

2022

# PSO Climate Change Accountability Report

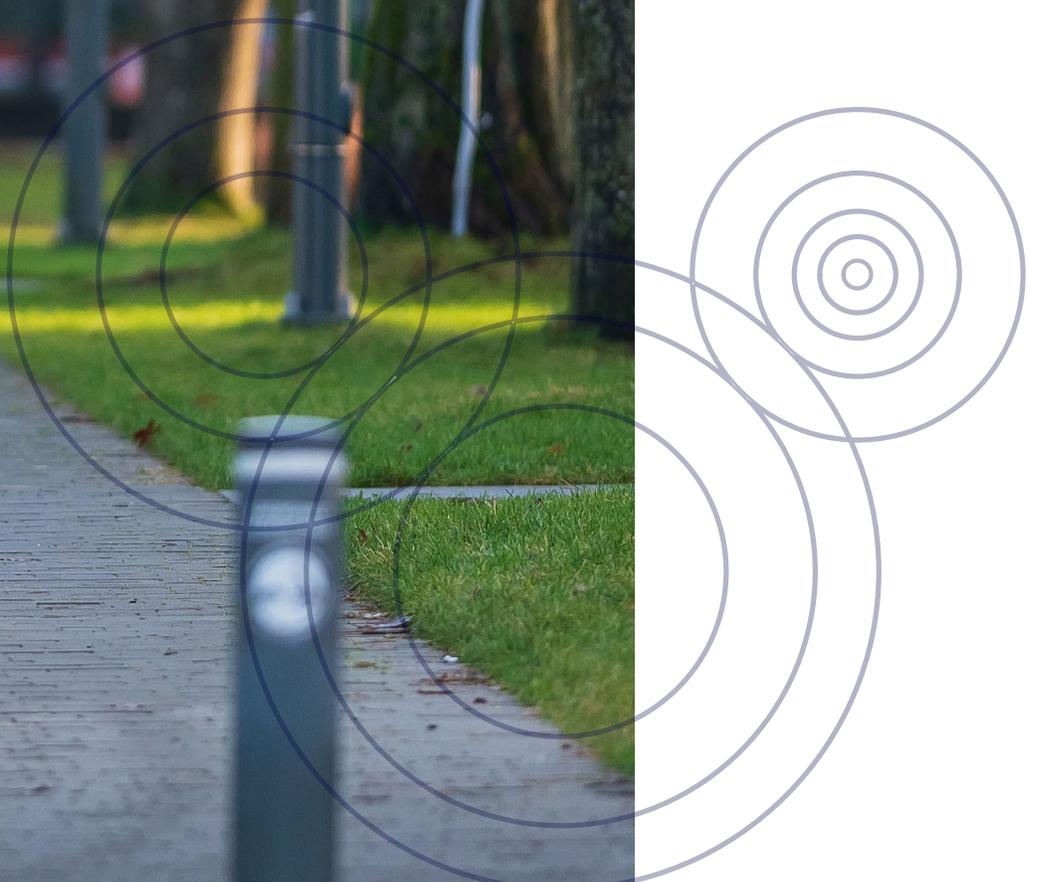






# 2022 PSO CLIMATE CHANGE ACCOUNTABILITY REPORT

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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 consistently ranks as a top 10 university among more than 1,500 participating global universities in the Times Higher Education Impact Rankings for climate leadership. 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 60,000 students and employ over 17,000 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](https://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](https://sustain.ok.ubc.ca/reports)

# EXECUTIVE SUMMARY

The endorsement of the UBC Vancouver and Okanagan Climate Action Plans 2030 (CAP2030) by the Board of Governors in 2021 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 emissions<sup>1</sup>. CAP2030 aligns, and in some case surpasses, the 2030 emissions reductions required to achieve the Paris Agreement<sup>2</sup> goal of keeping global temperatures within 1.5°C.

UBC continues to demonstrate innovative approaches to address climate change through strong collaborations between academic researchers, operational staff as well as 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 Climate Emergency Declaration<sup>3</sup> recognized the severity, complexity, and disproportionate impacts of, and responsibilities for, climate change. This Declaration committed UBC to develop a systems response that embedded climate justice throughout its activities and priorities. Climate action continues to be a top strategic priority for UBC.

In 2022, UBC achieved a combined 37% reduction in total offsetable greenhouse gas (GHG) emissions across both campuses when compared to 2007 emissions; despite an overall 33% growth in floor space, 53% increase in student enrolment and the more intense use of campuses after COVID-19. Overall, UBC has achieved a 59% GHG emissions reduction per full-time equivalent student since 2007.

## UBC VANCOUVER CAMPUS

A reduction of 20% (9,212 tCO<sub>2</sub>e) in total offsetable GHG emissions from 2021 was noted in UBC Vancouver campus in 2022. It has taken vigorous measures to reduce our GHG emissions, including continued energy conservation initiatives, building retrofits and the expansion of the Bioenergy Research and Demonstration Facility (BRDF). The BRDF expansion project is mostly completed, with the facility operating at about half of its design capacity primarily due to technical and construction issues including conveyance of the biomass feedstock. Once fully commissioned, including the installation of a new heat recovery system, the expansion project will result in a further GHG emissions reduction of 15,700 to 17,700 tCO<sub>2</sub>e each year. In the coming years, the campus will expand

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/>

efforts to reduce energy and carbon emissions through implementation of CAP2030 decarbonization activities to meet its 2030 climate targets of reducing operational emission (i.e., Scope 1+2) by 85% and to reduce emissions from extended impact emissions – including commuting, business air travel, food related emissions, embodied carbon and waste – by 45% (i.e., Scope 3).

## UBC OKANAGAN CAMPUS

The UBC Okanagan campus saw a 23% increase in campus operational GHG emissions from 2021. This is in part a result of how the campus has returned to more intense use of space, the retention of COVID-19 building operational protocols, and notably, the incremental addition of five new buildings in recent years. Despite the increase, the campus remains below its 2013 baseline by 15%. In the coming year, guided by an established policy basis, the campus will continue to focus its efforts on climate mitigation, adaptation and resilience. To enable stronger alignment between green building policies and the UBCO CAP 2030, a Green Building Plan will provide guidance for the design and construction of new buildings, renovations and retrofits to achieve a level of performance toward UBCO CAP 2030 targets and net-positive 2050 goal as well as to focus on embodied carbon reduction opportunities in buildings.

In 2022, Times Higher Education once again ranked UBC as one of the top universities globally for climate action. 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 relentless effort to increase energy efficiency and drive down carbon emissions also brings in financial benefits. This is especially relevant with the price on carbon forecasted to increase materially over the next seven years. 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. UBC’s experience shows that with a drive to innovation and problem solving, climate action can be good for the climate and the bottom line too.



**MICHAEL WHITE**  
Associate Vice-President  
Campus and Community Planning  
University of British Columbia  
Vancouver Campus



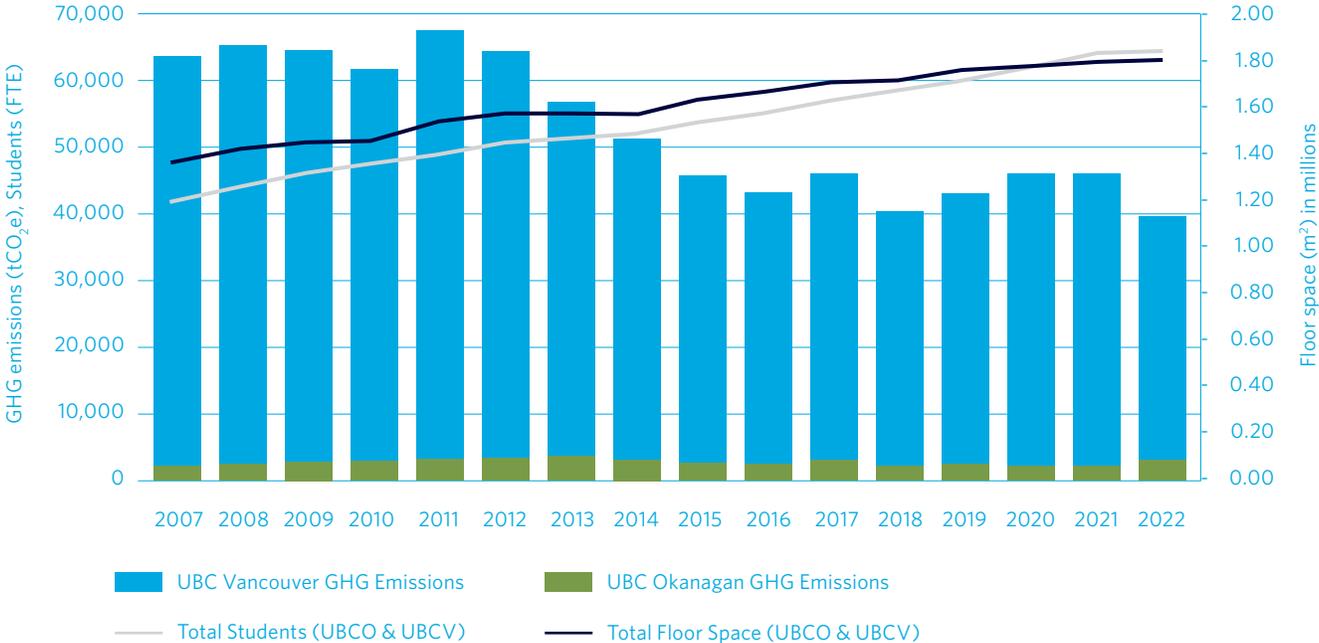
**ROB EINARSON**  
Associate Vice-President  
Finance and Operations  
University of British Columbia  
Okanagan Campus

