

# 2019 Carbon Neutral

ACTION REPORT





# 2019

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## Foreword From Interim President Geoff Payne

During the past year we have navigated turbulent waters together here at UNBC and around the world. Yet it is often through adversity that we discover our inherent creativity, fortitude and connection to our community. With compassion and kindness, we are supporting each other as we meet challenges and overcome obstacles, all while maintaining a relentless focus on our mission to inspire leaders for tomorrow by influencing the world today. Together we are building a sustainable University that will serve northern British Columbia for generations to come.

One pillar of this sustainable foundation is our pledge, through research and innovation, to discover new ways to reduce our carbon emissions. To meet our goals, we must continue to invest in this future by reiterating, revitalizing and reinventing all facets of our built and social environment.

Through our actions, some of which are detailed in the pages of this report, we are demonstrating our leadership in sustainability. But we know there is still much more we can do. If you have an idea of how UNBC can reduce its emissions, or if you have a success story to share, please contact Energy Manager Danika Doucette at [Danika.Doucette@unbc.ca](mailto:Danika.Doucette@unbc.ca)

## Declaration Statement

This Carbon Neutral Action Report for the period of January 1, 2019, to December 31, 2019, summarizes UNBC's emissions profile, the total offsets to reach net-zero emissions, the actions the University took in 2019 to reduce greenhouse gas emissions, and the plans to continue reducing emissions in 2020 and beyond. Due to the COVID-19 pandemic, 2018 total offset values are being reported for 2019 as directed by the Climate Action Secretariat on March 31, 2020. Any adjustments that are required for the 2019 reporting year will be accounted for in the 2020 report.

By June 30, 2020, 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).

## Overview

The University of Northern British Columbia (UNBC), fittingly trademarked as Canada's Green University, has achieved a 35 per cent reduction in electricity use, 26 per cent reduction in natural gas consumption, and a 10 per cent reduction in overall utility costs since the start of its Energy Management (EM) program in 2010. As a result, UNBC has avoided over \$5.65 million in energy costs over the past decade.

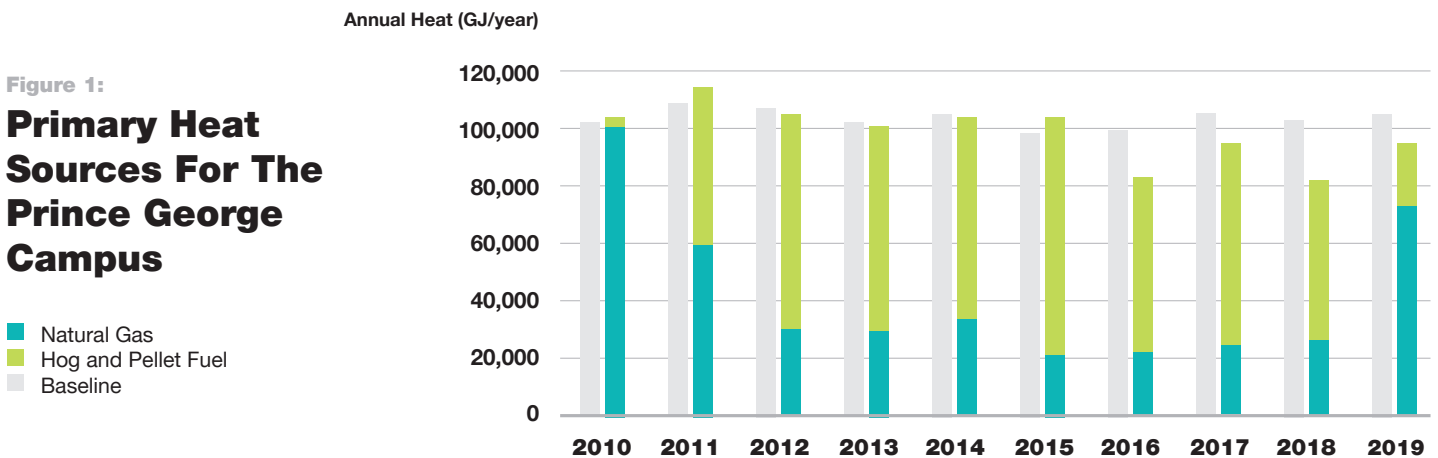
The energy conservation initiatives during 2019 focused on four major lighting upgrades across the Prince George campus, which have a projected savings of 709,000 kWh/yr, or a 5.8 per cent decrease in electrical load. These measures will save upwards of \$49,500 per year in utility costs.

