



## Managing Building Information to Optimize Lifecycle Performance

### Location

Kelowna, British Columbia

### Project Completion

December 2020

### Project Cost

\$18.9 Million

## PROJECT DESCRIPTION

The Health Sciences Centre at Okanagan College's Kelowna Campus is a 3,200 m<sup>2</sup> addition to the College's existing Health Sciences Building, providing new teaching, laboratory, and office spaces. The building supports technology-enhanced and student-centred labs, classrooms, and offices for health and social development programs. Ample interior glazing provides views into program spaces and facilitates social connections, allowing the exterior to achieve a superior thermal energy demand target providing greater resilience and occupant comfort.

The building is a hybrid super structure, consisting of mass timber and structural concrete. Mass timber, a renewable and sustainable low carbon building solution, aids in offsetting total CO<sub>2</sub>e emissions over the building's lifespan through wood-based materials carbon capture and sustainable forestry. This project is also one of 16 across Canada that are participating in the Canadian Green Building Council's (CaGBC) Net-Zero Carbon pilot program.

The building prioritizes materials and systems that promote occupant health and comfort by meeting stringent low-VOC (volatile organic compound) thresholds to assure there is no harm to the environment and humans. Transparency of materials is promoted through the integration of materials that provide a health product declaration or an environmental product declaration, as well as through sustainably derived materials such as FSC-certified wood. The team completed a Whole Building Impact Assessment to determine opportunities for lifecycle impact reduction during design. Natural ventilation systems reduce the demand on mechanical systems with locally procured photovoltaic (PV) arrays on the building and within an adjacent surface parking lot to offset power consumption. The design takes advantage of a nearby wastewater treatment plant through a closed-loop system that recovers waste heat from treated effluent before it is discharged. The design of the building envelope provides superior R-value (insulation), optimizing energy efficiency by reducing heat loss.

The Okanagan College Health Sciences Centre is LEED® Gold certified, verifying the sustainability of the building and its design features. To achieve this certification, the Okanagan College Health Sciences Centre was rated on integrative process, location and transportation, sustainable sites, water efficiency, energy and atmosphere, materials land resources, indoor environmental quality, innovation, and regional priority credits. The Health Sciences Centre was awarded 63 out of 110 points in these categories, garnering its LEED® Gold status.

# OKANAGAN COLLEGE HEALTH SCIENCES CENTRE

## ENERGY OPTIMIZATION

In terms of energy performance, modeled energy cost savings of 43.2% were demonstrated and 13.85% of the virtual total building energy cost is offset by renewable energy production. The total predicted annual energy consumption for the project is 178,157 kWh/year of electricity and 110,938 kWh/year of district hot water. Outdoor water use was reduced by 56% through reduced irrigation, and indoor water use was reduced by 35.44%. The build received a 46% in the responsible sourcing of raw materials.

The Centre integrated mechanical, electrical, and HVAC control systems, and continues to carefully monitor energy performance, including energy consumption per square foot, in order to track compliance with energy targets. The Centre offers unprecedented visibility into the operation and performance of buildings, utilizing pattern recognition algorithms that are capable of discerning common sources of inefficient system performance or equipment malfunctions. This approach automates the tedious manual analysis traditionally required in commissioning and performance testing. Our Building Analytics run constantly and provide customized notifications and detailed historical records that are accessible in different formats including live-access dashboards and periodic reports for distribution.

The Centre generates reports informed by systems monitoring that detail any issues or underperforming equipment and suggest areas for improvement and optimization. On a monthly basis, an overall Building Health Score is calculated based on the number of issues detected, whether they are related to primary or secondary mechanical equipment, and the accuracy in maintaining space temperature setpoints. The goal is to monitor the rate of improvement while maintaining or improving the space comfort. As issues are corrected, operating costs and energy consumption should decrease. For the Okanagan College Health Science Centre, the Building Health Score analytics facilitated a rapid improvement in performance, including in the hydronic heating and cooling systems.

In addition to monitoring and analyzing the mechanical systems, The Centre also integrated information from electrical and thermal meters that measure the energy consumption of liquid heating and cooling systems using temperature sensors. This provides Okanagan College with a better understanding of past energy consumption and can be used as a baseline to achieve further efficiencies and optimization with the systems of the Health Sciences Centre building.

## INDIGENOUS COLLABORATION

Collaboration with Indigenous communities was an integral part of the Okanagan College Health Sciences Centre construction process as Indigenous knowledge and culture informed many aspects of the build from start to finish. This ongoing engagement and dialogue included engagement from the College's Indigenous Committee and members of the Westbank First Nation. The design incorporates Indigenous plantings and trees within formal linear arrangements that speak to the Valley's horticultural history. Additionally, the design of the building is meant to embody an Indigenous basket, tying into the building's surroundings, which includes an Indigenous Garden. Weaving is a very important concept to Sylix Okanagan people and is represented in the exterior design as well as the wood ceiling. In 2021, a 30-foot sculpture created by local Indigenous artist Clint George has become a focal point of the building which depicts the Sylix Okanagan oral history (or captik) on how food was given. The area below the sculpture has provided a safe and quiet area that has spiritual significance to the campus and Indigenous students, faculty, and community members.

