

# 2023

## PSO Climate Change Accountability Report

UBC Okanagan



THE UNIVERSITY OF BRITISH COLUMBIA

Office of Sustainability

Okanagan Campus



# Acknowledgement

We begin by acknowledging that UBC's Okanagan campus is located on the unceded territory of the Syilx Okanagan peoples and that UBC's activities take place on Indigenous lands throughout British Columbia and beyond.

The Syilx Okanagan people have been here since time immemorial. In September 2005, the Okanagan Nation Alliance officially welcomed UBC to Okanagan territory in a ceremony, Knaqs npi'ismist, where UBC signed a Memorandum of Understanding with the Okanagan Nation Alliance. The university works with the Okanagan Nation in the pursuit of campus plans for UBC Okanagan in respectful acknowledgment of the Syilx Okanagan people's stewardship of their territory for thousands of years.



Photography: Darren Hull, Paul Joseph, Geoff Lister, Margo Yacheshyn



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# 2023 Emissions Overview

## GHG Emission and Offsets summary

GHG emissions for the period January 1 – December 31, 2023	
Total BioCO <sub>2</sub> e (tCO <sub>2</sub> e)	155
Total Emissions (tCO <sub>2</sub> e)	2,534
Total Offsets (tCO <sub>2</sub> e)	2,379
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO <sub>2</sub> e)	0
Grand Total Offsets for 2023 Reporting Year	
Grand Total Offsets (tCO <sub>2</sub> e) to be Retired for 2023 Reporting Year	2,379
Offset Investment (\$25 per tCO <sub>2</sub> e)	\$59,475

### Retirement of Offsets

In accordance with the requirements of the Climate Change Accountability Act and Carbon Neutral Government Regulation, UBC Okanagan (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.

## GHG Emissions

The following GHG emissions have been qualified using the BC Government's Clean Government Reporting Tool Reporting Framework.

**Table 1** provides a breakdown of GHG emissions by source on the Okanagan campus between 2022 and 2023. Of note, there was a 19 per cent reduction in total offsets from 2022 to 2023, which reduces UBCO's carbon offset liability by \$13,775 (excl. tax). The contributing factor of this reduction is a result of a 549 tCO<sub>2</sub>e decrease in building emissions reflecting milder weather in the Central Okanagan region in 2023, which lowered our heating demands and reduced natural gas consumption. Despite this, UBC Okanagan continued to develop and implement policies and plans to support ongoing emissions reductions into future years, which are detailed in the Actions Taken in 2023 to Minimize Emissions and Plans to Continue to Reducing Emissions in 2024 and Beyond sections of this report.

TABLE 1 GHG COMPARISON BY SOURCE BETWEEN 2022-2023

Source	2022 Emissions (tonnes CO <sub>2</sub> e)		2023 Emissions (tonnes CO <sub>2</sub> e)		Changes from 2022 to 2023	
Buildings	2,931	95%	2,382	94%	-19%	-549 tCO <sub>2</sub> e
Fleet	53	1.7%	52	2.1%	-2%	-1 tCO <sub>2</sub> e
Paper	14	0.5%	13	0.5%	-7%	-1 tCO <sub>2</sub> e
Fugitive Emissions	87	2.8%	87	3.4%	0%	0 tCO <sub>2</sub> e
<b>Total Emissions *</b>	<b>3,085</b>	<b>100%</b>	<b>2,534</b>	<b>100%</b>	<b>-18%</b>	<b>-551 tCO<sub>2</sub>e</b>
<b>Total Offsets</b>	<b>2,930</b>	<b>100%</b>	<b>2,379</b>	<b>100%</b>	<b>-19%</b>	<b>-551 tCO<sub>2</sub>e</b>

\* Totals may not sum due to rounding

### Carbon Neutral Offsets in 2023

In accordance with the Clean Government Reporting Tool, and as required by the Climate Change Accountability Act (CCAA), offsets required to achieve carbon neutrality in 2023 total 2,379 tCO<sub>2</sub>e. As part of the UBCO's 2023 GHG emissions profile, 155 tCO<sub>2</sub>e do not require offsets.

# Emission Reduction Activities

## Actions Taken in 2023 to Minimize Emissions

The following provides an overview and plans reported in the CCAR Actions Form, Part 1.

### A. Stationary Sources (e.g. buildings, power generation)

The primary source of in-scope GHG emissions on campus comes from buildings. In 2023, UBC Okanagan achieved a reduction in building emissions of 19 per cent decrease or 549 metric tons of carbon dioxide equivalent (tCO<sub>2</sub>e). This reduction can be attributed to the milder weather experienced in the Central Okanagan region over the last year. With average temperatures of 10.8°C in 2023 compared to the previous year's 8.8°C, the warmer climate led to a decrease in heating demand, resulting in a reduction of natural gas consumption by 11,200 gigajoules compared to 2022. While nature primarily drove these reductions, it also highlights the campus' ability to adjust its building and energy systems to effectively respond to changing weather conditions, resulting in lower energy usage and emissions. Despite this, UBCO remains committed to long-term efforts to improve building energy efficiency and reduce GHG emissions as outlined in the following section detailing energy and carbon reduction plans and activities.

### Climate Leadership Planning and Policy Implementation

Throughout 2023, UBCO remained dedicated to developing and putting into action crucial energy and carbon reduction policies that support and align with the CleanBC mandate and UBC's Climate Emergency Declaration.

The implementation of **UBCO's CAP 2030** has been instrumental in advancing the campus towards achieving its 2030 targets—aiming for a 65 per cent reduction in operational emissions and 45 per cent reduction in extended emissions—and longer-term goal of achieving a net-positive campus performance in operational energy and carbon by 2050, established by the UBCO Whole Systems Infrastructure Plan (2016).

In 2023, efforts continued toward the development of the **UBCO Green Building Standards**, aimed at better aligning existing green building policies with the UBCO CAP 2030. Once completed, these standards, serving as a companion document to the UBCO Campus Design Guidelines, will ensure that the design and construction of new buildings, as well as renovations and retrofits, meet the performance levels required to fulfill the targets of the UBCO CAP 2030 and net-positive 2050 goal.

The campus also maintained its collaboration with UBC Vancouver in developing an embodied carbon policy aiming to

establish a clear pathway for meeting the **embodied carbon reduction** target outlined in UBCO and UBCV's CAP 2030.

