

CORPORATE REPORT

To: CAO for the Recreation, Culture & Airpark Services Commission Date: 2019-01-22
From: Stacey Barker, Deputy Director of Regional Programs File No: 1855-35

Subject: Improving Energy Efficiency at the Hope and Area Recreation Centre

FOR INFORMATION ONLY

INTENT

This report is intended to advise the Recreation, Culture & Airpark Services Commission of efforts to position the Hope and Area Recreation Centre as a leader in environmental sustainability, financial viability and continued safe facility operation by increasing its energy efficiency through a geothermal heat pump system. Staff is not looking for a recommendation and has forwarded this information should members want more clarification to discuss the item further.

STRATEGIC AREA(S) OF FOCUS

Provide Responsive & Effective Public Services
Support Healthy & Sustainable Community
Support Environmental Stewardship

PRIORITIES

Priority #2 Air & Water Quality

BACKGROUND

A large amount of energy is required to heat and cool the buildings, create and maintain the ice, and heat the swimming pool at the Hope and Area Recreation Centre. Current systems are energy inefficient, with 1,868,000 kWh of thermal energy dissipating to the outdoor air through a cooling tower or through the municipal sewer system, a practice that is both hard on municipal piping infrastructure and wastes significant quantities of potable water. The refrigeration plants alone produce 34% more energy than is needed to heat the buildings per year. These factors make the Hope and Area Recreation Centre the Fraser Valley Regional District's (FVRD) largest corporate greenhouse gas contributor and requires a significant portion of its budget be directed towards energy needs.

Recent incidents at other ice arenas have also highlighted that the use of ammonia as a refrigerant for producing ice is still a concern. Although the Centre has an outstanding safety record and follows recommended safe working protocol, the ammonia system currently used could be replaced with safer options now available.

Recreation centres across Canada are looking to solve the problems such as those mentioned above by capturing the excess heat production with a geothermal heat pump system. A geothermal heat pump is a central heating and cooling system that transfers and stores heat to and from the ground. Heat removed from the ice can be stored in a geothermal heat pump system and be recirculated to heat the buildings or pool, make hot water, melt snow, and dehumidify the rink.

A geothermal heat pump can be broken down into three primary components:

- A ground heat exchanger – this consists of long sections of liquid-filled plastic pipe buried in the ground horizontally that are used to store and transfer heat to the ground, and vice versa.
- A liquid pump – sends water through the system.
- Water source heat pump – this functions like a boiler; it receives heat from the loop and then distributes it within the given structure.

For added energy efficiency in arenas, a thermal storage buffer can be installed under the conventional concrete floor that supports the ice slab. The heat pump chills the buffer under the ice during off-peak hours allowing the ice to remain cold for an extended period of time during a power outage or extreme cold snaps where energy supply may be limited.

DISCUSSION

The feasibility study conducted by the FVRD in 2018 concluded that the Hope and Area Recreation Centre is an excellent candidate for a geothermal heat pump system. A geothermal heat pump system at the Centre would remove the use of gas and reduce the CO₂ emissions by approximately 290 tonnes (93%) annually. It would eliminate the use of ammonia and ensure the Centre continues to be a safe and environmentally sustainable space for the community.

The empty lots/playing fields adjacent to the Centre are ideal for placement of required piping. Timing is also optimal as the arena floor slab is due for replacement which would allow for the addition of a thermal storage buffer under the ice. The location of the Centre is also advantageous as it would be possible to extend the system in the future off the site to surrounding properties, creating a district heating system and further offsetting operations costs for the Centre.

BC Hydro, which operates an electrical sub-station in close proximity to the arena, is supportive of the potential project because the addition of a thermal storage buffer may assist them with lowering demand of the electrical substation during peak times. In support of the project, the FVRD has been successful in securing a \$43,000 grant from BC Hydro under their PowerSmart Program to undertake an Energy Efficiency Study at the Hope and Area Recreation Centre. The Study will include a comprehensive review of energy savings potential and will provide recommendations to improve the energy efficiency of the buildings and mechanical systems. This Study will complement and coordinate with future geothermal heat pump plans.

The FVRD is also working to secure grant funding for the cost of implementing a geothermal heat pump system. Currently, the ***Investing in Canada Infrastructure Program***, which both the Governments of Canada and British Columbia jointly fund, is accepting applications under two streams: the ***Community, Culture & Recreation Infrastructure*** stream and the ***Green Infrastructure*** stream. The applications for these opportunities are due in January and March, 2019 respectively. It is not expected that any funding awards would be announced for at least 6 months after the closure date.

COST

The FVRD's Environmental Services Department and the Engineering & Community Services Department are working together with Recreation, Culture and Airpark Services staff to finalize costing estimates and to pull together the best project scenario.

If the FVRD is able to secure grant funding, it will finalize costing responsibilities, present options and costs to the Commission, and seek permission to proceed with the project from the Board.

CONCLUSION

A geothermal heat pump system for the Hope and Area Recreation Centre would drastically decrease its carbon footprint, help it realize long-term financial savings, and ensure continued safe working conditions. Securing grant funding to assist in its implementation would make the project more economically feasible and therefore the FVRD is applying for several opportunities.

COMMENTS BY:

Mike Veenbaas, Director of Financial Services

Reviewed and supported.

Paul Gipps, Chief Administrative Officer

Reviewed and supported