

# 2018 Carbon Neutral Action Report



## Overview

The University of Northern British Columbia (UNBC), appropriately trade marked as Canada's Green University, has achieved a 34% reduction in electricity use, 76% reduction in natural gas consumption, and a 21% reduction in utility costs since the start of our Energy Management program in 2010. As a result, UNBC has avoided over \$4.3 million dollars of energy costs over the past 8 years. Our 4.4 MW Bioenergy Plant and 0.4 MW Pellet Plant, which use local sawmill wood waste and pellets respectively as fuel, continue to aid in the reduction of UNBC's carbon emissions. In fiscal year 2018, the Bioenergy Plant supplied approximately 85% of the heat required for the core buildings on the Prince George campus, while the Pellet plant supplied approximately 80% of the heat required for two student housing buildings, the daycare, and the Enhanced Forestry Lab (EFL) greenhouse on the Prince George campus. Combined, these operations displaced roughly 91,000 GJ NG<sub>eq</sub>, or 4500 tonnes CO<sub>2e</sub>.

Our energy reduction targets for 2020 include a 25% reduction in energy consumption and an 85% reduction in natural gas usage compared to 2010 levels. We will achieve these targets by continuing to pursue low-carbon heating alternatives and placing strong emphasis on energy reduction measures such as equipment retrofits and public awareness/engagement campaigns.



## Declaration Statement

This Carbon Neutral Action Report for the period January 1<sup>st</sup>, 2018 to December 31<sup>st</sup>, 2018 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2018 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2019 and beyond.

By June 30, 2019, the University of Northern British Columbia's final Carbon Neutral Action Report will be posted to our website at [www.unbc.ca](http://www.unbc.ca).

Table 1: Emissions and Offsets Summary

| University of Northern British Columbia GHG Emissions and Offset for 2018 (tCO <sub>2e</sub> ) |             |
|--|-------------|
| GHG Emissions created in Calendar Year 2018  |             |
| Total Emissions (tCO <sub>2e</sub> )   | 7,199       |
| Total BioCO <sub>2</sub>   | 5,384       |
| Total Offsets (tCO <sub>2e</sub> )   | 1,815       |
| Adjustments to GHG Emissions Reported in Prior Years   |             |
| Total Emissions (tCO <sub>2e</sub> )   | 0           |
| Total Offsets (tCO <sub>2e</sub> )   | 0           |
| Grand Total Offsets for the 2018 Reporting Year:   |             |
| Grand Total Offsets Required (tCO <sub>2e</sub> )  | 1,815       |
| Total Offset Investment  | \$45,375.00 |

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 2018 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:

  
Signature \_\_\_\_\_ Date May 31 2019

Barb Daigle  
Name (please print) \_\_\_\_\_ Title Interim VP, Finance, People, Organizational Design & Risk.



## Adjustments to Carbon Emissions Reported in Previous Years

No adjustments were made for previous reports.

## Actions Taken to Reduce Carbon Emissions in 2018

### *Lighting Upgrades*

UNBC completed two major lighting projects in 2018 estimated to save 294,000 kWh/yr. We removed old fluorescent light technology in our Library and Medical buildings, and replaced it with energy efficient LED light technology. LED's provide improved light quality and may convert up to 95% of the energy input into usable light, thereby reducing the energy input required to illuminate a space and ultimately lower greenhouse gas emissions.

### *Electric Vehicles*

UNBC procured a 2018 Nissan Leaf last year for the Facilities department to service the new Wood Innovation Research Lab (WIRL) building in downtown Prince George. This is expected to reduce carbon emissions by 2.1 tonnes CO<sub>2e</sub>, while adding 2200 kWh to the annual electrical consumption.



## ***Green Day***

UNBC's annual Green Day started in 2008 as a celebration and platform to share sustainability actions and commitments. It is important that we don't just call ourselves Canada's Green University, but that we live it. Green Day is also an opportunity to generate new ideas from future leaders on sustainable initiatives within the community. Topics included:

- **Water Wise** – info on water consumption in partnership with the City of PG.
- **Cumulative Impacts Research Consortium** – exploring the topic of cumulative impacts on northern communities.
- **University Farmer's Market** – a place to buy healthy local food.
- **The David Douglas Botanical Garden Society** –info around northern plants and gardens.
- **The Women's Centre** – helped people analyze personal care products to determine the climate and human impacts.
- **NUGSS** – info table about food Security featuring the NUGSS food bank on campus.
- **UNBC Apiary Club**- Learn about bees and and beekeeping.