# EMISSIONS OVERVIEW (VANCOUVER CAMPUS & OKANAGAN CAMPUS)

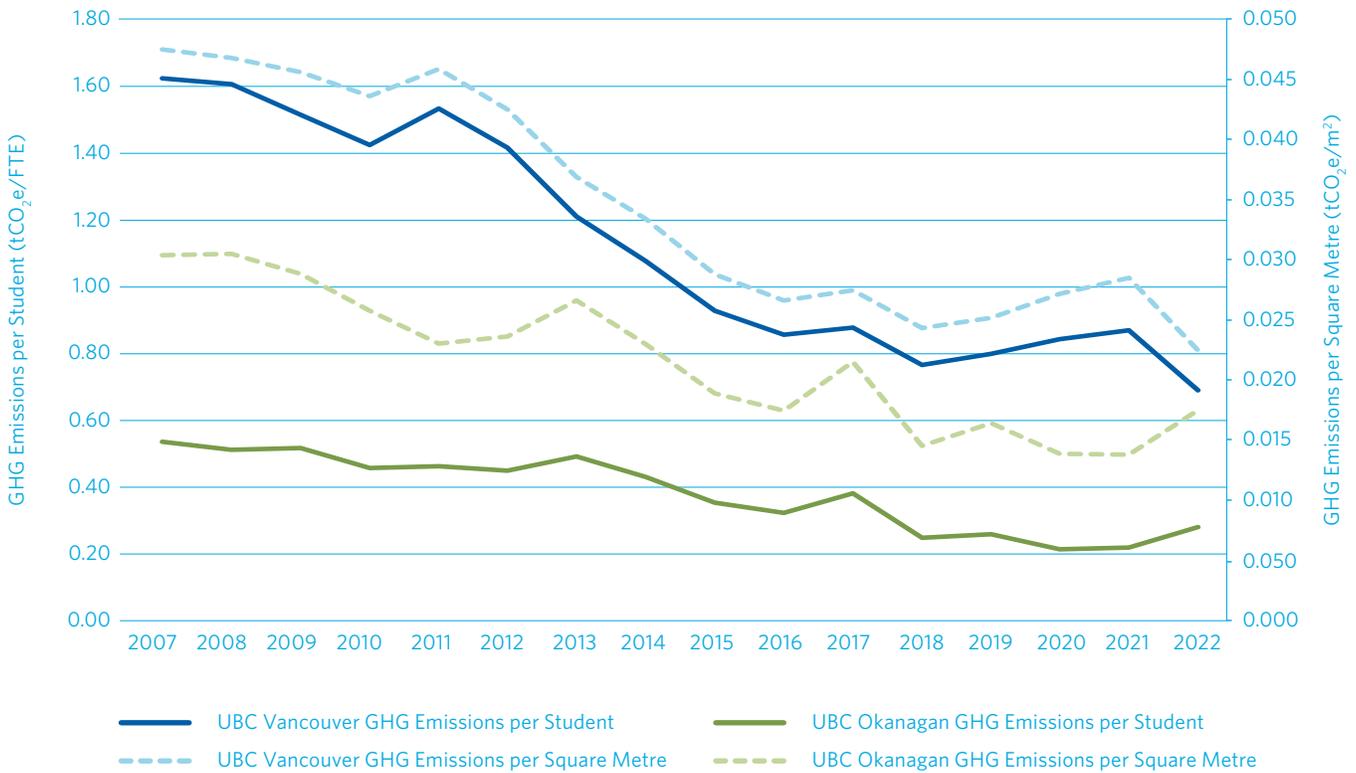
## EMISSIONS AND OFFSET SUMMARY (SCOPE 1, 2 AND PAPER)

UBC tracks and reports the absolute (including biogenic emissions) and offsettable emissions for each campus since 2007, as shown in Figure 1, to measure performance against our Climate Action Plan targets. Intensity-based emissions, as shown in Figure 2, are also used to demonstrate campus GHG emissions performance that accounts for changes in growth.

**FIGURE 1:** UBC Growth and Emissions for Carbon Offsets, 2007 to 2022



**FIGURE 2:** UBC Offsetable GHG Emissions Intensity, 2007 to 2022



## 2022 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 46,617 tCO<sub>2</sub>e in 2022; 94% 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 2022 amounted to 68,743 tCO<sub>2</sub>e, including 22,126 tCO<sub>2</sub>e of biogenic emissions<sup>4</sup>. The biogenic emissions (BioCO<sub>2</sub>) from biomass combustion are reported separately and not included in the emission totals for offset in accordance with Provincial reporting guidelines as the BioCO<sub>2</sub> released is part of the biogenic carbon cycle and would be released naturally during decomposition.

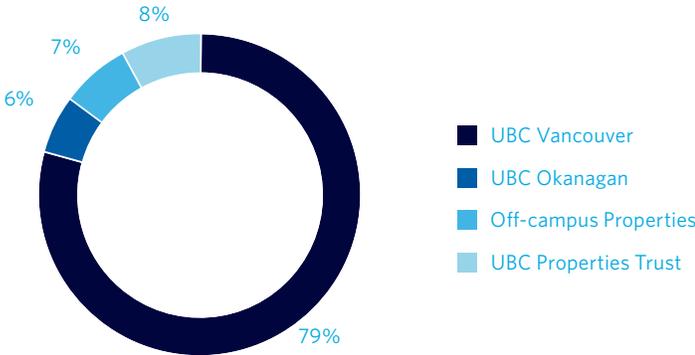
4 Biogenic emissions arise from biomass combustion, including wood waste, renewable natural gas and biofuels. The UBC Bioenergy Research and Demonstration Facility (BRDF) only uses clean wood waste from regional wood product manufacturing and municipal plant trimmings.

In 2022, UBC’s total offsetable emissions reduced by 15% (8,199 tCO<sub>2</sub>e) compared to 2021, but the total emissions (including biogenic) increased by 15% (8,918 tCO<sub>2</sub>e). The significant reduction in offsetable emissions was mainly due to the re-commencement of BRDF expansion at the UBC Vancouver campus in 2022. On the other hand, the biogenic emissions significantly increased.

**TABLE 1: 2022 UBC Total GHG Emissions by Location (in tCO<sub>2</sub>e)**

Location	2022 Emissions for offset	Emissions not required to be offset <sup>5</sup>	Total GHG Emissions
UBC Vancouver Campus	36,746	21,969	58,715
UBC Okanagan Campus	2,930	155	3,085
Off-campus Properties	3,160	1	3,161
UBC Properties Trust	3,781	0	3,781
<b>UBC Total</b>	<b>46,617</b>	<b>22,126</b>	<b>68,743</b>

**FIGURE 3: 2022 UBC Offsetable GHG Emissions Distribution (Vancouver and Okanagan Campuses)**



5 The biogenic emissions (BioCO<sub>2</sub>) from biomass combustion are reported separately and not included in the emission totals for offset in accordance with Provincial reporting guidelines as the BioCO<sub>2</sub> released is part of the biogenic carbon cycle and would be released naturally during decomposition.

Table 2 shows the 2022 emissions for offsets from UBC's two main campuses along with key performance indicators.

**TABLE 2:** 2022 Offsettable Emissions and Key Indicators for UBC Vancouver and UBC Okanagan

Key Performance Indicator	Vancouver Campus	Okanagan Campus	UBC Campuses Total
GHG Emissions (tonnes CO <sub>2</sub> e)	36,746	2,930	39,676
Floor Space (m <sup>2</sup> )	1,634,194	167,626	1,801,820
GHG Emissions per Square Metre (tonnes CO <sub>2</sub> e/m <sup>2</sup> )	0.022	0.017	0.022
Student Enrolment (FTE)	53,311	10,514	63,825
Staff and Faculty Employees (FTE)	16,189	1,728	17,917
GHG Emissions per Student (tonnes CO <sub>2</sub> e/FTE)	0.69	0.28	0.62



2022 PSO Climate Change  
Accountability Report

**UBC VANCOUVER  
CAMPUS**



THE UNIVERSITY OF BRITISH COLUMBIA

**vancouver campus**

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# VANCOUVER CAMPUS SUMMARY

The endorsement of the UBC Vancouver Climate Action Plan 2030 (CAP2030) by the Board of Governors in 2021 provides the impetus for UBC to accelerate climate action and commit to exceeding the Paris Agreement 1.5°C emissions reductions target by 2030. CAP2030 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.

In 2022, the UBC Vancouver campus achieved an operational GHG emissions reduction of 40% (24,336 tCO<sub>2</sub>e) from a 2007 baseline, despite a 42% increase in student enrolment and a 27% growth in campus building floor space. This success, coupled with CAP2030, builds on UBC's strong reputation as an international sustainability leader.

Key achievements for 2022 include:

- The Bioenergy Research and Demonstration Facility (BRDF) expansion project is mostly completed. It is now operating at part-load. Once fully commissioned, the project will reduce emissions by an additional 13,000 to 15,000 tCO<sub>2</sub>e each year. In addition, UBC's Energy & Water Services (EWS) has started to install a new heat recovery system at the BRDF to reduce GHG emissions by a further 2,700 tCO<sub>2</sub>e per year.
- Detailed design work is currently underway to transition the Academic District Energy System (ADES) to 100% clean and renewable energy by 2030, advancing one of the key commitments from the CAP2030 strategy. As recently as 2010, the ADES consumed 1,000,000 GJ of natural gas per year, emitting 50,000 tCO<sub>2</sub>e. With the completion of the BRDF and the heat recovery system described above, natural gas consumption will be reduced to less than 250,000 GJ per year. The design work currently underway and future implementation of the project will further reduce this close to zero by 2030.

