



### Beyond Energy

Energy efficiency is a key component of efforts to reduce emissions from building operations. The Step Code's focus on energy efficiency aligns well with LEED, which weighs energy efficiency more heavily than any other component within the rating system. While energy efficiency is of vital importance, the CaGBC encourages the BC design community to think bigger. By applying LEED® or the CaGBC Zero Carbon Building Standard, projects can enjoy benefits beyond energy efficiency.

The Step Code uses the energy efficiency of basic building operations as a surrogate for GHG emissions. LEED enhances this effort by encouraging additional GHG reductions through measures that include renewable energy generation; participation in demand response programs; lowering the embedded carbon of construction materials; providing greater walkability and access to public transit; and promoting alternative fuel vehicles.

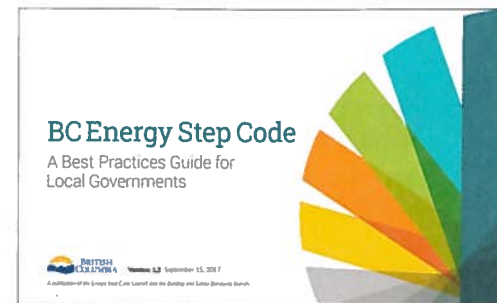
Additionally, with its broader holistic assessment of sustainability, LEED allows other important environmental impacts to be considered, including water efficiency, the sustainability of a site, construction waste, and the environmental impacts of materials. Equally important, LEED also places an emphasis on aspects of design that impact human health and wellness.

Unique to LEED is the opportunity to benchmark projects against an international set of peers. The rating system benefits from the efforts of volunteers and proponents from across the globe, who are all working to ensure that LEED is always evolving to drive the industry forward. For example, LEED has helped spur ongoing discussions about the choice of energy efficiency metrics by creating the Alternative Energy Performance Metric pilot credit, which allows project teams to evaluate performance based on source energy, primary energy, and GHG emissions. The Energy Performance Metering Path Pilot Credit even allows project teams to meet energy efficiency requirements using actual building performance.

### Toward Carbon

While energy efficiency will always be a foundational tenet of any sustainable building's design, the CaGBC believes that efforts to address GHG emissions must evolve to focus on carbon. This is why CaGBC worked closely with industry to launch the CaGBC Zero Carbon Building Standard (ZCB) in May of 2017.

Taking a carbon-centric approach is crucial because the most important factor in the emissions footprint of a building is often not energy performance, but rather the carbon intensity of the electricity and fossil fuels used. Recognizing the differences in electrical grids and fuels sources is critical to assessing impacts accurately and guiding investments.



