

**2023 PSO**  
**Climate**  
**Change**  
**Accountability**  
**Report**





# 2023

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## Foreword from President and Vice Chancellor Geoff Payne

UNBC's guiding vision is to lead a sustainable future, as outlined in our renewed strategic plan, Ready. Sustainability is a key priority across our institution, implemented through our operations, education, and research. 2023 saw a significant reduction in Scope 1 and 2 GHG emissions at UNBC as we recorded the second-lowest emissions total in our history. This means that despite our continued growth as an institution, emissions were almost 70% lower in 2023 than our 2007 baseline, exceeding the province's overall target for 2040, as well as its building and communities sector target for 2030.

I am also excited about the recent renewal of our Sustainability Office. We have already celebrated a successful Countdown to Green Day which engaged our community across 15 days of events centred around the UN Sustainable Development Goals. We are also establishing a new Sustainability Council that will act as an advisory committee to my office to meet priorities on sustainability. New Climate and Sustainability Strategy and Sustainability Policy documents are also being developed and will help serve as the foundation for driving our sustainability initiatives forward.

I am encouraged by our collective actions to lead a more sustainable future for UNBC and the communities we serve. We are uniquely positioned in our region to play a leading role in tackling pressing issues such as climate change. With our passionate students, faculty, and staff, I know we are ready to do just that.

## Declaration Statement

This PSO Climate Change Accountability Report for the period January 1, 2023 to December 31, 2023 summarizes our greenhouse gas (GHG) emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2023 to minimize our GHG emissions, and our plans to continue reducing emissions in 2024 and beyond.

By June 30, 2024, the University of Northern British Columbia's final 2023 Climate Change Accountability Report will be posted to our website at [www.unbc.ca](http://www.unbc.ca)

## Emission Reductions: Actions & Plans

### Stationary Sources

#### Actions Taken to Minimize Emissions

Stationary energy use in buildings is the most significant contributor of emissions at UNBC. In 2023, building energy use contributed to more than 92% of total emissions. As in previous years, UNBC continued to implement measures in 2023 to reduce emissions from stationary sources. One of the most impactful projects completed in 2023 was the third phase of Round 2 of the Continuous Optimization program. Undertaken in partnership with BC Hydro, the Continuous Optimization program involves investigating existing building systems to identify and implement opportunities for energy savings. The first round of the program took place between 2013 and 2017, tackling nine of the largest buildings at the Prince George campus. Eight of those nine buildings were then selected for a second round of the program. In this second round, the third set of buildings completed in 2023 included the Conference Centre, Library, and the Teaching and Learning buildings. A total of 27 existing measures were reconfirmed and 9 new measures implemented, including controls optimization, equipment scheduling, and new installations and upgrades. In total, from this third phase completed in 2023, it is expected that electricity savings will be approximately 635,000 kWh per year and fuel savings over 6,000 GJ per year, ultimately leading to an emissions reduction of approximately 52 tonnes of CO<sub>2</sub> per year.



Figure 1:  
**Upgraded Agora Heat Exchanger System**



Figure 2:  
**Maintenance Building Heat Pump**

Another continuing major effort in the pursuit of increasing energy efficiency and reducing emissions is the multi-year series of heat exchanger upgrade projects. In 2023, comprehensive upgrades were completed for three heat exchanger systems in the Agora building (Figure 1), following on from upgrades completed in previous years, including in the Power Plant, Charles J. McCaffray Hall, Teaching & Learning Centre, Dr. Donald Rix Northern Health Sciences Centre, and the Conference and Northern University Student Centre. The main intent of these projects is to replace aging inefficient heat exchanger systems with newer more efficient systems. This entails replacing large inefficient plate-and-frame heat exchangers with smaller more efficient brazed plate heat exchangers. Additionally, this often involves replacing multiple large inefficient fixed speed pumps with fewer and smaller variable speed drive pumps. The redesigns can also include decoupling systems so that they can be run independently, such that equipment can be shut down when not needed. These optimizations, large and small, ultimately improve the efficiency of each system that is upgraded, thereby resulting in reduced energy consumption.

UNBC has also installed a hybrid heat pump system to replace an aging propane furnace at the Maintenance Building (Figure 2). The new heat pump will be primarily used for heating during winter months, with the new high efficiency propane furnace only being used at very cold ambient temperatures. An added benefit of the new heat pump is that it will allow for the building to be cooled during the summer.