Planned energy reduction initiatives for 2020 include updating the lighting in the bioenergy plant, completing a server-room free-cooling project, constructing a new Passive House building on the Prince George campus, and undertaking a second round of recommissioning of controls systems for three buildings on the Prince George campus.

Ongoing public engagement remains one of the key elements of the EM program in 2020, and the EM team will organize at least one energy conservation campaign in partnership with BC Hydro. In addition, the 14th annual Green Day will be hosted during the 2020/21 academic year. This event brings together the entire community to share, discuss, and learn about the wide array of sustainability-focused initiatives that are happening on campus and in the greater Prince George community.

UNBC's 4.4 MW bioenergy plant and 0.4 MW pellet plant, which use local sawmill wood waste and pellets respectively, continue to aid in the reduction of UNBC's carbon emissions, though reductions were not as significant in 2019 as in previous years. The bioenergy plant supplies approximately 85 per cent of the heat required for the core buildings on the Prince George campus. However, it was shut down from March 2019 until March 2020 while significant maintenance work was completed. This had a noticeable impact on natural gas consumption and overall utility costs for the year. In spite of this setback, the pellet plant continued to operate efficiently and supply the heat required for two student-housing buildings, daycare, and the Enhanced Forestry Lab (EFL) greenhouse. With the bioenergy plant back to full operation, we anticipate to see a return to previous greenhouse gas (GHG) levels, as well as further reductions from continued electrical and thermal conservation efforts.

Figure 1 shows the effect of the bioenergy plant shut down on the ratio of natural gas to bio-fuel consumed. This graph is not normalized for temperature, so overall gigajoules of heat produced is primarily related to variations in weather patterns from year to year. The baseline represents what the heat demand would have been in a given year had UNBC not made improvements to the thermal efficiency of its equipment and buildings over time.



## Emissions and Offsets Summary Table

### University of Northern British Columbia GHG Emissions and Offset for 2019 (tCO<sub>2</sub>e)

GHG Emissions created in Calendar Year 2019	
Total Emissions (tCO <sub>2</sub> e)	7,199
Total BioCO <sub>2</sub>	5,384
Total Offsets (tCO <sub>2</sub> e)	1,815
Adjustments to GHG Emissions Reported in Prior Years	
Total Emissions (tCO <sub>2</sub> e)	0
Total Offsets (tCO <sub>2</sub> e)	0
Grand Total Offsets for the 2019 Reporting Year:	
Grand Total Offsets Required (tCO <sub>2</sub> e)	1,815
Total Offset Investment	\$45,375.00

## 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 (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2019 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

Colleen Smith

Signature

May 27, 2020

Date

Colleen Smith

Name (please print)

Interim VP, Finance

Title



## Actions Taken to Reduce Carbon Emissions in 2019

### Main Campus Lighting Upgrades

UNBC completed four major lighting upgrades on the Prince George campus in FY 2019/2020, which are estimated to save at least 709,000 kWh/yr and \$49,500 per year in utility costs. Old fluorescent light and ballast technology was removed and replaced with energy efficient LEDs and improved controls systems that utilize motion sensing, daylight harvesting, and dimming. These upgrades have improved usability and user experience in over 21,000 square metres, or 22 per cent of the main campus. LEDs provide improved light quality and may convert up to 95 per cent of energy input into usable light, thereby reducing the energy input required to illuminate a space and ultimately lowering greenhouse gas emissions. Anticipated savings by project are:

- |  |                       |
|--|-----------------------|
| • <b>Agora Canfor Winter Garden</b>        | <b>219,000 kWh/yr</b> |
| • <b>Research Lab</b>                      | <b>307,000 kWh/yr</b> |
| • <b>Charles J. McCaffray Hall</b>         | <b>106,000 kWh/yr</b> |
| • <b>I.K. Enhanced Forestry Laboratory</b> | <b>77,000 kWh/yr</b>  |



The EFL lighting upgrade will not only have significant impacts on electrical consumption and bottom line savings, but it will also provide a more technologically advanced research space for faculty and students. The HortiLED Top fixture was chosen for its wide array of customizable features including the distribution angle, colour spectra, and dimming.