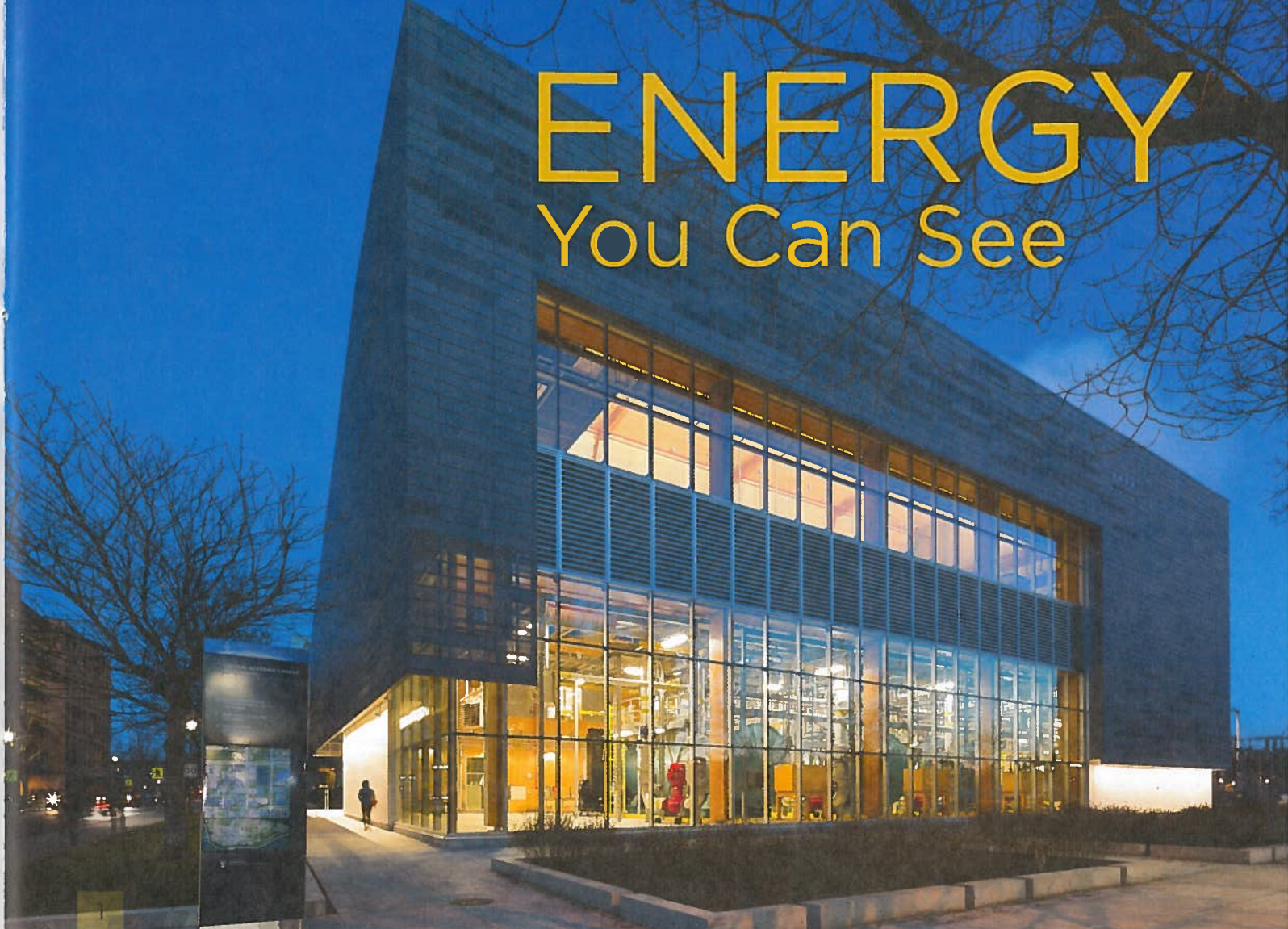
Like the BC Step Code, the Zero Carbon Building Standard uses Energy Use Intensity (EUI) and Thermal Energy Demand Intensity (TEDI), however, the ZCB goes further by measuring carbon outcomes directly. This means that the Standard is not fuel agnostic - it drives choices about the types of energy that are used, and it encourages additional renewable energy generation both onsite and offsite.

As Canada's first green building program to make carbon emissions the key indicator for building performance, the Zero Carbon Building Standard positions Canada in an elite group of countries working on similar initiatives, including Australia, France, Brazil and the US.

### Finding Synergies

The City of Vancouver's Zero Emission Fire Hall is an example of a project seeking to better understand and benefit from the synergies of applying different sustainability requirements. The project is seeking LEED and Passive Haus certification, and is participating as a pilot in the CaGBC's Zero Carbon Building Standard. The design of the Fire Hall will incorporate the generation of on-site renewable solar PV energy in order to offset greenhouse gas emissions, and the project is being used as a case study to develop best practices and approaches to designing future City of Vancouver owned buildings.

The CaGBC believes that while every project is different, there are invariably significant benefits to applying third-party green building rating systems like LEED and the Zero Carbon Building Standard in concert with the enhanced requirements of the BC Step Code. We look forward to working with municipalities and the private sector to help them determine how they can best improve building performance while maximizing emissions reductions.