- Energy and Water Services (EWS) completed the installation of a zone-specific cooling system at the David Strangway Building. This project allows cooling to be targeted to just the single space, increasing thermal comfort and energy performance. The project is expected to reduce the building's electrical energy use by 100 MWh and thermal energy use by 750 GJ per year, for a total of 47 tCO<sub>2</sub>e GHG savings per year.
- The UBC Gateway building construction commenced. The project has been designed to meet UBC's energy and emissions targets using a passive first approach and is targeting both Zero Carbon Building Standard and LEED gold certification. The project is targeting an embodied carbon reduction by 50% by 2030 which aligns with the CAP2030 target for embodied carbon.

We forecast that with the implementation of CAP2030 actions, the Green Building Action Plan (GBAP), and full commissioning of the BRDF expansion, our campus will continue reducing emissions and continue to demonstrate our leadership in responding to the climate crisis.

## MICHAEL WHITE

Associate Vice-President  
Campus and Community Planning  
University of British Columbia

## JOHN MADDEN

Director  
Sustainability and Engineering  
University of British Columbia

## DECLARATION STATEMENT

This PSO Climate Change Accountability Report for the period January 1, 2022 to December 31, 2022 summarizes our GHG emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2022 to reduce our GHG emissions, and our plans to continue reducing emissions in 2023 and beyond.

By June 30, 2023 University of British Columbia Vancouver campus' 2022 PSO 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 Table<sup>1</sup>

UBC Vancouver 2022 GHG Emissions and Offsets	
<b>GHG Emissions created in Calendar Year 2022</b>	
Total BioCO <sub>2</sub>	21,971
Total Emissions (tCO <sub>2</sub> e)	65,658
Total Offsets (tCO <sub>2</sub> e)	43,687
<b>Adjustments to Offset Required GHG Emissions Reported in Prior Years</b>	
Total Offsets Adjustment (tCO <sub>2</sub> e)	0
<b>Grand Total Offsets for the 2022 Reporting Year</b>	
Grand Total Offsets (tCO <sub>2</sub> e) to be Retired for 2022 Reporting Year	43,687
Offset Investment (\$25 per tCO <sub>2</sub> e)	\$1,092,175

## RETIREMENT OF OFFSETS

In accordance with the requirements of the Climate Change Accountability Act and Carbon Neutral Government Regulation, UBC Vancouver (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2022 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.

<sup>1</sup> This table includes combined details of Vancouver Campus, Off-Campus Properties, and UBC Properties Trust.

# 2022 EMISSIONS OVERVIEW



*The UBC Boulevard Cascading Water Feature promotes biodiversity*

## OVERVIEW

Greenhouse gas 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 fugitive<sup>2</sup>. UBC Vancouver campus now emits 40% (24,336 tCO<sub>2</sub>e) less offsetable GHG emissions compared to the 2007 baseline.

**TABLE 2:** Vancouver Campus Offsetable Emissions Comparison by Source (in tCO<sub>2</sub>e), 2007, 2021 & 2022

Source	2007 Emissions	2021 Emissions	2022 Emissions	% Change from 2007
Buildings	58,105	44,473	35,544	-39%
Fleet	1,973	811	795	-60%
Paper	1,003	101	142	-86%
Fugitive	-	573	265	
<b>Total Vancouver Campus Emissions</b>	<b>61,082</b>	<b>45,958</b>	<b>36,746</b>	<b>-40%</b>

The Vancouver campus emissions for offsets amounted to 36,746 tCO<sub>2</sub>e in 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 Table 3.

<sup>2</sup> Fugitive emissions are determined by the amount of refrigerants used to replenish refrigeration equipment, such as building chillers during servicing.

**TABLE 3: 2022 Offsetable Emissions for the UBC Vancouver Campus (in tCO<sub>2</sub>e)**

Source	2007 emissions	2021 emissions	2022 emissions	% of 2022 Total
<b>UBC Vancouver Campus – Core buildings<sup>3</sup></b>	<b>46,478</b>	<b>34,203</b>	<b>25,593</b>	<b>70%</b>
DES (natural gas and light fuel oil) <sup>4</sup>	40,106	25,136	15,458	42%
Natural gas (direct burn)	3,515	7,778	8,144	22%
Electricity	2,856	1,247	1,628	4%
Biomass facility <sup>5</sup>	N/A	19	343	0.93%
Renewable Natural Gas <sup>6</sup>	N/A	23	20	0.06%
<b>UBC Vancouver Campus – Ancillary buildings<sup>7</sup></b>	<b>11,405</b>	<b>10,199</b>	<b>9,891</b>	<b>27%</b>
DES (natural gas and light fuel oil)	7,311	6,307	5,365	15%
Natural gas (direct burn)	3,108	3,307	3,625	10%
Electricity	986	580	793	2%
Biomass facility	N/A	5	108	0.29%
<b>TRIUMF<sup>8</sup></b>	<b>222</b>	<b>71</b>	<b>60</b>	<b>0.16%</b>
<b>Fleet</b>	<b>1,973</b>	<b>811</b>	<b>795</b>	<b>2%</b>
<b>Paper</b>	<b>1,003</b>	<b>101</b>	<b>142</b>	<b>0.39%</b>
<b>Fugitive</b>	<b>0</b>	<b>573</b>	<b>265</b>	<b>0.7%</b>
<b>Total Vancouver Campus Offsetable Emissions</b>	<b>61,082</b>	<b>45,958</b>	<b>36,746</b>	<b>100%</b>

- 3 Core buildings comprise academic and administrative buildings. Tenants in UBC owned buildings are included with Core buildings in this table.
- 4 District Energy System (DES)
- 5 UBC is required to offset the CH<sub>4</sub> and N<sub>2</sub>O portions of biomass combustion from the BRDF. In addition, the BRDF burns a small amount of natural gas.
- 6 UBC is required to offset the CH<sub>4</sub> and N<sub>2</sub>O portions of renewable natural gas.
- 7 Ancillary buildings include student housing, conference, athletics and parking facilities.
- 8 TRIUMF Inc. is a federal not for profit corporation. 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.

With the partial operation of the BRDF expansion project, significant emission reduction was still achieved in 2022 even though colder weather with a 2% increase in heating degree days resulted in an increase in building heating demand. The emissions from the district energy system dropped by 39% and 15% among core buildings and ancillary buildings respectively. The fugitive emissions also reduced by 54% in 2022. Figure 1 shows the distribution of major offsetable emissions from UBC’s Vancouver campus.

**FIGURE 1: 2022 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 targets, such as CAP2030. Operational emissions (buildings, fleet, fugitives, and paper) amounted to 0.69 tCO<sub>2</sub>e per student FTE in 2022, a 58% decrease since 2007, despite significant growth in buildings and student enrollment. Table 4 outlines key performance indicators for the UBC Vancouver campus.

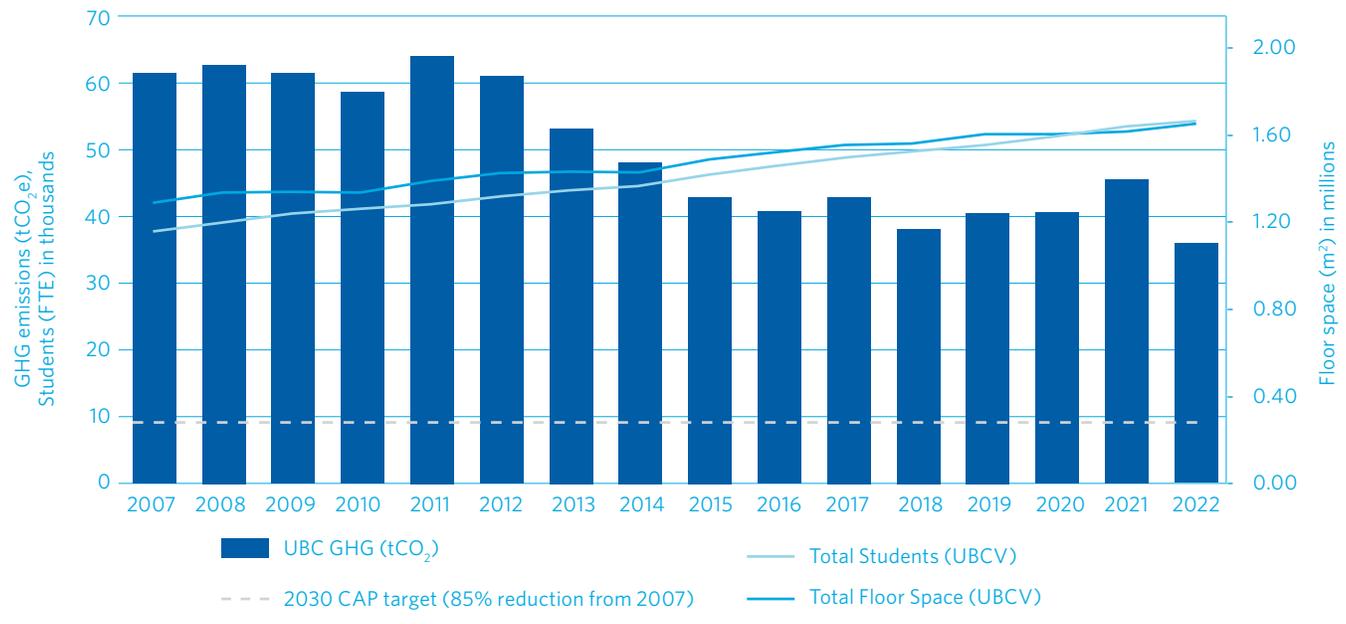
**TABLE 4: 2022 UBC Vancouver Campus Key Performance Indicators**

Key Performance Indicator	2007	2022	% Change from 2007
GHG Emissions (tCO <sub>2</sub> e)	61,082	36,746	-40%
GHG Emissions per Student (tCO <sub>2</sub> e/FTE)	1.62	0.69	-58%
GHG Emissions per square meter (tCO <sub>2</sub> e/m <sup>2</sup> )	0.048	0.022	-53%
Floor Space (m <sup>2</sup> )	1,284,482	1,634,194	+27%
Student Enrolment (FTE)	37,589	53,311	+42%
Staff and Faculty Employees (FTE)	10,509	16,189	+54%

