Centre for Interactive Research on Sustainability (CIRS) - UBC

by John T.D. Keyes

The Centre for Interactive Research on Sustainability (CIRS) occupies a significant spot on the Vancouver campus of the University of British Columbia, both literally and figuratively. The building stands in contrast to other green developments that risk becoming "islands of sustainability in a swamp of business as usual," says Professor John Robinson, executive director of the UBC Sustainability Initiative, who in 1999 helped author a landmark document that outlined the way in which new campus construction might reflect the university's commitment to a sustainable future. "Indeed, this is the whole point of CIRS: to not be such an island."

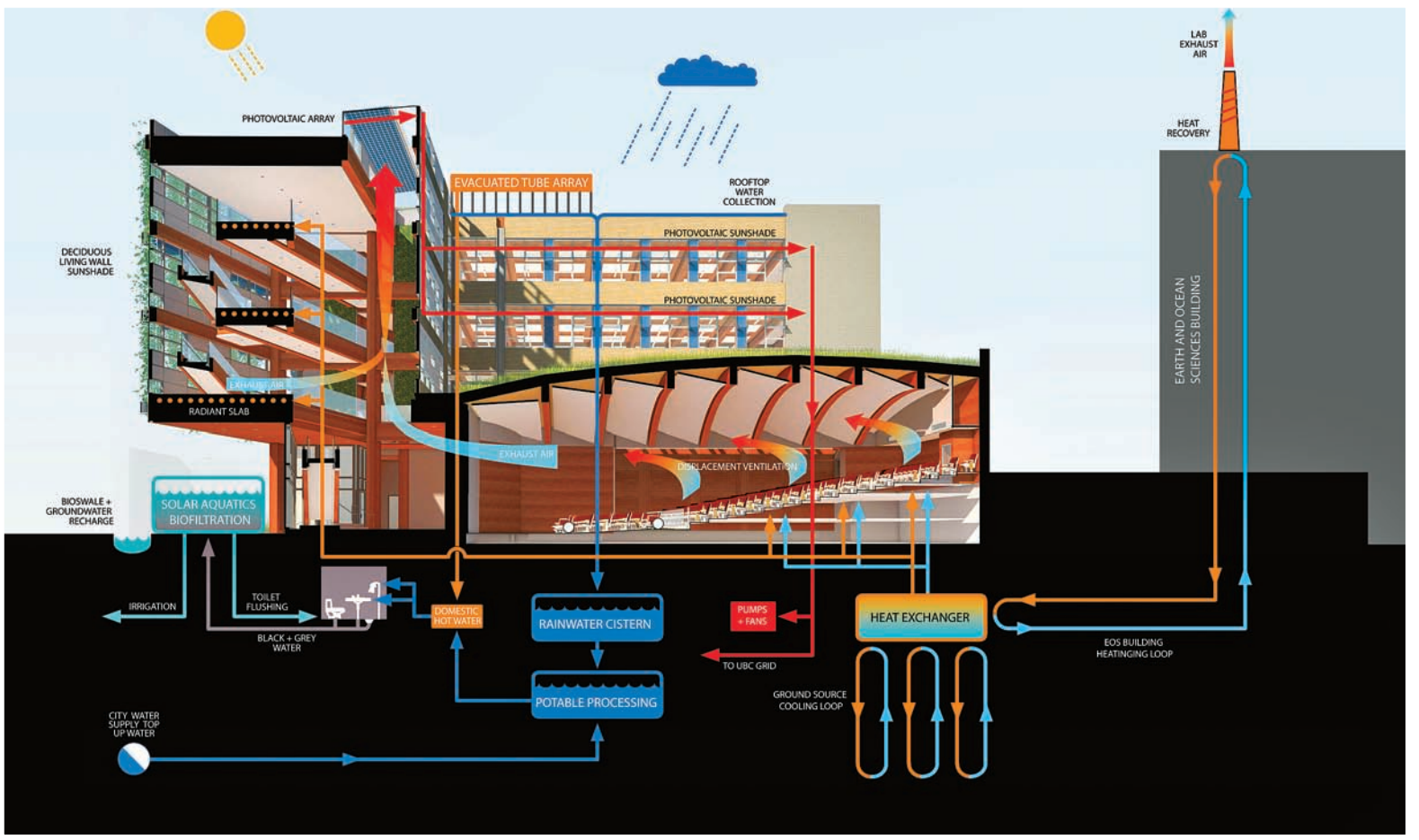
As Robinson recalls the process, "We said, 'What should be the next step? Might it be to build a showcase where we could implement the most advanced sustainable building on the planet and then study it as researchers – the technical aspects as well as the behavioural?' Sustainability projects are popping up all over the planet, but they're ad hoc projects, incremental, one-offs, and they're not connected to a larger pattern of sustainable behaviour. Could we build a project and a program that would have a tangible impact on the uptake of sustainability in our region and beyond?"

