

2015

UNBC UNIVERSITY OF
NORTHERN BRITISH COLUMBIA

Carbon Neutral Action Report

CANADA'S
GREEN
UNIVERSITY™



Introduction

At the University of Northern British Columbia, sustainability is in our nature, for a wide variety of reasons. Geographically, we are located in one of the world's most magnificent natural settings: Northern British Columbia. We are, however, living in the North during a time of great change, including the lingering effects of the pine beetle, increased interest in mineral and energy resource development, and the increasingly significant impacts of our changing climate.

There are important questions to address regarding what sustainability means in the North, and as a university for the North, UNBC is uniquely positioned to address these considerations. This is evidenced by our four foci of scholarship, notably: Environment and natural resources; First Nations and Indigenous issues; Northern community sustainability and development; and Health and quality of life. In many regards we are living out the dreams of our founders, who imagined a university that would "improve the world through its research, service, and the graduates it produced."

One important component of UNBC's sustainability mandate relates to carbon neutrality. Over the past 5 years we have taken significant steps to reduce our carbon emissions and demonstrate sustainable practices in the north. Most notably, UNBC commissioned the 4.4MW Bioenergy Plant in 2011 – the first university owned and operated facility in Canada to use waste wood to heat campus buildings. The Bioenergy Plant delivers roughly 70% of UNBC's heat, and has helped UNBC reduce non-biogenic greenhouse gas emissions by 62%. In particular, we are significantly reducing our consumption of natural gas.

Building on the successes of the Bioenergy Plant, UNBC commenced work in the Fall of 2014 on the Sustainable Communities Demonstration Project (SCDP), a new low temperature district heating system which connects the student residences, greenhouse, and daycare to a 400KW wood pellet boiler. The SCDP will reduce UNBC's greenhouse gas emissions a further 7%, and will allow for experimentation with alternative heating sources such as heat recovery, solar thermal and geothermal. The SCDP is expected to become operational in Summer 2016.

Sustainability and carbon neutrality align with our core mission of serving society through our teaching, research, service and the actions of our graduates. The benefit of our sustainability initiatives are far reaching, and relate to our institutional impact on the environment, the expertise we develop and share, and the influence we have on the personal and professional lives of our faculty, staff and students. We will continue to look forward and work towards our mission for sustainability in the North and beyond as Canada's Green University™.



CNAR Overview

Organization Name: University of Northern British Columbia

Declaration Statement: This Carbon Neutral Action Report for the period January 1st, 2015 to December 31st, 2015 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2015 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2016 and beyond.

By June 30, 2016, the University of Northern British Columbia's final Carbon Neutral Action Report will be posted to our website at www.unbc.ca.

Overview: As Canada's Green University™, UNBC takes sustainability and carbon neutrality to heart, and we exemplify this through our teaching, research, operations and campus life. In summer 2016, UNBC will take a new step forward with the implementation of our Sustainable Community Demonstration Project, which will help us reduce our fossil fuel consumption, and demonstrate to the North the potential for bioenergy.

Emissions and Offsets Summary Table:

University of Northern British Columbia GHG Emissions and Offsets for 2015 (TCO ₂ e)	
GHG Emissions created in Calendar Year 2015:	
Total Emissions (TCO ₂ e)	8,952
Total Offsets (TCO ₂ e)	1,583
Adjustments to GHG Emissions Reported in Prior Years:	
Total Emissions (TCO ₂ e)	0
Total Offsets (TCO ₂ e)	0
Grand Total Offsets for the 2015 Reporting Year	
Total Offsets (TCO ₂ e)	1,583

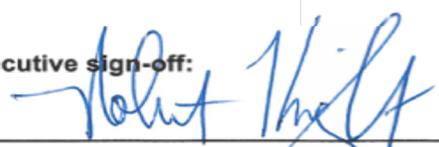
Retirement of Offsets:

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, the University of Northern British Columbia is responsible for arranging for the retirement of the offsets obligation reported above for the 2015 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 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:

Signature

Name (please print)


Robert Knight

Date

Title

May 26, 2016
Vice President - Finance

Adjustments to Carbon Emissions Reported in Previous Years

No adjustments were made to carbon emissions reported in previous years.



Actions Taken to Reduce Carbon Emissions in 2015

During 2015, a number of projects and initiatives were undertaken at UNBC to reduce the carbon emissions associated with fuel combustion, purchased electricity, the mobile fleet and purchasing.