Projects completed in 2023 to contribute to this initiative include:

- **UBC's Whole Building Lifecycle Assessment Guidelines V1.1**, which defines methodologies for evaluating embodied carbon reductions for a building's structure, envelope and interior finishes;
- Update to **UBC's Technical Guidelines** to include recommendations for low carbon concrete; and,
- The **10 per cent embodied carbon reduction target pilot project** within UBCO's ʔəl sic snpaʔnwixʔtn, currently under construction.

Lastly, UBC Okanagan and UBC Vancouver began the **UBC Resilient Buildings Project**. This project aims to align UBC's existing policy with CleanBC's Climate Resilience Framework and Standards to future-proof UBC buildings in light of climate change while simultaneously reducing GHG emissions.

### Energy and Emission Reduction Initiatives

The **SEMP** underwent an update in 2023 with a focus on achieving UBCO's carbon reduction goals, simplifying building operations, maximizing resilience and providing a foundation for the integration of waste heat, renewable energy and other low carbon energy sources in the future. Implementation of the SEMP is integral to accelerating decarbonization of the campus' core operations to achieve the UBCO CAP 2030 energy and emissions reduction goals and long-term 2050 net-positive goal. To advance these the following priority projects were identified:

- **Implementing energy demand reductions** at the building level—both existing buildings (through retrofits) and new buildings;
- **Decarbonization** of the centralized district energy system; and,
- **Enabling infrastructure** to connect existing and new buildings to district energy—ʔəl sic snpaʔnwixʔtn Cluster Plant and the necessary piping.

In addition to completing the SEMP update, projects completed in the last year that are anticipated to support ongoing energy and emission reductions include:

- Working with Vitalis Extraction Technology to advance the next phase of the **CO<sub>2</sub> Air Source Heat Pump (ASHP)**<sup>1</sup>

<sup>1</sup>CO<sub>2</sub> Air Source Heat Pumps are heating and cooling systems that use carbon dioxide (CO<sub>2</sub>) as a refrigerant instead of traditional refrigerants such as hydrofluorocarbons (HFCs) or chlorofluorocarbons (CFCs).

project that integrates ASHPs into the campus' district energy system through the Geothermal building. Upon completion, this innovative project will address environmental concerns by removing the need to use traditional refrigerants for cooling, provide significant improvements in efficiency (from 72 per cent to 174 per cent) and operational flexibility to campus buildings, and is expected to reduce the campus' GHG emissions by over 700 tCO<sub>2</sub>e annually;

- Installing the **AQGARD™ indoor air quality (IAQ)** demand-controlled ventilation system in the Science building, which is expected to achieve annual energy savings of 124,000 kWh and 1,100 GJ, reducing emissions by 56 tCO<sub>2</sub>e;
- Completing a **reset of the supply air temperature** for a trio of the campus' legacy buildings to respond to cooling demands. This modification is expected to ensure that the supply air temperature reset is aligned with the cooling requirements, preventing unnecessary reduction of the air handler setpoint during night setback scenarios;
- Implementing a **controls recommissioning project** to identify energy inefficiencies in the Upper Campus Health building. Interventions implemented aim to optimize energy efficiency, rectify temperature control deficiencies and eliminate the occurrence of simultaneous heating and cooling;
- Reviewing the completed high-level concept design for an **Upper Innovation Precinct Cluster Plant Study**, which was carried out to explore thermal system configurations to meet the demands of two existing and two future residence buildings; and,
- Completing the **development of a CO<sub>2</sub> monitoring** tool that was designed to monitor air quality across the campus. This monitoring tool's development was implemented in response to the COVID-19 pandemic, which required UBCO to increase ventilation rates in buildings across campus while maintaining comfortable indoor air temperature and humidity.

In the last year, the campus also undertook a number of studies that were completed in the last year with an aim to improve efficiencies and support emission reductions. These include:

- Completing the **Thermal Energy Storage Study**;
- Completing the **occupancy-based demand-controlled ventilation studies** on the Arts & Sciences Centre and Charles E. Fipke Centre for Innovative Research. The implementation of recommended projects is expected to save 541,344 kWh and 2,677 GJ of energy and reduce emissions by 140 tCO<sub>2</sub>e annually;
- Completing the **Heat Recovery Study** on the Science building, which was conducted to review if the campus can recover heat from a rooftop laboratory exhaust via glycol runaround heat recovery system;
- Completing the **District Energy Plant Efficiency Study**

that recommended a sequence of operation update, which is expected to provide 300 tonnes of additional cooling capacity. A similar exercise carried out to review the District Energy System during the heating season demonstrated a 7.5 per cent efficiency gain or approximately 750 GJ natural gas savings, reducing emissions by 37 tCO<sub>2</sub>e annually; and,

- Completing a study to analyze the current campus-wide high-voltage electrical distribution systems. The resulting **High-Voltage Master Electric Plan** was elevated to UBCO's senior leadership for review and project approval for the coming year.

Additionally, UBCO continued to supplement a portion of natural gas used by the Central Heating Plant—which provides heating to the campus' legacy buildings—with renewable natural gas. The use of **renewable natural gas** reduced the campus' 2023 emissions profile by 153 tCO<sub>2</sub>e. As it is considered carbon neutral, no offsets are required.

Finally, the campus began employing the use of **SkySpark**, an advanced analytics software platform that enables intelligent monitoring and analysis of building systems and energy data. The utilization of SkySpark is anticipated to enhance energy efficiency, identify optimization opportunities and support UBCO's overall building performance.

## New Buildings

Construction of major capital projects progressed in 2023.

**UBCO Downtown** is targeted to achieve LEED® Gold Certification and Step 3 of the BC Energy Step Code. Among the project's sustainable design features is a solar wall to supply energy for preheating outdoor air. Targeting completion in 2026, this mixed-use facility aims to serve future regional needs while expanding UBC's presence in Kelowna. It will offer much-needed academic, research and residential space to UBCO while providing collaborative meeting and social amenities to the wider community.

**UBCO's xəl sic snpaʔnwiw™tn** building is targeting LEED® Gold certification and provides an excellent example of passive design principles to reduce operational energy and carbon loads for this energy-intense building type. It includes the longest earth tube system in Canada and one of the longest in the world, enabling the transfer of ground source energy to heat or cool ventilation air. Complementary strategies contributing to energy performance include connection to the campus' low carbon district energy system, a high-performance envelope, active heat recovery with heat recovery chiller, efficient lighting design and extensive occupancy and daylight controls. Lab ventilation will be managed with Aircurity controls, and a wind dispersion study has been conducted to enable efficient lab exhaust fan energy control. The building is projected to consume 63 per cent less energy and emit 92 per cent fewer emissions than a LEED® baseline facility.