## Electric Vehicles

In 2018, UNBC procured a 2018 Nissan Leaf for the Facilities department to service the new Wood Innovation Research Lab in downtown Prince George. This vehicle is expected to reduce carbon emissions by 2.1 tonnes CO<sub>2</sub>e, while adding 2,200 kWh to the annual electrical consumption. In 2019, the Leaf accrued 2,317 km, directly offsetting that amount of kilometres from one of the other gas-powered vehicles in the fleet. We anticipate that as more personnel are trained in the vehicle's operation, it will be more frequently utilized and able to offset even more gasoline kilometres.



## Green Day

UNBC's annual Green Day started in 2008 as a student-run celebration and platform to share sustainability-gearred causes across campus and the wider Prince George community. Green Day is also an opportunity to generate new ideas from future leaders on sustainable initiatives. Some of the groups and conversations at our most recent Green Day included:

- Prince George Electric Vehicle Association – Presentation and vehicle display with seven different local EV's including Tesla, Nissan, and Hyundai models
- David Douglas Botanical Garden Society – Information about northern plants and gardens, and future expansion plans for the botanical gardens at UNBC
- Northern Women's Centre – Analyzing personal care products to identify climate and human impacts
- City of Prince George – Storm and sanitary sewer information, and downstream aquatic effects
- The Wildlife Society – Teaching students about local fish and wildlife species
- UNBC Apiary Club – Education about bees and beekeeping
- UNBC Energy Management – Program details on current energy conservation projects on campus
- Prince George Cycling Club – Sharing all there is to know about cycling in Prince George
- *Motherload* movie screening – A documentary on cargo bikes
- Students for a Green University – Presented a Dinner for Divestment with a panel discussion
- Many local foods and Farmers' Market vendors

## All-Campus Energy Challenge

This year's energy challenge was a fun, interactive event open to all staff and students. Participants were given a wildflower seed-paper door hanger that had several energy-conserving actions listed on it. They pledged to undertake one or more of these actions for one week, or list their own unique action to commit to. Participants then visited the Energy Management booth at Green Day, which coincided with the conclusion of the challenge, where they could collect ballot entries for prizes. They could also share their creative and unique pledges from the past week to inspire future energy challenge campaigns. There were over 100 enthusiastic participants in this year's campus-wide energy challenge.



## Operations Affecting Overall Carbon Emissions in 2019

UNBC strives to continually reduce carbon emissions, which are primarily influenced by heat production as shown in Figure 2. Stationary heat is a combination of fossil fuels (natural gas, diesel, and propane) and renewable fuels (hog and pellets), with the renewable fuels being exempt from required offsets.

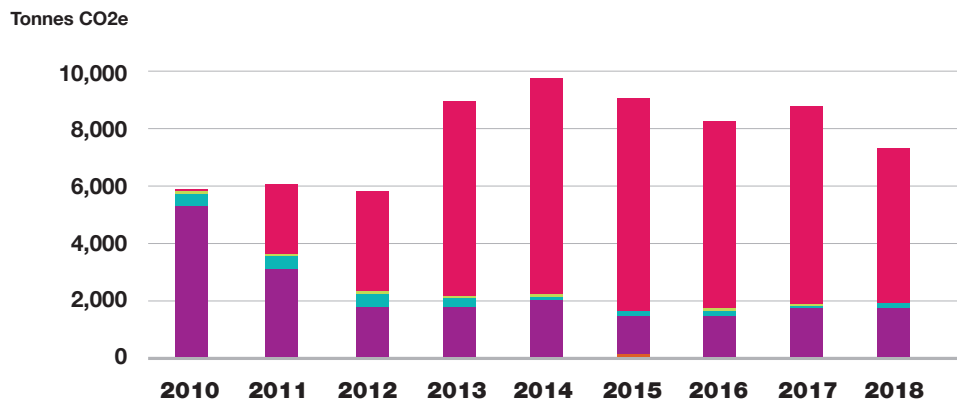
The 0.4 MW pellet plant was built in 2009 followed closely by the 4.4 MW bioenergy plant in 2010. Since the introduction of these two renewable fuel heat sources, there has been a dramatic decrease in UNBC's carbon footprint. The bioenergy plant is capable of meeting the main campus heat demand when temperatures are above  $-5^{\circ}\text{C}$ ; when temperatures drop below  $-5^{\circ}\text{C}$  extra heat must be supplied by the natural gas boilers. The pellet plant supplies heat to the two student housing buildings, daycare, and the EFL. If it cannot meet the head demand the bioenergy plant can back it up, followed by the natural gas system.