- Replaced parking and pathway exterior streetlights with high efficiency dimmable LED fixtures.
- Implemented Prince George Campus-wide building schedules to shut down unessential HVAC and lighting on statutory holidays and for the winter holiday campus closure, and limit daytime HVAC operation to building high-occupancy hours.
- Installed occupancy and vacancy sensors in labs, classrooms and lecture theatres for HVAC and lighting control.
- Installed 25 solar PV panels on roof of Conference Centre.

- Converted 175W lights on Northern Sports Centre to 38W LEDs.
- Connected Administration Building basement lighting to daylight sensor.
- Replaced electric humidifier with high pressure injection and hot water from Bioenergy.
- Optimized Research Lab, Teaching Lab and Agora building operations through improvements to building scheduling of lighting and HVAC operations.
- Hardwired Power Plant air handler with boiler operation.
- Replaced T12 fluorescent lighting in Teaching Lab Penthouse with T8.
- Replaced metal halides in Reef Fish Tank with LEDs.
- Replaced the natural gas boilers at UNBC Bank of Montreal Building with higher efficiency models.
- Converted a Conference Centre natural gas air handler to hot water heated by bioenergy, and removed a natural gas air handler.
- Continued with the second year of the BC Hydro Workplace Conservation

Awareness program, aimed at promoting pro-environmental behaviour change on campus.

- Created a campus-wide Green Team to promote pro-environmental behaviours on campus.
- Organized conservation-themed events, including National Sweater Day, Light's Out UNBC, Earth Hour and Earth Day.
- Continued the partnership with the City of Prince George, Northern Health, and Fraser-Fort George Regional District where UNBC Distribution Services, Residence Assistants, and UNBC employees had shared access to a fully electric Nissan Leaf from September to December 2015. The Nissan Leaf was used daily by Distribution Services instead of their gas-fueled van.
- Implemented a Papercut program for all print jobs. Papercut provides real-time tracking on paper usage and related GHG emissions, and defaults to double-sided printing.





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 associated emissions. In addition, as the University expands offerings, such as the new food service plan, operating hours have increased, leading to increased emissions.

- As part of the SCDP project, the 400 kW wood pellet boiler that was heating the greenhouse was temporarily decommissioned and relocated alongside the Bioenergy Plant in November 2014. The greenhouse is using natural gas for heating until the pellet boiler is reconnected in Summer 2016.
- Student Residence policy changed such that students in 1st and 2nd year living in Residence are now required to enroll in the meal plan (previously only 1st year students were required). The increase in students on the meal plan led to increased emissions related to cooking.



Actions to Reduce Provincial Emissions and Improve Sustainability

UNBC has been involved in a number of initiatives to promote sustainability and emissions reductions that fall outside the reporting scope defined by the Greenhouse Gas Reduction Targets Act, ranging from infrastructure improvements, to community and student engagement.

- As part of the 5th year Environmental Engineering Design Course, students studied and designed environmental solutions to a range of problems including:
 - Regional Solid Waste Management System Design for the Regional District of Kitimat-Stikine
 - Industrial Wastewater Treatment and Recycling for the Husky Energy Prince George Refinery
 - Geexchange Feasibility Assessment for Use of a Deep Warm Water Well Resource for Heating of a Proposed Water Treatment Plant (WTP) and Greenhouse Buildings for Tetra Tech EBA, Whitehorse
 - Design of Anaerobic Digester System for WWTP Sludge Treatment for the City of Kelowna
 - Bioenergy Plant Heat Recovery for UNBC
 - Organic Waste Management for UNBC
 - Riverbank Erosion Mitigation for the City of Prince George
- Partnered with local businesses, government, and the Canada Winter Games to fund a Sustainability Manager for the 2015 Canada Winter Games. The Sustainability Manager worked primarily out of the UNBC Green University Centre. The Canada Winter Games won multiple awards for sustainability.
- Taught ENVS 498 - Carbon Management, where UNBC students measured the carbon footprint of local businesses, and recommended ways to reduce emissions and ultimately become carbon neutral.
- Undertook research into microgreen production to promote food security in rural and remote communities.
- Hosted a University's Farmers Market every Tuesday featuring local food, produce and products to promote local living.
- Hosted the 7th annual Green Day, a day to celebrate all of the green initiatives on campus. Interactive activities included mug painting for the Borrow-A-Mug program (BAM), a vermicomposting workshop, and edible insects.