UBC Okanagan also completed design of the new **Child Care Facility** in 2023. Upon completion in August 2024, it will provide



a 66 per cent increase to the existing child care capacity by adding 37 new spaces and will be co-located next to the existing Daycare. Sustainable features integrated into the final design include the incorporation of wood, a low-carbon material, throughout its structure and installation of electrical heat pumps to provide heating and cooling.

In addition to the capital projects under construction, the campus also completed two building projects in the last year that align with UBCO's green building and sustainability policies and guidelines. The **Office Modular 2**, which provides additional office space to campus departments, was fitted with a high-efficiency electrical system and a low-temperature heat pump system. The **Quonset Equipment Shed**, which provides Facilities Management with an enclosed workspace to complete projects—including on-site vehicle and equipment maintenance, reducing off-campus trips—was designed as a fully electric facility that utilizes no fossil fuels for energy or heating.

Finally, the **UBCO Commons library expansion received LEED® Gold Certification**. Completed in 2018, the building has been providing students with an additional 6,596 m<sup>2</sup> of study, learning and collaborative space while using no natural gas for environmental comfort. Its HVAC system was integrated into the campus' low temperature district energy system, which is used to heat and cool the building, reducing the campus' reliance on traditional fuel sources.

## Existing Buildings

Projects implemented within existing campus buildings as recommended by the SEMP to reduce energy demand and associated emissions in the last year included:

- Completing an **LED lighting upgrade for the Plant Growth Facility** that is projected to reduce energy consumption by 169,000 kWh and two tCO<sub>2</sub>e per year;
- Implementing the recommendations from the **Engineering Management and Education building's recommissioning study**. The projects will address identified deficiencies in the operation of the building that are wasting energy, increasing equipment wear and tear, or decreasing occupant comfort; and,
- **Initiating the night flush program**. Night flushing, or night ventilation, is a passive cooling technique that utilizes the outdoor diurnal temperature swing and the building's thermal mass to pre-cool a building through increased outdoor airflow at night. This allows radiant cooling to take place during the day when the building is occupied.

## Student Resident Buildings

Two energy reduction projects were completed in the campus' student residence buildings in 2023. An LED light switch-out project conducted in Valhalla Residence reported that 175 32-watt fixtures were replaced with 10-watt fixtures and



Rendering of Xal sic snpañwix\*tn courtesy of HCMA and Kieran Timberlake.



175 42-watt fixtures were replaced with 15-watt fixtures. In the Nicola Residence, three legacy hot water tanks were replaced with two more efficient systems, reducing the British thermal units and associated energy and emissions.

## IT Infrastructure Actions

A number of IT projects designed to streamline efficiencies and reduce energy consumption were completed in 2023 and include:

- Continuing to replace desktop computers with laptops that are newer and more efficient and phasing out desktop towers with docking stations to reduce power consumption;
- Upgrading faculty and staff devices from spinning hard drives to solid state drives to reduce waste, power consumption and replacement costs;
- Replacing older power distribution units with newer and more efficient models across campus; and,
- Decommissioning several racks of legacy storage systems which drew significantly more power than modern systems.

Key departments also continued to undertake the development of lifecycle plans for all IT-related infrastructure. These plans ensure equipment is maintained to perform optimally and hardware is replaced with improved technologies that support reduced power consumption according to industry best practices, which includes continuing to include power considerations in all purchasing decisions for new IT equipment and infrastructure. This ensures the equipment draws less power and that less cooling is required to control the ambient temperature of the places that house the infrastructure.

## B. Mobile Sources (e.g. Fleet vehicles, off-road/portable equipment)

In 2023, fleet vehicles accounted for 52 tCO<sub>2</sub>e, or two per cent of the campus' total emissions. This is a two per cent or one tCO<sub>2</sub>e reduction over 2022.

Actions taken in the last year to support long-term fleet-related emission reductions include:

- Continuing to reduce the campus' reliance on fleet vehicles by consolidating off-campus trips, decreasing the number of trips and encouraging fleet carpooling, walking or cycling;
- Ongoing stewardship of sustainable mobile-fuel combustion by adhering to sustainable fleet procedures, replacing retired fleet vehicles with electric and energy-efficient models as well as ongoing training and education to support sustainable fleet use; and,
- Continuing to monitor the impact of remote work/learn on campus fleet vehicle emissions.

## C. Paper Consumption

Paper-related emissions accounted for 0.5 per cent of total campus emissions, or 13 tCO<sub>2</sub>e. Although activities on campus have returned to pre-pandemic status, the amount of paper purchases has remained low, reduced by seven per cent or one tCO<sub>2</sub>e in emissions over the last year. Ongoing paper reduction activities implemented this year include:

- Continuing to promote the purchase of 30 per cent or greater post-consumer recycled content paper on the campus' procurement website;
- Ongoing use of digital screens and related communications platforms to share news, activities and events to reduce the reliance on paper-based promotional materials; and,
- Continuing to use the Find-Me printing option through the PaperCut™ print-tracking software on all campus printers. The software delivers reports to clients on print volumes; generates consumption awareness; promotes printing alternatives; and allows users to print from any device on campus—users must release their job within four hours of submission by tapping their campus ID card.
  - In 2023, 420,000 pages were submitted to be printed, but not released within the allotted time. This was a 115 per cent increase over 2022 that reduced GHG emissions by 1,156 kgCO<sub>2</sub>e and saved 3.19 trees.

## D. Fugitive Emissions

Hydrofluorocarbon (HFC) emissions accounted for three per cent of total campus emissions, or 87 tCO<sub>2</sub>e, in 2023. The ongoing maintenance of older and inefficient refrigerant equipment is the contributing factor to achieving a zero per cent change from the previous year. Additional measures implemented in 2023 include:

- Continuing to centralize cooling loads and install centralized chillers for climate control in our newly constructed and existing facilities, which reduces the amount of equipment requiring refrigerant on campus. In the instance of residences, this measure integrates centralized chillers into the building's HVAC system, in place of installing individual Packaged terminal air conditioners units, which reduces a facility's reliance on traditional fossil fuels and refrigerants;
- Conducting research to identify alternative refrigerants for those being phased out (i.e., R410a and R134a); and,
- Continuing to replace inefficient and older equipment, while performing preventative maintenance and upgrades to existing HVAC systems and associated appliances.



