

2023

Climate Change Accountability Report





2023 CLIMATE CHANGE ACCOUNTABILITY REPORT

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INTRODUCTION

ABOUT UBC

The University of British Columbia (UBC) is a global center for teaching, learning and research, consistently ranked among the top 25 public universities in the world and recently recognized as North America’s most international university. With sustainability at the core of its identity, UBC also ranks second in Canada and fourth globally according to the QS Sustainability Rankings. Since 1915, our motto, Tuum Est (It is Yours), has been a declaration of our commitment to attract and support those who have the drive to shape a better world. As a result, UBC students, faculty and staff continue to embrace innovation and challenge the status quo, placing us at the forefront of discovery, learning, and engagement.

UBC encourages bold thinking, curiosity, and initiative so that one can realize their greatest potential. Our two main campuses, in Vancouver and in the Okanagan, represent over 70,000 students and employ over 20,000 staff and faculty.

SUSTAINABILITY PLANS & PUBLICATIONS

UBC’s Vancouver campus sustainability plans and reports, including annual GHG Inventories, Climate Change Accountability Reports, and Annual Sustainability Reports are available at:

sustain.ubc.ca/about/plans-policies-and-reports

UBC’s Okanagan campus sustainability plans and reports, including annual GHG Inventories, Climate Change Accountability Reports, and Annual Sustainability Reports are available at:

sustain.ok.ubc.ca/reports

EXECUTIVE SUMMARY

The UBC Vancouver and Okanagan Climate Action Plans 2030 (CAP 2030) sets a bold vision and pathway for UBC to address the climate emergency and Paris targets through bold, impactful actions to accelerate and deepen greenhouse gas (GHG) reductions across operations, and expanded action to reduce extended emissions¹. CAP 2030 aligns, and in some cases surpasses, the 2030 emissions reductions required to achieve the Paris Agreement² goal of keeping global temperatures within 1.5°C and advances CleanBC’s plan on lowering carbon emissions by 40%.

UBC continues to demonstrate innovative approaches to address climate change through strong collaborations between academic researchers, operational staff and partnerships with government, utilities, industry and non-governmental organizations. These partnerships continue to elevate UBC’s unique position to use its campus as a living laboratory and its buildings, infrastructure and landscapes to create place-based solutions to drive innovations at the campus, regional and global scales. UBC’s role in affiliations also helps facilitate knowledge exchange to support rapid deployment of low carbon solutions.

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INDUSTRY, INNOVATION
AND INFRASTRUCTURE

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SUSTAINABLE CITIES
AND COMMUNITIES

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RESPONSIBLE
CONSUMPTION
AND PRODUCTION

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CLIMATE
ACTION

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PARTNERSHIPS
FOR THE GOALS

UBC is uniquely positioned to use its institutional and intellectual capacities toward a bigger collective impact to advance the United Nations Sustainable Development Goals with top-tier thought leadership that inform innovative sustainable development.

UBC’s Climate Emergency Declaration³ recognized the severity, complexity, and disproportionate impacts of, and responsibilities for, climate change. This Declaration committed UBC to develop a systematic response that embedded climate justice throughout its activities and priorities. Climate action continues to be a top strategic priority for UBC.

In 2023, UBC achieved a combined 34% reduction in total offsetable GHG emissions across both campuses when compared to 2007 emissions; despite an overall 34% growth in floor space and 54% increase in student enrolment. Overall, UBC has achieved a 57% GHG emissions reduction per full-time equivalent student since 2007.

UBC VANCOUVER CAMPUS

As a commitment to advance toward these CAP 2030 targets, the campus had put great efforts in 2023 to continue reducing operational GHG emissions such as UBC’s Major Capital Projects process kick-off for the electric boiler and thermal energy storage project for transitioning the academic District Energy System (DES) to 100% clean and renewable energy, a number of heating and cooling control enhancement projects, and the Gateway building project which achieved the Canada Green Building Council’s Zero Carbon Building Design certification and pursuing LEED Gold certification, is designed to achieve both low operational emissions and significantly reduced embodied carbon. Climate Ready Requirements under the Green Building Action Plan (GBAP), which includes an embodied carbon reduction pathway, will further build on these successes. UBC’s contributions were recognized by the Carbon Leadership Forum for Public Sector Leadership in helping to map pathways for deep embodied carbon reductions.

¹ Extended emissions include emissions from UBC-related commuting, building lifecycle (embodied carbon), solid waste, business flights, and food systems.
² <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>
³ <https://climateemergency.ubc.ca/>

This year, the UBC Vancouver campus achieved a reduction of 35% (21,489 tCO₂e) in total offsetable GHG emissions from a 2007 baseline, despite a 43% increase in student enrolment and a 28% growth in campus building floor space. When compared to 2022, an increase of 8% (2,847 tCO₂e) in total offsetable GHG emissions was noted in UBC Vancouver campus. The key reasons for the increase in campus emissions were the planned and unplanned outages of the Bioenergy Research and Demonstration Facility (BRDF), resulting in low BRDF utilization in 2023. Other key reasons were the significant leaks at several Variable Refrigerant Flow heat pump systems, resulting in materially increase in fugitive emissions.

Just as importantly, many high-impact initiatives to reduce extended impact (Scope 3) emissions have been advanced over the past year. Some highlights include the e-bike share program to address commuting emissions, the climate-friendly food label to inform on the GHG impacts from daily dietary choices on campus, the Furniture Reuse program to advance the circular economy, and more. The momentum building behind these efforts is uplifting and speaks to the sustainability commitments of the broader UBC community.

In the coming years, the campus will continue to implement CAP 2030 decarbonization activities including BRDF economizer and heat pump project, the Strategic Energy Management Plan (SEMP) updates.

UBC OKANAGAN CAMPUS

In 2023, UBC Okanagan reported an 18% or 551 tCO₂e decrease in absolute GHG emissions from the previous year. This decrease is largely related to the decrease in heating demand compared to 2022 in the Central Okanagan region in 2023 as well as the campus' ability to adjust its building and energy systems to effectively respond to changing weather conditions, resulting in lower energy usage and emissions. Over the past year, ongoing implementation of CAP 2030 includes actions to accelerate the reduction of operational emissions and measures to reduce emissions in areas of extended impact, including commuting, food, waste, embodied carbon and business air travel. The campus continued developing and putting into action energy and carbon reduction projects such as the development of the UBCO Green Building Standards and the Strategic Energy Management Plan updates. New capital projects underway including UBCO Downtown, the x̌əl sic snpa̓nwixʷtn (XSS) building, and a new Child Care Facility each provide innovative approaches to reduce operational energy and carbon loads.

In 2024, an innovative CO₂ Air Source Heat Pump project will be advanced to provide significant environmental and efficiency improvements as well as operational flexibility to campus buildings. The campus will also develop an Infrastructure Resilience Plan to identify the actions needed to address risks and identify high-priority projects for implementation.



UBC Okanagan - Arial View

Looking forward, the UBC Climate Resilient Buildings Project will be undertaken by both UBC campuses in the coming year to address climate resiliency. This project aims to align UBC's policy with CleanBC's Climate Resilience Framework and Standards to future proof UBC buildings in light of climate change while simultaneously reducing GHG emissions. Both campuses will also expand efforts to reduce emissions in high-impact areas of extended impact (Scope 3), including commuting, food, waste, embodied carbon and business air travel.

UBC relentless effort to increase energy efficiency and drive down carbon emissions also brings in financial benefits. This is especially relevant with the Provincial price on carbon forecasted to increase materially until 2030. It is estimated that achieving UBC's climate target of an 85% reduction below 2007 levels by 2030 would reduce carbon liabilities by approximately \$18 million per year when compared to a business-as-usual scenario. To further support climate actions and align sustainability with forward looking financial decision making, UBC has developed an internal carbon price, currently set at \$250 per tonne of CO₂. UBC's experience shows that with a commitment to innovation and problem solving, climate actions can be good for the climate and the bottom line too. Moving forward, with the increasing incremental cost of abatement of carbon, continued financial and policy support from the government is crucial for UBC to make deeper emission reductions.

The climate emergency represents one of most pressing issues of our time and UBC will continue to leverage its institutional and intellectual capacities to demonstrate climate leadership through continued action to address climate mitigation and adaptation. As a large, research-intensive university, with considerable land, assets and utilities, we are in a unique position to use our campuses as a test bed for climate solutions and deeper progress towards sustainable development. UBC will continue to create and provide opportunities for students, faculty and staff to act collectively to reduce GHG emissions and achieve our climate target by 2030.

MICHAEL WHITE
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Campus and Community Planning
University of British Columbia
Vancouver Campus

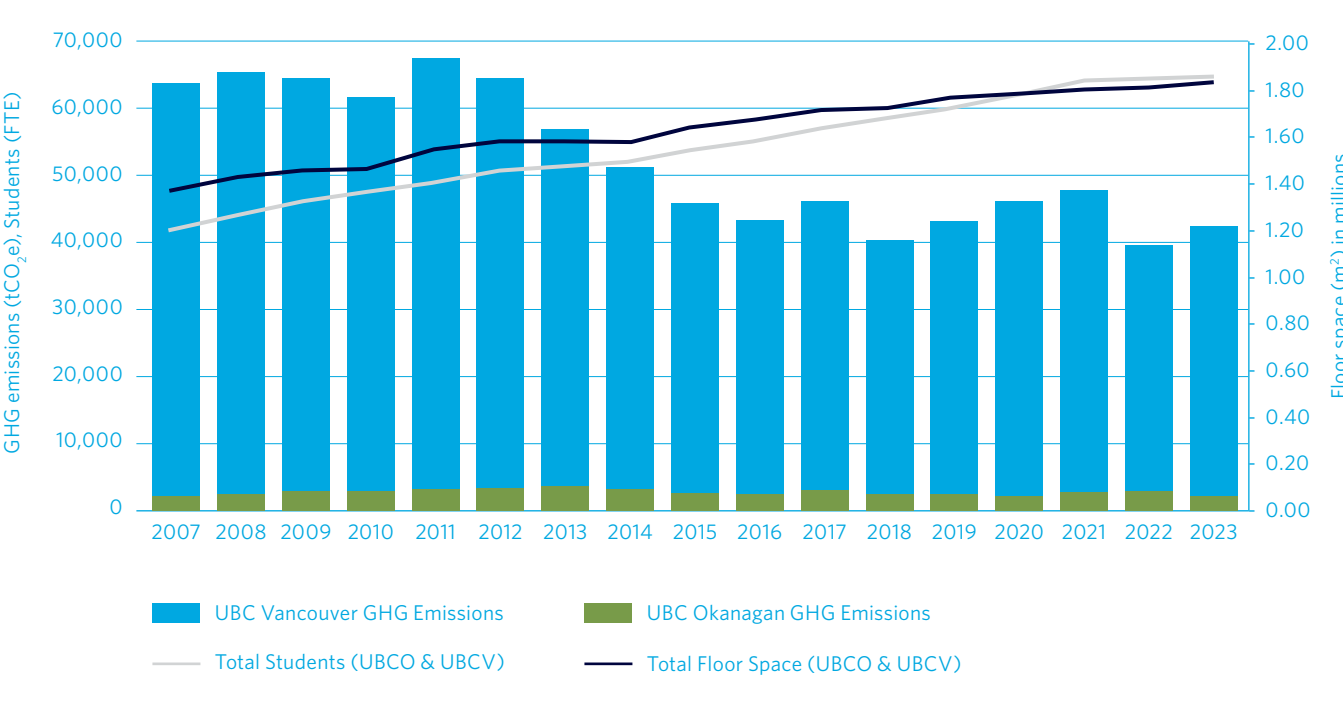
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EMISSIONS OVERVIEW (VANCOUVER CAMPUS & OKANAGAN CAMPUS)

EMISSIONS AND OFFSET SUMMARY (SCOPE 1, 2 AND PAPER)

UBC tracks and reports the absolute (including biogenic emissions) and offsetable emissions for each campus since 2007, as shown in Figure 1, to measure performance against our Climate Action Plan targets.

