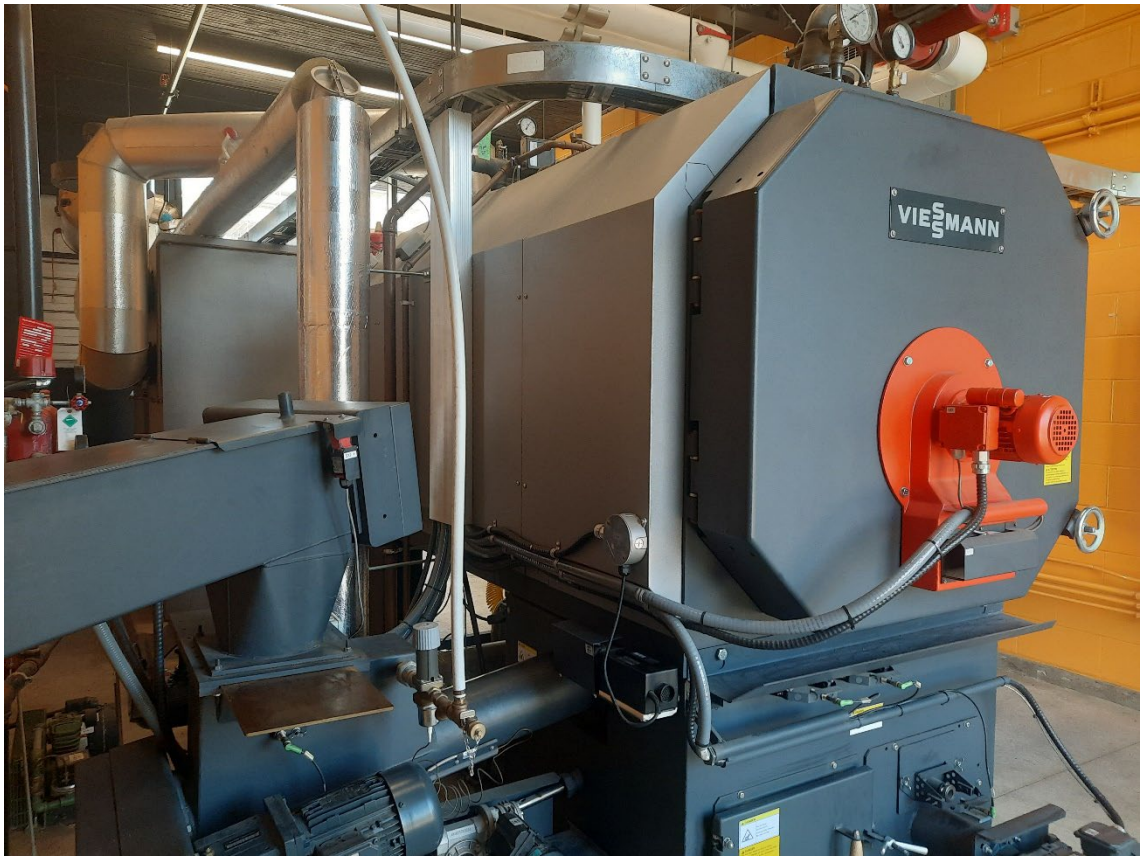
SDG Accord Case Study – BCIT Wood Waste to Energy Centre

The SDG Accord

The University and College Sector's Collective Response to the Global Goals

BCIT



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Integration of SDGs in

☐ Institutional governance/strategic level
☐ SDGs in research
☒ SDGs in campus operations
☐ SDGs in curriculum development
☒ SDGs in student engagement activities
☐ SDGs into community activities
☐ SDGs at a whole-institution level

Focus on

☐ Goal 1 - No poverty
☐ Goal 2 - Zero hunger
☐ Goal 3 - Good health and wellbeing
☒ Goal 4 - Quality education
☐ Goal 5 - Gender equality
☐ Goal 6 - Clean water and sanitation
☒ Goal 7 - Affordable and clean energy
☐ Goal 8 - Decent work and economic growth
☒ Goal 9 - Industry, innovation and infrastructure
☐ Goal 10 - Reduced inequalities
☐ Goal 11 - Sustainable cities and communities
☒ Goal 12 - Responsible consumption and production
☒ Goal 13 - Climate action
☐ Goal 14 - Life below water
☐ Goal 15 - Life on land
☐ Goal 16 - Peace, justice and strong institutions
☐ Goal 17 - Partnerships for the goals

SDG Accord Case Study – BCIT Wood Waste to Energy Centre

Summary:

The British Columbia Institute of Technology (BCIT) has opened a new Wood Waste to Energy Centre (WWEC) at its Burnaby Campus. The WWEC uses a biomass boiler to convert wood waste into clean energy.

