

TO: Operations Policy & Planning Committee of the Whole  
FROM: Kim Morris  
RE: Net Zero Cedar Hill Middle School Replacement Options **UPDATED**  
DATE: December 6 , 2021

---

## Background

At its September 27, 2021 Regular Open Board meeting, the Board made the following motion:

Be it resolved that the Board of Education of School District No. 61 (Greater Victoria) direct the superintendent to direct staff to determine the cost of incorporating net zero into the design of new Cedar Hill Middle School;

AND FURTHER

That staff report the cost, including business case, back to the Board by November 2021 for Board approval to consider the funds for the net zero design.

A net zero building is an energy efficient building which only uses as much energy as it can produce from on-site renewable energy on an annual basis. The design strategy is first-and-foremost to reduce the energy consumption of the building through building design.

This includes orientation of the building, efficient building form, enhanced envelope design (insulation, reduced thermal bridging, air/vapour barrier system design, glazing, and sunshades), the use of energy efficient mechanical and electrical systems, and energy saving fixtures and appliances.

The second major strategy for the building is to produce any of its remaining energy needs through on-site renewable energy and/or efficient sources. Solar, including photo-voltaic (PV) systems, is the primary viable means of doing this.

In support of developing the Project Definition Report for Cedar Hill a workshop was conducted to identify measures that would optimize the design of the build both in terms of capital costs and energy reductions. The primary goal was to design a school that could generate as much renewable energy on site as it consumed over a typical year – that is a net zero energy (NZE) building. In order to meet the goal of a net zero design in the most cost effective manner, potential energy saving measures were analyzed both in terms of site energy savings and relative value.

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories we live, we learn, and we work.

The new middle school energy base design for Cedar Hill met or exceeded the requirements of the BC Building code. From this initial base design, three bundle options of energy efficient measures were explored.

**Bundle 1: Positive Net Present Value** (simply referred to as NPV bundle)

Positive NPV - the projected earnings generated by a project or investment—in present dollars—exceeds the anticipated costs, also in present dollars. It is assumed that an investment with a positive NPV will be profitable. The bundle was configured such that each measure's NPV was positive.

Bundle 1 most notably does NOT include a PV solar array and focuses on reduced capital costs and utility bills primarily by:

- x Re
- d
- c

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories we live, we learn, and we work.

The building's main energy sources would be air source heat pump and ground source heat pump with a backup gas boiler.

### Bundle 3 NZER with 272kW PV Solar Array

While NZER Bundle 2 allows for further PV panels to be added at a later date and is achievable within the design and build of the new school with further funding from the Greater Victoria School District. A net zero school would include the full PV system to be added in the present construction phase. Adding enough rooftop PV to offset the building's equivalent annual energy requirements is achievable with a larger 272kW photovoltaic system at an estimated cost of nearly \$1.1M. Currently BC Hydro's net metering program only allows for 100kW systems. Until BC Hydro lifts this cap, the new Cedar Hill Middle School will not be truly net zero using PV systems. NZER with 272kW PV Solar Array would require alternate types of on site energy production under current BC Hydro Net Metering Service constraints.

The building's main energy sources would be air source heat pump and ground source heat pump with a backup gas boiler.

Table 1 outlines the bundle information identified to achieve optimal energy performance.

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories we live, we learn, and we work.

Table 1 – Information and Costs Associated with Net Zero Ready and Net Zero Builds

Bundle #	Cost Explanation	Annual Energy Costs	CQ Emissions (tonnes)	Net Annual Energy Use (ekWh/m <sup>2</sup> )	Capital Costs x 1	Notes
Bundle 1	(\$386,240) NPV Bundle Cost	\$37,910	26.1	66.3	(\$386,240)	-Less utility costs than base -Less Capital Costs due to replacing the base65T ASHP with 30TGSHP -No PV in this option
Positive Net Present Value	Total = (\$386,240)					
	\$118,375					
Bundle 2	Cost of energy design					
Net Zero Energy Ready						
-NZER building with 100kW Solar Array	\$300,000- 100kW PV Cost \$100,000- PV Structural Costs					
	Total =					

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories we live, we learn, and we work.

## Table 2 – Suggested Heating Plant Upgrades

Conclusion:

The City of Victoria, Sechelt and District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories we live, we learn, and we work.

One *kwikwaka'wakw* Community

Greater VICTORIA District

2. The Greater Victoria School District Board advocate for BC Hydro to lift the 100kW net metering cap by advocating directly with BC Hydro and through BCSTA to BC Hydro, Minister of Education, Minister of Finance, Minister of Environment and Clean BC.
3. Prioritize targeted funds, in excess of the required Bundle 2 NZER with a 100kW PV Solar Array \$538,375 capital outlay, on carbon reducing heating plant retrofits that will reduce district carbon immediately, while simultaneously replacing equipment that is nearing end of life. Please refer to Table 2 above. Upgrading Lambrick Park's aging infrastructure would cost \$1.3M with an annual carbon savings of 90.8 tonnes. Suggested spending plans could include:

	\$2.5M – Estimated Communicated in Public Consultation	\$1.2M-Estimated for Bundle 3
NZER Cedar Hill with 100kW PV Solar Array	\$538,375	\$538,375

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories we live, we learn, and we work.