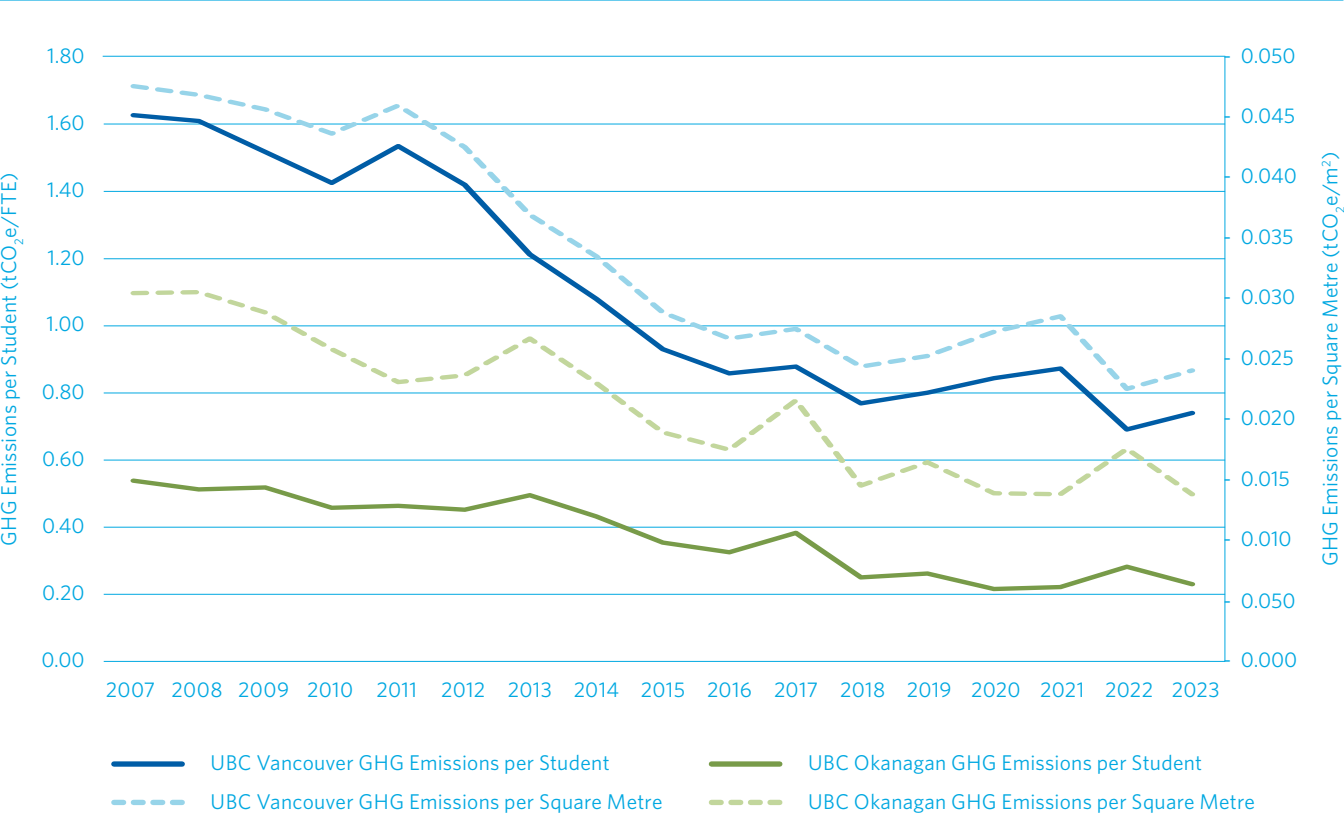
FIGURE 1: UBC Growth and Emissions for Carbon Offsets, 2007 to 2023



EMISSIONS AND OFFSET SUMMARY (SCOPE 1, 2 AND PAPER) - continued

Figure 2 shows the offsetable GHG emissions intensity from 2007 to 2023. UBC's emissions intensity has been reduced by 50% since 2007.

FIGURE 2: UBC Offsetable GHG Emissions Intensity, 2007 to 2023



2023 EMISSIONS AND OFFSETS

Under the Climate Change Accountability Act (formerly titled Greenhouse Gas Reductions Target Act), UBC has been required to report and offset Scope 1, 2 and paper emissions since 2010, including emissions from all properties owned and leased by UBC and its subsidiaries, such as UBC Properties Trust.

A summary of emissions attributed to UBC's two campuses and off-campus properties and sites are provided in Table 1 and Figure 3. The total offsetable emissions amounted to 48,669 tCO₂e in 2023; 95% of which was attributed to emissions from the operations of the UBC Vancouver campus, off-campus properties and UBC Properties Trust.

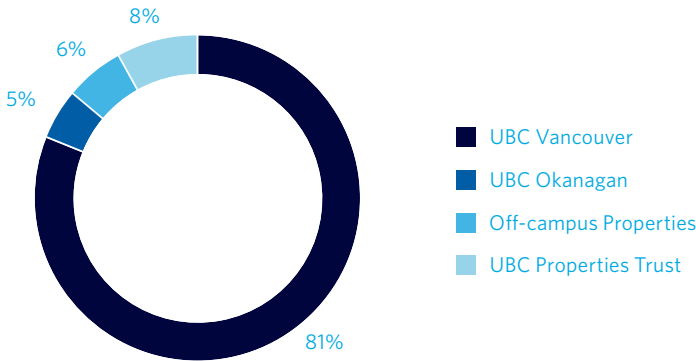
UBC’s total emissions for 2023 amounted to 61,090 tCO₂e, including 12,421 tCO₂e of biogenic emissions⁴. The biogenic emissions (BioCO₂) from biomass combustion are reported separately and not included in the emission totals for offset in accordance with Provincial reporting guidelines as the BioCO₂ released is part of the biogenic carbon cycle and would be released naturally during decomposition.

In 2023, UBC’s total offsetable emissions slightly increased by 4% (2,052 tCO₂e) compared to 2022, but the total emissions (including biogenic) decreased by 11% (7,652 tCO₂e). In the UBC Bioenergy Research and Demonstration Facility (BRDF), repairs were required on both the biomass conveyor system and the grate-fired biomass boiler in 2023, which reduced the utilization of this low-carbon energy supply for the campus, thus resulting a slight increase in GHG emissions.

TABLE 1: 2023 UBC Total GHG Emissions by Location (in tCO₂e)

Location	2023 Emissions for offset	Emissions not required to be offset ⁵	Total GHG Emissions
UBC Vancouver Campus	39,593	12,265	51,857
UBC Okanagan Campus	2,379	155	2,534
Off-campus Properties	2,912	1	2,913
UBC Properties Trust	3,785	0	3,785
UBC Total	48,669	12,421	61,090

FIGURE 3: 2023 UBC Offsetable GHG Emissions Distribution by Location



⁴ Biogenic emissions arise from biomass combustion, including wood waste, renewable natural gas and biofuels. The UBC Bioenergy Research and Demonstration Facility (BRDF) only uses clean wood waste from regional wood product manufacturing and municipal plant trimmings.

⁵ The biogenic emissions (BioCO₂) from biomass combustion are reported separately and not included in the emission totals for offset in accordance with Provincial reporting guidelines as the BioCO₂ released is part of the biogenic carbon cycle and would be released naturally during decomposition.

Table 2 shows the 2023 emissions for offsets from UBC’s two main campuses along with key performance indicators.

TABLE 2: 2023 Offsetable Emissions and Key Indicators for UBC Vancouver and UBC Okanagan

Key Performance Indicator	Vancouver Campus	Okanagan Campus	UBC Campuses Total
GHG Emissions (tCO ₂ e)	39,593	2,379	41,972
Floor Space (m ²)	1,647,367	173,152	1,820,519
GHG Emissions per Square Metre (tCO ₂ e/m ²)	0.024	0.014	0.023
Student Enrolment (FTE) ⁶	53,621	10,568	64,189
Staff and Faculty Employees (FTE)	17,775	1,826	19,601
GHG Emissions per Student (t CO ₂ e/FTE)	0.74	0.23	0.65

⁶ Numbers are calculated on a full-time equivalent basis, instead of headcount.

2023 Climate Change Accountability Report

UBC VANCOUVER CAMPUS



THE UNIVERSITY OF BRITISH COLUMBIA
Vancouver Campus

ACKNOWLEDGMENT

We acknowledge that the Vancouver campus is situated on the traditional, ancestral, and unceded territory of the xʷməθkʷəy̓əm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.



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VANCOUVER CAMPUS SUMMARY

The UBC Vancouver Climate Action Plan 2030 (CAP 2030) provides the impetus for UBC to accelerate climate action and commit to exceeding the Paris Agreement 1.5°C emissions reductions target and support CleanBC’s plan on lowering carbon emissions by 40% by 2030. CAP 2030 sets ambitious targets for the Vancouver campus; an 85% GHG reduction for operational emissions and a 45% GHG reduction for extended impact emissions by 2030, reaching net zero operational emissions by 2035. UBC’s commitment to achieving these targets continues to elevate UBC’s global leadership and demonstrates how strategic investments in addressing climate action enable UBC to be more climate resilient in delivering top-tier teaching, learning and research despite increasing and more intense impacts associated with a changing climate. UBC’s climate investments support core operations while also creating innovative platforms for teaching, learning and research — the foundation of leveraging our campus as a living lab.



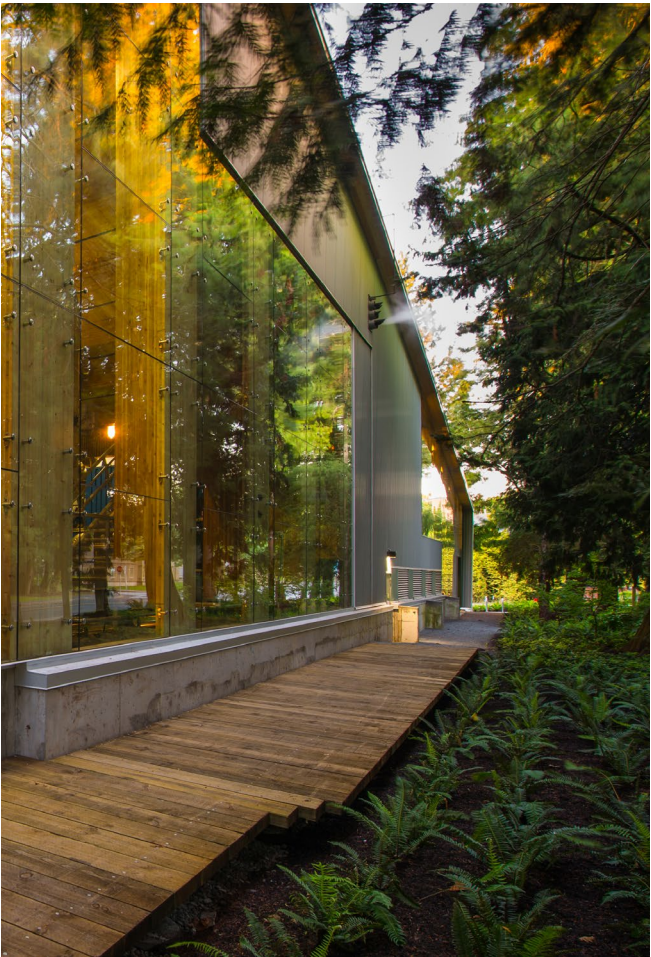
As a commitment to advance toward these CAP 2030 targets, the campus had put great efforts to continue reducing GHG emissions:

- To transition the academic District Energy System (DES) to 100% clean and renewable energy by 2030, the electric boiler and thermal energy storage project officially started UBC’s Major Capital Projects process, an important milestone in executing the project.
- Energy and Water Services (EWS) Energy Conservation Group completed a number of enhancement projects to conserve thermal, electrical and peak demand, and to better control the heating and cooling in UBC facilities.
- The Gateway project, currently under construction, has achieved Zero Carbon Building Certification (Design) which demonstrates the building is designed to be low carbon. The embodied carbon has been reduced by 27% compared to a reference building thanks to the hybrid wood structure and careful choice of materials. The project has also been awarded a 2021 Canadian Architect Award of Excellence.
- UBC has developed energy and emissions targets, an embodied carbon reduction pathway with targets, and Climate Ready Requirements for new buildings under the Green Building Action Plan (GBAP). UBC was recognized by the Carbon Leadership Forum for Public Sector Leadership in helping to map pathways for deep embodied carbon reductions.
- UBC launched the new Zero Waste Action Plan 2030: Towards a Circular Economy, setting out new targets and more strongly prioritizing waste reduction in alignment with CAP 2030 targets and circular economy opportunities including sustainable procurement and reuse.
- Many high-impact initiatives to reduce extended impact (Scope 3) were advanced, including the e-bike share program to address commuting

emissions, the climate-friendly food labels, the Furniture Reuse program to advance the circular economy, and more.

In 2023, the UBC Vancouver campus achieved an operational GHG emissions reduction of 35% (21,489 tCO₂e) from a 2007 baseline, despite a 43% increase in student enrolment and a 28% growth in campus building floor space. When compared to 2022, an increase of 8% (2,847 tCO₂e) in total offsetable GHG emissions was noted in UBC Vancouver campus. The key reasons for the increase in campus emissions were the planned and unplanned outages of the Bioenergy Research and Demonstration Facility (BRDF), resulting in low BRDF utilization in 2023, and the significant leaks at several Variable Refrigerant Flow heat pump systems.

We forecast that with the implementation of CAP 2030 actions, GBAP, full commissioning of the BRDF expansion, as well as campus and community engagement, our campus will continue reducing emissions and demonstrate our leadership in responding to the climate crisis. Moving forward, the incremental cost of abatement of carbon is increasing, making deeper emission reductions more challenging. Continued financial and climate policy support from the government is crucial for UBC to reach net zero operational emissions.



The UBC Bioenergy Research and Demonstration Facility

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Associate Vice-President
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JOHN MADDEN

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DECLARATION STATEMENT

This Climate Change Accountability Report for the period January 1, 2023 to December 31, 2023 summarizes our 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 University of British Columbia Vancouver campus’ 2023 Climate Change Accountability Report will be posted to our website at: <https://sustain.ubc.ca/about/plans-policies-and-reports>

EMISSIONS AND OFFSETS SUMMARY

TABLE 1: UBC Vancouver Emissions and Offsets Summary Table¹

UBC Vancouver 2023 GHG Emissions and Offsets Summary	
GHG Emissions for the Period January 1 – December 31, 2023	
Total BioCO ₂	12,266
Total Emissions (tCO ₂ e)	58,556
Total Offsets (tCO ₂ e)	46,290
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO ₂ e) ²	11
Grand Total Offsets for the 2023 Reporting Year	
Grand Total Offsets to be Retired for 2022 Reporting Year (tCO ₂ e)	46,301
Offset Investment (\$25 per tCO ₂ e)	\$1,157,525

RETIREMENT OF OFFSETS

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

¹ This table includes combined details of Vancouver Campus, Off-Campus Properties, and UBC Properties Trust.
² The adjustments to offsetable GHG emissions in 2022 was due to the consensus on the GHG emissions calculation for Great Northern Way Campus among four organizations.