UNBC's CO<sub>2</sub>e emissions are also influenced by two 910-ton rooftop chillers that provide cooling to the campus in the warmer months. However, the electrical load has only contributed to approximately 8 to 13 per cent of the offset-able emissions between 2013–2018. Therefore, any emergency or scheduled shutdown to our renewable fuel heating systems will have the most noticeable impact on emissions in a given year by increasing natural gas consumption.

Figure 2:

### UNBC CO<sub>2</sub>e Emissions by Source from 2010 – 2018

- Heat - Renewable
- Office Paper
- Electricity
- Heat - Fossil Fuel Based
- Fleet



The bioenergy plant experienced a major shut down from March 2019 until March 2020 while significant maintenance work was completed on the boiler. This had a substantial impact on UNBC's natural gas consumption (Figure 1) and will certainly impact carbon emissions for the 2019 reporting year. Despite challenges with the bioenergy plant, the pellet plant continued to operate efficiently and supply the majority of the heat required for its aforementioned building connections. With the bioenergy plant now back to full operation, we anticipate to see a return to previous GHG levels, as well as further reductions from continued electrical and thermal conservation efforts.

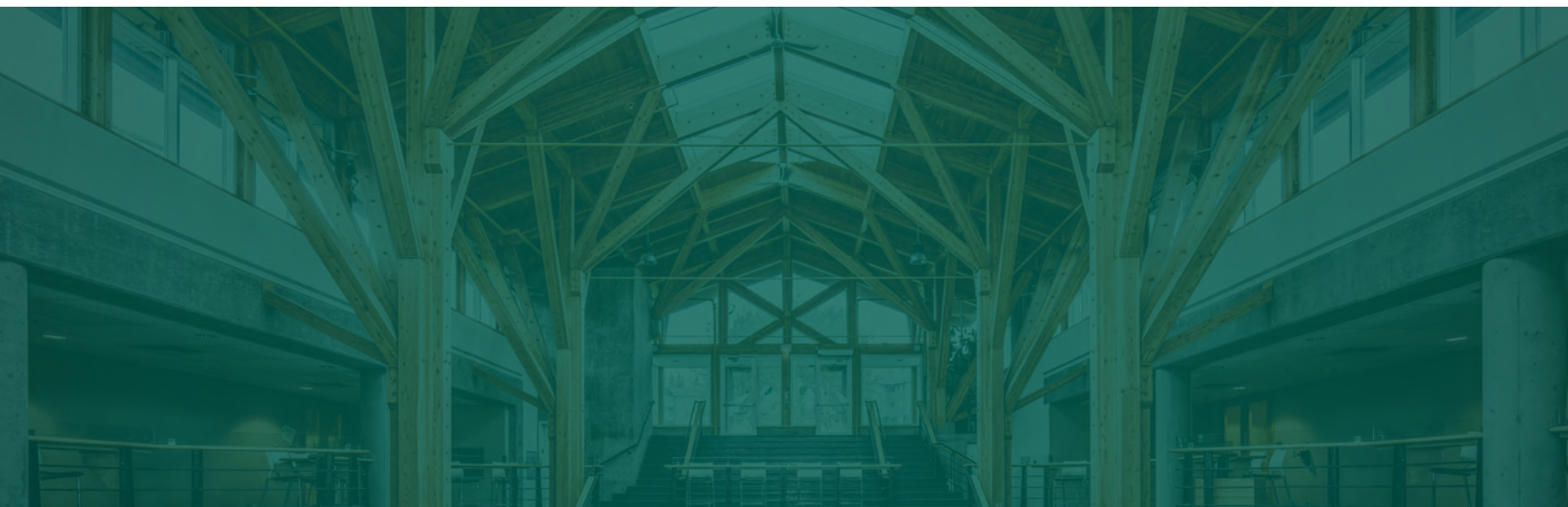
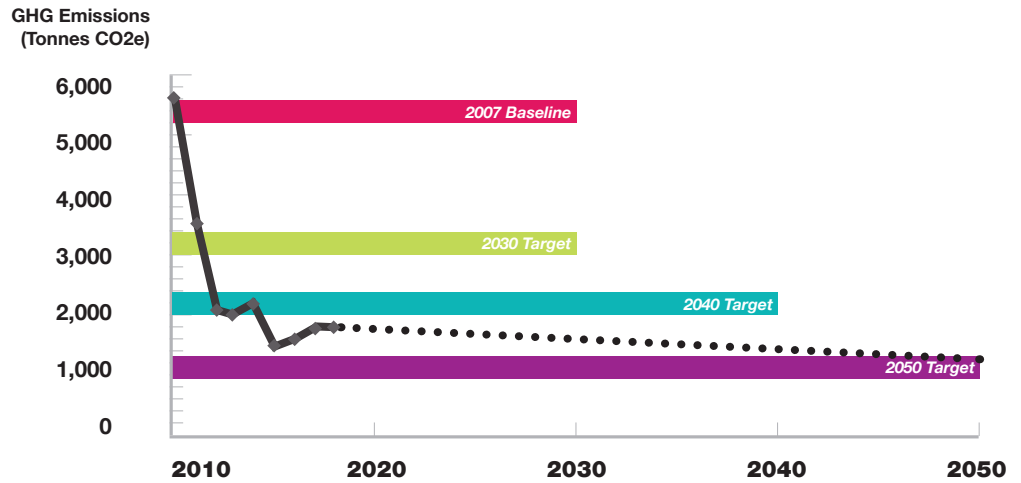