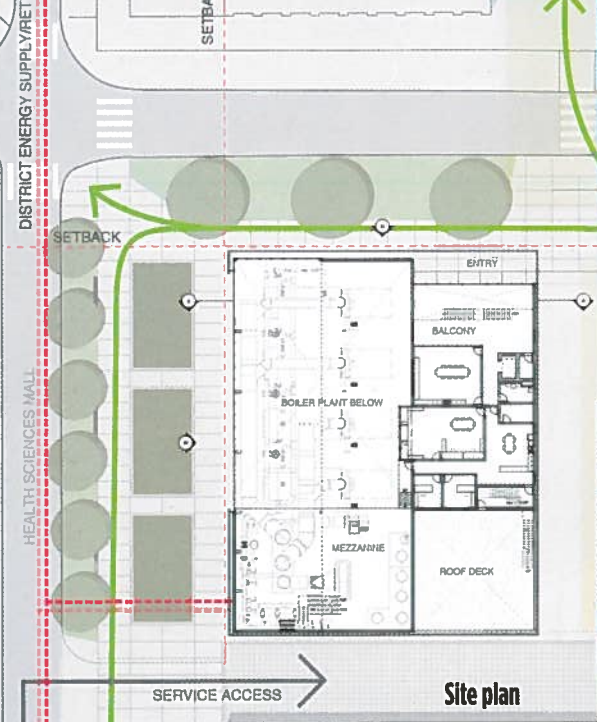
The University of British Columbia's Campus Energy Centre (CEC) is a state-of-the-art hot water boiler facility that provides for the campus heating requirements. Recently certified LEED Gold, this \$24 million facility demonstrates leading edge sustainable design strategies and plays a significant role in reducing UBC's GHG footprint. Its situation puts the campus' energy infrastructure in the heart of the community, while its voyeuristic design makes the system within visible to students - a conscious choice made to elevate UBC's awareness of their own energy consumption.

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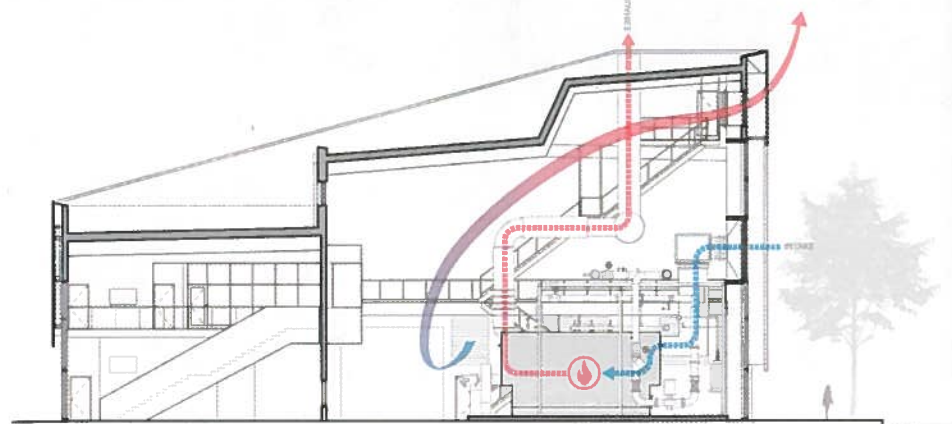
The University of British Columbia is recognized as a leader in advancing the global sustainability agenda - as steward of a large public institution, as educator of our future leaders, and as active participant in the search for ideas and solutions that will shape the province's common future. In 2007 UBC made a bold commitment to reduce its greenhouse gas (GHG) emissions by 33% from its baseline, by 2015.

UBC's Campus Energy Centre is major contributor to the University achieving its ambitious emissions target. Comprised of a new high-efficiency hot water heating plant and district hot-water distribution loop, the CEC replaces the pre-existing steam boiler plant constructed in 1925. The new system serves over 130 buildings, or 12,000 square feet of campus development delivered through 14 km of underground insulated pipe. The 20,000 square foot building houses all process equipment including three 15 MW boilers with capacity for phased expansion to a total output of 80 MW.



The CEC is sited on a prominent corner of the Health Sciences Mall on a former parking lot [2].

Sited on a prominent corner of Health Sciences Mall and Agronomy Road, the CEC replaces an existing surface parking lot, adjacent to the Life Sciences Building to the north, the Pharmaceutical Sciences Building to the east and the campus electrical sub-station to the south. The east façade of the CEC frames a public plaza that acts as connection point between the campus Health, Residential, and Sports precincts. Continuity of the campus fabric is reinforced by matching the street-wall setbacks and height datum established by adjacent buildings.



Combustion/ventilation

The building's simple volume is enlivened by the play of light across and through the shroud by the selective use of three different types of panels - an opaque, a 30% perforated, and a 50% perforated panel. Further, the surface of the shroud tells a story where a higher intensity of perforation expresses process requirements for air exchange, ventilation or transparency. The zinc shroud also materially connects the CEC with both the Life Sciences and Pharmaceutical Sciences buildings.

On the west facade, the metal shroud has been peeled back to reveal the glazed skin of the 15m high boiler house providing pedestrians with views into the vaulted space of the process area and celebrating the building's operation and process equipment through interpretative signage.