2023 EMISSIONS OVERVIEW



UBC Main Mall

OVERVIEW

Greenhouse gas (GHG) emissions were quantified using the BC Provincial Government's Clean Government Reporting Tool (CGRT). Table 2 provides a source breakdown of Vancouver campus GHG Inventory emissions from buildings, fleet, paper, and fugitive³. UBC Vancouver campus emits 35% (21,489 tCO₂e) less offsetable GHG emissions compared to the 2007 baseline.

TABLE 2: Vancouver Campus Offsetable Emissions Comparison by Source (in tCO₂e), 2007, 2022 & 2023

Source	2007 Emissions	2022 Emissions	2023 Emissions	% Change from 2007
Buildings	58,105	35,544	37,312	-36%
Fleet	1,973	795	922	-53%
Paper	1,003	142	179	-82%
Fugitive	-	265	1,180	N/A
Total Vancouver Campus Emissions	61,082	36,746	39,593	-35%

The Vancouver campus emissions for offsets amounted to 39,593 tCO₂e in 2023, an increase of 8% from 2022. A detailed breakdown of the campus emission sources is provided in Table 3. Core academic buildings include teaching and learning spaces, lecture theatres and laboratories, while ancillary buildings include athletics, student housing residences and the bookstore. Tenants in UBC owned buildings are combined with the core buildings in this Table.

³ Fugitive emissions are determined by the amount of refrigerants used to replenish refrigeration equipment, such as building chillers during servicing.

TABLE 3: 2023 Offsetable Emissions for the UBC Vancouver Campus (in tCO₂e)

Source	2007 Emissions	2022 Emissions	2023 Emissions	% of 2023 Total
UBC Vancouver Campus – Core buildings ⁴	46,478	25,593	26,559	67%
DES (natural gas and light fuel oil) ⁵	40,106	15,458	17,306	44%
Natural gas (direct burn)	3,515	8,144	7,514	19%
Electricity	2,856	1,628	1,556	4%
Biomass facility ⁶	N/A	343	165	0.42%
Renewable Natural Gas ⁷	N/A	20	19	0.05%
UBC Vancouver Campus – Ancillary buildings ⁸	11,405	9,891	10,685	27%
DES (natural gas and light fuel oil)	7,311	5,365	5,980	15%
Natural gas (direct burn)	3,108	3,625	3,871	10%
Electricity	986	793	783	2%
Biomass facility	N/A	108	52	0.13%
TRIUMF ⁹	222	60	67	0.17%
Fleet	1,973	795	922	2%
Paper	1,003	142	179	0.45%
Fugitive	0	265	1,180	3%
Total Vancouver Campus Offsetable Emissions	61,082	36,746	39,593	100%

⁴ Core buildings comprise academic and administrative buildings. Tenants in UBC owned buildings are included with Core buildings in this table.

⁵ District Energy System (DES)

⁶ UBC is required to offset the CH₄ and N₂O portions of biomass combustion from the BRDF. In addition, the BRDF burns a small amount of natural gas.

⁷ UBC is required to offset the CH₄ and N₂O portions of renewable natural gas.

⁸ Ancillary buildings include student housing, conference, athletics and parking facilities.

⁹ TRIUMF is a joint venture with other universities for physics research, it has historically been included in the UBC Vancouver Campus inventory since it is located on campus. UBC accounts for 1/21st of the TRIUMF emissions.

The key reasons for an increase in campus emissions in 2023 were the planned and unplanned outages of the Bioenergy Research and Demonstration Facility (BRDF). The BRDF has grown increasingly important to UBC's low-carbon energy supply, evolving from a research and demonstration project in 2012 to providing much of the District Energy System (DES) heat with its 2020 expansion.

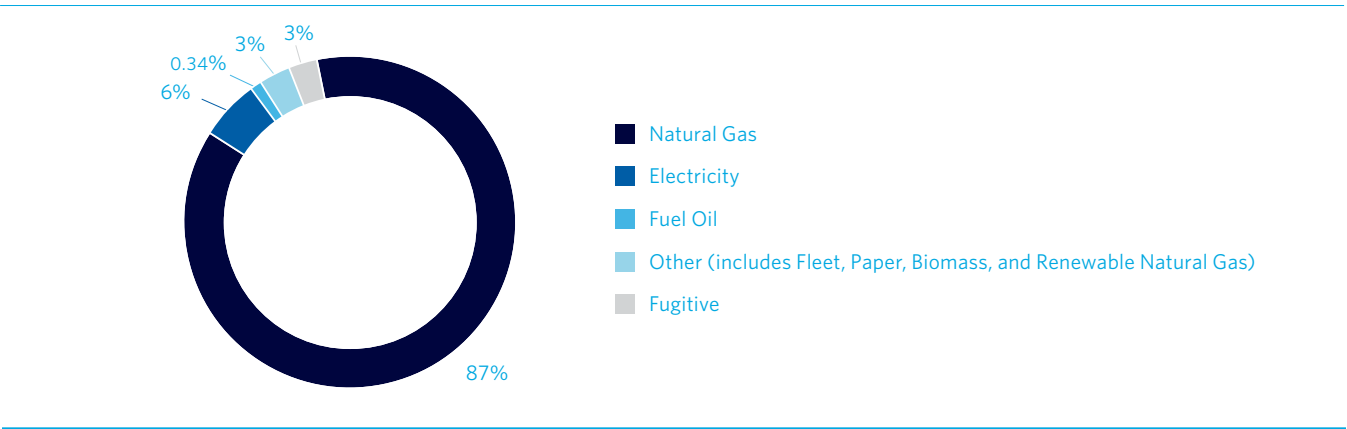
In ensuring the ongoing resiliency, a planned 6-month outage was undertaken to repair a large portion of the biomass conveyor system which had not been functioning as required. With that portion of the conveyor system rectified, the grate-fired biomass boiler was repaired, recommissioned, and restarted to support reliable long-term operation. Unrelatedly, a tube leak occurred in the gasifier's 12-year-old boiler economizer, resulting in only 50% operating capacity and further reducing the BRDF thermal heating supply in 2023.

Fugitive emissions were up materially in 2023, increasing by 345% compared to 2022. Its share went up from 0.7% to 3% of offsetable emissions. Key reasons for this were significant leaks at several Variable Refrigerant Flow heat pump systems, including at the Saltwater and Orchard Commons residences, and a circuit discharge at a heat recovery chiller in Life Science building.

In 2023, the campus community was fully transitioned back to on-campus activities since COVID curtailed some on-campus activities. This resulted in an increase in GHG emissions from fleet by 16% and from paper consumption by 26%.

Figure 1 shows the distribution of major offsetable emissions from UBC's Vancouver campus.

FIGURE 1: 2023 Offsetable Emissions Distribution for the UBC Vancouver Campus



COMPARISON TO BASELINE YEAR

UBC Vancouver tracks and reports our relative emissions against a 2007 baseline to measure and demonstrate performance against our Climate Action Plan 2030¹⁰ (CAP 2030) targets. Even with significant growth in buildings and student enrollment, UBC has made strategic investments to reduce its operational GHG emissions and reliance on fossil fuels. In 2023, per student emissions were 0.74 tCO₂e, a 55% decrease since 2007. Table 4 outlines key performance indicators for the UBC Vancouver campus.

¹⁰ [UBCV_CAP2030_FINAL.pdf](#)

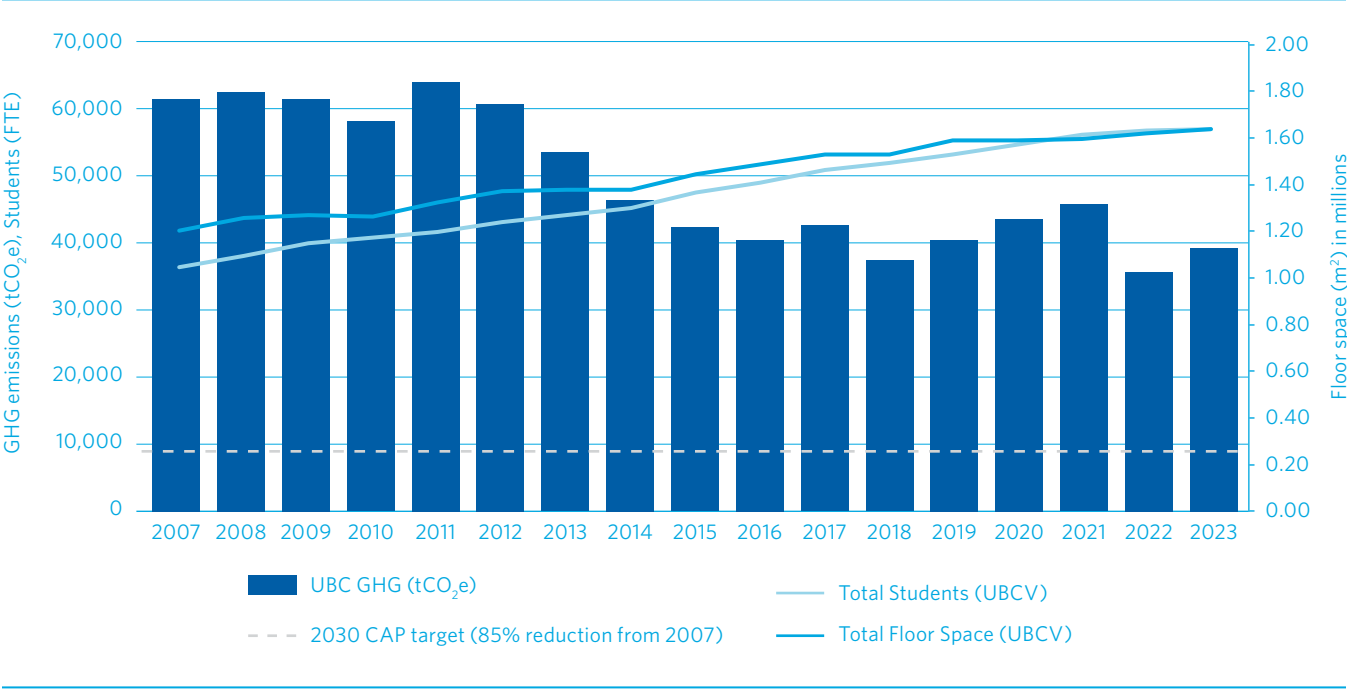
TABLE 4: 2023 UBC Vancouver Campus Key Performance Indicators

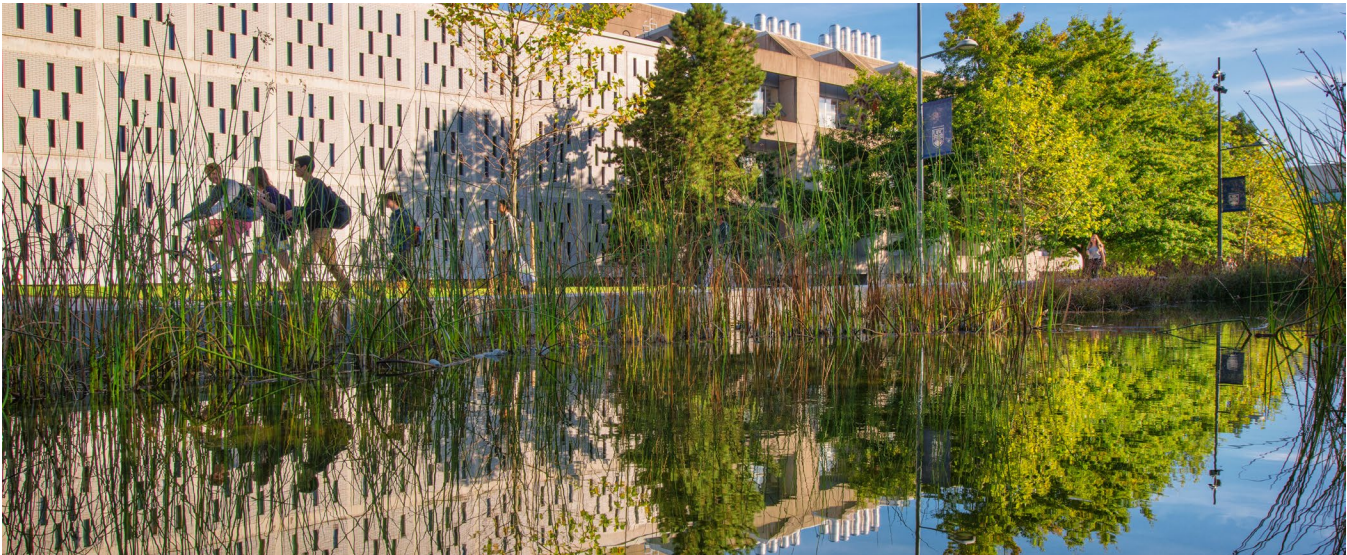
Key Performance Indicator	2007	2023	% Change from 2007
GHG Emissions (tCO ₂ e)	61,082	39,593	-35%
GHG Emissions per Student (tCO ₂ e/FTE)	1.62	0.74	-55%
GHG Emissions per square meter (tCO ₂ e/m ²)	0.048	0.024	-49%
Floor Space (m ²)	1,284,482	1,647,367	28%
Student Enrolment (FTE)	37,589	53,621	43%
Staff and Faculty Employees (FTE)	10,509	17,775	69%

COMPARING EMISSIONS TO GROWTH

Figure 2 below illustrates the change in campus emissions since the 2007 baseline year, along with some key indicators of Vancouver campus growth and CAP 2030 targets.

