CASE STUDY

Peatt Commons West

Net-Zero Energy-Ready Challenge Winners Series

February 2021

The NZER Challenge

The Net-Zero Energy-Ready (NZER) Challenge is a provincial CleanBC incentive program for large buildings (multi-unit residential, office, retail, commercial, institutional, etc.) launched in late 2018. In addition to providing financial support for developments targeting NZER levels of performance, the program aims to celebrate, promote and learn from these innovative and energy-efficient projects.

Out of over 50 applications received, a juried competition resulted in the selection of 11 winning projects that represent the best examples of NZER buildings. These projects received up to \$390,000 in incentives to help cover the estimated cost premiums associated with the design and construction of NZER buildings.



UBCO Skeena Residence (Credit: Andrew Latreille)

Carrington View Building A (Credit: Skyline Living)

825 Pacific Street (Credit: IBI Group Architects Ltd.)

Project Overview

Peatt Commons West is the second phase of a purpose-built rental development by Peatt Commons Inc. in Langford, British Columbia. While its original design targeted some improvement in energy performance, the developer decided to pursue Step 4 of the BC Energy Step Code after deciding to participate in the NZER Challenge. Peatt Commons Inc. engaged an energy modeler to guide the design team in upgrading the design to meet the higher performance target.

The aim of the Peatt Commons West development was to provide the local community with affordable, condo-quality, energy-efficient rental housing while minimizing the overall carbon footprint of the development. The developer anticipated that this approach would attract more responsible and discerning tenants.

The original design for Peatt Commons West included an above-grade, mass timber structure and some basic energy conservation measures which decreased the energy consumption of the building 15% below the applicable baseline established by the 2015 National Energy Code for Buildings. To qualify for the NZER Challenge competition, the developer decided to pursue the highest level of the Energy Step Code for this size of building. Targeting Step 4 was an opportunity to be at the forefront of the green development community and to test new design and construction strategies that would help achieve the developer's intrinsic goals.



Credit: Design Build Services

Project Specs

PROJECT INFORMATION

Address	821 Hockley Avenue, Langford, BC
Climate Zone	4
Ownership Type	Purpose-built rental
Residential Units	72
Levels	Six storeys above grade and two underground parking levels
All-Electric Building	No
Minimum Building Code Requirement	BC Building Code 2012 NECB 2015
Canadian Construction Documents Committee (CCDC) Contract	14 (Design-Build Stipulated Price Contract)
Gross Floor Area	
GIOSS FIOOI Alea	Residential: 5,634 m ² (60,644 ft ²) Parkade: 2,278 m ² (24,520 ft ²)
Modeled Floor Area	Residential: 5,634 m ² (60,644 ft ²) Parkade: 2,278 m ² (24,520 ft ²) 5,184 m2 (55,800 ft2)
Modeled Floor Area Window to Wall Area	Residential: 5,634 m ² (60,644 ft ²) Parkade: 2,278 m ² (24,520 ft ²) 5,184 m ² (55,800 ft ²) 32%
Modeled Floor Area Window to Wall Area Form factor ¹	Residential: 5,634 m² (60,644 ft²) Parkade: 2,278 m² (24,520 ft²) 5,184 m² (55,800 ft²) 32% 0.88
Modeled Floor Area Window to Wall Area Form factor ¹ Construction Duration	Residential: 5,634 m² (60,644 ft²) Parkade: 2,278 m² (24,520 ft²) 5,184 m² (55,800 ft²) 32% 0.88 15 months (February 2019 to May 2020)
Modeled Floor Area Window to Wall Area Form factor ¹ Construction Duration Total Energy Use Intensity ²	Residential: 5,634 m² (60,644 ft²) Parkade: 2,278 m² (24,520 ft²) 5,184 m² (55,800 ft²) 32% 0.88 15 months (February 2019 to May 2020) 93.2 kWh/m² yr
Modeled Floor Area Window to Wall Area Form factor ¹ Construction Duration Total Energy Use Intensity ² Thermal Energy Demand Intensity ²	Residential: 5,634 m² (60,644 ft²) Parkade: 2,278 m² (24,520 ft²) 5,184 m² (55,800 ft²) 32% 0.88 15 months (February 2019 to May 2020) 93.2 kWh/m² yr 14.5 kWh/m² yr
Modeled Floor Area Window to Wall Area Form factor ¹ Construction Duration Total Energy Use Intensity ² Thermal Energy Demand Intensity ² Greenhouse Gas Intensity ²	Residential: 5,634 m² (60,644 ft²) Parkade: 2,278 m² (24,520 ft²) 5,184 m² (55,800 ft²) 32% 0.88 15 months (February 2019 to May 2020) 93.2 kWh/m² yr 14.5 kWh/m² yr 7.3 kgCO₂eq/m² yr