# Plans to Continue Reducing Emissions in 2024 and Beyond

This section describes planned actions across buildings, fleet, fugitive emissions, and procurement in the coming years.

## A. Stationary Sources (e.g., buildings, power generation)

### Climate Leadership Planning and Policy Implementation

In the coming year, UBCO will continue to focus on implementing the UBCO CAP 2030 to reduce operational and extended GHG emissions to meet the 2030 targets and long-term net-positive campus performance. A number of actions initiated in 2023 will be advanced in 2024, and new phases of plan implementation will begin.

Actions initiated and described in earlier sections of this report that will be advanced in 2024 include:

- Finalizing the **UBCO Green Building Standards**;
- Continuing to work with UBC Vancouver to advance an **embodied carbon policy**; and,
- Completing the UBC Resilient Buildings Project and implementing actions that are expected to include updating the **UBC Climate Ready Building Requirements** for new construction at both campuses.

### Energy and Emission Reduction Initiatives

UBCO will continue to implement subsequent phases of the **SEMP** with a focus on energy demand reductions, decarbonization of the campus district energy system and infrastructure upgrades to connect existing and new buildings to district energy. Pending funding approval, projects include:

- Installing **CO<sub>2</sub> ASHP** through the Geo-Exchange upgrade project that supports the decarbonization of the campus' district energy system; and,
- Extending **UBCO's ǰəl sic snpaǰnwix<sup>w</sup>tn's four-pipe infrastructure study**, which will serve heating and cooling demands of surrounding buildings from the future ǰəl sic snpaǰnwix<sup>w</sup>tn cluster plant, to investigate alternative, more cost-effective piping systems.

Upon final review and approved funding, the campus will commence implementation of the **Campus-Wide Voltage Master Electric Plan**.

Key departments will also continue to implement **SkySpark** to support ongoing data collection to enhance building energy efficiency monitoring, identify optimization opportunities and improve overall performance across campus buildings.

Additionally, UBCO will continue working to advance and update the **Infrastructure HVAC Asset Management database**, which has the potential to link major on-campus capital retrofit projects in the near future. This involves consolidating campus-wide direct

digital controls (i.e., building automation systems), physical meters and manual metering points to one location, as well as further developing a meter tree.

### New Building Projects

UBCO will continue the construction of its two major projects, both incorporating sustainability features as detailed in the initial section of this report.

Anticipated to achieve completion in 2026, **UBCO Downtown** is a 38,581m<sup>2</sup> mixed-use facility that will provide academic, research and residential space to the campus while also enhancing community engagement and collaboration opportunities through the provision of a public atrium space, an art gallery and a public engagement suite. UBC Okanagan will also explore opportunities to maximize the use of academic and non-academic spaces, with an eye to professional, adult learning programs that foster global citizenship and advance a sustainable and just society.

Expected to achieve completion in 2025, **ǰəl sic snpaǰnwix<sup>w</sup>tn** was designed with a focus on collaboration, interdisciplinarity and Indigeneity. The 13,185 m<sup>2</sup> space will provide the campus community with state-of-the-art learning and research facilities. The **Interior Salish Studies** and the **Bachelor of Nsyilxcn Language Fluency programs** will be offered in dedicated spaces within ǰəl sic snpaǰnwix<sup>w</sup>tn and at the future Outdoor Gathering Space, currently in development.

The **Outdoor Gathering Space** advances Indigenous teaching and research on campus through the support of land-based learning and teaching, and nature interpretation in the Nsyilxcn language. The space will be located adjacent to ǰəl sic snpaǰnwix<sup>w</sup>tn, which will house the Interior Salish Studies and the Bachelor of Nsyilxcn Language Fluency programs.

The new **Child Care Facility**, co-located next to the existing Daycare, is presently under construction and targeting a fall 2024 completion. The new facility will provide 37 new childcare spaces to the current 57, a 66 per cent increase, and will offer unique learning and training opportunities for UBC medical, nursing and psychology students.

### Building Recommissioning

UBCO will undertake recommissioning studies and projects in existing buildings in the upcoming year, these include:

- Implementing the recommended measures identified in the Engineering, Management and Education building's recommissioning study. Projects initiated will address deficiencies identified in the operation of the building that were wasting energy, increasing equipment wear and tear, or decreasing occupant comfort; and,



- Within the Science building, implementing the recommendations of the Heat Recovery Study conducted to review the possible recovery of heat from the existing rooftop laboratory exhaust via a glycol runaround heat recovery system.

### Student Residence Buildings

In the coming year, the LED light switch-out program will continue to be implemented on a failure-based need and a review to replace the Similkameen Residence common space duct cooling equipment will be undertaken.

### IT Infrastructure Actions

UBCO will continue to implement projects that support energy reduction, including:

- Replacing desktop computers with laptops and more efficient devices as part of UBCO's IT Computer Replacement Program;
- Phasing out desktop towers with docking stations to reduce power consumption;
- Applying a phase-in approach to replace step-down transformer uninterruptible power supply units with power sharing, splice devices; and,
- Installing new storage racks which require considerably less power than the older systems in place before.

## B. Mobile Sources (e.g., fleet vehicles, off-road/portable equipment)

UBCO will continue to implement projects that support emissions reductions from mobile sources in the coming years, which include:

- The purchase of a new hybrid vehicle by a campus operations department;
- Studying the potential of converting electric golf cart batteries to a more recyclable lithium-ion option;
- Continuing to reduce reliance on fleet vehicles by consolidating off-campus trips, and decreasing the number of trips taken by encouraging fleet carpooling, walking or cycling; and,
- Continuing to encourage sustainable mobile-fuel combustion by adhering to internal sustainable fleet procedures, replacing retired fleet vehicles with electric and energy-efficient models, and ongoing staff training and education to support sustainable fleet use.

## C. Paper Consumption

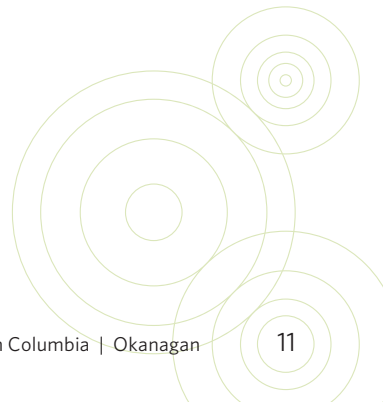
UBCO will continue to implement projects that support emissions reductions from paper consumption in the coming years, which include:

- Continuing to display messaging prompts through the PaperCut™ print-tracking software to increase user awareness about reducing paper consumption behaviours to align with implementation of printing charge increases;
- Continuing to promote the purchase of 30 per cent or greater post-consumer recycled content paper, as well as alternative, tree-free options, including Sugar Sheet™;
- Continuing to increase the use of digital signs and related communications platforms within buildings to share news, activities and events to reduce the reliance on paper-based promotional materials; and,
- Ongoing investment in improved and more sustainable technologies, which provide better performance with a reduced environmental impact.