The BCIT Carpentry and Joinery programs create wood waste from lumber off-cuts, which historically have been disposed of off campus. The wood shops have been heated using natural-gas-fired appliances, with a significant associated greenhouse gas (GHG) emission footprint. Repurposing the wood waste as fuel for a biomass boiler, energy is generated and can be used to provide space heating for the two program buildings. This will reduce external energy source flows via natural gas displacement, as well as reduce costs and emissions associated with hauling wood waste off-site for disposal.

There are three main elements:

1. Students sort clean kiln-dried lumber off-cuts which are then sent to a chipper and cut into inch-long chips. These are stored in a silo and fed into the biomass boiler by an auger.
2. The water in the boiler is heated by burning the wood chips and then piped to heat the adjacent buildings. Fan unit heaters blow air over hot water coils to deliver warm air.
3. The exhaust from the boiler system is run through a multi-stage filter to ensure that it meets strict emissions regulations from Metro Vancouver, British Columbia, Canada.

Wayne Hand, Dean, BCIT School of Construction and the Environment, noted that, "*the low-carbon heating system serves as a great example of a living lab. Trades and technology students were involved in the planning, design, and construction of the facility.*"

Outline the 3 key benefits of integrating this theme:

1. Generates heat for buildings: The WWEC will use up to 250 tonnes of wood cut-offs and sawdust to heat buildings at the Burnaby Campus.
2. Reduces GHG emissions: The boiler can save up to 1% of BCIT's total emissions, equivalent to 75 tCO_2e GHG. It could be expanded in the future to save up to 240 tCO_2e GHG annually.
3. Reduces waste: Diversion of waste from off campus disposal also reduces associated transportation GHG emissions.

Outline the barriers or challenges encountered in integrating this theme and how you overcame these:

1. Cost management by involving students and faculty in key aspects of the project. For example:
   - The boilerhouse roof and equipment enclosure wall panels were constructed by Carpentry and Joinery students and faculty. Nail-laminated timber (NLT) was selected to allow for sustainable deconstruction and reuse/recycling at the end of project life. These NLT panels were also torched by students to provide a natural

form of weatherproofing that would aid in end-of-life recycling and avoid the use of chemical wood treatments.
- The steel frame of the enclosure for the chipper and chip silo were erected by Ironworker students and faculty.
- The air emissions dispersion model for submission to the local regulatory authority was created by an Environmental Sciences student.

2. Integrating complex "Living Lab" aspects into the project was achieved by staff from the School of Construction & Environment helping to design the fuel quality control program, which was a crucial component of the air quality emissions permit application to ensure only clean, kiln-dried lumber offcuts are used for the fuel stream. This involves students in the woodworking programs, who sort wood waste and have a hands-on connection to the fuel that heats their working spaces.

Please outline your conclusions and recommendations to others:

- Design features were added to facilitate project integration into curriculum, such as floor-to-ceiling windows in the boilerhouse, interpretive signage for tours, gas sampling ports in the exhaust stack, and a user-friendly graphical display in our building automation software.
- Look to waste streams, especially those that have an ongoing cost, to find sustainability opportunities.
- Look beyond simple payback to gain buy-in for a project (e.g. curriculum, operational improvements, industry connections, climate and sustainability).
- Student and curriculum involvement takes time. Be sure to factor in plenty of time to coordinate schedules and curriculum content with faculty. Students require realistic timeframes for deliverables as they are not professionals. Additional measures may be required to bring student projects into the "real world" through permitting and engineering approvals.
- Stakeholder engagement greatly increases the sense of ownership across the organization and community.