1 Form factor calculated using the modeled floor area of the building.

2 Based on the modeled energy performance with a default air infiltration value of 0.2 L/s.m² at operating pressure.



Wood structure with CLT floor and roof panels. (Credit: Design Build Services)

PROJECT TEAM

Owner/Developer	Peatt Commons Inc.
Design-Builder	Design Build Services
Architect	Jack James Architect
Building Envelope Consultant	Aqua-Coast Engineering Ltd.
Energy Modeler	Edge Consultants
Structural Engineer	Sorenson Trilogy Engineering Ltd.
Mechanical Engineer	Avalon Mechanical Consultants Ltd.
Electrical Engineer	Magma Consulting Ltd.

Technical Details

Structure

The wood-framed structure over the parkade consists of prefabricated cross-laminated timber (CLT) floor and roof panels supported by wood columns and beams. The floor and roof panels were manufactured by Structurlam, craned into place directly from the delivery truck and inter-connected using 12.5 mm (½") thick wood splines. The floor panels are covered in a lightweight concrete topping. The exterior walls were framed on-site and most are of wood-stud construction. The two-level parkade is a conventionally reinforced concrete structure.

Fenestration

The windows installed on this building are from the Starline 7100 Series. They are triple-glazed, vinyl-framed casement windows with an effective U-value of 0.88 W/m²K. The insulating glass units are argon-filled and a low emissivity coating was applied to one surface. Their low solar heat gain coefficient of 0.22 reduces the cooling load in the summer. The patio doors are triple-glazed, vinyl-framed doors from the Starline 8500 Series with an effective U-value of 1.11 W/m²K and a low solar heat gain coefficient of 0.2.



Construction of the elevator shaft using CLT panels. (Credit: Design Build Services)



Installation of the CLT floor panels. (Credit: Design Build Services)

Insulation

The above-grade exterior walls were designed to achieve an effective thermal resistance of RSI 3.12 m²K/W (R-17.7) using 140mm (5½") thick fiberglass batt insulation between the studs and 65mm (2½") thick continuous mineral wool insulation over the exterior sheathing and the air barrier membrane. The roof was designed to achieve an effective thermal resistance of RSI 6.1 m²K/W (R-37) with 165mm (6½") thick polyisocyanurate insulation and a sloped roofing package of no less than 25mm (1") thick expanded polystyrene (EPS) rigid insulation. The CLT roof panels provide approximately RSI 0.8 m²K/W (R-5) of thermal resistance. 127mm (5") of spray-applied glass fiber insulation was applied to the underside of the P1 soffit slab (beneath the conditioned floor areas of the ground floor) resulting in an effective thermal resistance of RSI 3.5 m²K/W (R-20).

Airtightness

Tyvek® CommercialWrap® air barrier was installed on the exterior face of the sheathing. IKO Armourbond™ Flash was used as a self-adhered air/vapour barrier applied to the exterior face of the CLT roof panels.

Heating and Cooling

Space heating and cooling are provided by an energy-efficient, in-suite, Daikin split heat pump system with one indoor unit located in the living area of each apartment. The heat pump uses R-410a refrigerant and can provide heating down to an outdoor temperature of approximately -15°C (5°F). Additional heating is provided by electric baseboard heaters in other areas of the apartment. The heat pump has a coefficient of performance (COP) of 3.5 and a seasonal energy efficiency ratio (SEER) of 17.



Installation of the air barrier. (Credit: Aqua-Coast Engineering Ltd.)