## D. Fugitive Emissions

UBCO will continue to implement projects to support emissions reductions from the utilization of HFC sources in the coming years, these include:

- Continuing to research and identify alternative refrigerants for those being phased out (i.e., R410a and R134a);
- Continuing to centralize cooling loads from buildings to reduce the amount of equipment requiring refrigerant on campus, where possible;
- Implementing the use of district-scale CO<sub>2</sub> heat pumps to replace HVAC equipment, which relies on traditional fossil fuels and refrigerants to heat and cool campus buildings;
- Ongoing replacement of inefficient and older equipment;
- Conducting preventative maintenance and upgrades to HVAC systems and associated appliances; and,
- Replacing individual packaged terminal air conditioner units in residences, on an as-needed basis.





# Campus Emission Trends

## Comparing Emissions to Growth

**Figure 1** illustrates growth trends and cumulative GHG emissions from campus and building operations from 2007 to 2023.

Despite substantial increases in both floor area and student enrolment, rising by over 141 and 159 per cent respectively since 2007, the year-to-year changes in total GHG emissions have remained relatively stable.

In 2023, UBCO reported an 18 per cent year-over-year reduction in absolute emissions. This decrease is attributed to milder weather conditions experienced in the Central Okanagan region in the last year, which led to lower heating requirements on campus and subsequently reduced natural gas consumption. To provide context, the average temperatures between 2022 and 2023 increased by 28 per cent, rising from an average of 8.8°C

to 10.8°C respectively. Despite this warming trend, the campus continued to implement programs aimed at improving energy efficiency and reducing emissions. These efforts are aligned with UBCO's ongoing commitment to achieve its operational emission reduction target by 2030, as well as its longer-term goal of achieving net-positive campus performance by 2050.

Another method to assess campus GHG emission performance, which considers changes in growth, is intensity-based analysis. For instance, Figure 2 illustrates the trend of emissions intensity relative to the growth in campus floor area from 2007 to 2023. Despite substantial growth in floor area, GHG emissions per building gross square metre ( $m_2$ ) decreased from 0.030 in 2007 to 0.015 in 2023, marking a reduction of 52 per cent.



Figure 1 Total GHG Emissions Relative to Growth: 2007-2023

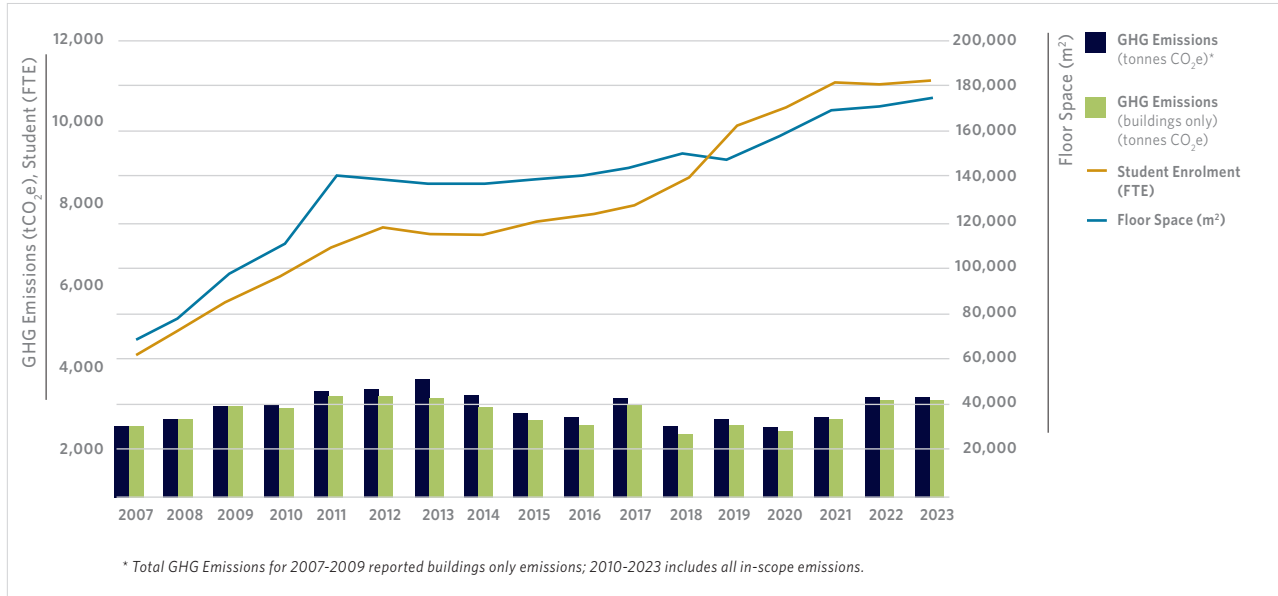
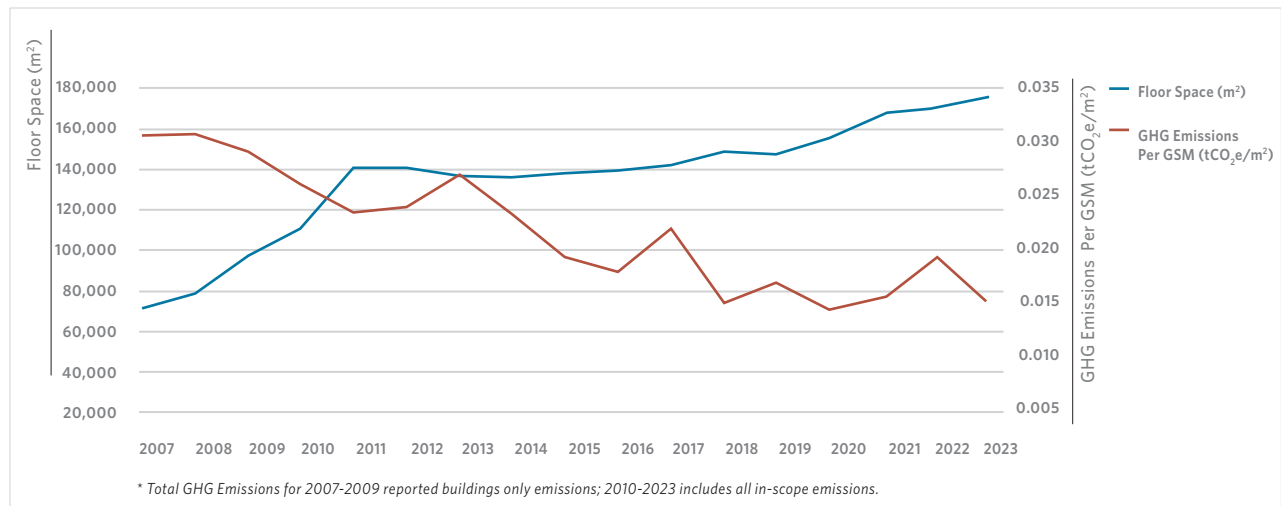