## 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 CAP2030 targets.

**FIGURE 2:** UBC Vancouver Campus Growth and Offsetable Emissions Reduction



UBC Main Mall

## SCOPE 3 EMISSIONS

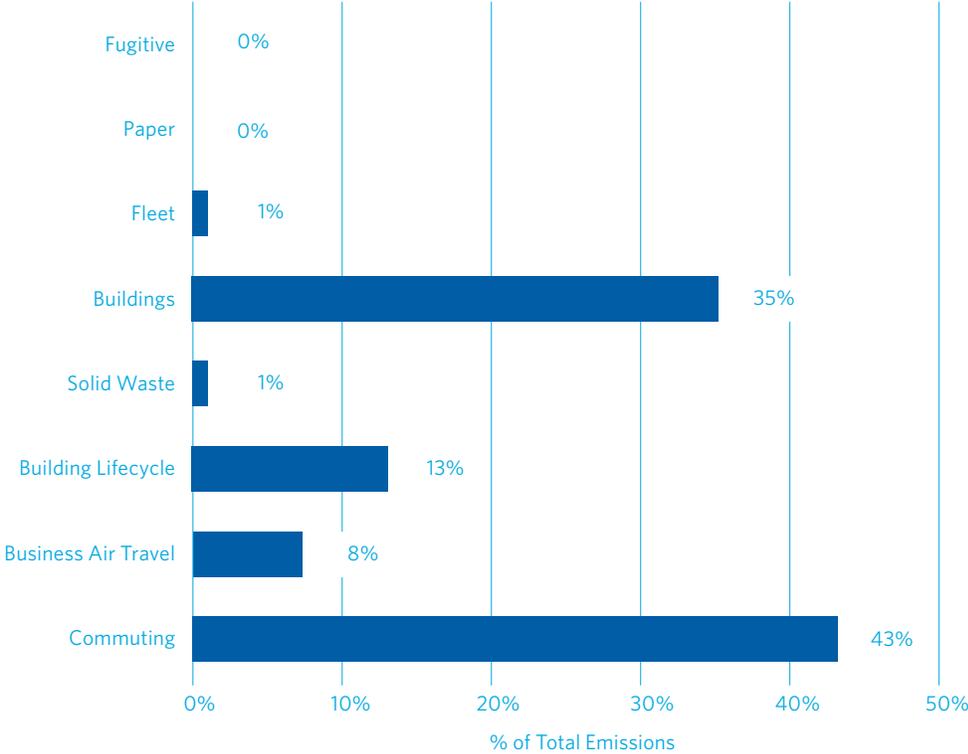
Under current legislation, UBC is not responsible for carbon offset payments associated with Scope 3 emissions (except paper). Despite this, UBC has made an explicit target in CAP2030 to reduce extended impact emissions by 45% below 2010 by 2030 (aligned with the reduction needed to achieve the Paris Agreement). The Vancouver campus GHG inventory quantifies the optional Scope 3 emissions which are outlined in Table 5.

**TABLE 5: 2022 UBC Vancouver Campus Scope 3 Emissions (in tCO<sub>2</sub>e)**

Source	2007 emissions	2022 emissions	% Change from 2007
Commuting <sup>9</sup>	41,523	43,805	+5%
Business Air Travel	13,600	8,191	-40%
Building Lifecycle	10,190	13,482	+32%
Solid Waste	1,930	693	-64%

In 2022, the Vancouver campus adapted hybrid working arrangements and the campus community progressively transitioned back to on campus activities. Figure 3 shows the comparative proportions of these emissions for the Vancouver campus.

**FIGURE 3: UBC’s Vancouver Campus Total Emissions for Scope 1, 2 and 3, 2022**



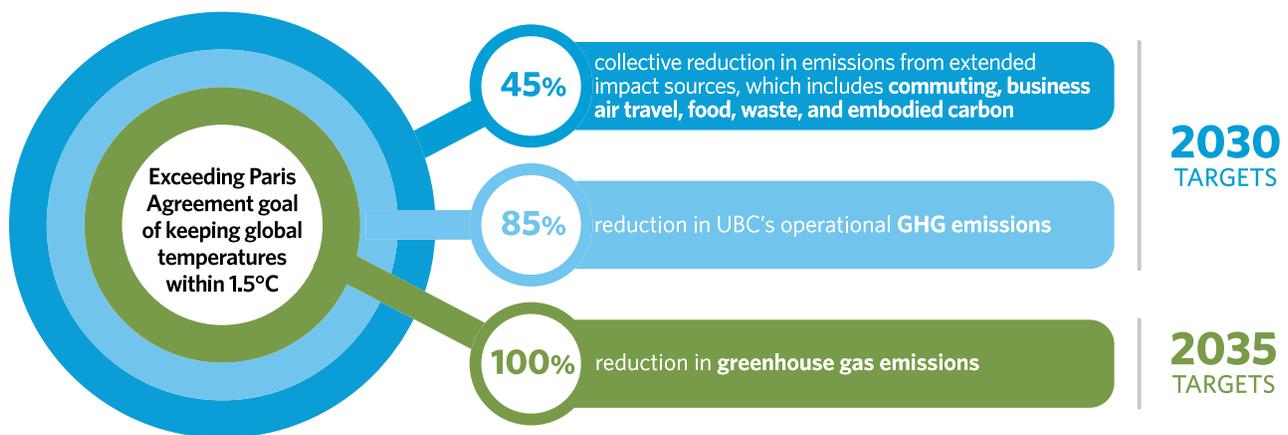
<sup>9</sup> The emissions were calculated using an updated methodology which has been implemented since 2021 reporting year to better track commuting GHG emissions.

# 2022 EMISSIONS REDUCTIONS: ACTIONS

The endorsement of the UBC Vancouver Climate Action Plan 2030 (CAP2030<sup>10</sup>) 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 2020 Climate Action Plan.

In response to the unprecedented threats posed by climate change, CAP2030 charts an accelerated path to net zero emissions for buildings and energy supply, as well as to significantly reduce greenhouse gas emissions for extended impact areas.

**FIGURE 4:** UBC Vancouver CAP2030 Targets



## A. Stationary Sources (Buildings)

UBC is continuously innovating in order 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. Along with such innovation, we acknowledge there is also a need of future-proofing 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 Plan (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. Through the GBAP, new buildings are required to meet operational emissions and embodied carbon reduction targets as well as be designed to address occupant comfort, health and safety in future climate.

## ENERGY SUPPLY

In order 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

<sup>10</sup> <https://planning.ubc.ca/cap2030>



*Bioenergy Research and Demonstration Facility*

changes in provincial and federal policy through a variety of projects in 2022. These projects build on past work to transition away from fossil fuels to cleaner sources of energy. In 2022, approximately 40% of total energy consumed on campus was provided by fossil fuels, down from about two-thirds in 2007.

#### [Bioenergy Research and Demonstration Facility – Biomass Expansion](#)

Since its start-up in 2012, the Bioenergy Research and Demonstration Facility (BRDF) has been pivotal in reducing UBC’s GHG emissions. In combination with the Campus Energy Centre, UBC’s primary energy source, it makes up UBC’s academic district energy system which is used to heat numerous buildings on campus. 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, offsetting over 150,000 GJ of natural gas consumption annually.

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 district energy system 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 tCO<sub>2</sub>e each year. The expansion is now operating at part-load while the operating team addresses deficiencies associated with new equipment and systems.

#### [Bioenergy Research and Demonstration Facility – Heat Recovery Project](#)

While UBC has already seen major successes with the biomass plant, the Energy & Water Services (EWS) team has continued to identify opportunities for improvements at the facility. In 2021, the department started on an ambitious plan to install a heat recovery system at the BRDF, to try to extract as much energy as possible out of the wood fuel.

The first phase, which is now under construction, involves installation of two economizers to recover waste heat from the exhaust gas of the gasification system and the cogeneration engine to increase energy

efficiency. These two economizers alone will reduce annual natural gas consumption by 18,000 GJ, and biomass fuel by 1,000 tonnes. This first phase alone will reduce GHG emissions by almost 1,000 tCO<sub>2</sub>e per year, and has received an incentive of one million dollars from FortisBC.

The second phase will see the deployment of a first-of-its-kind heat pumps in Western Canada, using a next-generation ultra-low-GWP (global warming potential) refrigerant. This second project phase will have an even bigger impact than the first, with annual savings expected at 33,000 GJ of natural gas and nearly 2,000 tonnes of biomass. This will reduce GHG emissions by a further 1,700 tCO<sub>2</sub>e per year. The project received funding from both BC Hydro and the provincial government's CleanBC fund.

