amendment to the Revised Consolidated 5 Year Financial Plan (2020-2024). Unspent funds will be returned to the Capital Building and Infrastructure Reserve.

For comparison, staff also assessed performance metric information for both options against other libraries in the Lower Mainland that the City has access to (Attachment 1).

Note that staff efforts to reduce the costs and preparation for the RFP for this option resulted in consulting expenses of \$155,000.

Table 1: Cost Comparison of LCC Mechanical Upgrade Options

	Option 1	Option 2
	Conventional Mechanical Retrofit Project (Recommended)	Equipment Renewal and GHG Reduction Project
Approved Capital Funding	\$ 1,050,000	\$ 1,960,000
Total Project Cost	\$ 1,050,000	\$ 3,500,000
Additional Funding Required	\$ 0	\$ 1,540,000

Financial Impact

Should the recommended Option 1 be endorsed, approved capital funding will be used. The City will forego grant funding by approving this option.

Conclusion

Staff recommend that Option 1 be endorsed so that the mechanical system upgrade at LCC can proceed. Completion of this project will reduce GHG emissions by 10%.



Poroshat Assadian, B.Arch CEM LEED
Corporate Energy Manager
(604-244-1239)

Att. 1: Energy and Greenhouse Gas (GHG) Intensities in the Lower Mainland

Attachment 1: Energy and Greenhouse Gas (GHG) Intensities in the Lower Mainland

The LCC is unique facility combining a broad range of uses. For comparison purposes, staff used available information from other regional libraries, see figures below.

Figure 1: Comparative Energy Use Intensity of Lower Mainland Libraries

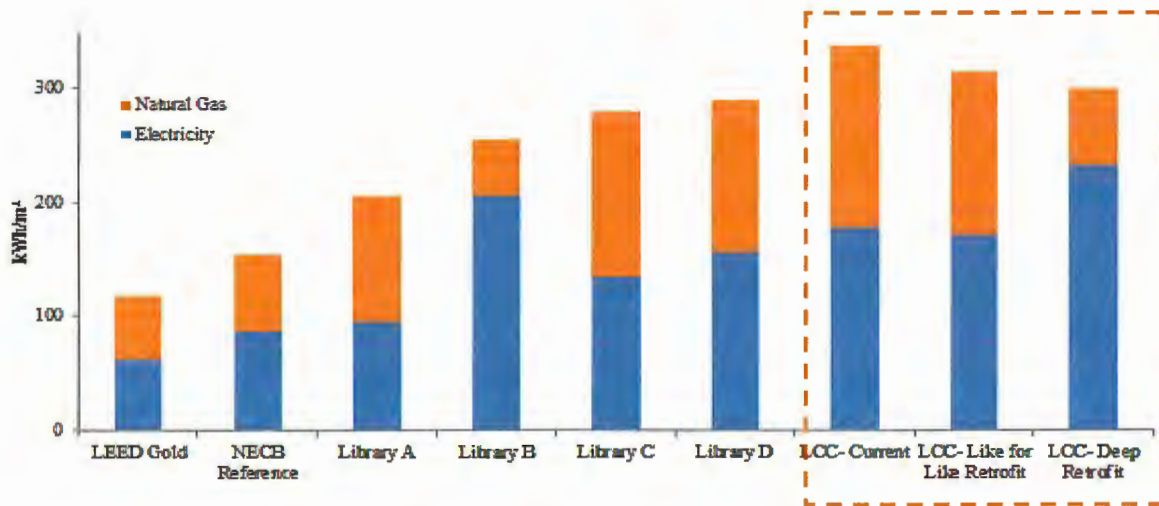


Figure 2 shows greenhouse gas GHG emission intensities for Lower Mainland library facilities. The deep energy retrofit option results in a 60% modelled reduction of GHG emissions from the current LCC mechanical system. Implementing a deep greenhouse gas emission and energy efficiently retrofit will lower the GHG emissions of the building close to the National Energy Code of Canada for Buildings 2011.

Figure 2: Comparative Greenhouse Gas Emission Intensity of Lower Mainland Libraries