FIGURE 2: UBC Vancouver Campus Growth and Offsetable Emissions Reduction





The UBC Boulevard Cascading Water Feature promotes biodiversity

SCOPE 3 EMISSIONS

Under current legislation, UBC is not responsible for carbon offset payments associated with Scope 3 emissions (except paper). Despite this, UBC has made an explicit target in CAP 2030 to reduce extended impact emissions by 45% by 2030, aligned with the reduction needed to achieve the Paris 1.5°C Agreement. The Vancouver campus GHG inventory quantifies the optional Scope 3 emissions which are outlined in Table 5 below.

TABLE 5: 2023 UBC Vancouver Campus Scope 3 Emissions (in tCO₂e)

Source	Baseline Year	Baseline Year Emissions	2023 Emissions	% Change from Baseline
Commuting ¹¹	2010	42,248	40,543	-4%
Business Air Travel ¹²	2019	40,653	27,772	-32%
Building Lifecycle	2010	10,179	13,591	+34%
Solid Waste	2019	1,930	818	-58%

¹¹ An updated methodology has been implemented since 2021 reporting year to better track commuting GHG emissions. When using the revised methodology for 2007, the increase in emissions is reduced to 5%, with shifts to sustainable transport modes almost offsetting campus population growth.

¹² An updated methodology has been implemented since 2023 reporting year to better track business air travel GHG emissions. Radiative forcing factors (RFFs) are applied.

BUSINESS AIR TRAVEL GHG ACCOUNTING METHODOLOGY UPDATE

The atmospheric warming from air travel is typically quantified by examining the CO₂ produced from the burning of jet fuel. However, it is increasingly recognized that fuel combustion at high-altitude causes additional atmospheric warming from soot, water vapor, contrail formation and formation of high-altitude cirrus clouds that often act like a warming blanket.

To align with latest science and best practice reporting standards, UBC now applies radiative forcing factors (RFFs) based upon figures from the Intergovernmental Panel on Climate Change (IPCC), US Environmental Protection Agency, and several peer-reviewed scientific research and review papers to its air travel emissions estimates. This is to better account for the total warming produced from business air travel.

In the updated methodology, UBC distinguishes the extra radiative forcing impact of short-, medium- and long-haul flights based on the proportion of fuel burned at high altitude. With these updated emissions estimates, UBC business air travel’s contribution to Scope 3 emissions is significantly increased – by about a factor of 2.5. This underscores the importance of addressing the need for air travel within UBC’s operations, both academic and administrative, as an issue of climate action and of climate justice. Figure 3 shows a summary of UBC Vancouver campus business air travel emissions of the past 10 years using both the previous and new GHG accounting methodologies.

FIGURE 3: UBC Vancouver Campus Air Travel Emissions Comparison between Previous and New GHG Accounting Methodologies

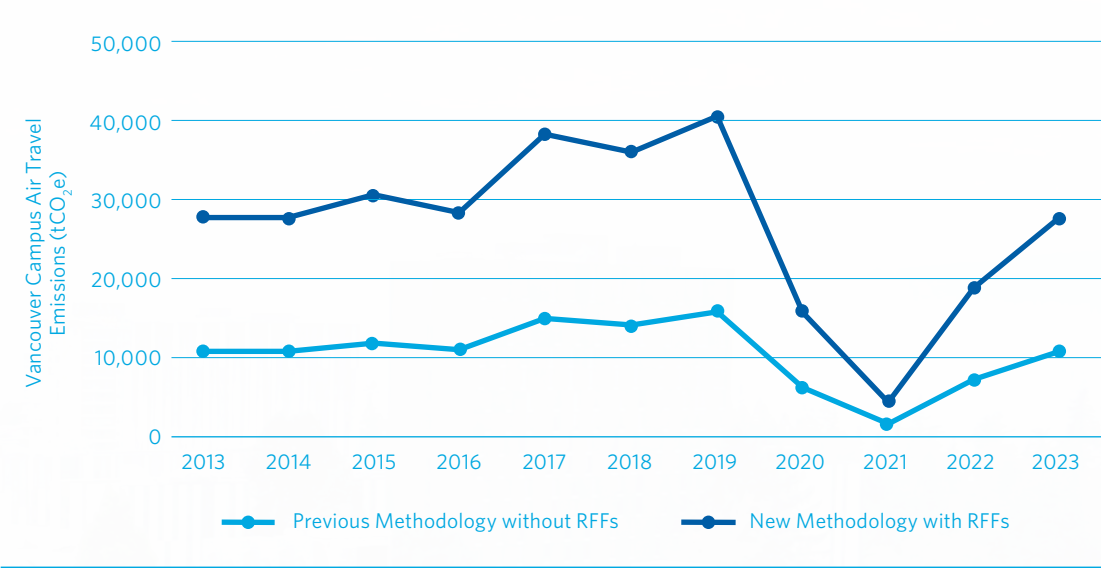
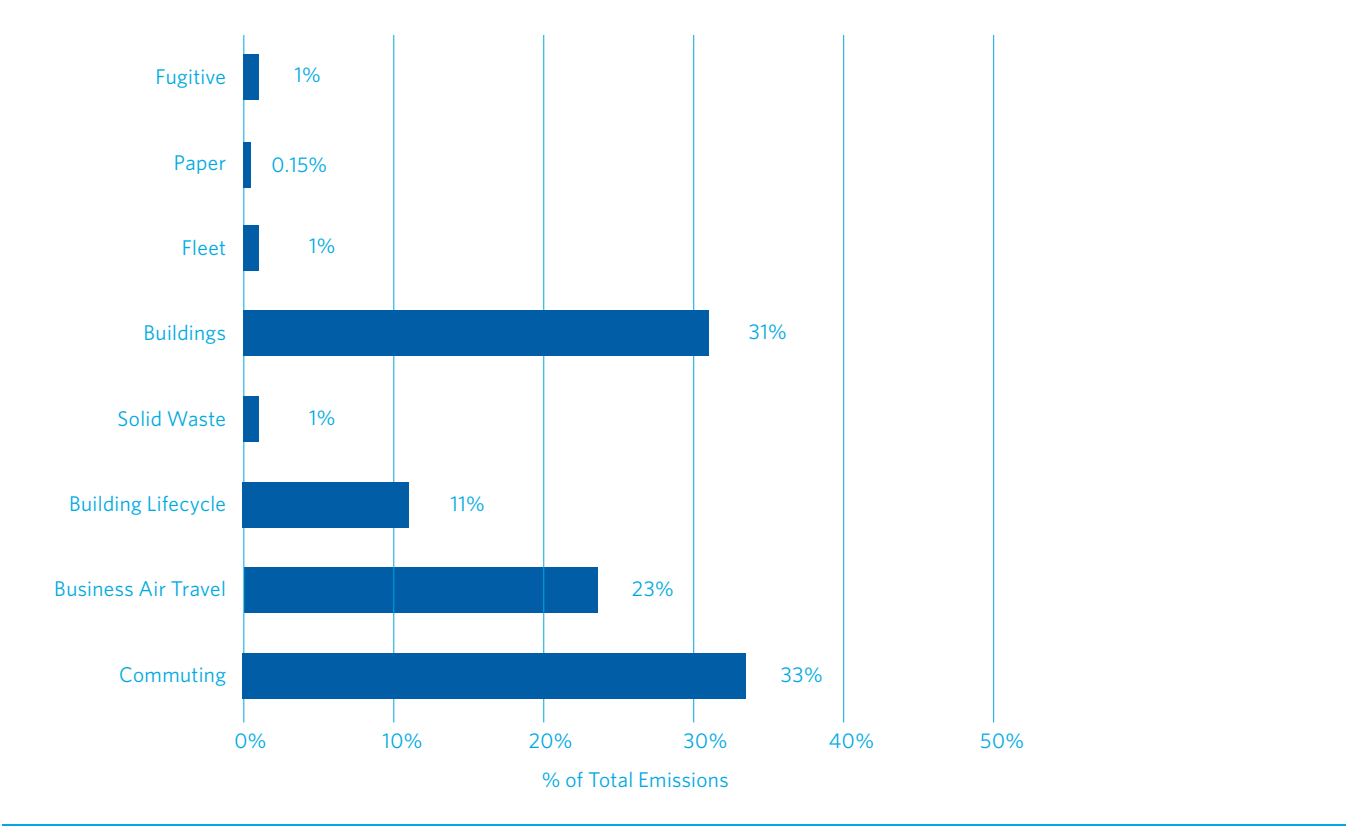


Figure 4 shows the comparative proportions of these emissions for the Vancouver campus. GHG emissions from buildings (including embodied carbon) and commuting have already accounted for 75% of the total emissions.

FIGURE 4: UBC’s Vancouver Campus Total Emissions for Scope 1, 2 and 3, 2023

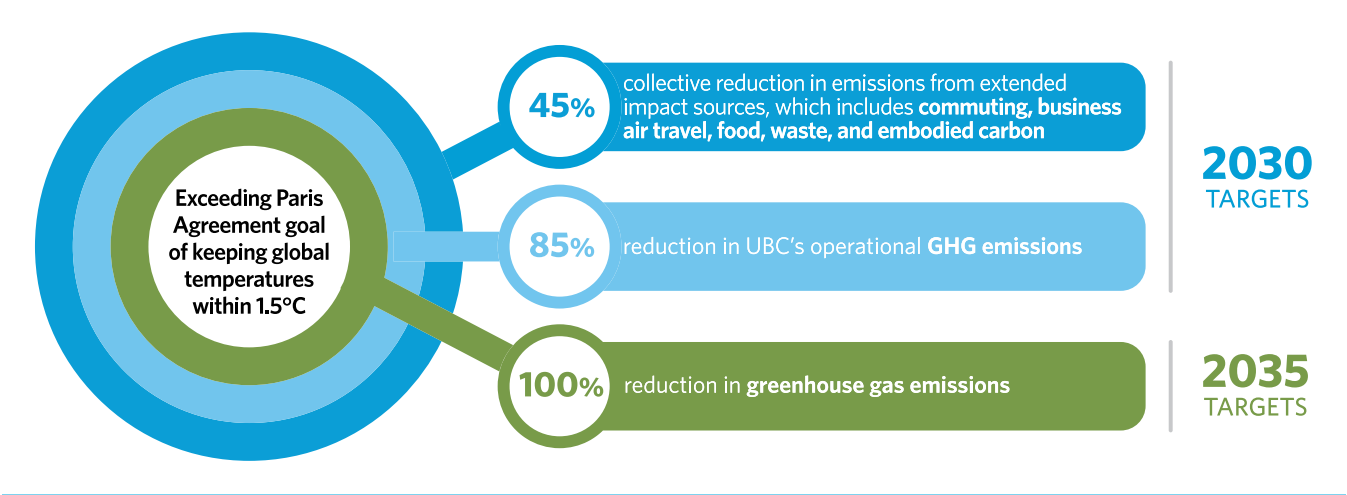


2023 EMISSIONS REDUCTIONS: ACTIONS AND PLAN

UBC is the largest post-secondary institution in BC and plays a key role in helping to advance CleanBC goals while also forging a path to net zero emissions for other higher education institutions to follow. The UBC Vancouver CAP 2030 endorsed by the Board of Governors in 2021 provides the impetus for UBC to accelerate decarbonization of its core operations. This includes expanding the scope of action to address extended (indirect) emissions that UBC has influence over, while applying a climate justice lens, which includes the commitment to deepening engagement with Indigenous communities. It puts UBC Vancouver 15 years ahead of the original net zero target date of 2050 from the previous Climate Action Plans.

In response to the unprecedented threats posed by climate change, CAP 2030 charts an accelerated path to net zero emissions for buildings and energy supply, and to significantly reduce GHG emissions for extended impact areas.

FIGURE 5: UBC Vancouver CAP 2030 Targets



A. Stationary Sources (Buildings)

UBC is continuously innovating to decarbonize its buildings and energy supply. Increased investments in expanding clean energy supply and energy-efficient technologies provide an opportunity for partnering with faculty researchers devoted to help advance innovation in these areas. UBC's role in affiliations (e.g. UC3, AASHE, ISCN, PICS)¹³ helps facilitate knowledge exchange to support rapid deployment of low carbon solutions. Continued financial support from the government and industry is also crucial for UBC to make deeper emission reductions with the increasing incremental cost of abatement of carbon.

Along with such innovation, we acknowledge there is also a need for future proof UBC's buildings to the impacts of climate change including heat waves, fires and floods, as made clear by the heat dome, devastating floods and UBC tornado. The UBC Green Building Action Plan¹⁴ (GBAP) includes many actions to accelerate higher levels of performance and commits UBC to a vision that by 2035, our buildings will make net positive contributions to human and natural systems. The GBAP includes new Climate Ready Building Requirements which ensures that designs of new buildings are resilient to more frequent and intense climate events.