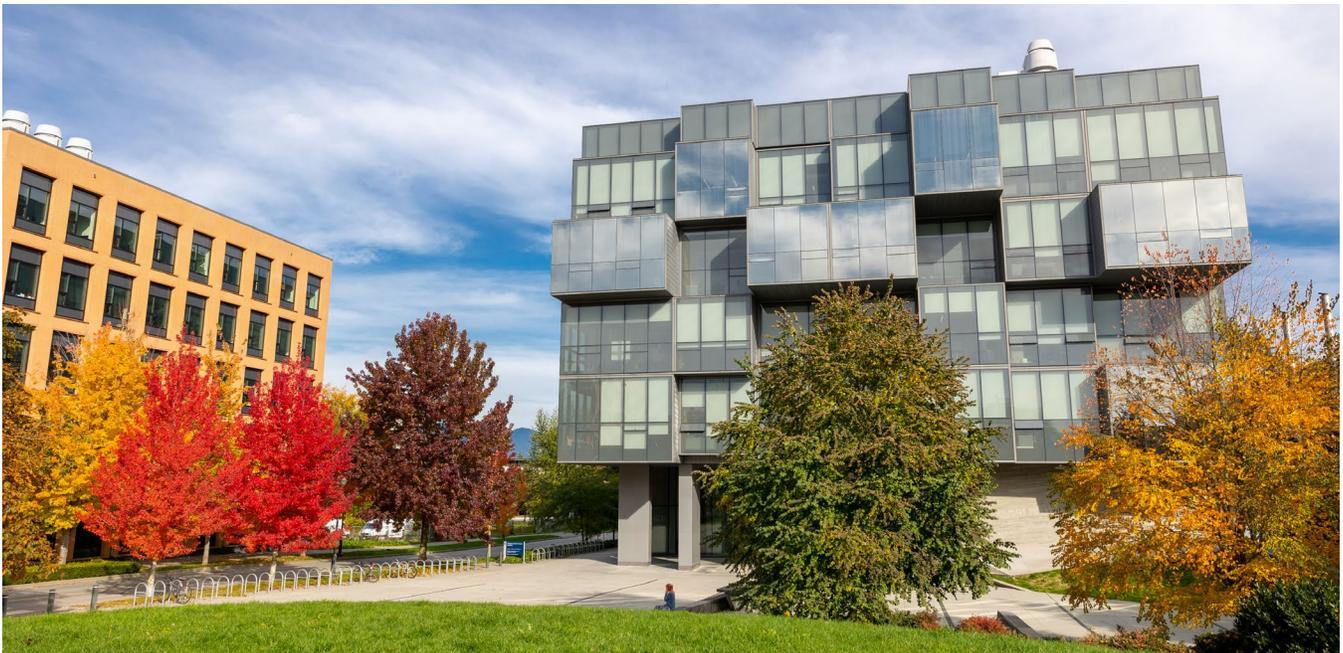
## EXISTING BUILDINGS

Many buildings have undergone retrofits over the years which provide pedagogical updates and significantly improve building seismic performance, target energy and emissions reductions and improve occupant comfort in light of future climate change events (i.e. heat domes). The Macleod building completed its full renewal in 2022. The Jack Bell building has started the

design process for a comprehensive renewal which will address important pedagogical changes while also retrofitting the envelope and mechanical systems to drive down carbon emissions.

In 2022, EWS completed the installation of a zone-specific cooling system at the David Strangway Building. This project allows cooling to be targeted to just the single space, rather than requiring cool air to be supplied to the whole building and reheated where cooling was not required. The project increases thermal comfort and energy performance. It is expected to reduce the building's electrical energy use by 100 MWh and thermal energy use by 750 GJ per year, for a total of 47 tCO<sub>2</sub>e GHG savings per year.

In addition to these major building renewals, a number of energy efficiency upgrades were completed in existing buildings on campus. These include the installation of an Aircuity demand control ventilation system at the Pharmaceutical Sciences Building, completion of Continuous Optimization Round 3 and initiation of the next round, continuation of the LED retrofit campaign, installation of variable speed drives, as well as many smaller retrofits.



*UBC Pharmaceutical Sciences Building*



*Chill Up Challenge*

## NEW BUILDINGS

In 2022, the Gateway building construction commenced. This project has four overall objectives; net zero carbon certification, creating a welcoming gateway to the campus, providing a focus on health and wellbeing through design and collaboration with First Nations host. The project has been designed to meet UBC's energy and emissions targets using a passive first approach and is targeting both Zero Carbon Building Standard and LEED gold certification. The project is targeting an embodied carbon reduction in new buildings by 50% by 2030.

## COMMUNITY ENGAGEMENT CAMPAIGNS

Achieving UBC's CAP2030 targets requires systemic change that will reach every corner of the institution, as well as the full breadth of the UBC community to be engaged and participate to achieve collective impact. With a goal that by 2030, three quarters of UBC faculty, staff and students will be aware of UBC's climate action goals and participating in UBC's evolving and expanding culture of sustainability. Highlights from the community engagement campaigns implemented in 2022 include:

### Shut the Sash

Fume hoods at UBC consume up to 10% of campus energy due to the large volume of air that needs to

be heated or cooled and moved through the hoods. In 2022, lab users in Chemistry D and E buildings took part in a 6 week 'Shut the Sash' competition to reduce energy loss through fume hoods. The competition saved an estimated 47,100 kWh of energy across participating fume hoods. Replicating these practices across all variable air volume (VAV) fume hoods at UBC Vancouver would mean an estimated \$19,700 in annual savings, or the equivalent electricity savings of 48 homes.

### Chill Up Challenge

Ultra-low temperature freezers (ULTs) are essential to research; but when operating at  $-80^{\circ}\text{C}$ , many use enough energy to power a single-family home. Energy and cost savings, as well as longer freezer lifespans and fewer maintenance requirements, can be achieved by "chilling up" these ULT freezers (adjusting setpoints from  $-80^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$ ), which is exactly what UBC Pharmaceutical Sciences researchers did over the three-week Chill Up Challenge held in November 2022. 50% of the faculty's ULT freezers are now chilled up! This is an excellent improvement, up from 19% pre-challenge. The faculty's chilled up freezers represent an estimated 30,440 kWh in annual electricity savings, or the equivalent annual electricity use of 142 standard, Energy Star-rated chest freezers.

## B. Mobile Sources (Fleet)

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 a number of ways, including actions to support the transition to electric 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. As of December 31, 2022, there are 93 Level 2 and seven Level 3 electric vehicle charging stations on the campus. Currently, 7% of UBC fleet are electric vehicles. The UBC Parking unit, whose vehicles annually have the greatest mileage on campus, aims to have 100% zero emission vehicles (ZEVs) by 2025. In 2022, they purchased two hydrogen fuel cell vehicles to add to their fleet.

## C. Paper Consumption

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 minimum 30% recycled content and eco-certified. Approximately 40% of paper sourced for UBC Vancouver Campus consisted of 30-100% recycled content.

## D. Fugitive Emissions

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.



*Fleet vehicle / electric charger*

# EMISSIONS REDUCTIONS PLANS IN 2023 AND BEYOND



*Koerner Library and Ponderosa complex and Vancouver Island at sunset*

With the newly approved UBC CAP2030, the University has identified effective pathways towards reaching its bold 2030 and 2035 carbon reductions targets, which include actions across various impact areas in the upcoming years:

## **A. Stationary Sources (Buildings)**

### **ENERGY SUPPLY**

To achieve CAP2030 goals, UBC is undertaking detailed design work to transition the Academic District Energy System (ADES) to 100% clean and renewable energy by 2030, advancing one of the key commitments from the CAP2030 strategy. As recently as 2010, the ADES consumed 1,000,000 GJ of natural gas per year, emitting 50,000 tCO<sub>2</sub>e. With the completion of the BRDF and the heat recovery system described above, natural gas consumption will be reduced to less than 250,000 GJ per year. Through this design currently underway work and future implementation of the project, this will be reduced to close to zero by 2030.

Work is also advancing to further increase energy efficiency across campus, install high-capacity heat pumps and seek innovative solutions for challenging and gas intensive applications, among others.

### **EXISTING BUILDINGS**

To inform the implementation and resource requirements of the CAP2030, 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 continue to update the Strategic Energy Management Plan (SEMP) outlining future energy conservation projects within existing buildings.

Key energy conservation projects expected to complete in 2023 include:

- Installation of an Aircuity system serving the basement vivarium spaces in UBC's Pharmaceutical Sciences building;
- Addition of variable frequency drives to boiler circulation pumps at the Campus Energy Centre;
- Continued 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; and
- 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.

## NEW BUILDINGS

In 2023, UBC will complete our policy pathway to reduce embodied carbon in new buildings by 50% compared to a baseline building by 2030. Starting in 2023, we expect buildings to reduce embodied carbon by 10%.

The Saltwater Residences were opened in 2022 with a target of LEED gold certification and targeting UBC's energy targets. The Houses of the Ones Belonging to the Saltwater (formerly Pacific Residence) project, located adjacent to and infilling around the Walter Gage Residence, will add one winter session and four year-round residential buildings ("houses") with a total of 940 housing beds for upper-year students. A new food outlet is also included in the program, serving both the growing residential and broader campus community.

## B. Mobile Sources (Fleet)

A Zero Emission Fleet policy is in development as part of the CAP2030 implementation. UBC procures 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 is a first in Canada integrated hydrogen refueling station and renewable energy system that is currently under construction. This \$23 million project will showcase scalable green hydrogen generation and system integration to deliver the fuel to end users. This can help UBC reaching zero emission fleet targets and drive critical learnings needed for the broader energy transition.