That thought process led to CIRS, a four-storey, 58,000-square-foot building built predominantly of glass and wood on a concrete base. On target for LEED Platinum certification and meeting the rigorous standards set by the Living Building Challenge, it was designed not only to be a state-of-the-art teaching and research facility but to remain cutting-edge throughout its lifetime, serving as a 'living laboratory' for the 16 user groups that will be based there, groups ranging from the UBC Sustainability Initiative itself to psychology graduate students to engineers and building technicians working on system integration with private-sector partners like Honeywell and BC Hydro. Each user is asked to sign a "sustainability charter," Robinson says, in return for five things: "very high air quality, daylighting everywhere, individual control over ventilation at the work station area level, real-time feedback on building performance, and the ability to vote on the control strategies of the building. We'll be studying everyone's productivity, their health and their happiness with the goal of improving those three things over time."

A highlight for both Gasmena and Bruce Hemstock, landscape architect at PWL Partnership Landscape Architecture Inc., is a pair of vegetative features: a green roof with native shrubs atop the atrium, serving as courtyard space for the surrounding offices, and a large green wall on the building's southwest side that acts as a solar shield. A Greenscreen product, the wall consists of a zigzag array of planters for deciduous flowering vines that provide a habitat for bats, birds and insects. "We worked very closely with Busby Perkins + Will," says Hemstock, "to ensure that the area of the planter and the depth of the growing medium let the vines reach their potential height, anywhere from 30 to 40 feet." PWL also designed a key component of the building's stormwater management system. "All the overflow water collected on the roof that doesn't go into the cistern is collected in a triangular rain garden with plants that don't mind their feet getting wet or can be dry. From there, the water follows a steel runnel into a tipping bucket measuring system."

Julien Fagnan of Fast + Epp Structural Engineers views the CIRS facility as two interconnected structures. "It's really two long, narrow buildings connected by an atrium. The long bars, which are open in plan with windows all along, do not allow for normal plywood shear walls in the long direction. We had to build a moment frame, so that the columns and the beams in each facade work together as a frame to handle the lateral forces. It's four storeys high, so that's the unique part of the building from a structural point of view. It doesn't have normal plywood shear walls, and there's no central corridor with party walls." As much as was feasible, UBC wanted to incorporate FSC-certified wood, including pine beetle kill timber as exposed flooring. "The mandate to use wood pushed us into using timber moment frames, and that was a big challenge structurally," says Fagnan. "With a steel moment frame, you weld everything together. With a concrete moment frame, it's cast monolithically. With wood, you don't get monolithic construction, so the connection forces are large and you have to calculate the shrinkage of the wood. The issue with wood is always the connections."

"As far as wood structures go, this has definitely been one of the most challenging we've ever worked on," says Dave Knight, construction manager and vice-president of Heatherbrae Builders



RENDERING AND SYSTEM DIAGRAM COURTESY BUSBY PERKINS + WILL

PHOTO COURTESY UBC PROPERTIES TRUST

Co. Ltd. "The requirements structurally combined with the architectural details and sustainability requirements made both the construction costs and schedule difficult to manage. However, through collective efforts from all parties, including fantastic cooperation from UBC Properties Trust, both of these have remained as targeted. It has been a rewarding and enjoyable experience for everyone involved at Heatherbrae."

For the mechanical experts at Stantec Consulting, the challenges were truly complex: to design systems for a self-sustaining building that would be a net zero energy consumer, emit no carbon emissions and produce no liquid waste. "We needed to think outside of the box of using conventional fuel sources, such as campus steam and natural gas. We had to bring out all the tricks in the bag," says mechanical engineer Jimmy Ng.

Stantec and the design team determined that the answer lay in a combination of technologies, which included geothermal and solar heat, and also capturing exhaust waste from an adjacent facility (the Earth and Ocean Sciences laboratory). "Waste heat from the laboratory exhaust is harvested as a low-grade heat and then processed via heat-pump technology as a higher grade heat," says Ng. This heat can then serve both CIRS and the EOS building. "The geothermal field [28 vertical closed-loop boreholes] and 10 evacuated tube solar panels are coupled to the heat-pump system as a source of top-up for peak demand," says Ng.

In the end, says Professor Robinson, "this was a big group effort. We are in a transformational moment at UBC. We're changing curriculum across the university, the way sustainability is taught, changing research and partnership programs, making every operational decision part of the sustainability initiative, and we're adding teaching and research to all of that. We're going to treat the whole campus as a living lab, investing about $150 million over the next four years to meet our climate change goals. CIRS is a big part of that." ■

LOCATION
2260 West Mall
University of British Columbia
Vancouver, B.C.

OWNER/DEVELOPER
UBC Properties Trust

ARCHITECT
Busby Perkins + Will

CONSTRUCTION MANAGER
Heatherbrae Builders Co. Ltd.

STRUCTURAL CONSULTANT
Fast + Epp Structural Engineers

MECHANICAL/ ELECTRICAL CONSULTANT
Stantec Consulting

LANDSCAPE ARCHITECT
PWL Partnership Landscape Architects Inc.

TOTAL AREA
58,000 square feet

TOTAL PROJECT COST
$37 million