¹³ UC3 - University Climate Change Coalition; AASHE - The Association for the Advancement of Sustainability in Higher Education; ISCN - The International Sustainable Campus Network; PICS - The Pacific Institute for Climate Solutions

¹⁴ <https://sustain.ubc.ca/campus/green-buildings/green-building-action-plan>

ENERGY SUPPLY

To mitigate present and future risks associated with changing climates and an evolving policy landscape, UBC has been taking actions to secure against volatility in conventional energy costs and changes in provincial and federal policy through a variety of projects in 2023. These projects build on past work to transition away from fossil fuels to cleaner sources of energy. In 2023, around 40% of total energy consumed on campus was provided by fossil fuels, down from about 66% in 2007.

Bioenergy Research and Demonstration Facility – Biomass Expansion

ACTIONS:
Since its start-up in 2012, the BRDF has been pivotal in reducing UBC’s GHG emissions. With the Campus Energy Centre, BRDF generates thermal energy for heating campus buildings. The BRDF is unique as the first project of this scale in North America capable of generating both clean heat and power using biomass, a plant-based, renewable energy alternative to fossil fuels. By replacing conventional fossil fuels, primarily natural gas, with biomass (clean and regional wood waste), the BRDF produces electricity and hot water that is distributed underground for use in campus buildings, reducing over 150,000 GJ of natural gas consumption annually (equivalent to the average natural gas consumption for around 1,800 households per year).

Based on this success, UBC has expanded the capacity of the plant. Once the new boiler is fully commissioned, UBC will triple the capacity of its overall biomass plant, energizing two thirds of the academic DES with renewable energy sources. This increase in capacity will further diminish UBC’s reliance on fossil fuels and lead to the reduction of an additional 13,000 to 15,000 tCO₂e each year. While the expansion is now operational, it only operated at part-load in 2023. A planned 6-month outage was undertaken to repair the biomass conveyor system which had been identified as a weak link in the system and been underperforming. With that portion of the conveyor system rectified, the grate-fired biomass boiler was repaired, recommissioned, and restarted to support reliable long-term operation. Unrelatedly, a tube leak occurred in the gasifier’s 12-year-old boiler economizer, resulting in only 50% operating capacity and further reducing the BRDF utilization in 2023.

PLAN:
Moving forward, further recommissioning and optimization of the grate-fired biomass boiler continues to progress. Continued reliable operation at 75% capacity is expected. Routine gasifier maintenance is expected to be finished in the second quarter of 2024, and by that time, the unit will operate at full capacity.



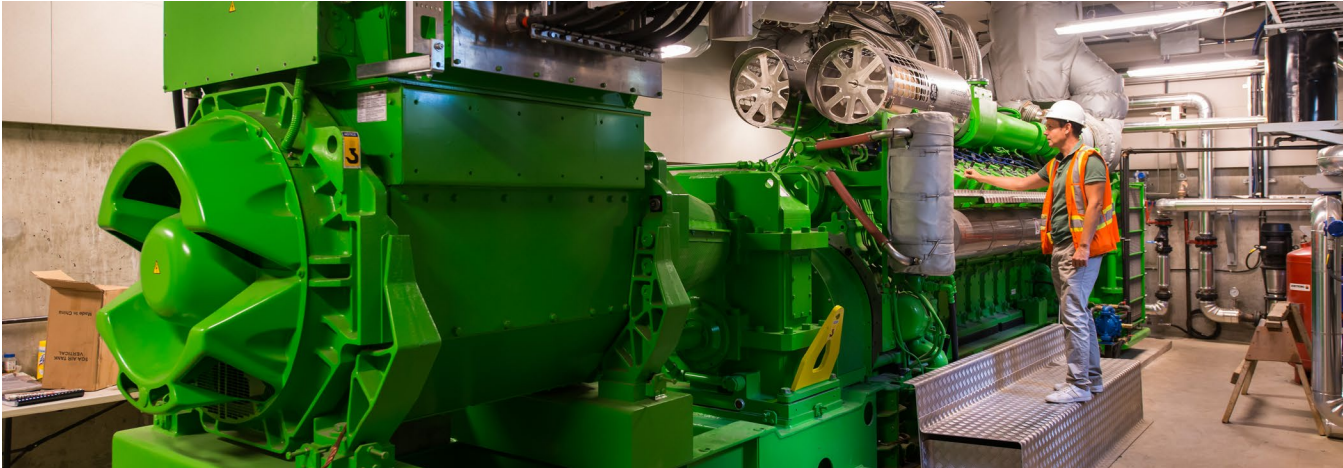
UBC Bioenergy Research and Demonstration Facility

Bioenergy Research and Demonstration Facility – Heat Recovery Project

ACTIONS:
Although the BRDF has been pivotal in UBC’s decarbonization of its DES, exhaust gases leaving the plant are at fairly high temperatures, producing heat that escapes into the atmosphere. In 2021, Energy and Water Services (EWS) started a project to capture this wasted heat and recycle it back into the DES. Two condensing economizers and heat pumps will be installed to capture and reuse wasted heat. A heat pump of this scale is a rarity in North America, and so the project has garnered funding from many sources: federal and provincial governments, and both FortisBC and BC Hydro.

PLAN:
For the upcoming economizer and heat pump project, key equipment has been purchased. Installation is expected by the first quarter of 2026. This initiative is expected to reduce natural gas and biomass consumption by 33,000 GJ. This will reduce GHG emissions by a further 1,700 tCO₂e per year.

A more robust thermal preventative maintenance system is being developed for the BRDF and Campus Energy Centre, further ensuring the reliability of long-term operations. This will ensure the plant is robust enough to provide UBC with low carbon energy to meet its operational and sustainability objectives.

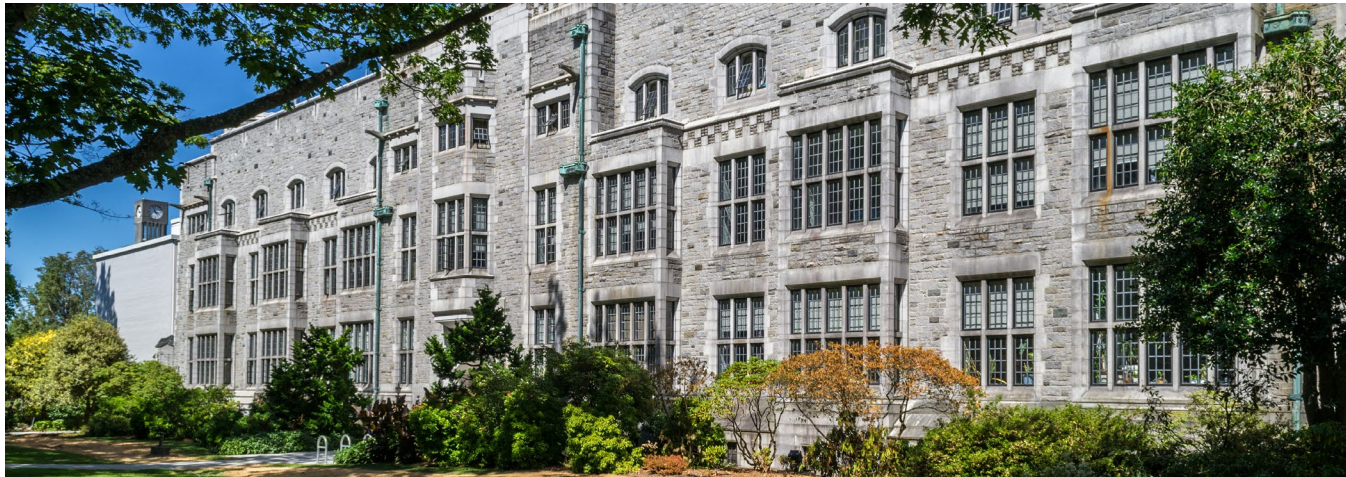


UBC Bioenergy Research and Demonstration Facility

Academic District Energy System Decarbonization

ACTIONS:
To advance toward CAP 2030 net zero emission goals, UBC is undertaking detailed design work to transition the academic DES to 100% clean and renewable energy by 2030, advancing one of the key commitments from the CAP 2030 strategy. Over the past year, UBC completed a detailed feasibility study, schematic designs and Level 4 costing of a large electric boiler and thermal storage project. This enabled the project to officially start UBC’s Major Capital Projects process in January 2024. Staff is also actively engaging with external partners for funding support, to successfully advance this "Big Lift" decarbonization project and help UBC achieve its climate goals while also forging an accelerated path for other higher educational institutions to follow.

PLAN:
With the completion of the BRDF and the heat recovery system described above, natural gas consumption will be further reduced to less than 250,000 GJ per year (equivalent to the annual average natural gas consumption for around 3,000 households), which will bring down the GHG emissions to 12,000 tCO₂e. UBC will continue to advance the electric boiler and thermal storage project as well as a third waste heat recovery project to transition the DES system to 100% clean energy by 2030. The focus over the next year will be on identifying funding opportunities and advancing the project through UBC’s capital process.



UBC Chemistry Building

EXISTING BUILDINGS

ACTIONS:

Many UBC buildings have undergone retrofits over the years which provide pedagogical updates and significantly improve building seismic performance, target energy, operational and embodied emissions reductions and improve occupant thermal comfort considering future climate change events (i.e. heat domes). For the Jack Bell building, its design process for a comprehensive renewal which will address important pedagogical changes was completed and approved in 2023. Construction is anticipated to begin in early 2024. The replacement of outdated mechanical and electrical systems and envelope upgrade to a high energy performance standard will support UBC's CAP 2030. The renewal of the building will achieve a 58% reduction in the embodied carbon compared to replacement with a standard new build.

In 2023, EWS Energy Conservation Group completed several projects to conserve thermal, electrical, and peak demand at UBC. The first project involved installing better controls in one of UBC facilities so that exterior radiant heating could be turned on and off only when needed by the building manager. Occupancy sensors were also installed in six buildings on campus to allow for better heating and cooling control. These projects will save the university 300 MWh in electricity and 1,200 GJ of thermal energy per year.

EWS has also been working to add variable speed drives to the main distribution heating pumps on campus, allowing for better flow control and saving energy. In addition to the variable speed drives, EWS has worked internally to program a supply temperature reset schedule on the DES to provide buildings on campus with adequate heat while optimizing return temperature to our main heating plants.

PLAN:

To inform the implementation and resource requirements of the CAP 2030, UBC is undertaking several consulting studies, including in partnership with CleanBC and BC Hydro, such as examining low-carbon electrification pathways for a variety of UBC buildings. UBC EWS continues to update the Strategic Energy Management Plan (SEMP) outlining future energy conservation projects within existing buildings which include:

- Continuing LED re-lamping; and further participation in BC Hydro's Continuous Optimization Program;
- Pursuing additional building retrofits and renewals (e.g. through seismic upgrades) to achieve further reductions in GHG emissions, energy and water;
- Supporting UBC Sustainability & Engineering to deliver climate action and engagement programming to students, staff, and faculty to encourage energy

conservation within buildings and to advance a culture of sustainability across the UBC community; and

- Advancing technical studies and designs to decarbonize the remaining carbon intensive buildings on campus. The goal is to have a "shovel ready" list of projects, to be able to take advantage of end-of-life replacement opportunities. It is our experience that there is often not enough time to do the design work and identify incremental funding once equipment starts to show signs of failure, risking locking-in new fossil fuel equipment for several decades.

NEW BUILDINGS

ACTIONS:

The Gateway building project, currently under construction at the corner of Wesbrook Mall and University Boulevard, has achieved Zero Carbon Building Certification (Design) which demonstrates the building is designed to be low carbon. The embodied carbon has been reduced by 27% compared to a reference building thanks to the hybrid wood structure and careful choice of materials. The project co-locates the schools of nursing, kinesiology, language science and UBC health clinics, and will be a gateway to the university. The project team is working closely with the Musqueam to meaningfully include culture and value in the project. The project has been awarded a 2021 Canadian Architect Award of Excellence.

PLAN:

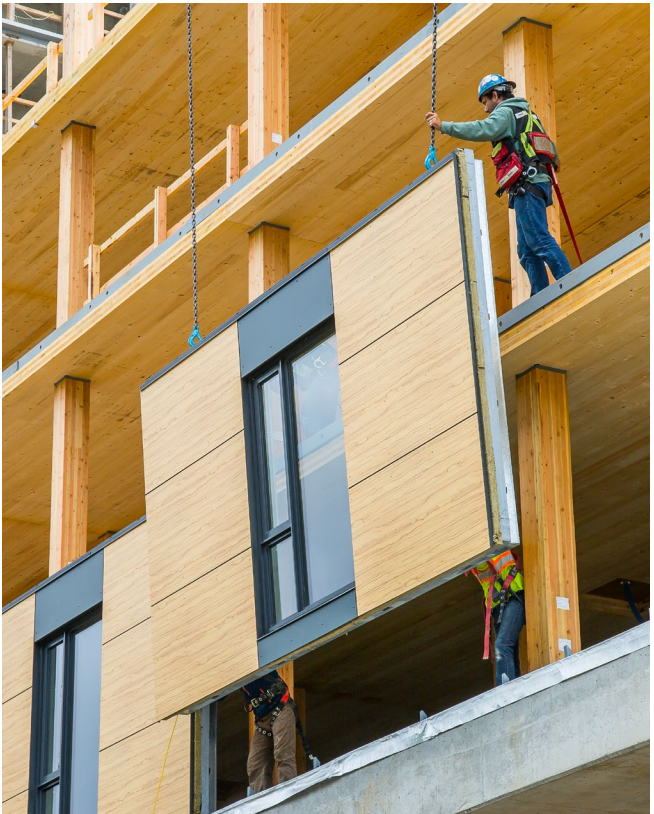
Through the GBAP, new buildings are required to meet operational emissions and embodied carbon reduction targets and be designed to address occupant comfort, health and safety in future climate. The following has been developed under the GBAP in 2023:

- UBC has developed energy and emissions targets¹⁵ for new buildings which align with CAP 2030 and will significantly reduce campus emissions in the future.