- Participated in Bike to Work Week 2015 from May 25th to 31st. Over the week UNBC cyclists logged a total of 365 trips and 2,830 kilometers.
- Held our second annual Bike to School Week in September to promote active modes of transportation.
- Held Prince George's first annual Electric Car Block Party to promote electrification of our transportation system.
- Organized the Prince George Climate Justice March in November 2015, as part of the lead-up to the Paris Conference of the Parties.
- Took part in National Bioenergy Day in October 2015, which included bioenergy plant tours, student projects and a networking session.
- Each year, up to \$45,000 is available to fund sustainable projects on campus. The Green Fund was created in 2009 from parking revenues to fund the Sustainability Manager position as well as sustainability initiatives on campus. Any member of the UNBC community (students, faculty, and staff) can submit a project to the Green Fund. Successful projects receiving funding in 2015 were:
 - The Borrow-A-Mug (BAM) expansion was funded to purchase uniform set of BAM mugs, build mug walls at retail locations to display and promote reusable mug usage across campus.
 - The Forestry Club Christmas Tree Farm was funded to develop 5 ha learning plantation on campus to teach forest stewardship while growing Christmas trees. The sale of Christmas trees will fund bursaries for students.
 - Professor Annie Booth received funding to investigate food insecurity on campus, and develop a baseline assessment of students, faculty and staff.
 - Funding was provided to support the cost of bringing celebrated Canadian author and activist, Naomi Klein, to present on climate change and sustainability.
 - The student residence advisors received funding to install a reciprocity shelf in residence to promote reuse and reduce waste.
 - Profs. Pam Wright and Phil Mullen received funding to develop resources to engage and encourage the UNBC community (students, faculty and staff) to connect with nature on both a daily and longer term basis.
 - The Wellness Centre received funding to promote mental and physical wellbeing by having students make Wellbeing boxes using recycled materials.



Plans to Continue Reducing Emissions in 2016 and Beyond

UNBC has a number of projects and initiatives planned for 2016 and beyond to reduce emissions. Some of the projects are highlighted below:

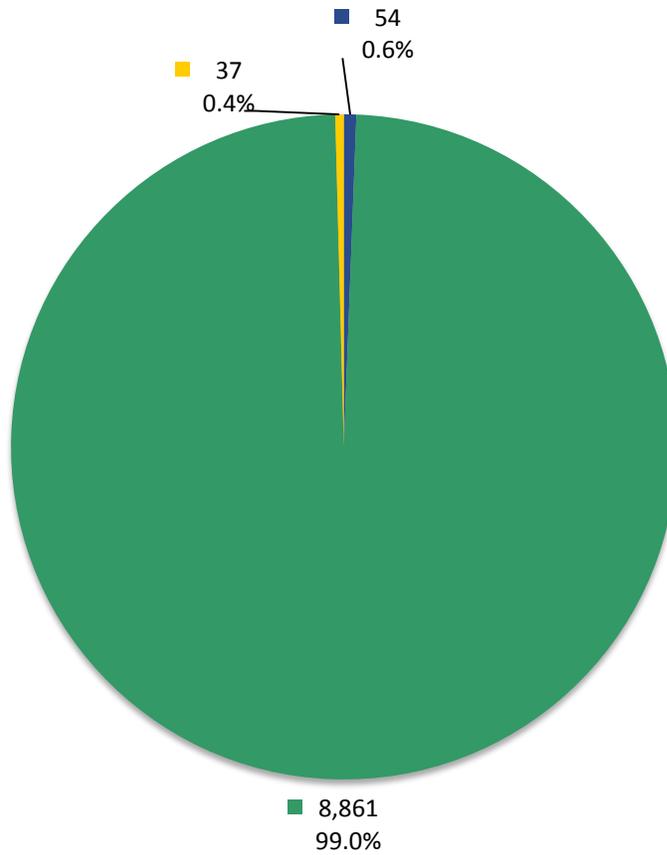
- Implementation of the Sustainable Communities Demonstration Project (SCDP) to connect the Residences, Daycare and greenhouse to the 400kW Pellet Plant will continue. The next steps will be: connecting the pellet boiler to the Bioenergy Plant; installing energy transfer stations in the Residences and Daycare; removing the natural gas equipment from the Residences and Daycare; and commissioning the new low temperature heating loop. The SCDP) is expected to reduce our off-settable emissions from 62% to 69% compared to 2010.
- UNBC is enrolled in the BC Hydro Continuous Optimization program to retrofit and optimize existing building operations. Six buildings have completed the implementation phase as of March 2016. The next three buildings will be completed by March 2017, with expected annual savings of 625,000 kWh of electricity and 6,000 GJ of natural gas.
- As part of the Carbon Neutral Capital Program (CNCP), UNBC received funding to upgrade the street lighting on campus. The upgrade was completed in January 2016, and is expected to save 86,000 kWh of electricity per year.
- UNBC will investigate optimization of the interface between the bioenergy plant and natural gas control systems so as to ensure that natural gas is used solely to meet peaking heat demand.

