UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

2017 Carbon Neutral Action Report

CANADA'S GREEN UNIVERSITY™

Overview

Since the Carbon Neutral Government was enacted in 2010, the University of Northern British Columbia (UNBC) has decreased its non-biogenic greenhouse gas emissions by as much as 72%. This decrease in emissions is in large part thanks to the commissioning of the Bioenergy Plant in 2011 on the Prince George Campus. The Bioenergy Plant uses sawmill waste wood to produce roughly 85% of the heat required by the main campus, and has displaced a large portion of the natural gas used for heating. This year, UNBC completed the latest phase of the Sustainable Communities Demonstration Project (SCDP), connecting two more buildings to the low-temperature district heating loop heated mainly by wood pellets. In 2017, the SCDP reduced greenhouse gas emissions by roughly 280 tonnes CO_2e.

In addition to fuel switching from natural gas to bioenergy, UNBC's strong energy management practices have resulted in impressive emissions reductions. Since 2010, energy use has decreased by nearly 20% when corrected for weather. With a focus on continually improving operational efficiencies, UNBC's resource consumption and their associated emissions will continue to decrease.

Finally, sustainability and carbon neutrality aligns with UNBC's core mission of serving society through teaching, research, service, and the actions of graduates. Leadership in green research, teaching, and operations has continued to influence the personal and professional lives of the faculty, staff, and students.

Declaration statement

This Carbon Neutral Action Report for the period January 1st, 2017 to December 31st, 2017 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2017 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2018 and beyond.

By June 30, 2018, the University of Northern British Columbia's final Carbon Neutral Action Report will be posted to our website at www.unbc.ca.

Emissions and Offsets Summary Table:

University of Northern British Columbia GHG Emissions and Offsets for 2017 (TCO2E)	
GHG Emissions created in Calendar Year 2017:	
Total Emissions (TCO_2E)	8,646
Total Offsets (TCO_2E)	1,821
Adjustments to GHG Emissions Reported in Prior Years:	
Total Emissions (TCO_2E)	0
Total Offsets (TCO_2E)	0
Total Emissions for Offset for the 2017 Reporting Year:	
Total Offsets (TCO_2E)	1,821

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, the University of Northern British Columbia (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2017 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment ensuring that these offsets are retired on the Organization's behalf, the Organization will pay within 30 days, the associated invoice to be issued by the Ministry in an amount equal to $25 per tonne of offsets retired on its behalf plus GST.

Executive sign-off:

Robert Knight — May 29, 2018

Signature — Date

Robert Knight — Vice President Finance

Name (please print) — Title

Actions Taken to Reduce Carbon Emissions in 2017

During 2017, a number of projects and initiatives were undertaken at UNBC to reduce the carbon emissions associated with fuel combustion and purchased electricity.

Keyoh Residence and Childcare Centre Hot Water Heating Conversion
In Summer 2017, we renovated our second Residence building (Keyoh), and our Childcare Centre. In doing so, we replaced natural gas air handlers and domestic hot water boilers with hot water units; converted electric baseboard heaters to hydronic hot water radiators in Keyoh; installed a hot water distribution system within the buildings to deliver hot water to the air handlers, and radiators; and connected the buildings to the low-temperature district heating loop. The low-temperature district heating loop is anchored by a 400 kW Wood Pellet Plant, with backup and peaking support from the Bioenergy Plant. It currently provides heat in the form of hot water to the two Residences, Enhanced Forestry Lab, and Childcare Centre.