## ***Wood Innovation Research***

### ***Laboratory (WIRL)***

The Wood Innovation Research Lab provides students, faculty, and researchers from UNBC's Master of Engineering in Integrated Wood Design program with the ability to build and test large-scale integrated wood structures. WIRL is a certified Passive House and has caught the attention of Passive House researchers around the world because it demonstrates how an industrial structure constructed with wood in Northern British Columbia's cold climate can be a global leader in energy efficiency. Certified Passive House buildings use up to 90 per cent less energy for heating and cooling when compared with standard buildings and use up to 70 per cent less energy overall.





## ***New Bus Shelter***

In 2018 UNBC built a bus shelter outside of the Charles J. McCaffery Hall, one of the busiest bus stops in Prince George. It was designed by the inaugural cohort of the Master of Engineering in Integrated Wood Design students. The design was inspired by the natural topography and geography of Prince George located in the Traditional Territory of the Lheidli T'enneh. The hyperbolic paraboloid shape gives a wavy appearance to the roof but is comprised entirely of straight wood pieces (ruled surface) and thus much less expensive.

The main structural members are Douglas-Fir Glulam produced in Penticton, B.C. and the siding is made of Cedar. Cedar is naturally resistant to decay, making it a good choice for siding that is - exposed to the elements.

One of the driving forces behind building the bus shelter was to provide transit users a comfortable and safe area, protected from the elements and in doing so, encourage more transit use.

## ***'Energy Factoids' Social Media Campaign***

A 25 page interactive Instagram story was created to engage the UNBC audience in how electrical and thermal energy is consumed on our campus. The story sought to inform people on what influence they individually have over this and some simple actions we can all take to reduce our impact. The story was posted for 24 hours on UNBC's main Instagram account. UNBC's IG account had 4,844 followers at the time of posting, the majority of which were students. 1,215 people saw the first page of the story, 1,081 were still viewing by the middle, and 1,005 were engaged through to the last page. That means we reached 25% of the possible audience on the account, and 83% of them engaged with the entire story!



## Operations Affecting Overall Carbon Emissions in 2018

UNBC strives to continually reduce carbon emissions, however, they are strongly correlated to the operation of our Bioenergy and Pellet Plants. Any emergency or scheduled system shutdown can lead to increased natural gas consumption and therefore emissions in a given year. The Bioenergy Plant was undergoing maintenance for an extra 66 days in 2018 compared to 2017.

UNBC's emissions are also driven by the main campus heating demand, which is correlated to the outdoor air temperature. The Bioenergy Plant is capable of meeting the campus heat demand when temperatures are above  $-5^{\circ}\text{C}$ , however, when temperatures drop below  $-5^{\circ}\text{C}$  extra heat must be supplied by the natural gas boilers. In the warmer months, two 910-ton rooftop chillers provide cooling to the campus. In 2018 UNBC had a 0.2% decrease in Heating Degree Days (HDD) from 2017 based on a benchmark temperature of  $15.5^{\circ}\text{C}$ . Additionally, there was an 11% increase in Cooling Degree Days (CDD) from 2017 based on a benchmark temperature of  $18^{\circ}\text{C}$ .

Emissions were reduced in 2018 through the disposal of a  $1320\text{ m}^2$  downtown building that used all natural gas heating. Additionally, the WIRL was added to UNBC's portfolio which, as a Passive House building, has a very low heating demand. The net result of these building changes was a reduction in emissions.

Figure 1 shows that buildings are the most significant emissions source for UNBC. Despite minor increases in fleet and supply emissions, the above mentioned building factors created an overall decrease in carbon emissions from 2017 to 2018.

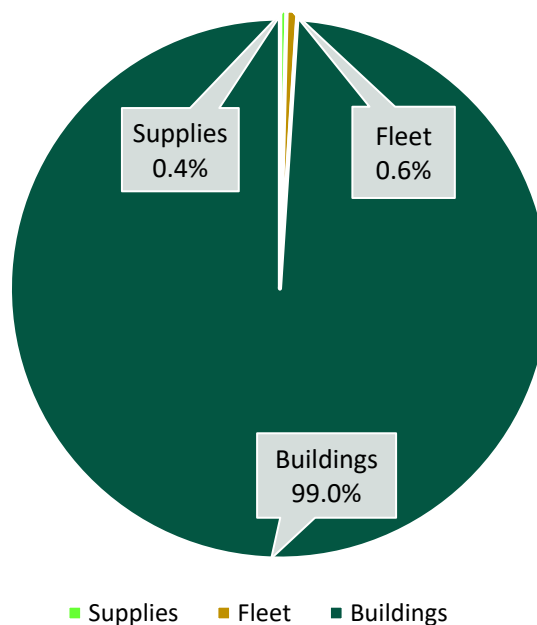


Figure 1: University of Northern British Columbia Total Emissions for 2018 ( $\text{tCO}_{2\text{e}}$ )



