2013 Wood Design Awards - Project Fact Sheet

Bioenergy Research and Demonstration Facility (Comm)

Location: university of British Columbia, Vancouver

Height	Size		Completion	Construction Budget
2	20,990	1,950	2012-07	$6,500,000
Storeys	*sq ft*	*sq M*	*Date*	*$ Cdn*

Project Description:

OVERVIEW:

The Bioenergy Research and Demonstration Facility (BRDF) is a 1,950m2 heavy timber framed cogeneration project on the UBC Vancouver campus. In collaboration with Nexterra and General Electric, UBC commissioned this combined heat and power (CHP) plant to supply the campus grid with clean, renewable heat and power through biomass gasification. The CHP plant will produce 2 megawatts of electricity (enough to power 1,500 homes) and 8% of the UBC base steam power load by using syngas extracted from wood chips and municipal wood trimmings. UBC greenhouse gas emissions will be reduced by 4,500 tonnes annually with 12% of the campus natural gas heating demand displaced. The BRDF is the first cogeneration plant of its kind in North America that produces heat and power for a university campus. Funding partners included NRCan, the Province of BC, FP Innovations, BC Bioenergy Network and Sustainable Development Technologies Canada.

LIVING LAB DEMONSTRATION: WOOD INNOVATION AND POWER COGENERATION: UBC implemented the University Sustainability Initiative (USI) in 2010 and mandated that the BRDF become a demonstration facility to showcase not only energy cogeneration by gasification, but also cross laminated timber (CLT) construction as part of the USI initiatives "Campus As A Living Lab" and "University As An Agent Of Change". UBC collaborated with FP Innovations who expedited CLT testing and authored North American standards for CLT construction, allowing the BRDF to become one of the first institutional scale buildings in North America to be constructed with CLT panel technology.

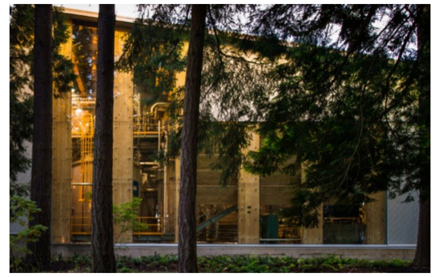
DESIGN CONCEPT: The design of the building results from the integration of functional needs, sustainable systems and educational objectives. The building is composed of two main areas: the plant area - a large volume containing the gasification equipment, and a public area – a 2-story lower volume containing viewing and research lab facilities. Taking the form of a wedge rising from east to west, the building is designed to accommodate varying sizes of process equipment while controlling its inevitable impressive scale. The roof is a simple plane which acts as an air foil to draw low level fresh air through the building where it exhausts up high near the roof ridge. Hotter and taller equipment is installed to the west, at the building’s tallest height, where it is able to enhance the natural convective flow of ventilation air.

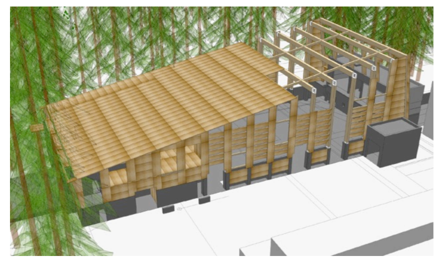
Generous interior and exterior glazing convey the demonstration nature of the project, with views into the floor plant and its

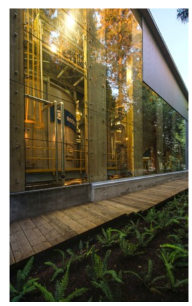
ADVANTAGES OF CROSS LAMINATED TIMBER: Two main superstructure components support the building, CLT panels and innovative glulam post & beam moment frames that span 24.5meters, leaving the plant floor unencumbered by structure. CLT panels make up the walls, rook deck, upper floor structure and air guiding acoustic "gills". The use of CLT panels was beneficial on a site that is tight, narrow, heavily circulated and busily used by UBC operations personnel. These conditions, along with the need to install the plant equipment prior to construction of the walls and roof, would have made it impossible to use with tilt-up concrete construction and much more labour intensive had the superstructure been steel or stick frame construction.

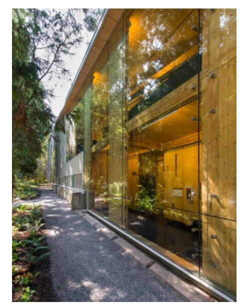
Two general contractors had to share the site, each with their respective trades and at times with 3 cranes simultaneously reaching across the work area. Given that portions of the site were effectively blocked by the installation of the process equipment, the construction process greatly benefitted from the ability to lift by crane the CLT panels – literally over the process equipment - and anchor them, at the receiving end, using smaller man-lifts. The installation of glulam beams followed a similar method, eliminating the need for scaffolding which would have greatly impeded the installation of process equipment. The robustness of the panels was able withstand heavy construction activity while allowing them to maintain a surface suitable as a finish.

Project Images









Where the Wood Was Used:

Primary Structural System	Columns, Beams & Braces	y
	Floor Structure	y
	Exterior Walls	y
	Foundation	
	Shear Walls	y
	Bearing Walls	y
	Fire Walls	y
	Roof Structure (inc. columns and braces)	y
	Stairway & Elevator Shafts	y
Secondary Structure	Convenience Stairs	y
	Entrances & Canopies	y
	Fire Separations	y
	Enclosures for Mechanical Equipment	y

Architectural	Partitions (interior)	y
	Exterior Curtain Walls	
	Ceilings	y
	Exterior Cladding	
	Parapets	
	Ceiling Bulkheads	
	Flooring	
	Doors	y
	Windows	
	Skylights	
	Trim, Paneling & Features	y
	Millwork	y
	Wall and Corner Guards	y
	Other Architectural Woodwork	y
	Hard Landscaping & Structures	y
	Perimeter Fencing	y

Building Project Team Members:

McFarland Marceau Architects Ltd		
Architect		
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Infrastructure Development | Project Services, UBC		
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Nexterra Systems Corporation		
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LMDG		
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Stantec		
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woodWORKS!
Project of the Canadian Wood Council