## C. Paper Consumption

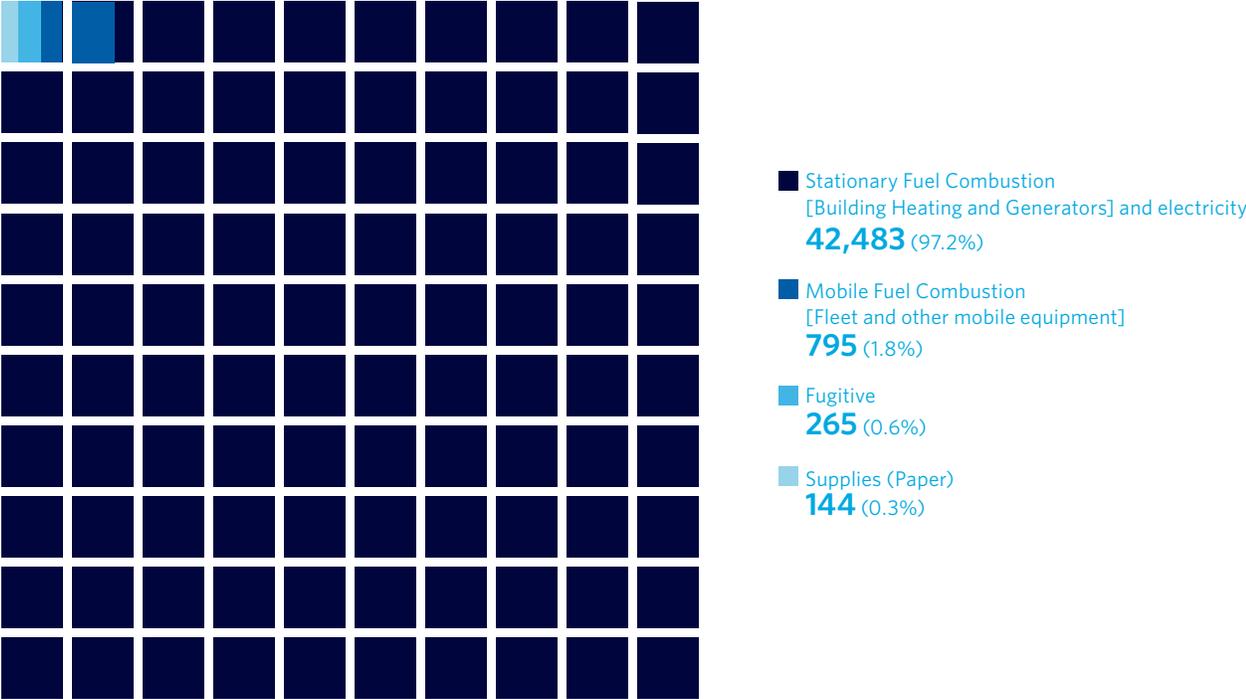
We plan to continue to promote the Sustainable Purchasing Guide to the campus community, especially for the departmental and unit administrators, and the network of Sustainability Coordinators across campus. The Sustainability Purchasing Guide is designed to help UBC staff, faculty, and students to purchase sustainable goods and services.

## D. Fugitive Emissions

UBC plans to continue replacing inefficient and older equipment and conduct preventative maintenance and upgrades to refrigeration/air conditioning equipment to minimize refrigerant leakage that leads to fugitive emissions.

# GHG EMISSIONS BY SOURCE

**FIGURE 5:** UBC Vancouver Total Emissions by Source (Vancouver Campus, Off-campus Properties, and UBCPT) for the 2022 Calendar Year (tCO<sub>2</sub>e\*)

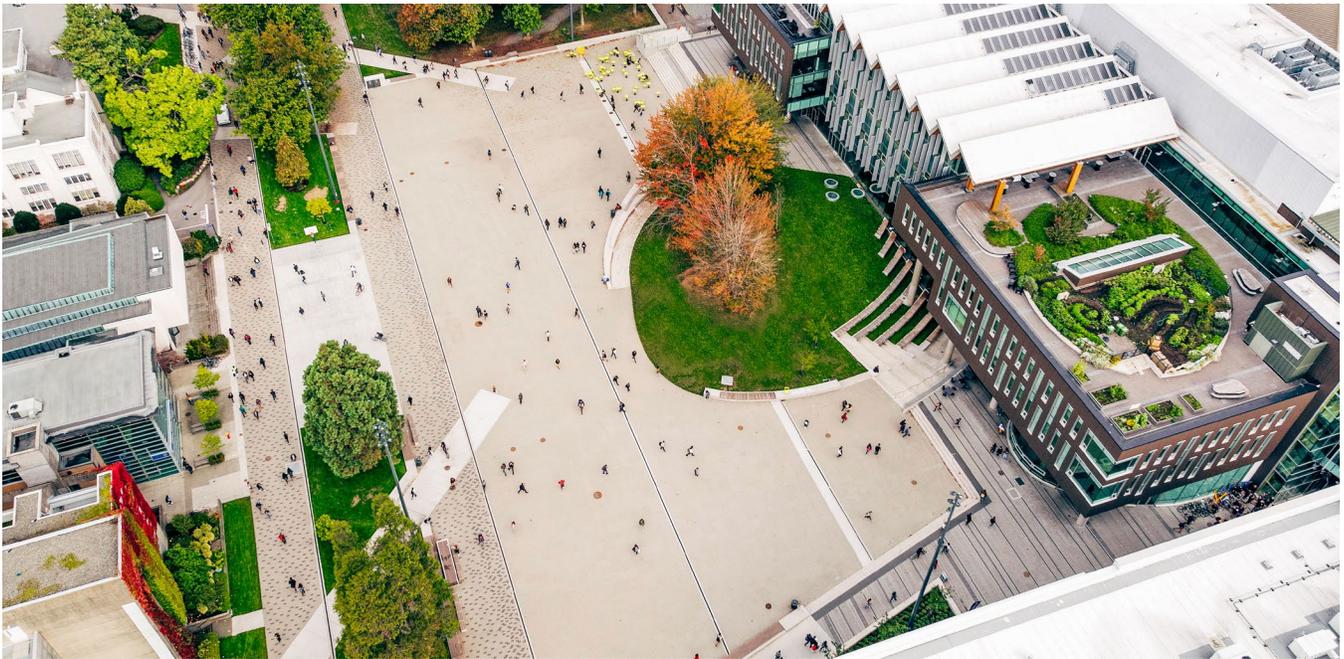


**TOTAL EMISSIONS: 65,658**

Offsets Applied to Become Carbon Neutral in 2022 (Generated April 20, 2023)  
 Total offsets required: 43,687  
 Total offset investment (inc. GST): \$1,146,784  
 Emissions which do not require offset\*\*: 21,971

\* Tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) 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 Reduction Targets Act, all emissions from the sources listed above must be reported. As outlined in the regulation, some emissions do not require offsets.

# PUBLIC SECTOR LEADERSHIP



*Communal plaza outside the AMS Nest*

## 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, focused primarily on climate mitigation, such as CAP2030, which commits to the development a climate adaptation resiliency, and biodiversity strategy. Specific actions have also been identified in the Green Buildings Action Plan<sup>11</sup> to assess issues from a coordinated climate mitigation and adaptation lens. For example, consideration 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 at all possible.

UBC has established an Integrated Stormwater Management Plan to further reduce the risk of flooding 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 on a priority access perspective annually, and recent climate events flagged critical access points and the need to ensure emergency and public transit access.

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.

<sup>11</sup> <https://planning.ubc.ca/sustainability/sustainability-action-plans/green-building-action-plan>



Fresh vegetables and produce from UBC Farm

## 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 CAP2030 target of a 45% overall reduction in these emissions by 2030, from a 2010 baseline. Key 2022 highlights and successes include:

### CLIMATE FRIENDLY FOOD SYSTEMS

The SEEDS<sup>12</sup> (Social Ecological Economic Development Studies) 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.

### BIODIVERSITY TOOLTREE

This year, SEEDS launched the Urban Biodiversity in a Changing Climate ToolTree. The ToolTree consists of a suite of four Toolkits that relate to Urban Biodiversity in a Changing Climate. The Toolkits include a Citizen Science Toolkit, Tree Inventory Toolkit, Ecological Connectivity Toolkit, and a Green Careers Toolkit. Each Toolkit aims to (i) support applied student-led research projects in partnership with UBC faculty and staff in ways that can advance UBC's sustainability commitments, and (ii) serve as accessible resources to increase awareness, knowledge and action, and improve resilience to climate change, through biodiversity and other nature-based solutions on campus and beyond.

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

## BUSINESS AIR TRAVEL

In January 2022, UBC launched its Sustainable Travel Program to help achieve its goal of reducing business air travel emissions by 50% from 2019 levels by 2030 and inspire other institutions to take similar actions. The program is currently preparing a suite of outreach and engagement activities which will draw from existing sustainable travel best practices and involve a diverse network of staff and faculty. Also underway is better IT and accounting systems integration to more accurately track air travel GHG emissions.

## ZERO WASTE ACTION PLAN UPDATE - COMMUNITY ENGAGEMENT

Community engagement to support the development of Zero Waste Action Plan 2030 continued through 2022, including a novel approach to engaging community members through “talking” recycling bins, that interact with users via 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 food systems and food waste, a significant source of greenhouse emissions, including (i) continued to pilot a compost bag program in a large residence hall, providing an ongoing supply of free compostable bags to 640+ student residents to reduce plastic contamination in food scraps bins; and (ii) continued to pilot and analyze results from the Climate-Friendly Food Label initiative. The label provides an opportunity for the campus community (faculty, staff, students) to make informed purchasing decisions that can promote a climate-friendly food system.

Additionally, the reuse-it<sup>13</sup> UBC online platform for exchanging and reusing goods and equipment at UBC was revamped with a new, more powerful interface, and a promotional campaign has been initiated. Since launch in late 2021, usage has already increased dramatically. 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.

## AMBER GLASS RECYCLING PROGRAM

UBC Green Labs 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. The program was piloted in 2017 in Michael Smith Laboratories and has since expanded to recycle amber glass from the Life Sciences Centre, the Chemistry complex, Chemical and Biological Engineering, and Aquatic Ecosystems Research Lab. In total, 7,450 kg of UBC’s Point Grey campus lab glass was diverted from landfill in 2022.

## GLOVE RECYCLING PROGRAM

Gloves are one of the highest contributors to plastic waste coming from laboratories at UBC. The AMS Sustainability Project and the UBC Student Environment Centre awarded Melody Salehzadeh, a doctoral student in the department of zoology and her team of seven other students funding to buy two giant pallets for collecting the gloves: one for all brands and one for Kimberly-Clark gloves. The team launched a competition to encourage labs to collect gloves for recycling. 17 labs took part, with the winning Ciernia lab collecting 19 kg of gloves. Through the competition, a total of roughly 48,700 gloves were collected, diverting 146.1 kilograms of waste from landfills in 2022. The gloves are recycled into plastic pellets used for building and construction supplies. Some may even see life again as lawn furniture or plastic planters through the Kimberly-Clark program.