Figure 2 GHG Emissions Intensity Relative to Building GSM: 2007-2023





# Public Sector Climate Leadership

## Climate Risk Management

Driven by local conditions, recent climate events and rapid regulatory changes, UBC Okanagan is identifying and managing risks from climate change in its campus operations and climate adaptation, resilience and biodiversity plans.

A recent initiative to address the campus' vulnerability to risks is the **Multi-hazards Risk Assessment** completed in 2022. The assessment identifies and evaluates potential risks to the campus infrastructure systems. The project produced a risk assessment framework memo and risk register. These documents will provide the basis for a forthcoming **Infrastructure Resilience Plan**. This plan will identify high-impact, proactive mitigation measures aimed at reducing service disruptions and safeguarding UBCO's teaching and research mission. As part of this planning process, shovel-ready projects will be identified for implementation.

In 2023, the campus began the **UBC Climate Resilient Buildings Project**. The project was launched in response to CleanBC's Climate Resilience Framework and Standards for Public Sector Organizations. This initiative is designed to enhance climate resilience and reduce GHG emissions in building projects across UBC. In addition, over the coming year, UBCO will begin scoping an **update to the 2006 Wildland Fire Management Plan** to inform best practices to safeguard the campus lands, buildings and infrastructure. Immediate actions to protect the campus from wildfire smoke include the installation of smoke and air quality monitoring sensors both in and outside the Arts and Library buildings that offer automated sequencing for wildfire smoke events; and, the integration of the AQGard™ demand control ventilation system in the Science building's labs, which supports ongoing air quality requirements while reducing energy and associated emissions.

The ongoing implementation of **UBCO's Integrated Rainwater Management Plan (IRMP)** developed in 2017 protects the campus from flood risks and incorporates future climate modelling for rainwater up to 2070. The IRMP supports resiliency through best practices in green infrastructure and low-impact development while supporting the natural hydrological cycle and achieving important co-benefits to the campus ecology and biodiversity. Examples of projects implemented to meet the IRMP goals include the integration of rain gardens adjacent to the **Commons Building** and **Nechako Residence and Commons Block**.

The campus is also focusing efforts on the **protection of campus ecology in land use planning**. Protection of the campus' natural assets such as trees and vegetation provide shading to offset the heat island effect and supports carbon sequestration. Priority areas for protection include **campus wetlands and the surrounding transitional ecosystems**, the intact **coniferous woodland** north of campus core and the **stormwater pond and surrounding trees**, many of which support wildlife.

The campus also applies **UBC's Climate Ready Requirements for Buildings** in new building projects to inform key design strategies that will reduce risk and life cycle costs of campus buildings due to climate change in our region. For example, in order for buildings to be able to withstand extreme heat events, the Pacific Climate Impacts Consortium future weather files are referenced during project design to ensure thermal comfort up to 2050.

*See below for an example of Climate Adaptation and Mitigation in action.*

**ᖃᖅ sic snpaᖅnwix<sup>w</sup>tn** is designed to be **climate resilient** through measures to mitigate and adapt to climate change.

Incorporation of an **earth tube system** and connection to UBCO's **low carbon district energy system** are two features that will enable the project to use **63 per cent less energy and produce 92 per cent fewer carbon emissions than a LEED® baseline building**. The project also **targets to achieve a 10 per cent embodied carbon reduction**.

The project will be **adaptive to future climate changes** by adhering to key recommendations in the **Campus Ecological Update Report and Integrated Rainwater Management Plan**. **Indigenous gardens** will be incorporated in the project along with the **retention of native Ponderosa Pine trees**.







# Climate Policy Implementation

## Actions to Reduce CAP 2030 Extended Emissions

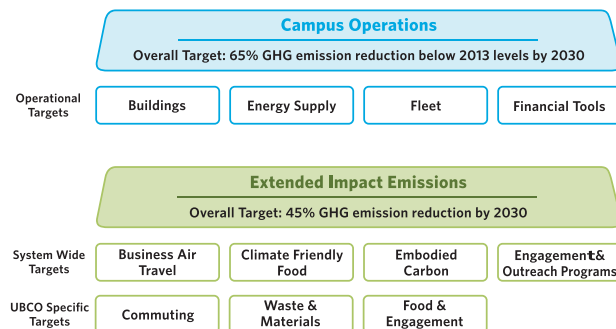
Following the UBC Board of Governors' endorsement of UBCO's initial CAP 2030 in 2021, key unit leaders and stakeholders have actively pursued actions to meet the plan's targets for accelerating GHG emission reductions from both campus operations and extended (indirect) sources. Actions pertaining to Scope 1 and 2 emissions, which encompass campus operations, were outlined in previous sections of the 2023 CCAR. Subsequent sections detail measures aimed at reducing Scope 3 emissions associated with commuting, waste management, materials usage and food systems by 45 per cent by 2030 compared to the baseline. Additionally, this section outlines forthcoming projects intended to enhance the campus' climate resilience and mitigate future risks.

- Continuing the **Bike Share e-bike/scooter program** that provides active commuting alternatives to community members. The program reported that approximately 75,000 trips were taken to and from UBCO's campus in 2023.

Actions completed in 2023 to advance the UBCO CAP 2030 waste and materials GHG reduction target include:

- Introducing three recycling programs to laboratories and selected departments that **divert hard-to-recycle plastics from the landfill**;
- Launching a **reusable mug discount program** at all retail locations to reduce the use of single-use coffee cups;
- Continuing to advance zero food and material waste actions in Pritchard Dining Hall; and,
- Ongoing diversion of campus food waste to the Spa Hills Compost facility which offsets carbon emissions by removing the material from the waste stream. In 2023, over 147,690 kgs of compostable material was diverted from the landfill.