Another continued success in 2023 has been the improved availability of the Bioenergy Plant after major maintenance challenges in recent years. Since it began operating in 2011, the Bioenergy Plant at UNBC (Figure 3) has been the most important factor in reducing emissions, supplying up to 85% of the peak heating demand of the Prince George campus, which otherwise would be supplied by combustion of natural gas. Through both the Bioenergy Plant and the smaller pellet boiler that supplies heat to a number of small buildings through the winter, UNBC has been able to reduce its annual emissions by approximately 70% compared to the 2007 baseline level. Major maintenance issues, especially in 2019, had a detrimental effect on emissions reduction as the Bioenergy Plant had to be shut down for prolonged periods, resulting in increased use of the natural gas boilers. However, after significant efforts, including the replacement of the boiler, these maintenance issues have now been largely resolved. The Bioenergy Plant continues to operate optimally and in 2023, it was once again crucial in reducing emissions at UNBC.



**Figure 3:**  
**Bioenergy Plant**

### **Plans to Continue Reducing Emissions**

In 2024, we are planning to complete a second round of the aforementioned BC Hydro Continuous Optimization program for the Dr. Donald Rix Northern Health Sciences Centre. It is expected that this project will result in significant electricity and fuel savings, which should in turn result in a reduction of associated emissions.

Additional energy savings projects being planned in 2024 include significant LED lighting upgrades for the Northern Sport Centre basketball courts and the lab and teaching spaces in the Teaching Laboratory building. These will not only result in significant electricity savings, but will also have added benefits such as improving user comfort, lighting controls, and maintenance and reliability of the lighting systems.

As part of the ongoing initiative to upgrade our heat exchanger systems, multiple system upgrades are being planned, including for the Agora and Research Laboratory buildings. These upgrades will provide several energy efficiency improvements, thereby reducing energy usage and emissions. One of the positive byproducts of the upgrades is that the return temperature of the main district heating loop is anticipated to decrease, which should eventually allow for low temperature heat recovery.

UNBC continues to investigate various low carbon electrification opportunities to further displace the use of fossil fuels. This includes the potential conversion of domestic water heating from natural gas boilers to electrically powered heat pumps at the Northern Sport Centre (NSC). The NSC is not connected to the bioenergy district heating system and currently relies only on natural gas for its heating needs, thus providing a potential opportunity for low carbon electrification.

Continued planning and implementation of maintenance activities for the Bioenergy Plant will help to ensure its reliable operation, thereby limiting the use of natural gas for heating. Efforts in the last few years have been successful in significantly improving the operation of the plant after major maintenance issues, and this is intended to continue in the coming years.

Longer term plans to reduce emissions include investigating and implementing opportunities for heat recovery in the Bioenergy Plant and the primary district heating loop, which could have a significant effect on reducing energy consumption. The university is also working on projects to improve energy usage in the chilled water system, through

the potential use of a fluid cooler and variable speed drives on the chillers. Additionally, the Passive House standard that has been adopted for new buildings will also be investigated for application in retrofits of existing buildings, such that their energy demand and consequent emissions can also be minimized.

## Mobile Sources

### Actions Taken to Minimize Emissions

Mobile emissions in 2023 represented approximately 7% of total emissions. The overall UNBC fleet is comprised of 34 vehicles. Of those, there are only 6 non-research fleet vehicles, two of which are fully electric Nissan Leafs used by the Facilities department. One of these electric vehicles was procured in 2023 (Figure 4) to replace a previous gas powered utility vehicle. The electric vehicles are the main light-duty vehicles used by the Facilities department for travelling on the main campus and within Prince George. Research fleet vehicles are independently procured and maintained by their respective owner research groups and faculty.

There are three Siemens Level 2 charging stations installed at UNBC. The charging stations are freely accessible and users only have to pay for parking. They support the use of electric vehicles by the university and wider community of Prince George, while also providing a scenic charging destination for those driving through the city.



Figure 4:  
**UNBC Facilities Electric Vehicle**

### Plans to Continue Reducing Emissions

As fleet vehicles are replaced, UNBC will review alternative zero emissions options where feasible in order to further reduce fleet emissions, as was done successfully in the case of the Facilities Nissan Leaf vehicles. This will require collaboration between departments including the user groups and the Purchasing department, and may need to take the form of a zero emissions fleet procurement policy, setting out a standard process for fleet vehicle replacement that prioritizes zero emission vehicles. There are already opportunities being identified wherein zero emission vehicles may be a viable replacement for certain vehicles reaching end of life. However, it should be noted that the majority of fleet vehicles are research vehicles that tend to travel to remote locations and typically need to be able to store and tow heavy equipment, as well handle rough terrain. The improvement of charging infrastructure in remote areas and increased availability of affordable zero emission vehicles that can meet these requirements will be important in enabling a faster conversion to a zero emission fleet. In addition, with the increasing adoption of electric vehicles by the UNBC community and anticipated increase in electric fleet vehicles, further planning will need to be carried out on the long term strategy for charging electric vehicles on campus. The Facilities department is also looking into electric versions of maintenance equipment, such as utility vehicles, where feasible, to replace existing equipment that reaches end of life.

