

Low-Energy Buildings



Bois Ellen Co-op

Laval, Quebec

An Affordable and Energy-Efficient Co-Op Residence for Families and Seniors

The **Bois Ellen Co-operative** in Laval, Quebec, was built around one core objective: to create an eco-friendly, energy-efficient and affordable place that everyone from young families to seniors could call home.

The 166-unit passive house-compliant residence combines the energy performance and cost savings of a passive house building, with a comfortable, accessible and community-focused design. The result breaks new ground in sustainability, durability and ease of maintenance, while also meeting the unique needs of seniors and others who may have mobility issues.



Images courtesy of Bois Ellen Housing Co-operative and L'OEUF Architects.

Bois-ElLEN Co-op: Quick Facts

- **Project:** Low- and mid-rise mixed co-operative residence with one 6-storey and one 13-storey wing. Both buildings are concrete frame with steel stud and brick exterior envelopes.
- **Location:** Laval, Quebec.
- **Construction Cost:** \$24.5 million.
- **Number of Units:** 166 units (104 accessible units for seniors with mobility issues, plus 62 units for families, individuals and independent seniors).
- **Target Occupants:** Mix of young families, independent seniors and seniors who need to use a walker or wheelchair.
- **Development Partners:** Coopérative de solidarité Bois Ellen; L'OEUF architects; Giasson Farregut architectes; Sept Frères Construction G2 Inc.; NCK Inc. engineering; Pageau Morel et associés inc.; Beaupré associés landscape architects; Enersys Analytics energy modelling; Patenaude-Trempe Van Dalen Inc. (CLEB) consultants; SYNAIRGIS consultants.
- **Funding Sources:** Réseau 2000+; Accès-Logis; Société d'Habitation du Québec (SHQ); City of Laval.
- **Construction Timeline:** January 2015 to July 2016.

Source: Bois Ellen Co-operative Residence and L'OEUF Architects.

“Our goal was to seamlessly integrate sustainable technologies and elements into the design and construction of the building, so as not to significantly impact the future operation and maintenance of the building. A passive house approach allowed us to do that as efficiently and cost-effectively as possible.”

- Daniel Pearl, Senior Architect and Founding Partner, L'OEUF Architects



Image courtesy of Bois Ellen Housing Co-operative and L'OEUF Architects.

Passive House: Better Buildings. Affordable Performance.

Pioneered in Saskatchewan in the early 1970s and refined by the Passive House Institute in Germany, **passive house** is a “better building” approach to design and construction that uses passive techniques, technologies and strategies to improve energy-efficiency, reduce operating expenses and create a healthier and more comfortable living environment. Instead of relying on complex energy or mechanical systems, passive house focuses on simple and inexpensive ways to improve performance, like adding more or better **insulation** and **high-efficiency windows**, reducing or eliminating **thermal bridges**, creating an **air-tight building envelope** and using energy or heat recovery ventilators (ERVs/HRVs).

Key Passive House Features

Since much of the work to maintain the building will be carried out by the residents, the team behind Bois Ellen adopted an approach that would incorporate as many passive housing principles as possible, while minimizing the ongoing operating costs and maintenance. Among other features, this included:

- **high-performance triple-glazed windows**—with insulated frames on north-facing facades;
- **extra highly-efficient insulation**—including an exterior wall assembly with 125 millimetres (five inches) of semi-rigid insulation outside of the supporting walls, to achieve an RSI of 4.4 (R-25), keep moisture from seeping into the building, and create a durable and low-cost building envelope;
- **reduced thermal bridging**—with a focus on mitigating or eliminating thermal bridges in the exterior wall insulation, at the structural lintels supporting the masonry cladding, and at all balconies and loggias, to help save energy and prevent heat loss throughout the complex;
- **passive solar shading**—including “brise-soleil” shading devices installed on the southwest façade to reduce heat gain by up to 80%;
- **water-efficient, reduced-flow plumbing fixtures**—with additional features like the capacity to recover shower wastewater and convert from electric to solar hot water heating in the future; and
- **heat recovery ventilators (HRVs) in each unit**—to save energy and circulate fresh air throughout the residence, while still giving individual residents control of their living environment.



Through these and other passive house strategies, the Co-op is expected to **use about 42% less energy** than a conventional building of the same size, and **save 70% on heating costs**. The residence also expects to achieve an **airtightness rating of 0.9 air changes per hour** (at 50 pascals of air pressure)—a significant improvement over the Novoclimat standard of 1.5 air changes per hour.

Because two thirds of the Co-op's residents are seniors, all of the suites in both buildings can be **easily adapted to become wheelchair accessible**. The complex also includes a shared dining hall and a number of support services to help improve the residents' independence and quality of life.

Further Information

L'OEUF Architects: www.loeuf.com/en

Passive House Canada: www.passivehousecanada.com

Passive Buildings Canada: www.passivebuildings.ca

Canadian Passive House Institute: www.passivehouse.ca

Housing Research Report: *Passive Approaches to Low-Energy Affordable Housing – Literature Review*
ftp://ftp.cmhc-schl.gc.ca/chic-ccdhd/Research_Reports-Rapports_de_recherche/2017/RR_Passive_Approaches_to_Low_energy_Affordable_Housing_Projects.pdf



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