- An embodied carbon pathway was developed for new building and renewals to meet an ambitious reduction target, 50% below a reference building by 2030. To align with this pathway, UBC will also re-visit the GHG accounting methodology for building lifecycle in the near future.
- UBC has Climate Ready Requirements to ensure buildings are designed to be adaptable to the future climate.

New building designs and major renovation projects will follow these guidelines which will help reduce future building energy use and emissions over time and support CAP 2030.

UBC will also carry out the Climate Resilient Buildings Project in the coming year to address climate resiliency. This project aims to align UBC's policy with CleanBC's Climate Resilience Framework and Standards to future proof UBC buildings in light of climate change while simultaneously reducing GHG emissions.



New construction on UBCV Campus

¹⁵ <https://planning.ubc.ca/sustainability/sustainability-action-plans/green-building-action-plan/institutional-building-requirements/institutional-energy-and-carbon-targets>

B. Mobile Sources (Fleet)

ACTIONS:
While UBC’s fleet of vehicles and motorized equipment has a relatively small impact on overall GHG emissions, vehicles are a highly visible part of UBC’s operations and internal combustion engine vehicles create local air quality impacts. UBC is responding to emerging technologies and transportation options in several ways, including actions to support the transition to electric and hydrogen vehicles and prepare for autonomous vehicles by continuing to invest in electric vehicle charging infrastructure across campus including fast chargers, evolving parking management practices, and supporting research collaborations and pilots exploring autonomous vehicles and related technologies.

UBC’s fleet emissions were up by 16% in 2023. This was largely a result of 2023 being the first full year since COVID where classes were back in person, increasing fleet activity related to campus operations and maintenance. On the positive side, electric vehicle charging at UBC at public and UBC fleet specific EV chargers grew by 73% compared to 2022, increasing to 330,000 kWh.

PLAN:
UBC aims to develop a Zero Emission Fleet policy as part of the CAP 2030 implementation. We are currently working with a consultant to develop a detailed fleet decarbonization strategy. UBC will continue to procure new vehicles and equipment that are zero emissions where feasible; with a replacement strategy to continually assess requirements against alternative fuel vehicles available in the market; consideration to defer replacements until alternative fuel vehicles are available, as well as rightsizing.

The UBC Renewable Energy Hub was completed. This is the first in Canada integrated hydrogen refueling station and renewable energy system. This \$23 million project will showcase scalable green hydrogen generation and system integration to deliver the fuel to end users. This can help UBC reach zero emission fleet targets and drive critical learnings needed for the broader energy transition.



Electric vehicle charging

C. Paper Consumption

ACTIONS:
UBC applies the sustainability vision and goals to all UBC business decisions affecting the supply of services, goods and equipment for operational needs and related transactions. UBC has established a Sustainable Purchasing Guide, a Supplier Code of Conduct, and is working to integrate sustainability into scoring criteria for all major bids. The Sustainability Purchasing Guide is designed to help UBC staff and faculty members or students, to purchase sustainable goods and services. The guide supports the adoption of UBC’s Sustainability Priorities and reflects a triple-bottom-line approach that balances best value, social equity and environmental protection.

The UBC Vancouver campus community is encouraged to procure paper made from alternative fibre paper or paper with a minimum of 30% recycled content and eco-certified. Around 35% of paper sourced for UBC Vancouver Campus consisted of 30-100% recycled content.

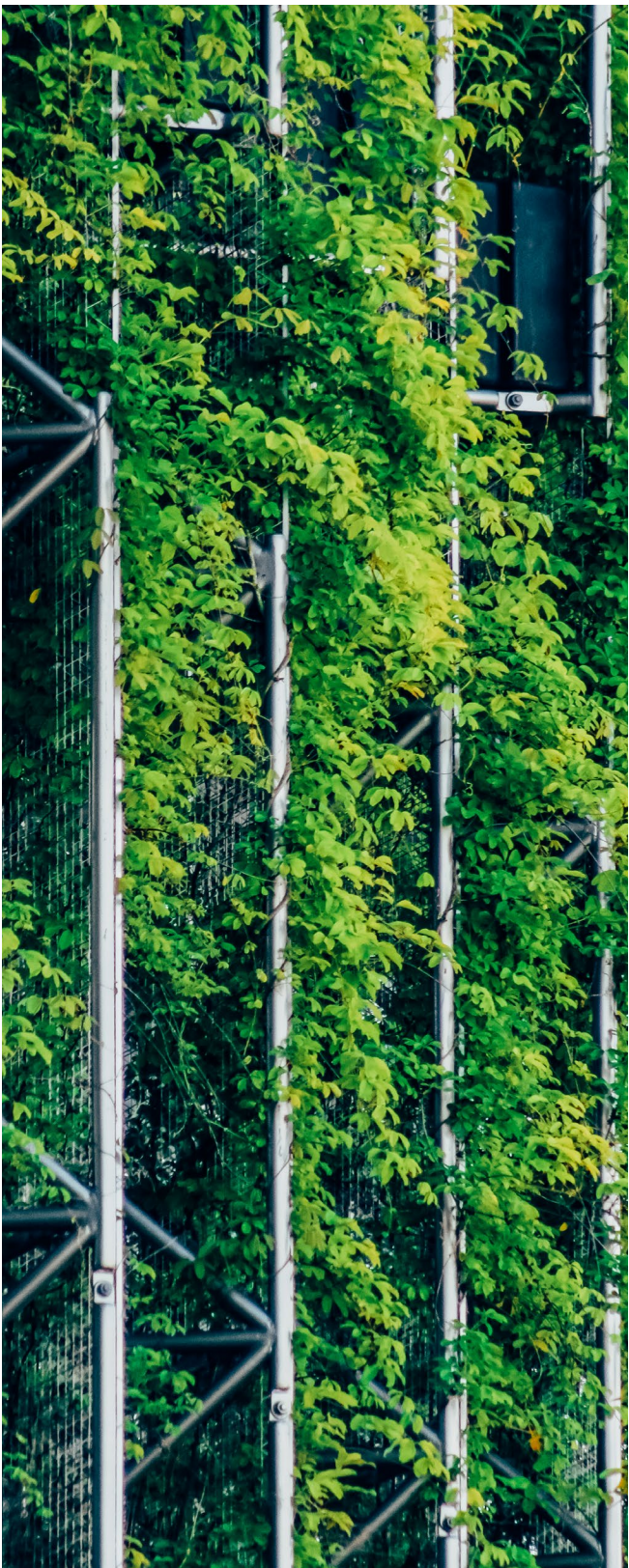
PLAN:
UBC continues to promote the Sustainable Purchasing Guide to the campus community, especially for the departmental and unit administrators, and the network of Sustainability Coordinators across campus.

D. Fugitive Emissions

ACTIONS:
The UBC Technical Guidelines address mitigation for leak detection and prevention of refrigerant loss, which are leading causes of fugitive GHG emissions. UBC Safety and Risk Services has developed specific pollution prevention policies, procedures and forms which aim to ensure compliance with the Environmental Management Act, Ozone Depleting Substances and Other Halocarbons Regulation, and Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems. This has improved communication with UBC operational departments/teams who manage refrigeration/air conditioning equipment on campus. UBC keeps comprehensive, up-to date inventories of refrigeration equipment, and refrigerant releases, including annual top-up volumes.

In 2023, refrigerant leaks were up materially in 2023, accounting for 3% of total offsetable emissions. The significant leaks were found in several Variable Refrigerant Flow heat pump systems, including at the Saltwater and Orchard Commons residences, and a circuit discharge at a heat recovery chiller in Life Science building. The regular maintenance undertaken has identified and rectified the leaks to minimize the emissions.

PLAN:
With increasing heat pump and air conditioning adoption, refrigerant leaks present an upward pressure on GHG emissions. Due to their long refrigerant lines, Variable Refrigerant Flow systems pose a particular challenge. This increases the amount of total refrigerant in the system while also increasing the risk of a leak due to puncture or other failures. UBC is committed to working with internal and external partners to identify installation and maintenance protocols to reduce the risk of leaks and to transition to lower GWP refrigerants. It is important to address this as heat pumps are seen as a key technology for successful decarbonization. Meanwhile, UBC will continue to replace inefficient and older equipment and upgrades to refrigeration/air conditioning equipment.



PUBLIC SECTOR LEADERSHIP



UBC Beaty Biodiversity Museum Garden

A. Climate Risk Management

UBC studies climate risk or takes actions to manage such climate risk in capital planning, asset management, infrastructure upgrades and strategic planning. Consideration is taken when determining strategy for end-of-life assets, while asset management risk assessment is considered for upsizing of infrastructure to deal with climate-related changes. Furthermore, climate change is incorporated into the assessment of infrastructure for capital works and is included in building design.

UBC has undertaken several climate action planning processes in the past that have focused primarily on climate mitigation. The new CAP 2030 commits to the development of a climate adaptation resiliency, and biodiversity strategy. Specific actions have also been identified in the GBAP to assess issues from a coordinated climate mitigation and adaptation lens. For example, considerations for campus cooling strategies are being investigated in addition to future demand on UBC’s district energy system. Also, UBC Technical Guidelines include selection of ventilation strategies that are passive or natural where possible.

UBC is currently in the process of updating its Integrated Rainwater Management Plan to further reduce the risk of flooding, cliff erosion and the amount of rainwater sent directly to the ocean. An assessment of critical service infrastructure has also been undertaken in relation to natural catastrophe and redundancy in certain areas, such as potable water, firefighting water and emergency diesel fuel.

UBC transportation network is reviewed from a priority access perspective annually, and recent climate events flagged critical access points and the need to ensure emergency and public transit access. Providing more affordable and climate resilient housing on campus for students, staff and faculty is also a priority that reduces the demands on a constrained regional transportation system.

UBC’s Enterprise Risk Assurance (ERA) Group provides trusted and impactful risk and assurance insights to enhance and protect the institution, and to advance a culture of risk informed decision making. They work in conjunction with specific groups to provide an overarching risk assessment portfolio. The ERA Group maintains the University’s Major Risk Register which

identifies, assesses and manages all major risks – The Major Risk Registry will be updated with significant climate related risks as they are identified.

B. Other Sustainability Initiatives & Success Stories

A number of broader sustainability initiatives are underway at UBC Vancouver, with a specific focus on reducing Scope 3 emissions to achieve the new CAP 2030 target of a 45% overall reduction in these emissions by 2030. Key 2023 highlights and successes include:

PLANNING AND ADVOCACY FOR SKYTRAIN TO UBC

Planning for the proposed Millennium Line UBC Extension will continue. Extensive work on designing and planning has been kicked off in 2023. With continued regional and senior government support, the

SkyTrain connection to UBC could open by the early 2030s, reducing transit commute times by as much as 20-25 minutes each way and GHG emissions from commuting to campus.

COMMUTE SMART UBC

Commute Smart UBC is an ongoing initiative to encourage the UBC community to make smart, sustainable and healthy commute choices. The program includes an on-line trip planning tool, regular outreach via social media channels and engagement programs such as:

- UBC’s campus-wide **Bike Share Program** offers a sustainable and active way for residents, students, workers and visitors to get to, from and around UBC’s 400-hectare campus. The program was expanded in 2023 to include electrified stations integrated with the City of Vancouver’s shared bike and e-bike program. There are now over 300 bikes and e-bikes available for use on campus.



UBC Go by Bike Week

- **Go by Bike Week** is a bi-annual initiative that celebrate cycling and encourage everyone in Metro Vancouver to give cycling a try. UBC workplace units compete as teams for awards, including the longest cumulative distance cycled, longest distance cycled per rider, and most new participants. In 2023, roughly 300 UBC riders across 50 teams participated in each Go by Bike Week event, logging over 50,000 kilometres total. UBC consistently ranks as a top organization regionally for its participation.
- UBC's **Carpooling Program** aims to bring more people to campus in fewer vehicles by helping drivers and riders to connect and commute together. UBC works with Liftango to incentivize carpooling. The service is free to the UBC community and UBC has created reserved stalls around campus for people who use Liftango to carpool to campus.

BUSINESS AIR TRAVEL

The UBC Sustainable Travel Program supports the goal of reducing UBC's business air travel emissions by 50% from pre-COVID levels by 2030 and aims to inspire other organizations to take similar actions. Outreach and engagement activities feature sustainable travel best practices and involve a diverse network of staff and faculty.

CLIMATE FRIENDLY FOOD SYSTEMS

The SEEDS¹⁶ sustainability team within UBC Campus and Community Planning are collaborating on many climate friendly food research initiatives in partnership with UBC Food Services and AMS. UBC aims to develop a Food System Resilience & Climate Action strategy to advance climate-friendly foods and introduce an updated procurement guideline for campus food providers. In 2023, Climate Friendly Food System Procurement Guidelines have been created to help inform UBC's food purchasing decisions with the goals of: 1) reducing food GHG emissions, 2) promoting biodiverse, resilient & regenerative food systems, and 3)

supporting just, sovereign and resilient communities.