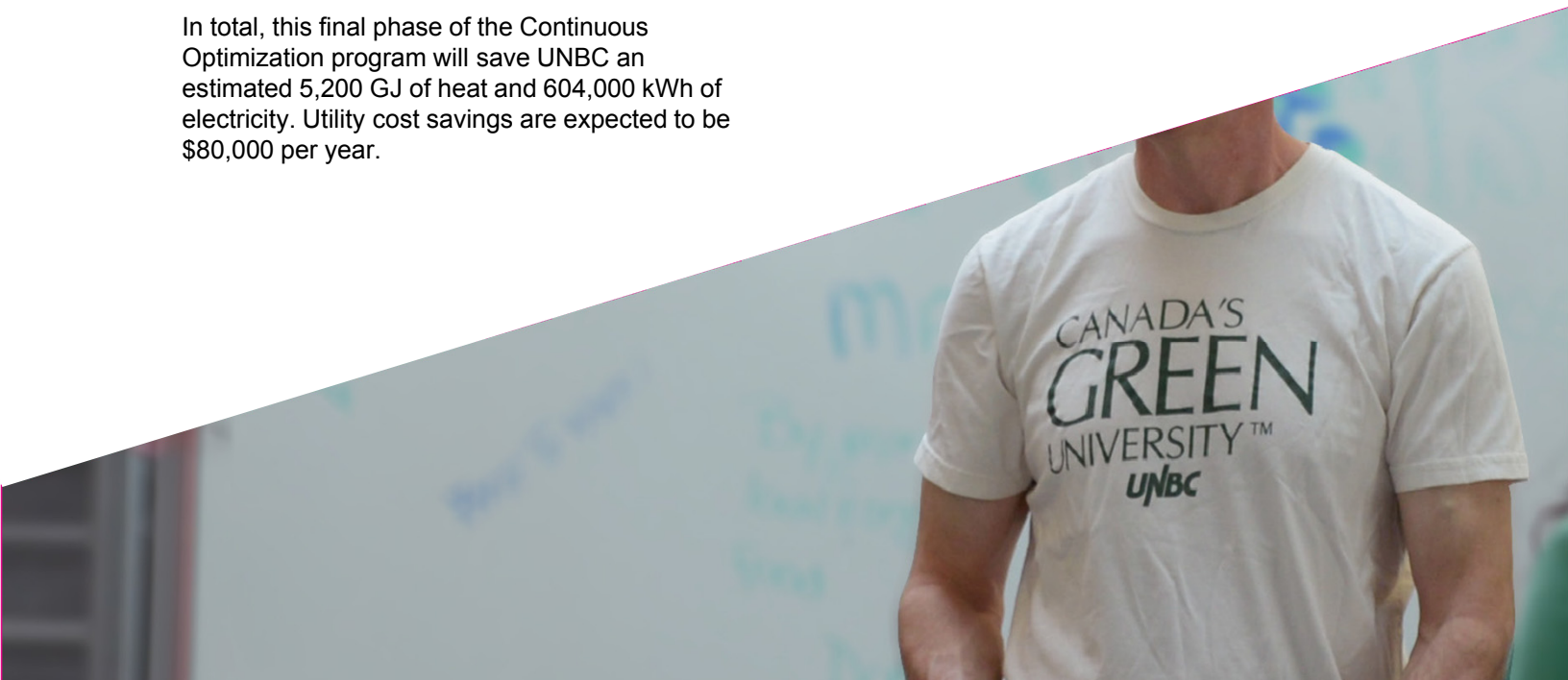
Continuous Optimization of our Building Stock
In 2017, we completed the implementation phase of the BC Hydro Continuous Optimization program in our final three buildings: the Library, Conference Centre/NUSC, and the Teaching and Learning Building. Upgrades included improved scheduling, upgraded control sequences on air handlers, and the installation of occupancy sensors to control ventilation and lighting,

In total, this final phase of the Continuous Optimization program will save UNBC an estimated 5,200 GJ of heat and 604,000 kWh of electricity. Utility cost savings are expected to be $80,000 per year.

Lighting Retrofits
In 2017, UNBC completed extensive lighting improvements on the Prince George campus. LED lighting and controls were installed in the Charles J McCaffray Hall, Geoffrey R. Weller Library, Conference Centre/NUSC, Agora, Northern Sport Centre, Keyoh Residence, Childcare Centre, and Power Plant. Total annual electricity savings will exceed 550,000 kWh.

Power Plant Hot Water Bypass
A bypass pipe was installed in the Power Plant to allow hot water produced by the Bioenergy Plant to bypass the natural gas boilers before being distributed to the campus. This is expected to reduce heat losses in the system by as much as 600 kW.

Workplace Conservation
UNBC participated in the BC Hydro Workplace Conservation and Energy Wise programs to promote energy conservation. Campaigns included Sweater Day, Earth Hour, Earth Day, Lights Off, Residence Challenge, and Winter Shutdown.



Operating Changes that Increased Carbon Emissions

UNBC strives to reduce carbon emissions; however, with our carbon emissions heavily reliant on the operation of our Bioenergy Plant and Pellet Plant, emergency and system shutdowns can lead to increased natural gas consumption and emissions. Similarly, our emissions depend strongly on our heating demand which is correlated to the outside air temperature. Our Bioenergy Plant is capable of meeting the campus heat demand when temperatures are above -5°C, however, when temperatures drop below -5°C, extra heat must be supplied by our natural gas boilers.

Not only was 2017 12% colder than 2016 in terms of total heating degree days, we also experienced 62 days where the average temperature was below -5°C, compared to 32 days in 2016. This resulted in 8% more heat being purchased than last year, and 50% more natural gas being used in our power plant boilers.

Plans to Continue Reducing Emissions in 2018 and Beyond

UNBC has a number of projects and initiatives planned for 2018 and beyond to reduce emissions. Some of the projects are highlighted below:

- Construction of a new Passive House lab building for the Master of Engineering in Integrated Wood Design program;
- LED lighting upgrades in the Geoffrey R. Weller Library, Dr. Donald Rix Northern Health Sciences Centre, and the server room;
- Free cooling design for the server room;
- Cooling system upgrade design for the Prince George campus;
- Heat recovery in the Bioenergy Plant;
- Low carbon heating conversion at the Charles Jago Northern Sports Centre;
- Increased efficiency for heat recovery in laboratory buildings.