## Paper Consumption

### Actions Taken to Minimize Emissions

In 2023, paper emissions accounted for less than 1% of total emissions. At 9.6 tonnes of CO<sub>2</sub>, 2023 was the lowest year for paper emissions since reporting began in 2010. It was a 25% reduction from the previous year, and a 88% reduction from the high point of 79.8 tonnes in 2011. This is owing to a decrease in the overall use of paper and an increase in the amount of recycled and alternative fibre content in paper that is purchased, which continued in 2023. All of the paper procured by UNBC in 2023 was from alternative fibre sources. This was comprised of 2,400 units (1 unit =500 sheets) of Sugar Sheet paper which is sourced from waste fibre generated from sugar cane processing.

The continued transition from paper to digital processes at UNBC, such as the introduction of a digital leave form system, has contributed to reducing paper emissions. In addition, the increased use of virtual instead of in-person meetings has also reduced the usage of paper materials for meetings. Tools such as PaperCut for printing also provide a mechanism for all individual users to monitor their paper usage and limit unnecessary printing.

## Plans to Continue Reducing Emissions

UNBC will continue to prioritize the procurement of paper with recycled content and from alternative fibre sources, with the aim of reducing the overall emissions intensity of paper consumption. In addition to procurement practices, paper consumption will also continue to be reduced through the ongoing transition from paper-based to digital workflows; a number of such projects are already underway and continue to be implemented by the UNBC Information Technology Services department.





## 2023 GHG Emissions and Offsets Summary Table

### University of Northern British Columbia 2023 GHG Emissions and Offsets Summary

GHG Emissions for the Period January 1 - December 31, 2023	
Total BioCO <sub>2</sub>	6,466
Total Emissions (tCO <sub>2</sub> e)	8,105
Total Offsets (tCO <sub>2</sub> e)	1,639
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO <sub>2</sub> e)	0
Grand Total Offsets for the 2023 Reporting Year:	
Grand Total Offsets (tCO <sub>2</sub> e) to be Retired for 2023 Reporting Year	1,639
Offset Investment (\$)	\$40,975

## Retirement of Offsets

In accordance with the requirements of the Climate Change Accountability Act and Carbon Neutral Government Regulation, University of Northern British Columbia (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2023 calendar year, together with any adjustments reported for past calendar years (if applicable). The Organization hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy (the Ministry) 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.

## Climate Risk Management

The Facilities department continues to work on projects that were prioritized during a risk assessment process that included climate related risks, such as wildfires, disruptions to campus water supply, and potential situations that would require campus evacuation. Various actions were identified, including the replacement of critical underground domestic water valves (a multi-year initiative that is underway), and the ongoing work on wildfire risk mitigation in the forested areas of the Prince George campus. UNBC has also partnered with the City of Prince George on flooding risks related to Shane Lake dam and the Shane Creek watershed.

Forest management to mitigate wildfire risks is an ongoing and constant priority for the university, which has only been further emphasized in the wake of more frequent and severe wildfires in recent years. To prepare for wildfire smoke, the Facilities department has reviewed outdoor air flushing programming and capabilities. Additional spare air filters are also secured each fire season due to more frequent replacements being required.

Severe heat waves are another climate risk identified for UNBC. Start-up prep and maintenance of the chilled water system has taken on additional importance. Localized individual AC units have also received similar attention to ensure they are functioning well. Additionally, mechanical cooling is included in the specification for all new buildings, largely as a provision for current and future climate change impacts. The rising peak summer temperatures will also inform the investigation into the replacement or upgrade of the existing cooling towers, and any other central chilled water system upgrades. As has been observed in recent years, preparing for and reacting to increasingly severe climate events does incur additional costs, including in the form of increased utility costs (e.g. high electricity use for chillers during a heat wave) and increased maintenance costs (e.g. cost of additional spare filters due to wildfire smoke).

Recent years have also shown the value of having back-up systems. For example, when the Bioenergy Plant had unplanned prolonged shutdowns due to maintenance issues in 2019 and 2020, existing natural gas boilers were used to maintain heating on campus. Similarly, in the event of power outages, diesel generators automatically start up to power emergency circuits. For emergency situations in which most students and staff cannot go to the campus, COVID-19 has proven that the university is still able to function and deliver most of its core services remotely using communication technologies like video conferencing.