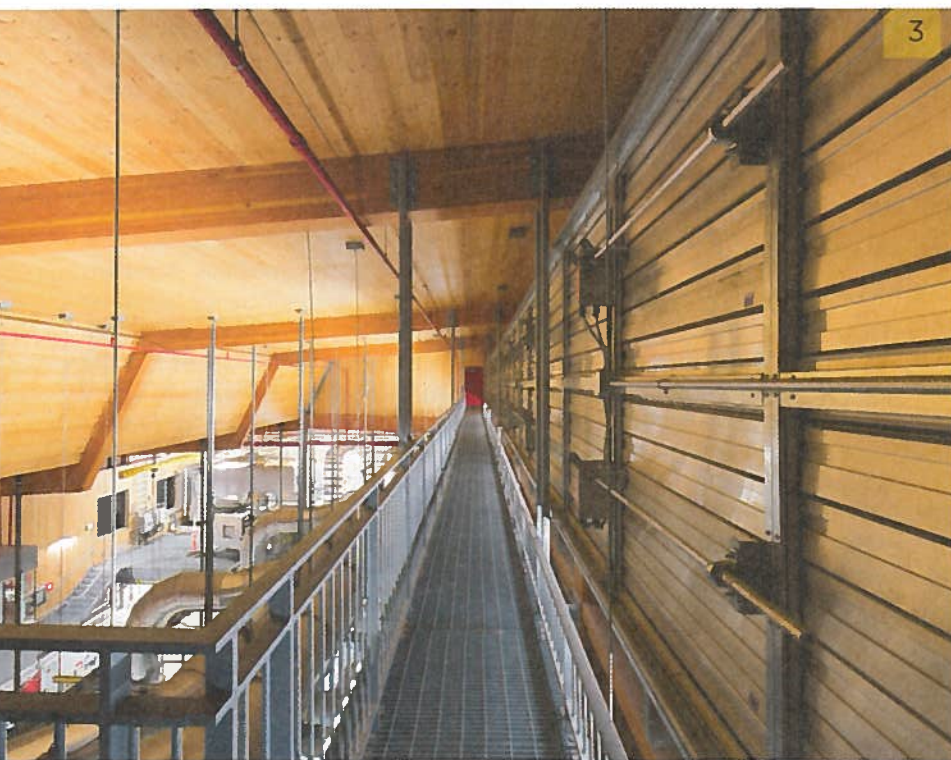
A building that breathes - the CEC inhales massive amounts of air to feed the combustion process and exhales hot, humid exhaust, while supporting a pulsing circulatory system that feeds hot water to campus buildings. The relationship between process equipment such as boilers, breeching exhaust, service rooms and hot water distribution equipment is driven by strict functional requirements.

To unify these distinct programme elements and reconcile the many requirements for intake and exhaust louvres, vents and other service penetrations, a zinc metal shroud wraps the building perimeter. This permeable skin, which floats 4m above the ground plane and is held off the building structure by one metre, was manipulated to provide transparency, weather protection and announce entry points.



The primary structure is constructed of cross-laminated timber (CLT) panels supported by glulam columns and beams [3]. The CEC inhales massive amounts of air to feed the combustion process and exhales hot, humid exhaust [4]. Pedestrians have views of the 15m high boiler house [5]. The Interior is naturally ventilated and well lit. Additional space conditioning is provided by waste process heat [6 and 7].

Interior spaces are naturally ventilated and flooded with daylight, while additional space conditioning is provided by waste process heat. The primary structure is constructed of renewable, locally-sourced cross laminated timber (CLT) panels supported by glulam columns and 20m clear span beams. The CEC project redefines District Energy by making sustainable infrastructure that is visible and able to inform, educate and engage the campus community by speaking to both the process and broader energy issues.



**PROJECT CREDITS**

- OWNER** University of British Columbia
- ARCHITECT** DIALOG
- STRUCTURAL ENGINEERING** Fast + Epp
- MECHANICAL ENGINEERING** FVB Energy Inc.
- ELECTRICAL ENGINEERING** Applied Engineering Solutions Ltd.
- CIVIL ENGINEERING** Kerr Wood Leidal Associates
- LANDSCAPE DESIGNER** Perry + Associates
- SUSTAINABILITY** Recollective Consulting
- AIR DISPERSION** RWDI Consulting Engineers & Scientists
- BUILDING CODE CONSULTANT** LMDG Building Code Consultants Ltd.
- PHOTOS** Ema Peter