Figure 3 illustrates UNBC’s GHG reductions over the last decade in comparison to Provincial reduction targets. The 2018 emissions were reduced by approximately 66 per cent from the 2007 baseline, which is 25 years ahead of Provincial target timelines. From this perspective, a small setback in renewable energy operations for 2019 is just that. UNBC will continue to pursue bold new ideas and technologically advanced solutions to ensure smart and sustainable energy operations for the lifetime of our institution.

**Figure 3:**  
**Total UNBC CO2e Emissions vs. Provincial Reduction Targets**

- 2007 Baseline
- 40% Reduction
- 60% Reduction
- 80% Reduction
- GHG Emissions



## Plans to Continue Reducing Emissions in 2020

Moving forward, UNBC will implement a full lighting upgrade to the bioenergy plant, which currently utilizes the same fluorescent lighting technology as when the plant was built in 2010. This is expected to reduce electrical consumption on the order of 50,000 kWh/yr as well as drastically improve the visibility in the process area of the facility.

We are also on track to complete a free-cooling project for the primary computer server room on campus by late summer. This project will bring in outdoor air to cool the space when the temperature is below 16°C, offsetting over 110,000 kWh/yr of electricity from the formerly utilized air conditioning system. The warm air that is removed from this space will be ducted to the adjacent shipping/receiving bay. This recycled heat will make the space more comfortable for occupants while offsetting demand from the primary district heating system.

A new Facilities Management building, built to Passive House standard on the Prince George campus, will be complete by the fall of this year. This standard is recognized around the world for its simple yet effective techniques that prioritize air-tight construction, building insulation, and smart use of southern exposure. Although this building will create some load growth for the campus, being a Passive House will ensure it has minimal impact while maximizing its operational lifespan.

Lastly, the EM team is participating in a new round of building recommissioning efforts in partnership with BC Hydro. The Research Lab, Teaching Lab, and Agora will be analyzed for potential savings. Combined, these buildings account for 24 per cent of UNBC’s floor space. The recommissioning will seek to optimize heating, ventilation, and air conditioning by making improvements to building automation systems. UNBC has participated in a similar program in the past with BC Hydro, and through those efforts have achieved several hundred thousand kilowatt-hours in savings. This year’s efforts are expected to save roughly 600,000 kWh.

Beyond 2020, UNBC will begin evaluating how best to recommission building envelopes to decrease thermal demand and increase savings.



## Contact

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