The two most recently constructed UNBC buildings have both been Passive House certified, and all future new buildings are expected to meet the same standard. This strategy will be beneficial for the university's resilience to a changing climate. Passive House buildings are more resilient to both higher and lower temperature extremes. They require less energy to operate and are slower to lose or gain heat in the case of a power outage. The Facilities Management Building, a Passive House certified building completed in 2021, is intended to act as an emergency control centre for the campus since it is the most resilient building. As a longer term measure, UNBC will also investigate adopting the same Passive House strategies in potential retrofits of other existing buildings.

## Other Sustainability Initiatives

There are a number of ongoing initiatives at UNBC that support sustainability, including the following:

- The renewed Sustainability Office is leading a number of key actions such as establishing a Sustainability Council to act as an advisory committee to the Office of the President to meet priorities on sustainability, and also developing policies on climate action and sustainability.
- UNBC has been part of BC Hydro's Energy Management program since 2010. Through this program, BC Hydro helps to fund the Energy Manager position as well as a variety of energy conservation projects and campaigns. This includes the Energy Wise Network program, through which UNBC organizes an energy conservation campaign every year for students, staff, and faculty.
- The Facilities department continues to provide tours to interested visitors of the Bioenergy Plant and pellet boiler, as well as more recently the new Passive House certified buildings. In addition, the Energy Manager or Facilities Director will provide guest lectures or collaborate with the academic departments for research or coursework.

- UNBC established a recycling program in 1992, which today includes an in-house recycling centre to collect and compact its recyclables, allowing for comprehensive collection of materials. UNBC also offers recycling receptacles for batteries as well as a drop-off bin for recyclable electronics. Additionally, during demolition on renovation projects, the Facilities team preserves as much reusable material like furniture, insulation, and lighting as possible so that it can be reused where needed in the future.
- UNBC maintains a Green Fund that provides seed grants for innovative research, education, and civic engagement projects that promote sustainability at UNBC. The program was started in 2009 through a levy on parking fees. It has funded over \$150,000 worth of projects.
- The Energy Conservation Revolving Loan Fund is maintained by the Energy Manager and provides funds to implement energy efficiency projects. Energy cost savings are used to repay the loan and fund future energy projects. The fund was created in 2012 when \$250,000 was made available for energy project funding. To date, projects worth a total of \$3 million have been funded.
- To promote cycling to campus, UNBC offers secure covered bike storage, six stand-alone high-security bike lockers, a bike repair station, shower facilities, and lockers for cyclists. In addition, all UNBC undergraduate and graduate students participate in the U-Pass transit program, which offers a discounted rate for unlimited access to public transit. For those commuting by car, UNBC also supports a carpooling program with a discounted parking permit.
- In partnership with the Feed BC program, UNBC Food Services supports local agriculture and food businesses through local food production, procurement, and active student engagement.
- As an additional sustainability benefit of the Bioenergy Plant, bio-ash resulting from the process is collected and used as a fertilizer at a local farm, through a permit from the BC Ministry of Environment and Climate Change Strategy, thereby diverting it from simply being landfilled.

## Success Stories

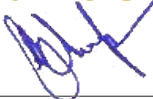
The recent revitalization of the Sustainability Office has already resulted in a number of successful actions and a renewed excitement around sustainability on campus. This includes the recent 15-day Leading a Sustainable Future: Countdown to Green Day 2024 series of 30 events that featured activities, presentations, and workshops related to the United Nations Sustainable Development Goals. A new UNBC Events Certification program based on a similar program at McGill University was also launched starting with the Green Day series of events which was certified platinum. In addition, a voluntary Sustainable Labs Working group has been established, and a new Sustainability Council will be established to advise the Office of the President on meeting sustainability priorities.

2023 has also been another successful year for bioenergy at UNBC. After various maintenance challenges in recent years that resulted in significant downtime, the Bioenergy Plant had another year of improved performance in 2023. This in turn resulted in a 70% reduction in GHG emissions when compared to the 2007 baseline. This is a reflection of the improvements made by UNBC's power engineering team over recent years, who operate and maintain the plant and district energy systems.



Figure 5:  
**UNBC Pellet Plant**

**Executive Sign-off**



\_\_\_\_\_  
Signature

Rahim Somani  
\_\_\_\_\_  
Name (please print)

\_\_\_\_\_  
May 31, 2024

\_\_\_\_\_  
Date

\_\_\_\_\_  
Vice-President, Finance and Administration

\_\_\_\_\_  
Title

If you have an idea of how UNBC can further reduce its GHG emissions or if you have a success story to share, please contact Energy Manager Sahil Dino at [sahil.dino@unbc.ca](mailto:sahil.dino@unbc.ca)