### UBCO CLIMATE ACTION PLAN 2030 TARGETS



Key actions for reducing commuting emissions, as outlined in the UBCO CAP 2030 and implemented through the **UBCO Transportation Plan** (2021) that aim to advance the achievement of emission reduction targets include:

- Establishing a Sustainable Transportation Levy on parking fees that will support the creation of a new **Sustainable Transportation Office** dedicated to delivering on the actions of CAP 2030 and the Transportation Plan;
- Ongoing implementation of the **faculty and staff ProPass** that provides a 50 per cent subsidized monthly pass to transit commuters—an average of 198 UBCO community members utilized the program each term in the last year; and,

Actions implemented that focused on UBCO food systems include:

- Providing plant-based options in over 55 per cent of Pritchard Dining Hall's menu items and extending these options to additional UBCO Food Services retail locations;
- Increasing the food purchasing volumes from local farms and suppliers by 50 per cent;
- Supporting the draft of UBC Climate-Friendly Food System Procurement Guidelines;
- Securing a third round of funding through FeedBC to drive local procurement and community engagement initiatives; and,
- Hosting "farmer spotlight" food tasting events that featured local produce prepared in a variety of ways, Q&A with the farmer and local procurement information sharing.

Additionally, the Students' Union Okanagan introduced the **\$5 Smart Meals program** that offers affordable, healthy and plant-forward meals to the campus community.

# Collective Community Engagement Activities

Over the past year, UBC Okanagan has actively pursued campus-wide community engagement initiatives aimed at reducing energy consumption and emissions stemming from commuting, food and waste.

UBCO hosted its **second Teach-In on Climate and Justice** in conjunction with the Worldwide Teach-In. The educational forum was organized by the faculty-led **UBCO Climate Action Plan Implementation Engagement Working Group (CAP-E)**. The event was attended by 84 students, faculty and staff who shared ideas and inspiration for researching climate solutions and engaging in community climate action. The event featured two main sessions. The first one consisted of concurrent panels of UBC Okanagan faculty members and graduate students from a variety of disciplines across campus who gave short five-minute presentations on how they are tackling interconnected climate and justice issues and solutions. In the second session, a group panel of UBC Okanagan students and staff facilitated Open Space discussions which provided participants a space to share views for achieving ambitious climate action both in reducing emissions as well as increasing resilience on campus. Conversations centred around climate advocacy and community care support as well as updates regarding the progress of UBCO CAP 2030, particularly emphasizing efforts to reduce emissions from commuting, food systems and waste.

More information can be found at [sustain.ok.ubc.ca/teach-in](https://sustain.ok.ubc.ca/teach-in).

## Extended Emissions (Scope 3) Reduction Activities

After the effective launch of UBCO's Lab Plastics Recycling program in 2010, which diverted over eight waste receptacles of laboratory plastics and packaging materials from landfills for more than a decade, attention shifted to tackling hard-to-recycle plastics.

In the past year, specific UBCO laboratories and key departments were enlisted to pilot three distinct diversion programs.

- **Pipette Tip Box Recycling**—a program that turns the material into new products, including park benches;
- **Pipette Tip and Tube Recycling**—a closed-loop program that turns the collected material back into new tips, tubes and tip boxes for sale back to labs; and,
- **Personal Protective Equipment Recycling**—a program that collects masks, gloves and other personal protective equipment, to be utilized within construction material, concrete reinforcement and textiles.

Each pilot successfully met compliance standards, facilitating the campus-wide implementation of these diversion programs across additional laboratories and operational departments.

Results from 2023 reported that 10 labs and two operational departments successfully diverted over 303 kg of non-hazardous plastics from the landfill, reducing related emissions by an estimated 189.5 kgCO<sub>2</sub>e. This is equivalent to GHG emissions produced when driving a gasoline-powered vehicle over 782 kms or a round-trip from UBC Okanagan to UBC Vancouver.

## Direct Emission (Scope 1 & 2) Reduction Activities

In 2023, UBCO continued to engage the campus community through a variety of awareness campaigns and educational programs that support energy conservation and emissions reductions.

Through the **Power of You**, UBCO's flagship engagement program, the campus continued its implementation of the **Cozy and Closed** and **Cool and Closed** awareness initiatives, aimed at promoting responsible window-closing habits. Concentrating on fostering this behaviour within core campus buildings yielded an 18 per cent decrease in reports of open windows. Among the targeted buildings, the most significant improvement was observed in the Engineering, Management and Education building, which saw a 93 per cent improvement in occupant behaviour. Furthermore, additional measures were taken to promote energy conservation across the campus, with key operational departments initiating voluntary nightly energy reduction audits. As a direct result of these efforts, employees switched off or powered down over 6,182 lights and 146 projectors/screens, and closed 90 windows.

In the upcoming year, provided there are sufficient resources, UBC Okanagan plans to introduce a series of community engagement events and awareness programs to the campus community. These initiatives will further support the continuous progress towards the campus' operational and extended emissions targets for 2030, as well as the longer-term goal of achieving a net-positive campus performance by 2050.





# Success Story

In 2023, UBC Okanagan partnered with Vitalis Extraction Technology to install a one-megawatt **CO<sub>2</sub> ASHP** system at the Geothermal building on campus. These systems use CO<sub>2</sub> as a refrigerant, rather than traditional refrigerants such as HFCs or CFCs. Approved for installation in 2024, this innovative technology is set to be integrated into the campus' district energy system. It is expected to significantly improve energy efficiency and system flexibility while reducing emissions by over 700 tCO<sub>2</sub>e annually. The reduction will be achieved by displacing the use of fossil fuels within the campus' district energy system, which advances progress toward the campus' 2030 operational emissions reduction target and longer-term goal of achieving a net-positive performing campus by 2050.