## Plans to Continue Reducing Emissions 2019 and Beyond

Moving forward in 2019/2020, UNBC will be completing further lighting projects in Charles J. McCaffery Hall, Agora, EFL, and Research Lab. Combined, these projects are estimated to reducing electricity consumption by 2.4% and saving approximately 646,000 kWh.

UNBC has undertaken a pilot study to gather data on the effectiveness of heat pumps in cold northern climates. This study may lead to the install of a heat pump at the Northern Sport Centre (NSC), with the intention of partially offsetting heating requirements for one of the large air handlers serving the indoor soccer fields. Key data related to cold weather coefficients of performance and the overall electrical consumption is required to inform the design of a large air source heat pump system that has the potential to offset the majority of the natural gas consumption at this facility.

### Contact

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# Part 1: CNAR Survey

## 1. General Information

**Name:** Danika Doucette

**Contact Email:** danika.doucette@unbc.ca

**Organization Name:** University of Northern BC

**Sector:** Post Secondary

**Role** - Please select your role(s) below.

*If more than one individual completed the survey, multiple categories may be selected:*

Energy Manager: Yes

Sustainability Coordinator: No

Administrative Assistant: No

Facilities/Operations Manager/Coordinator: No

CEO/President/Exec Director: No

Treasurer/Accounting: No

Superintendent: No

### A. Stationary Sources (e.g. Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

#### 1. Actions taken by your organization in 2018 to support emissions reductions from buildings.

##### a) Do you have a strategy to reduce emissions from stationary sources?

Yes

If yes above, what are the main goals?: Continue upgrading lighting across the Prince George campus from fluorescent to LED. Design heat recovery off the biomass gasification system. Install free cooling in our main server room. Replace the cooling towers and add a variable speed drive for the rooftop chiller system. Repair/replace various heat exchangers across the campus.

##### b) Whether you have a strategy or not (1.a), briefly describe your organization's plans to continue reducing emissions from stationary sources:

###### I. Over the medium-term term (1-5 years)

For FY2020 UNBC will be undertaking 4 major lighting upgrade projects, with potential savings of over 645,000 kWh. In the short term we also plan to install free cooling on the main server room, repair or replace several heat exchangers, and install a VSD on the chiller system.

###### II. Over the long term (6-10 years)

Over the longer term UNBC may install heat recovery on the existing biomass gasification system. There is also a plan to evaluate and potentially redesign some thermal envelopes of the core campus buildings.

##### c) Please describe your strategy's goals (if any) related to [energy audits](#).

Energy audits are conducted every 2nd year, with the last one being done in 2018; the next one will be completed in 2020.

I. What % on average of your building portfolio has an energy audit completed each year (if any)? : 0

**d) Please describe your strategy's goals (if any) related to building retrofits.**

Thermal envelopes may be evaluated in the long term to determine if they are candidates for retrofit.

I. What % on average of your building portfolio is retrofitted each year in the following categories (if any) - click [here](#) for further information:

Minor retrofits (e.g., low cost, easy to implement measures including caulking, lighting, adding roof insulation, etc.) (%): 5

Major retrofits (e.g., replacing windows and doors, equipment replacement such as boilers, etc.) (%): 5

Deep retrofits (e.g., replacing roof, replacing the heating, ventilation and air-conditioning system with a renewable technology like a ground-source heat pump, etc.) (%): 10

**e) Please describe your strategy's [re/retro-commissioning](#) goals (if any)?**

Targeted energy studies are conducted regularly and when funding is available to determine if retrofit/recommissioning is feasible and if it will positively impact energy consumption.

I. What % on average of your building portfolio do you recommission each year?: 15

**f) Do you keep records of Refrigerant gases category and refilling volumes?**

Yes

I. If yes, have you included the associated emissions in your reporting?

No

II. What, if any, mitigation approaches have been considered? Please describe.

Maintenance and service contracts are ongoing for the largest items on campus (ie. chillers).