This year, UBC's Climate Friendly Food (CFF) Labels were expanded across UBC's campus outlets to provide the campus community with an opportunity to learn more about how their choices can help reduce the university's overall GHG emissions and help create a more sustainable food system. The CFF Label is now displayed and fully integrated into all the UBC Food Services All Access Dining halls and piloted at UBC's Student Society the Alma Mater Society (AMS) Galley food outlets, with hundreds of recipes evaluated for their environmental impact.

SEEDS KNOWLEDGE EXCHANGE EVENTS

SEEDS launched a series of knowledge exchange events to engage the UBC community in urban biodiversity initiatives. In particular, SEEDS organized a knowledge exchange event during AMS Sustainability Week to shine a spotlight on the prevalence of single-use cup and container use across UBCV campus while gauging public awareness of fees associated with these disposable items. Students, faculty and staff engaged in conversations about the benefits of switching to reusable cups and containers, aiming to reduce waste and emissions, as well as lower consumer costs due to mandatory fees on disposables.

ZERO WASTE ACTION PLAN - COMMUNITY ENGAGEMENT

In 2023, the new Zero Waste Action Plan 2030¹⁷: Towards a Circular Economy was completed and endorsed by the UBC Board of Governors, setting out new targets and more strongly prioritizing waste reduction in alignment with CAP 2030 targets and circular economy opportunities including sustainable procurement and reuse.

Community engagement to support Zero Waste Action Plan 2030 continued through 2023, including a novel approach to engaging community members through "talking" recycling bins, that interact with users via



UBC Green Labs Program

phone text. Zero Waste student staff and Zero Waste Squad volunteers continued their outreach and support of many groups and events across campus to foster waste reduction and diversion. UBC also engaged with the community on reducing food waste, a significant source of greenhouse emissions.

Additionally, the reuse-it!¹⁸ UBC online platform for exchanging and reusing lab equipment, office supplies, and goods at UBC was revamped with a new, more powerful interface, and a promotional campaign has been initiated. Since its relaunch, usage has already increased dramatically by over 4-fold. UBC will continue evaluating this and other platforms as well as options to expand the scope of this project including both campuses and external buyers like other educational institutions and nonprofit organizations.

In 2023, UBC also launched a Furniture Reuse Program and Zero Waste Market. By reimagining furniture waste as a reusable and valuable resource, the Furniture Reuse Program has kept over 1,500 furniture items (51 garbage trucks) from disposal, avoided 95 tCO₂e, and saved around \$1,000,000 in cost-avoidance.

GREEN LABS PROGRAM

Green Labs helps researchers to take climate action and combat the high level of energy consumption of laboratories. It provides lab recycling options to help segregate lab-specific waste, promotes sustainable purchasing, and hosts interactive challenges between lab buildings. In 2023, the Green Labs Fund supported two new projects:

- UBC's Department of Electrical and Computer Engineering received \$4,000 to promote sustainable AI research by developing and implementing carbon footprint monitoring software for AI model training and producing guidance for model training efficiency.
- The Museum of Anthropology at UBC received \$4,000 to design, test and build equipment that allows for the reuse of high-quality exhibition mount and mount offcut materials.

¹⁶ <https://sustain.ubc.ca/teaching-applied-learning/seeds-sustainability-program>

¹⁷ https://planning.ubc.ca/sites/default/files/2023-08/230608_ZWAP.pdf

¹⁸ <https://reuseit.ubc.ca/>

Green Labs also drives UBC laboratories to reduce waste and save energy through different programs, including:

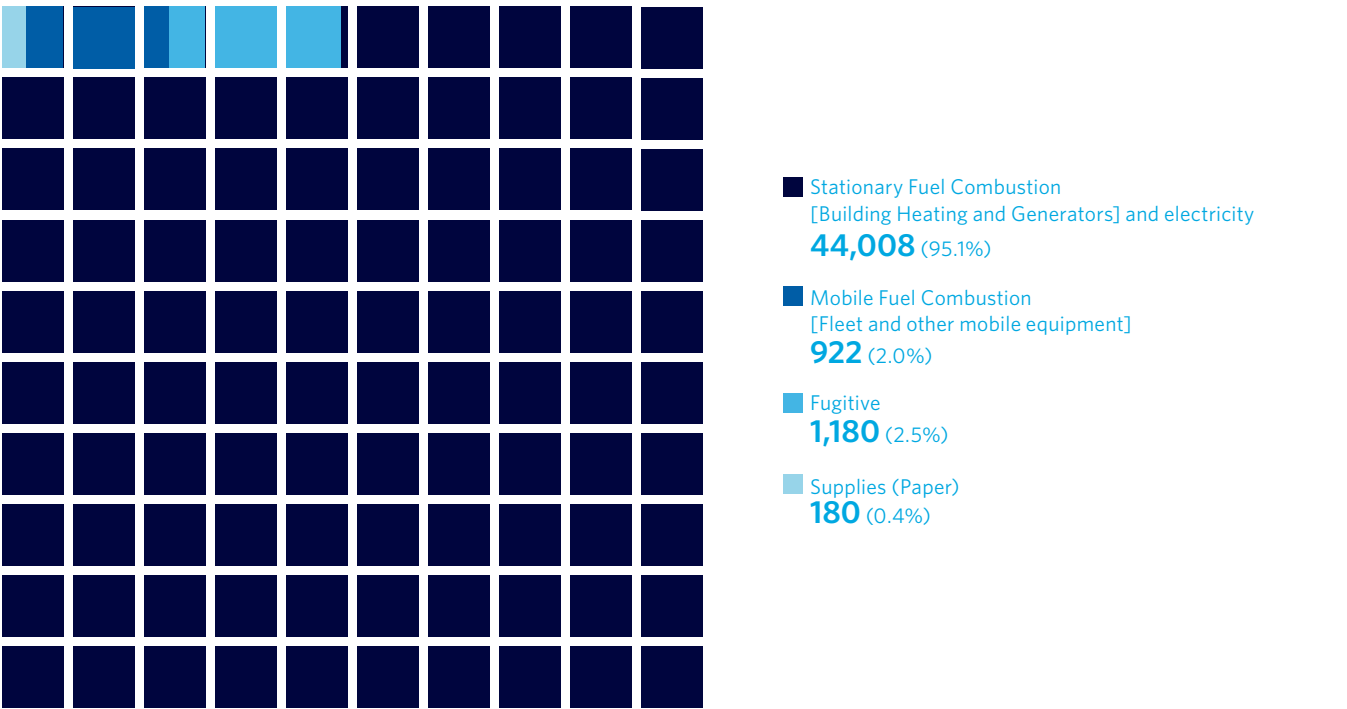
- **Styrofoam Recycling** program aims to reduce Styrofoam packaging in UBC core research laboratories, by working with suppliers to find Styrofoam alternatives, and by providing a convenient means of recycling Styrofoam on campus. In 2023, 6,300 kg of Styrofoam was recycled through the program.
- **Amber Glass Recycling** program helps reduce UBC’s solid waste stream and its associated GHG emissions by providing an opportunity for laboratories to recycle non-hazardous glass containers that would otherwise be sent to the landfill for disposal. The collected amber glass bottles are recycled into new bottles or ground into sand-blasting material. In total, 7,850 kg of UBC’s Point Grey campus lab glass was diverted from landfill in 2023.
- **Glove Recycling** program helps laboratories at UBC to collect and recycle gloves. In 2023, roughly 261,000 gloves were collected and recycled into plastic pellets used for building and construction supplies, diverting 1,335 kg of waste from landfills.
- **Lab Plastics Recycling** program helps divert 128 tonnes of plastics generated by UBC laboratories from the landfill every year by encouraging recycling of accepted plastic products. This year, 15 additional laboratories signed up for this program, adding 33 recycling bins to buildings across campus.
- **Gel Ice Pack Recycling** program diverts ice packs received with scientific supply shipments from landfill each year. In collaboration with Spud, the ice packs are collected in the Life Sciences Centre and donated to third parties, ensuring that sanitized packs can be reused indefinitely. In 2023, about 7,475 ice packs were donated through this program, more than double that of last year. Around 17,500 packs in total were diverted since inception.

- **International Freezer Challenge** is an annual competition for researchers to promote energy efficiency in cold storage management. The challenge covers all forms of cold storage, including refrigerators, freezers and cold rooms. Participants cleaned out old freezers, scheduling preventative maintenance, cleaning condenser coils and “Chill Up” ULT freezers – adjusting setpoints from -80°C to -70°C. In 2023, participating labs saved an estimated 142 kWh/day, the equivalent of 241 chest freezers.



GHG EMISSIONS BY SOURCE

FIGURE 6: UBC Vancouver Total Emissions by Source (Vancouver Campus, Off-campus Properties, and UBCPT) for the 2023 Calendar Year (tCO₂e*)



TOTAL EMISSIONS: 58,556

Offsets Applied to Become Carbon Neutral in 2023 (Generated on April 15, 2023)
Total offsets required: 46,290
Total offset investment (inc. GST): \$1,215,113
Emissions which do not require offset**: 12,266

* Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.
** Under the Carbon Neutral Government Regulation of the Greenhouse Gas ReductionTargets 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 CAMPUS



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’lsmist, 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.

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Executive Summary



In 2023, UBC’s Okanagan campus reported an 18 per cent, or 551 metric tons of carbon dioxide equivalent (tCO₂e), reduction in absolute greenhouse gas (GHG) emissions from the previous year. This decrease is largely related to the milder weather experienced in the Central Okanagan region in 2023 which led to a

decrease in heating demand compared to 2022. While weather conditions facilitated 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.

Over the past year, the campus continued developing and putting into action energy and carbon reduction projects that support and align with CleanBC, and advance progress toward the 65 per cent reduction in operational emissions by 2030 targeted by the **UBCO Climate Action Plan 2030 (CAP 2030)**. Ongoing implementation of CAP 2030 includes actions to accelerate the reduction of operational emissions and measures to reduce emissions in areas of extended impact, including commuting, food, waste, embodied carbon and business air travel.

Key projects initiated in the last year include the development of the **UBCO Green Building Standards**, which will facilitate implementation of UBCO’s existing green building policies through consolidation, clarification and streamlining requirements. The **Strategic Energy Management Plan (SEMP)** updated in 2023, provides the pathway to achieving UBCO’s operational carbon reduction targets while simplifying building operations, maximizing resilience and providing a foundation for the integration of other low-carbon energy sources into the campus district energy system in the future. New capital projects underway including **UBCO Downtown**, **Łəl síc snpáxnwix*tn**, and a new **Child Care Facility** each provide innovative approaches to reduce operational energy and carbon

loads aligned with UBCO’s green building and sustainability policies and guidelines.

Looking forward, a significant **CO₂ Air Source Heat Pump project** will be advanced in 2024. This innovative project will address environmental concerns by removing the need to use traditional refrigerants for cooling, provide significant efficiency improvements (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 tCO₂e annually.

Additional projects that will be undertaken in the coming year to address climate resiliency include 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. Building on the recently completed Multi-Hazards Assessment, the campus will also develop an **Infrastructure Resilience Plan** to identify the actions needed to address risks and identify high-priority projects for implementation.

The campus will also continue to work to create an **enabling environment** and opportunities for **collective community engagement** to advance actions that can be taken on the part of students, faculty and staff to reduce greenhouse gas emissions in support of CAP 2030.

Rob Einarson
Associate Vice-President Finance and Operations
UBC Okanagan

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 reduce our GHG emissions and our plans to continue reducing emissions in 2024 and beyond.

By June 30, 2024, UBCO’s final 2023 PSO Climate Change Accountability Report will be posted to our website at sustain.ok.ubc.ca/reports/#CCAR.

2023 Emissions Overview

GHG Emission and Offsets summary

GHG emissions for the period January 1 – December 31, 2023	
Total BioCO ₂ e (tCO ₂ e)	155
Total Emissions (tCO ₂ e)	2,534
Total Offsets (tCO ₂ e)	2,379
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO ₂ e)	0
Grand Total Offsets for 2023 Reporting Year	
Grand Total Offsets (tCO ₂ e) to be Retired for 2023 Reporting Year	2,379
Offset Investment (\$25 per tCO ₂ 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 tCO₂e 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 ₂ e)		2023 Emissions (tonnes CO ₂ e)		Changes from 2022 to 2023	
Buildings	2,931	95%	2,382	94%	-19%	-549 tCO ₂ e
Fleet	53	1.7%	52	2.1%	-2%	-1 tCO ₂ e
Paper	14	0.5%	13	0.5%	-7%	-1 tCO ₂ e
Fugitive Emissions	87	2.8%	87	3.4%	0%	0 tCO ₂ e
Total Emissions *	3,085	100%	2,534	100%	-18%	-551 tCO ₂ e
Total Offsets	2,930	100%	2,379	100%	-19%	-551 tCO ₂ e

* 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 tCO₂e. As part of the UBCO’s 2023 GHG emissions profile, 155 tCO₂e 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 (tCO₂e). 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 snpaʔnwix*ʔn, 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 snpaʔnwix*ʔn 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 **CO₂ Air Source Heat Pump (ASHP)**¹

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 tCO₂e 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 tCO₂e;
- 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 CO₂ 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 tCO₂e 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 tCO₂e 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 tCO₂e. 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 ʔəl sic snpaʔnwix*ʔn 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 Aircuity 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

¹CO₂ Air Source Heat Pumps are heating and cooling systems that use carbon dioxide (CO₂) as a refrigerant instead of traditional refrigerants such as hydrofluorocarbons (HFCs) or chlorofluorocarbons (CFCs).