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13 <https://reuseit.ubc.ca/>



*Glove Recycling Program*

### LAB PLASTICS RECYCLING PROGRAM

Up to 128 tonnes of plastic is generated by the UBC Vancouver laboratories each year. The Lab Plastics Recycling Program helps divert these plastics from the landfill by encouraging and enabling recycling. In 2022, 11 new laboratories signed up for the program, adding 16 recycling bins to buildings across campus. Plastics collected in this program are recycled with UBC's general plastic waste.

### ICE PACK DONATIONS

The Ice Pack Donation Program was initiated in early 2021 in collaboration between the Life Sciences Centre and Green Labs, continues to divert hundreds of ice packs, commonly received with scientific supply shipments, from landfill each year. The ice packs collected in the Life Sciences Centre, where donations are regularly coordinated with third parties, ensuring that sanitized packs can be reused indefinitely. In 2022, over 3,075 ice packs were donated through this program, and around 10,000 packs in total were diverted since the start of the donation partnership.

### GREEN LABS FUND

In 2022, the Green Labs Fund accepted and funded four project proposals. UBC's School of Biomedical Engineering received funding to recycle discards

from 3D printing to create new filament for reuse in 3D printers, reducing waste and supporting a circular economy. The Okanagan campus' School of Engineering was awarded funding to design and develop reusable steel formwork for studying sustainable reinforced concrete walls, reducing wood waste from conventional, disposable plywood formwork. The school also received funding upcycle campus wood discards into functional pieces for their department, reducing waste and extending the wood's life cycle. The campus' Department of Chemistry was granted funding to develop Canvas resources to engage and educate undergraduates on Green Chemistry, including hazardous chemicals and sustainable alternatives.

### PLANNING AND ADVOCACY FOR SKYTRAIN TO UBC

Planning for the proposed Millennium Line UBC Extension continued through 2022, with the Province beginning development the project Business Case following its confirmation as a regional priority in TransLink's Transport 2050 and 10-Year Priorities. 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.

## SUSTAINABLE TRANSPORTATION PROGRAM FOR COMMUTING

In 2022, UBC's Sustainable Transportation Program launched "Commute Smart UBC", an initiative aimed at encouraging the University community to make smart, sustainable and healthy commute choices. The program includes an on-line trip planning tool and a carpool matching service exclusively for the campus community, regular outreach via social media channels and engagement programs such as Go by Bike Week and Try an E-bike Program, and targeted information-sharing for new employees.

## CAMPUS CARPOOLING

In 2022 UBC continued to work with Liftango to bring more people to campus in fewer vehicles by helping drivers and riders to connect and commute together. 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.

## CAMPUS BIKE SHARE

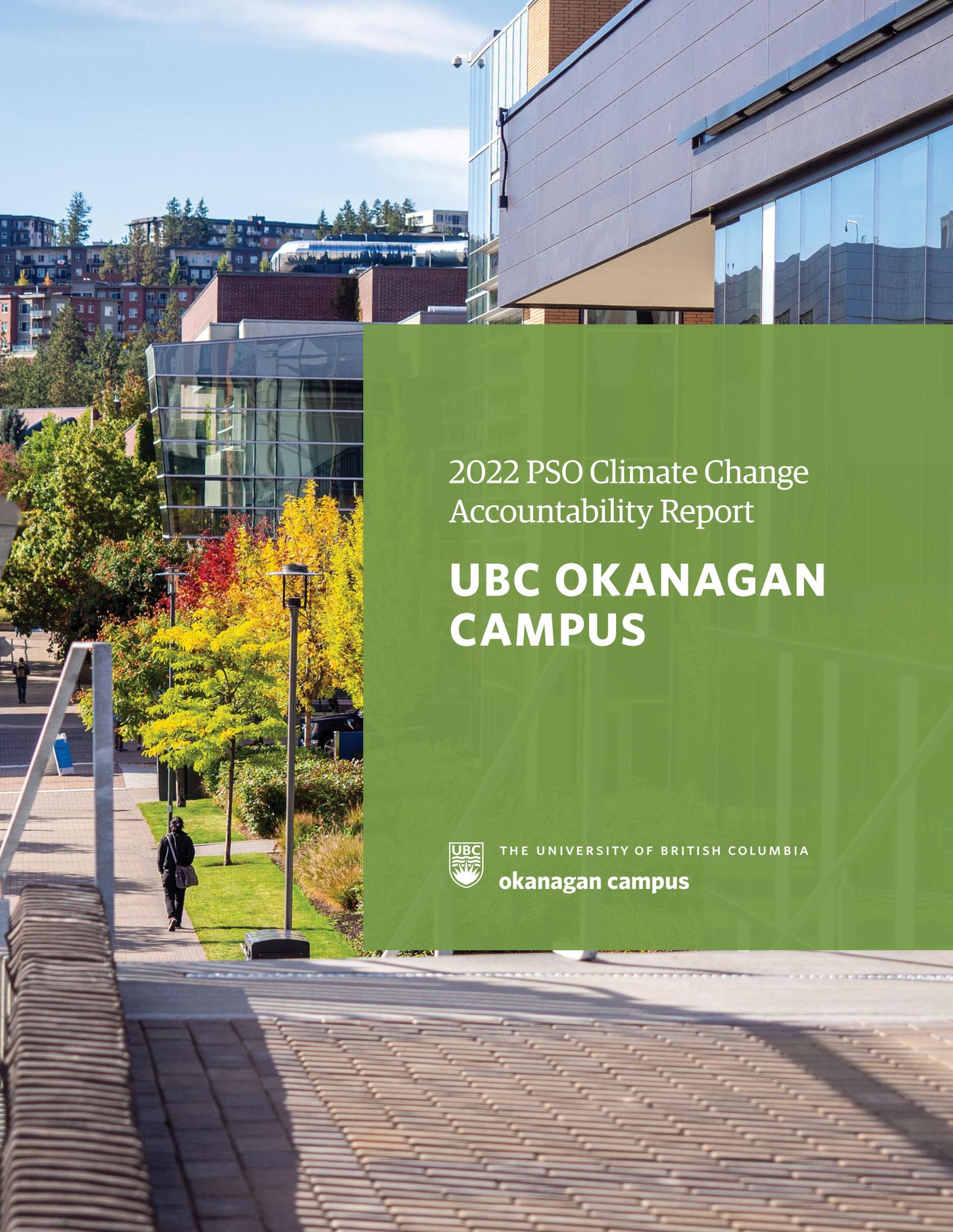
UBC's campus-wide bike share program continued to operate through 2022 with 50,000 trips taken, covering over 57,000 km. The program offers a sustainable and active way for neighbourhood residents, students, workers and visitors to get around UBC's 400 hectare campus and plays an important role as first- and last-mile connection to transit.

## GO BY BIKE WEEK

Go by Bike Week is a bi-annual initiative of HUB Cycling that aims both to celebrate cycling and to encourage everyone in Metro Vancouver to give cycling a try. To encourage friendly competition and recognize cycling champions on campus, UBC participates in the program by encouraging UBC workplace units to compete as teams for awards for the longest cumulative distance cycled, longest distance cycled per rider, and most new participants. In 2022, roughly 300 UBC riders participated in each week-long event, logging over 40,000 kilometres total. UBC consistently ranks as a top organization regionally for its participation in the program.



UBC Bike Share Program



2022 PSO Climate Change  
Accountability Report

**UBC OKANAGAN  
CAMPUS**



THE UNIVERSITY OF BRITISH COLUMBIA

**okanagan campus**

# ACKNOWLEDGEMENT

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

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

Photography: Hover Collective, Paul Joseph, Margo Yacheshyn

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## EXECUTIVE SUMMARY



UBC Okanagan continues to demonstrate environmental leadership through its policies and plans that target a 65 per cent reduction in operational GHG emissions by 2030 and align with UBC's Climate Emergency Declaration and CleanBC.

In 2022, the campus began implementing the **UBCO Climate Action Plan 2030** (UBCO CAP 2030). This plan establishes targets to reduce operational GHG emissions by 65 per cent from a 2013 baseline and extended emissions by 45 per cent by 2030 and a number of key actions were completed over the past year.

Comparison of 2020/2021 emissions to 2022 is impacted by significant reductions in campus occupancy, teaching and research activities during COVID-19. While campus operational emissions increased by 23 per cent since 2021, this is in part a result of how the campus has returned to more intense use of space, the retention of COVID-19 building operational protocols, and notably, the incremental addition of five new buildings in recent years that account for a 41 per cent of the total building emissions increase since 2019. Despite the increase, the campus remains below its 2013 baseline by 15 per cent.

In 2022, energy demand-side management and supply-side decarbonization was advanced by the **Strategic Energy Management Plan** and **Low Carbon Energy Strategy**. UBC's **LEED® Implementation Guide v4.1** was updated to align with the Provincial LEED® Gold mandate, and to include LEED® credit requirements and guidance tailored to the Okanagan campus. Actions to support climate risk mitigation included completion of a **Multi-Hazards Risk Assessment** which identifies climate risks relative to campus buildings and infrastructure.

Sustainability design principles were incorporated into the design of two major capital projects in 2022. The **Interdisciplinary Collaboration and Innovation (ICI) Building** targets a minimum LEED® Gold Certification and integrates an innovative Earth Tube passive design strategy to reduce heating and cooling loads. Connection to the Low Carbon Energy System

will provide low carbon energy supply to the building. As a result of these design strategies, it is projected that ICI will consume 63 per cent less energy and emit 92 per cent fewer emissions compared to a LEED® baseline facility.