Contact

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**University of Northern British Columbia
Greenhouse Gas Emissions by Source
for the 2015 Calendar Year (tCO₂e*)**



Total Emissions: 8,952

- Mobile Fuel Combustion (Fleet and other mobile equipment)
- Stationary Fuel Combustion (Building Heating and Generators) and Electricity
- Supplies (Paper)

Offsets Applied to Become Carbon Neutral in 2015 (Generated May 26, 2016 9:21 AM)

Total offsets required: **1,583**. Total offset investment: **\$39,575**. Emissions which do not require offsets: **7,369** **

*Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit of measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.

** Under the *Carbon Neutral Government Regulation of the Greenhouse Gas Reduction Targets Act*, all emissions from the sources listed above must be reported. As outlined in the regulation, some emissions do not require offsets.

2015 Carbon Neutral Action Report Survey

Organization Name:

University of Northern British Columbia

Please select your sector:

- Post-Secondary Institution

1) Stationary Sources (Buildings, Power Generators, Ext. Lighting) Fuel Combustion, Electricity use, Fugitive Emissions:

Please indicate which actions your PSO took in 2015:

Have developed an overall strategy/plan to reduce energy use in your organization's buildings inventory:

Yes

If Yes, please describe:

UNBC has a Strategic Energy Management Plan (SEMP) that outlines planned and committed energy conservation projects. The SEMP is updated annually, and the current targets are to:

- 1. Reduce electrical and thermal energy consumption (combined) by 25% by 2020; and*
- 2. Reduce fossil fuel consumption for heating by 85% by 2020 compared to a 2009/2010 baseline.*

Funding has been secured for the planned and committed projects through the UNBC Energy Conservation Revolving Loan Fund which was created in 2012. The Loan Fund was set up with \$250,000 and is used to fund energy efficiency projects, with a portion of the cost savings used to repay the loan, and to fund future energy conservation projects.

Undertook evaluations of building energy use:

Yes

Performed energy retrofits on existing buildings:

Yes

Built or are building new LEED Gold or other "Green" buildings:

No

Please list any other actions, programs or initiatives that your organization has introduced that support emissions reductions from buildings:

UNBC has implemented numerous energy reduction projects. Notably, we have:

- Replaced our exterior (parking and pathway) streetlights with high efficiency dimmable LED fixtures.*
- Implemented Prince George Campus-wide building schedules to shut down unessential HVAC and lighting on statutory holidays and for the winter holiday campus closure.*
- Installed solar PV panels on roof of Conference Centre*
- Converted 175W wallpacks on Northern Sports Centre to LEDs*
- Connected our Admin basement lighting to daylight sensor to harvest sunlight*
- Replaced electric humidifier with high pressure injection and hot water from Bioenergy*
- Optimized Research Lab, Teaching Lab and Agora building operations through improvements to building scheduling of lighting and HVAC operations.*
- Hardwired Power Plant air handler with boiler operation*
- Replaced T12 fluorescent lighting in Teaching lab Penthouse with T8*
- Replaced metal halides in Reef Fish Tank with LEDs*
- Converted a natural gas air handler in the Conference Centre to hot water heated by bioenergy*
- Removed an air handler in the Conference Centre*

UNBC is in the second year of the BC Hydro Workplace Conservation Awareness program, aimed at promoting pro-environmental behaviour change on campus. Behaviour change programs include:

- Took part in national Sweater Day to encourage the UNBC community to turn down their thermostats.*
- Implemented a Light's Out Challenge to encourage employees to turn their lights out when leaving the office.*

2) Mobile Sources (Fleet, Off-road/Portable Equipment) Fuel Combustion:

Indicate which actions your PSO took in 2015:

Have put in place an operations policy/program to support systematic reductions in fleet related emissions:

(e.g., program to convert fleet to renewable fuels)

No

If Yes, please describe:

(No response)

Replaced existing vehicles with more fuel efficient vehicles (gas/diesel):

No

Replaced existing vehicles with hybrid or electric vehicles:

No

Took steps to drive less than previous years:

Yes

Please list any other actions, programs or initiatives that your organization has introduced that support emissions reductions from fleet combustion:

UNBC is part of a multi-stakeholder partnership to co-own an electric vehicle (Nissan Leaf). UNBC organized the first Prince George Electric Vehicle Block Party to promote electrification of the transportation system.