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 m² 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 tCO₂e 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

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 tCO₂e, or two per cent of the campus' total emissions. This is a two per cent or one tCO₂e 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 tCO₂e. 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 tCO₂e 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 kgCO₂e and saved 3.19 trees.

D. Fugitive Emissions

Hydrofluorocarbon (HFC) emissions accounted for three per cent of total campus emissions, or 87 tCO₂e, 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.



Rendering of ʔal sic snpaʔnwix*tn courtesy of HCMA and Kieran Timberlake.

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 **CO₂ ASHP** through the Geo-Exchange upgrade project that supports the decarbonization of the campus' district energy system; and,
- Extending **UBCO's ǰǰ sic snpaǰnwix"tn's four-pipe infrastructure study**, which will serve heating and cooling demands of surrounding buildings from the future ǰǰ sic snpaǰnwix"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 38,581m² 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, **ǰǰ sic snpaǰnwix"tn** was designed with a focus on collaboration, interdisciplinarity and Indigeneity. The 13,185 m² 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 ǰǰ sic snpaǰnwix"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 ǰǰ sic snpaǰnwix"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 CO₂ 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

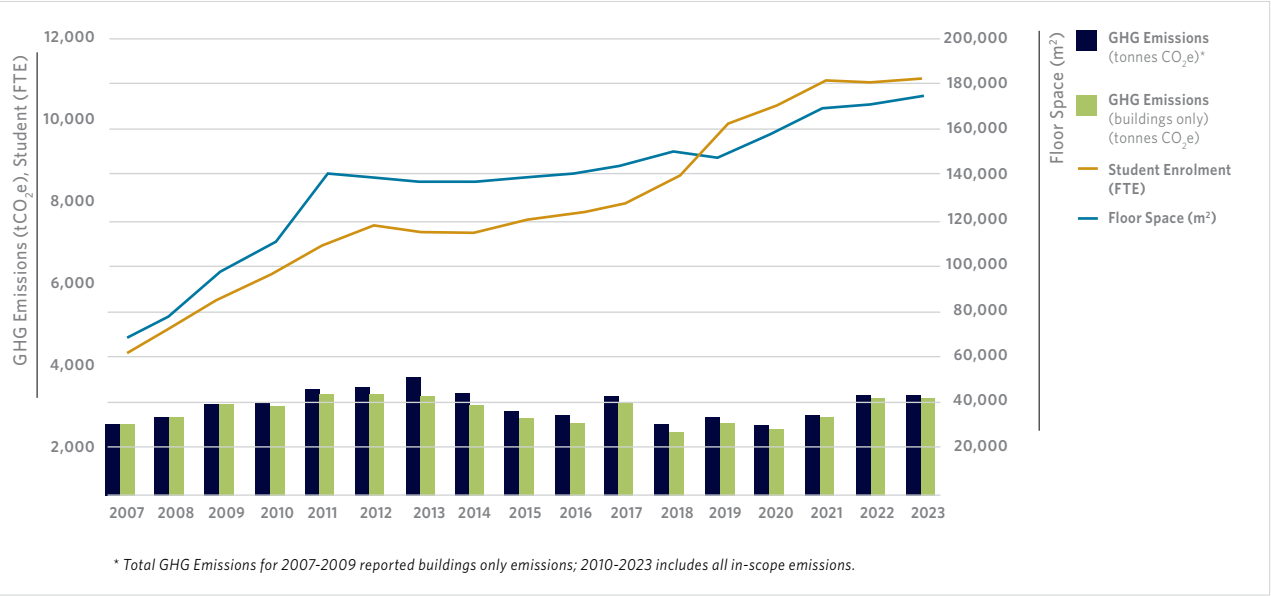
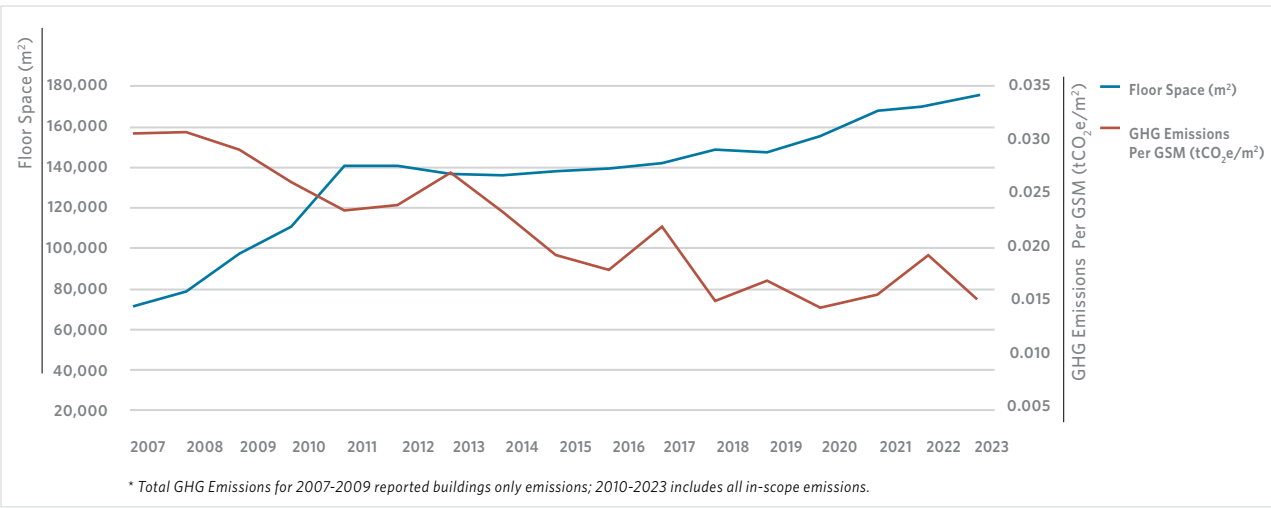


Figure 2 GHG Emissions Intensity Relative to Building GSM: 2007-2023



Climate Risk Management

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.

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 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.

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**.

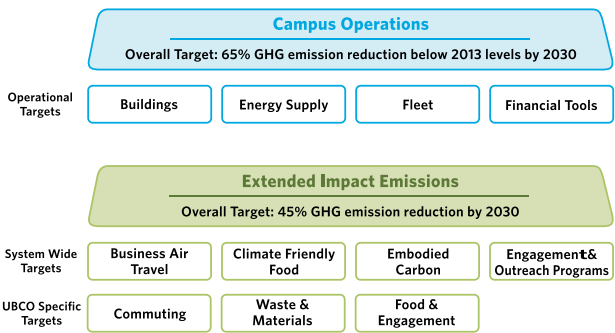


Climate Policy Implementation

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.

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,

- 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.

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.

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 kgCO₂e. 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 CO₂ ASHP system at the Geothermal building on campus. These systems use CO₂ 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 tCO₂e 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.

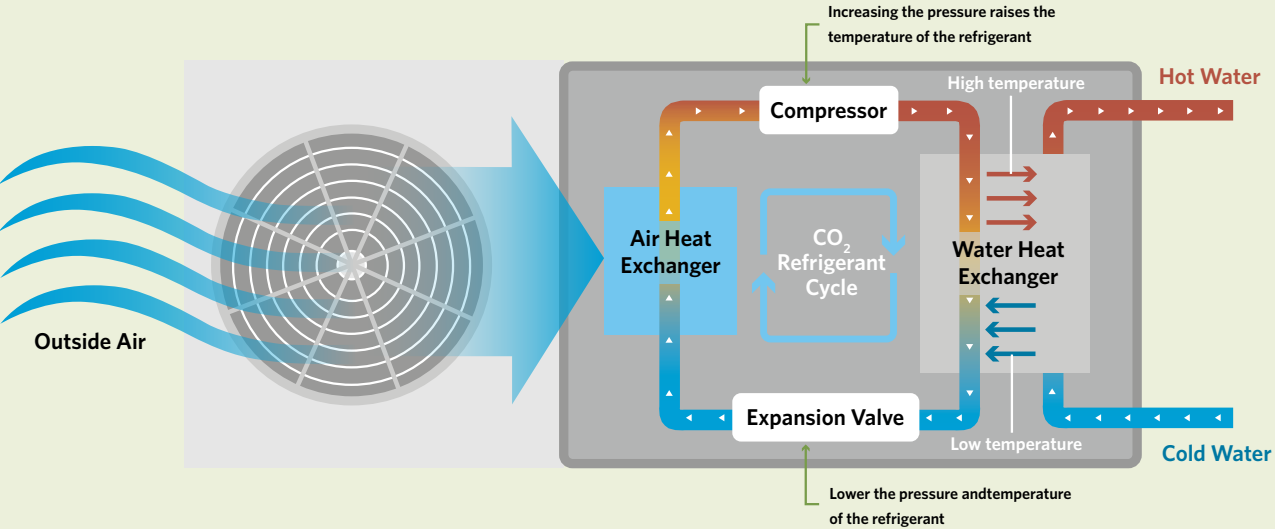


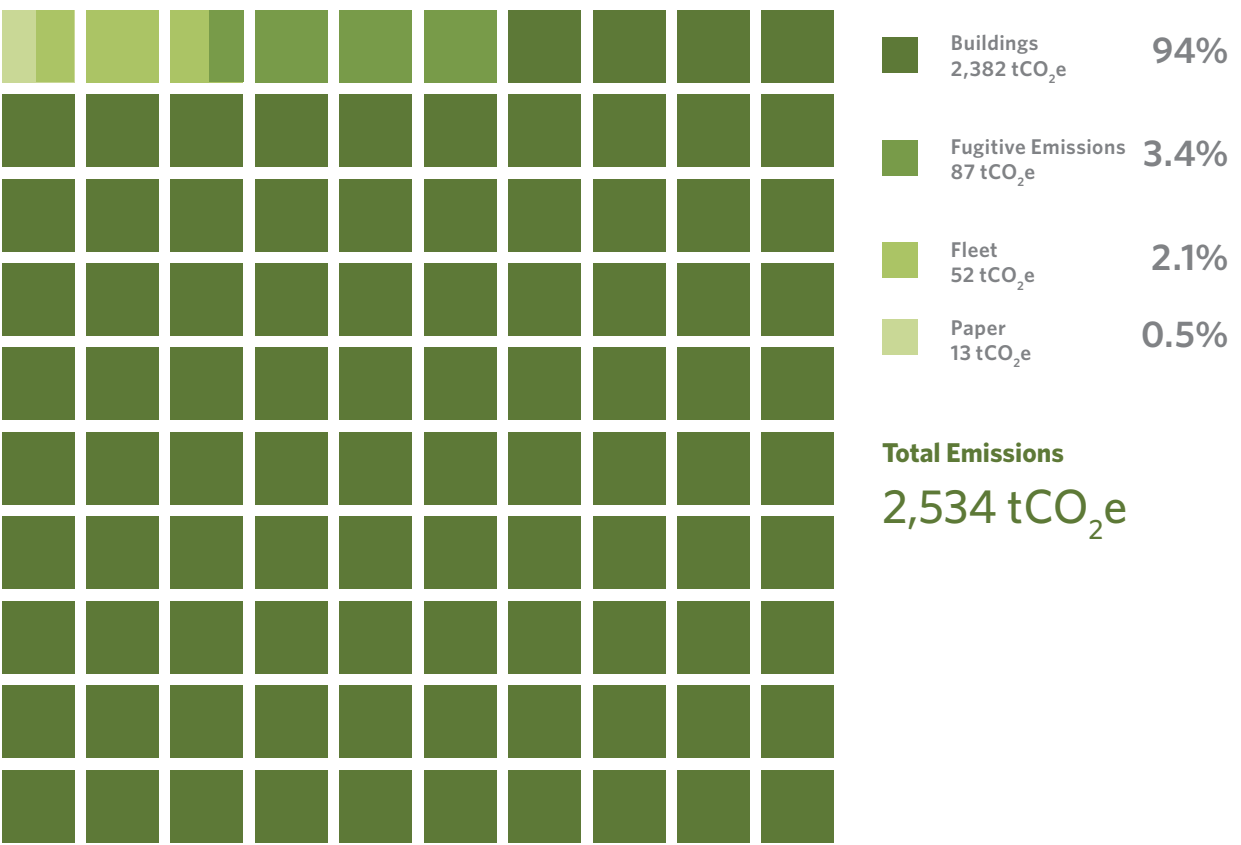
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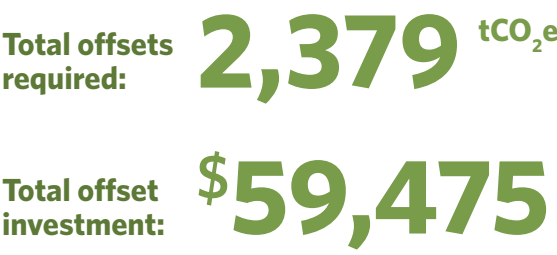


Emissions Profile 2023

UBC Okanagan Greenhouse Gas Emissions by Source for the 2023 Calendar Year (tCO₂e*)



Offsets Applied to Become Carbon Neutral in 2023



Emissions which do not require offsets: 155 tCO₂e**. Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit of measure in which all types of GHG are expressed based on their global warming potential relative to CO₂.

** 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.



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