**g) How many newly constructed buildings received at least LEED Gold certification in 2018 : 0**

I. How many newly constructed buildings did not receive LEED Gold certification?: 1

II. Please explain why LEED Gold certification was not obtained.

Used Passive House Standard for the newly constructed Wood Innovation and Research Lab.

## **B. Mobile Sources (Vehicles, Off-road/portable Equipment): Fuel Combustion:**

### **3. Actions taken by your organization in 2018 to support emissions reductions from mobile sources.**

**a) Do you have a strategy to reduce emissions from mobile sources?**

Yes

I. If yes, what are its goals?

UNBC will be actively monitoring market developments in hybrid and electric vehicles, specifically the class of pick up trucks, to enable reductions in fleet emissions.



**b) Whether you have a strategy or not (3.a), briefly describe your organization's plans to continue reducing emissions from mobile sources:**

**I. Over the medium-term term (1-5 years)**

UNBC will be actively monitoring market developments in hybrid and electric vehicles, specifically the class of pick up trucks, to enable reductions in fleet emissions.

**II. Over the long term (6-10 years)**

UNBC will be actively monitoring market developments in hybrid and electric vehicles, specifically the class of pick up trucks, to enable reductions in fleet emissions.

**c) How many fleet vehicles did you purchase from the following categories:**

Electric Vehicle – EV - (e.g., Nissan Leaf, Chevy Bolt): 1

"Plug In" Electric Vehicle – PHEV (e.g., plug-in Prius, Chevy Volt): 0

Hybrid vehicle – HEV – non "Plug In"- (e.g., Toyota Highlander Hybrid): 0

Hydrogen fuel cell vehicle : 0

Natural gas/propane: 0

Gas/diesel vehicle: 0

**d) How many existing EV charging stations does your organization have in each category:**

level 2: 3

level 3: 0

How many level 2 stations (if any) are specifically for your fleet vehicles: 1

How many level 3 stations (if any) are specifically for your fleet vehicles: 0

**e) How many EV charging station(s) did you install in 2018 in each category:**

level 2: 0

level 3: 0

How many level 2 stations (if any) were installed specifically for your fleet vehicles: 0

How many level 3 stations (if any) were installed specifically for your fleet vehicles: 0

**4. Please indicate the number of the vehicles in the following vehicle classes that are in your current fleet (including any purchased in 2018):**

**Definitions:**

- Light duty vehicles (LDVs) are designated primarily for transport of passengers <13 and GVWR<3900kg
- Light duty trucks (LDTs) are designated primarily for transport of light-weight cargo or that are equipped with special features such as four-wheel drive for off-road operation (include SUVs, vans, trucks with a GVWR<3,900kg )
- Heavy duty vehicles (HDV) includes vehicles with a GVWR>3,900 kg (e.g. ¾ tonne pick-up truck, transport trucks)

**a) Light duty vehicles (LDVs)**

Electric Vehicles – EV - (e.g., Nissan Leaf, Chevy Bolt): 1

Gas/diesel: 2

**b) Light duty trucks (LDTs)**

Gas/diesel: 24

**c) Heavy duty vehicles (HDV)**

Gas/diesel: 2

**5. Please indicate the number of the vehicles you plan to replace in your fleet:**

How many LDVs do you plan to procure annually over the next 5 years?: 1

How many LDTs do you plan to replace annually over the next 5 years?: 3

How many HDVs do you plan to replace annually over the next 5 years?: 2

**C. Office Paper: Indicate which actions your PSO took in 2018:****6. Actions taken by your organization in 2018 to support emissions reductions from paper supplies.****a) Do you have an Office Paper strategy?**

Yes

**I. If yes, what are its goals?**

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%.

**b) Whether you have a strategy or not (6.a), briefly describe your organization's plans to continue reducing emissions from paper use:****I. Over the medium-term (1-5 years)**

UNBC will continue to engage users in their consumption habits via educational tools like Papercut, with the ultimate goal of reducing printing and related emissions.

**II. Over the long term (6-10 years)**

UNBC will continue to engage users in their consumption habits via educational tools like Papercut, with the ultimate goal of reducing printing and related emissions.

**c) Have an awareness campaign focused on reducing office paper use**

No

**d) Purchased alternate source paper (bamboo, hemp, wheat, etc.)**

No