3) Supplies (Paper):

Indicate which actions your PSO took in 2015:

Have put in place an operations policy/program to facilitate a systematic reduction in paper-related emissions:

(e.g., policy to purchase 100% Recycled Content; default to double-sided printing)

Yes

If yes, please describe:

UNBC implemented a Papercut program for all print jobs. Papercut provides real-time tracking of paper usage and related GHG emissions, and defaults to double-sided printing.

Have put in place an operations policy/program to facilitate behavioural changes from paper use:

(e.g. awareness campaign to reduce paper use):

Yes

If yes, please describe:

UNBC implemented a Papercut program for all print jobs. Papercut provides users with real-time tracking of their paper usage and related GHG emissions, and defaults to double-sided printing. Since the implementation of Papercut, printing has decreased on campus by approximately 10%.

Used only 100% recycled paper:

No

Used some recycled paper:

Yes

Used alternate source paper:

(e.g., bamboo, hemp, wheat etc.)

No

Please list any other actions, programs or initiatives that your organization has introduced that support emissions reductions from paper supplies:

(No response)

4) Other Sustainability Actions:

Please note that this section is optional

Business Travel

Created a low-carbon travel policy or travel reduction goal:

(low-carbon = lowest emission of greenhouse gas per kilometer per passenger)

No

Encouraged alternative travel for business:

(e.g. bicycles, public transit, walking)

Yes

Encouraged or allow telework/working from home:

No

Other:

(No response)

Education Awareness

Have a Green/Sustainability/Climate Action Team:

Yes

Supported green professional development:

(e.g. workshops, conferences, training)

Yes

Supported or provided education to staff about the science of climate change, conservation of water, energy and/or raw materials:

Yes

Other:

-UNBC has a Friday afternoon lecture series focused on sustainability topics.

-UNBC has a coordinator for the Pacific Institute for Climate Solutions, who runs engagement activities related to climate change.

-UNBC organizes an annual Green Day to raise awareness of sustainability issues on and off campus. Green Day involves significant student and community involvement.

-UNBC has a campus-wide communication system for staff and students that it uses to raise awareness of resource conservation on campus and promote pro-environmental behaviour.

-UNBC hosts a number of community engagement events to raise awareness of key sustainability issues.

Adaptation Planning for Climate Risks

Have assessed whether increased frequency of extreme weather events and/or long term changes in climate will affect your organization's infrastructure, its employees and/or its clients:

No

Have incorporated these anticipated changes in climate into your organization's planning and decision making:

No

Other:

(No response)

Other Sustainability Actions

Established a water conservation strategy which includes a plan or policy for replacing water fixtures with efficient models:

Yes

Have put in place an operations policy/program to facilitate the reduction and diversion of building occupant waste stream from landfills or incineration facilities:

(e.g., composting, collection of plastics, batteries)

Yes

Established green standards for goods that are replaced infrequently and/or may require capital funds to purchase:

(e.g., office furniture, carpeting, etc.)

Yes

Incorporated lifecycle costing into new construction or renovations:

No

Please list any other sustainability actions your organization has taken not listed above:

-UNBC has a Green Fund which annually funds up to \$45,000 for sustainable projects on campus. The Green Fund was created in 2009 from parking revenues to fund the Sustainability Manager position as well as sustainability initiatives on campus. Any member of

the UNBC community (students, faculty, and staff) can submit a project to the Green Fund.

-UNBC promotes sustainable transportation through community engagement. Notable activities include participating in Bike to Work Week, organizing Bike to School Week, and hosting Prince George's first Electric Car Block Party.

- UNBC promotes bioenergy production, and takes part in National Bioenergy Day and the biennial International Bioenergy Conference.

-UNBC hosts a University's Farmers Market every Tuesday, featuring local food, produce and products to promote local living.

-UNBC teaches numerous sustainability related courses, including ENVS 498 - Carbon Management, where students measured the carbon footprint of local businesses, and recommended ways to reduce emissions and ultimately become carbon neutral. Likewise, the 5th year Environmental Engineering design projects focus on sustainability.