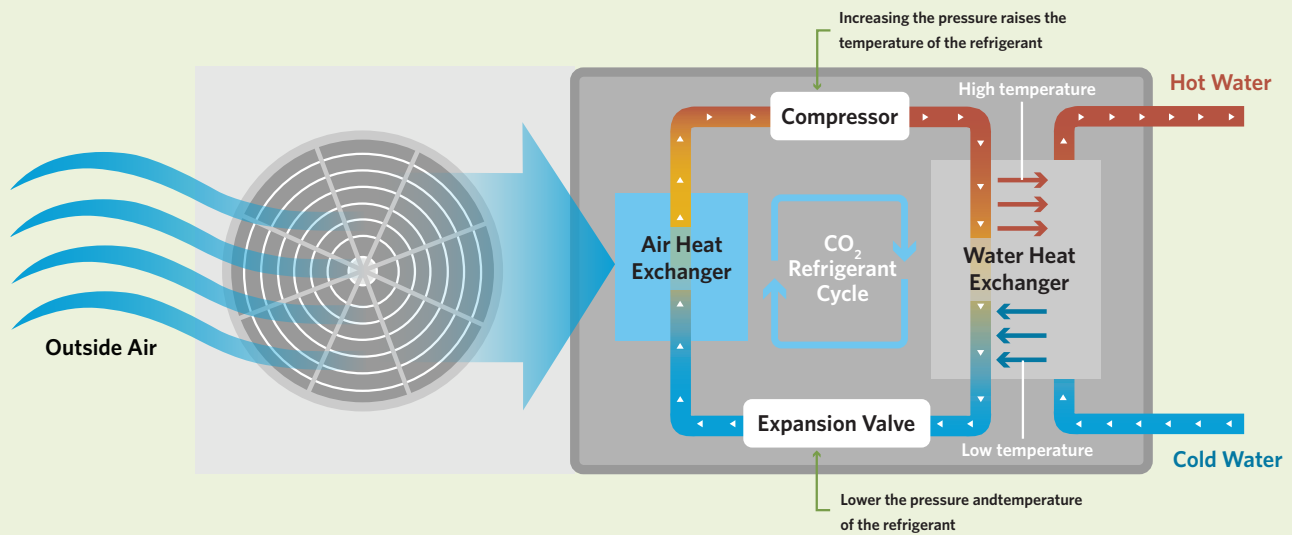


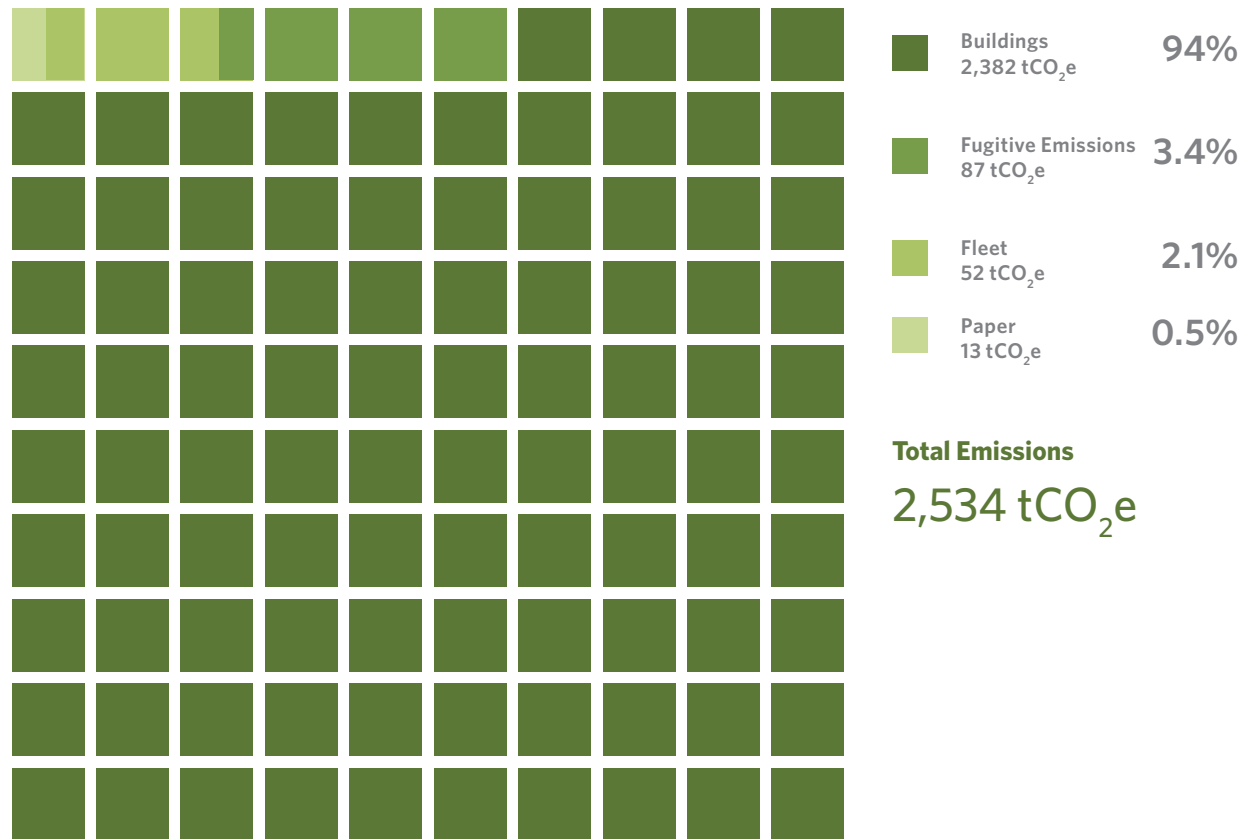
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# Emissions Profile 2023

UBC Okanagan Greenhouse Gas Emissions by Source for the 2023 Calendar Year (tCO<sub>2</sub>e\*)



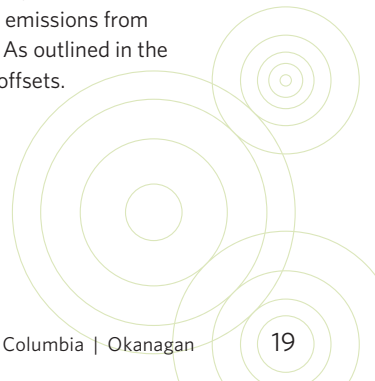
## Offsets Applied to Become Carbon Neutral in 2023

**Total offsets required:** **2,379 tCO<sub>2</sub>e**

**Total offset investment:** **\$59,475**

Emissions which do not require offsets: 155 tCO<sub>2</sub>e\*\*. Tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) is a standard unit of measure in which all types of GHG are expressed based on their global warming potential relative to CO<sub>2</sub>.

\*\* 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.





# 2023

PSO Climate Change  
Accountability Report  
UBC Okanagan



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