Top: Indoor unit of the split heat pump system. Bottom: Ducting for make-up air unit. (Credit: Peatt Commons Inc.)

Ventilation

The high level of indoor air quality in the apartments is achieved using in-suite Reversomatic Deluxe ECM series energy recovery ventilators (ERV) with variable speed motors which provide balanced and continuous ventilation. The ERVs pre-condition the incoming supply air by transferring heat and moisture from the exhaust air to the supply air (72% sensible heat recovery efficiency at 0°C (32°F) supply air and 30 L/s airflow). Range hoods and exhaust fans for the second bathroom (in apartments with two bathrooms) vent to the exterior through the exterior walls.

Domestic Hot Water

The domestic hot water is generated by three gas-fired Rinnai® SENSEI[™] condensing water heaters installed in the mechanical penthouse. The water heaters have an energy factor of 96% when the inlet water temperature is 26.6°C (80°F) or below. The hot water is stored in two Bradford White storage tanks. The storage tanks are manufactured with 50mm (2″) thick foam insulation and the hot water piping is wrapped in 25mm (1″) thick insulation. The hot water is continuously recirculated in the building.

Corridor Heating

The corridor supply air is heated in a two-stage process using a rooftop Greenheck gas-fired make-up air unit and Thermolec electric duct heaters. The make-up air unit heats the supply air to 10°C (50°F) when required and the electric duct heaters (one for each floor) heat the supply air to 18°C (64.4°F). This reduces the reliance on gas for heating and consequently, reduces the operational GHG emissions of the building.



Electric duct heater. (Credit: Peatt Commons Inc.)



Condensing water heaters. (Credit: Peatt Commons Inc.)

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Appliances

The ENERGY STAR® certified appliances include Whirlpool front-loading washers and heat pump dryers (ventless). Other appliances include Frigidaire refrigerators, dishwashers, Whirlpool electric cooktops and Broan under-cabinet direct exhaust range hoods.

Energy and Water Metering

Individual BC Hydro meters are installed for each apartment and for common electrical loads. One FortisBC meter is installed to measure gas consumption by the make-up air unit and water heaters. In addition to the main water meter for the building, GWF UNICOcoder MP® water submeters are installed to measure the hot and cold water supplied to each apartment. The information collected by the submeters will serve as the basis for individual water billing after the first year of free water use.



ENERGY STAR® certified washer and heat pump dryer. (Credit: Design Build Services)



Water meter enclosure. (Credit: Peatt Commons Inc.)



P1 Parking Level. (Credit: Peatt Commons Inc.)

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Project Highlights

Recognition in the CleanBC NZER Challenge, coupled with an emphasis on mass timber construction was a winning combination that elevated the project's brand and helped differentiate Peatt Commons West from other new rental buildings entering the market at the time.

- LEAH MULLEDA, BUSINESS MANAGER, PEATT COMMONS INC.

The financial compensation provided through the program helped to cover the costs for some of the additional energy conservation measures that were added to the design and construction. The upgrades amounted to approximately 6% more in construction costs compared to the original design. The largest contributors to this extra cost were the addition of in-suite ERVs, adding additional insulation to the opaque wall assemblies and upgrading the windows to triple-glazed windows.

While the use of mass timber floor and roof structures is not considered a significant energy conservation measure (CLT panels have an RSI value of about 0.2 m²K/W per 25mm), it significantly reduced the embodied emissions of the building compared to using concrete or steel. Using mass timber also significantly accelerated the construction schedule: the wood structure of the building was completed in approximately 40 days – about one third less time than if using traditional wood-framing methods.

Construction of the building was completed during the COVID-19 pandemic. Despite concerns that the pandemic would adversely affect the rent-up phase, the developer's "Choose a Green-Built Home" marketing strategy generated significant interest from highly qualified prospective tenants. Unit showings attracted a demographic of people interested in the green building aspects of Peatt Commons West. Large triple-glazed windows and low utility charges were strong selling features, along with some of the building amenities. Despite the pandemic, 100% of the apartments were rented two months after showings began in June 2020.



Net-Zero Energy-Ready Challenge Winners Series

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