Delivering on the Okanagan campus commitment to community-engaged research, **UBCO Downtown** will provide a collaborative, multi-use space to the community while working to integrate sustainable and technical design measures that meet LEED® Gold requirements and Step 3 of the BC Energy Step Code.

Looking into 2023, guided by an established policy basis, the campus will continue to focus its efforts on climate mitigation, adaptation and resilience.

A **Green Building Plan** will enable stronger alignment between green building policies and the UBCO CAP 2030. The plan will provide guidance for the design and construction of new buildings, renovations and retrofits to achieve a level of performance toward UBCO CAP 2030 targets and net-positive 2050 goal. New policy development will focus on **embodied carbon** reduction opportunities in buildings.

A **Climate Adaptation, Resilience and Biodiversity Strategy** will be completed to provide a guiding framework of actions for the campus that aligns with the provincial government's Climate Preparedness and Adaptation Strategy.

Lastly, recognizing the importance of **community engagement** to advance the UBCO CAP 2030, the campus will continue to reach out to students, faculty and staff to support effective and equitable solutions to reduce individual climate impacts on campus.

### Rob Einarson

Associate Vice-President, Finance and Operations  
*University of British Columbia, Okanagan campus*

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## DECLARATION STATEMENT

This PSO Climate Change Accountability Report for the period January 1, 2022 to December 31, 2022 summarizes our greenhouse gas emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2022 to reduce our GHG emissions, and our plans to continue reducing emissions in 2023 and beyond.

By June 30, 2023, UBCO's final 2022 PSO Climate Change Accountability Report will be posted to our website at [sustain.ok.ubc.ca/reports/#CCAR](https://sustain.ok.ubc.ca/reports/#CCAR).



# 2022 Emissions Overview



## GHG EMISSION AND OFFSETS SUMMARY

GHG Emission created in Calendar Year 2022	
Total BioCO <sub>2</sub> e (tCO <sub>2</sub> e)	155
Total Emissions (tCO <sub>2</sub> e)	3,085
Total Offsets (tCO <sub>2</sub> e)	2,930
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO <sub>2</sub> e)	0
Grand Total Offsets for 2022 Reporting Year	
Grand Total Offsets (tCO <sub>2</sub> e) to be Retired for 2022 Reporting Year	2,930
Offset Investment (\$25 per tCO <sub>2</sub> e)	\$73,250

### 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 2022 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.

## GREENHOUSE GAS EMISSIONS

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

**Table 1** provides a breakdown of GHG emissions by source on the Okanagan campus between 2021-2022.

Comparison of 2020/2021 emissions to 2022 is impacted by significant reductions in campus occupancy, teaching and research activities during COVID-19. While campus operational emissions increased by 23 per cent since 2021, this is in part a result of how the campus has returned to more intense use of space, the retention of COVID-19 building operational protocols, and notably, the addition of five new buildings since 2019. The new buildings account for a 14 per cent increase in GSM and 41 per cent of the total increase in building

emissions since 2019. Fleet, paper and fugitive emissions increased with the post-COVID resumption of campus occupancy, operations, teaching and research. Despite the increase, the campus remains below its 2013 baseline by 15 per cent. Actions taken in 2022 to reduce emissions follows this section of the report.

TABLE 1 GHG COMPARISON BY SOURCE BETWEEN 2021-2022

Source	2021 Emissions (tonnes CO <sub>2</sub> e)		2022 Emissions (tonnes CO <sub>2</sub> e)		Changes from 2021 to 2022
Buildings	2,429	97%	2,931	95%	+21% +502 tCO <sub>2</sub> e
Fleet	38	2%	53	1.7%	+39% +15 tCO <sub>2</sub> e
Paper	6	0.2%	14	0.5%	+133% +8 tCO <sub>2</sub> e
Fugitive Emissions	26	1%	87	2.8%	+235% +61 tCO <sub>2</sub> e
<b>Total Emissions *</b>	<b>2,499</b>	<b>100%</b>	<b>3,085</b>	<b>100%</b>	<b>+23% +586 tCO<sub>2</sub>e</b>
<b>Total Offsets</b>	<b>2,295</b>	<b>100%</b>	<b>2,930</b>	<b>100%</b>	<b>+28% +635 tCO<sub>2</sub>e</b>

\* Totals may not sum due to rounding

## CARBON NEUTRAL OFFSETS IN 2022

In accordance with the Clean Government Reporting Tool, and as required by the Climate Change Accountability Act, offsets required to achieve carbon neutrality in 2022 total 2,930 tCO<sub>2</sub>e. As part of UBCO's 2022 GHG emissions profile, 155 tCO<sub>2</sub>e do not require offsets.

# ACTIONS TAKEN IN 2022 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 largest source of campus in-scope GHG emissions is attributed to buildings. In 2022, UBCO continued to target building energy efficiency and GHG reduction actions by implementing energy and carbon reduction plans and activities. Despite these efforts, emissions from buildings increased by 21 per cent in part due to the campus returning to more intense use of space, the retention of COVID-19 building operational protocols, and notably, the addition of five new buildings since 2019 that account for 41 per cent of the total increase in building emissions since 2019.

## CLIMATE LEADERSHIP PLANNING AND POLICY IMPLEMENTATION

In the last year, UBCO has continued to develop and implement key energy and carbon reduction policies that align with CleanBC and UBC's Climate Emergency Declaration.

UBCO's first **Climate Action Plan 2030** (UBCO CAP 2030), completed and approved by UBC's Board of Governors in late 2021, has been instrumental to UBCO's climate leadership. The UBCO CAP 2030 establishes ambitious targets to achieve a 65 per cent reduction of operational emissions, and a 45 per cent reduction of extended emissions, by 2030. The plan provides a clear pathway to meet our GHG reduction targets that align with the Paris Agreement target to limit global warming to 1.5 C. The plan further supports the longer-term goal of achieving a net-positive performance in operational energy and carbon by 2050, established by the UBCO Whole Systems Infrastructure Plan (2016).

In 2022, the campus commenced the development of a **UBCO Green Building Plan** to enable stronger alignment between green building policies and the UBCO CAP 2030. Upon completion, the plan will ensure the design and construction of new buildings, renovations and retrofits achieve a level of performance toward UBCO CAP 2030 targets and net-positive 2050 goal.

The campus also began working with UBC Vancouver to develop **embodied carbon policy** to establish a clear pathway to achieve UBCO and UBCV's CAP 2030 embodied carbon reduction targets. A number of projects were completed in 2022 to inform this work, including a **Whole Building Lifecycle Analysis** and a **10 per cent embodied carbon reduction target pilot project** for UBCO's ICI building. The campus is also involved in informing the development of **emerging Whole Building Lifecycle Assessment Guidelines** targeting guidance for design teams.

UBCO also finalized the development of the **UBC LEED® v4.1 Implementation Guide**, which, for the first time, includes guidance specific to the climate, energy and environment on the Okanagan campus. As a key UBCO CAP 2030 action, the guide supports the achievement of operational GHG reduction targets and provides project teams with the UBC-specific direction required to optimize LEED®. The guide identifies credits that are mandatory or expected because of their alignment with UBCO policies.

Finally, key updates were completed in the **UBC Technical Guidelines** that include:

- The creation of **UBCO Building Management Technical Guidelines** that support building energy performance and monitoring; and,
- Updates to ensure new construction is compatible with the **Low Carbon District Energy System**.

## ENERGY INITIATIVES

UBCO continued to implement actions that align with the UBCO CAP 2030 energy and emissions reduction goals. Key plans integral to this process include the **Low Carbon Energy Strategy**, which guides future low carbon district energy system development and investments, and the **Strategic Energy Management Plan (SEMP)**, which provides a suite of demand-side management projects to reduce energy consumption and associated emissions.

- Key studies advanced in the last year, as recommended through the Low Carbon Energy Strategy include:
  - Implementation of Phase 1: boiler installation as recommended through the Geo-Exchange air source heat pump (ASHP) feasibility study;
  - A Thermal Energy Storage (TES) study;
  - The ICI Building four-pipe infrastructure study, which will serve heating and cooling demands of surrounding buildings from the future ICI cluster plant; and,
  - High level concept design for an Upper Innovation Precinct Cluster Plant study, which is being carried out to explore thermal system configurations to meet the demands of two existing and two future residence buildings.
- SEMP projects completed in 2022 are anticipated to reduce energy and emissions by 942,000 kWh, 4,000 GJ and 210 tCO<sub>2</sub>e, annually. Projects include:



UBCO Downtown courtesy of hcma Architecture + Design and Olson Kundig.

- The installation of the occupancy-based demand-controlled ventilation and indoor air quality (IAQ)-based demand-controlled ventilation systems in the Science building;
- Implementation of a study to install an IAQ monitory system in the Engineering, Management and Education (EME) Building;
- A WI-FI ventilation control recalibration; and,
- Initiating night time precooling of the geosystem cooling towers.

The **UBCO Archetype Study**, conducted to inform project-specific performance targets for new buildings based on the Okanagan climate and building archetype, was completed in 2022. This project established Total Energy Use Intensity, Thermal Energy Demand Intensity, and GHG Intensity targets for each building archetype, which have been approved and will be used to inform UBCO's Green Building Plan.

The campus entered into the final year of a three-year partnership with the School of Engineering to develop and implement an **energy monitoring and data management platform**. The platform will provide improved data management, reporting capabilities and analytical tools, which will inform future energy planning projects.

Additionally, the campus continued to supplement a portion of natural gas used by the Central Heating Plant (CHP) –

which provides heating to the campus legacy buildings—with **renewable natural gas (RNG)**. The use of RNG reduced the campus 2022 emissions profile by 153 tCO<sub>2</sub>e. As it is considered carbon neutral, no offsets are required.

## NEW BUILDINGS

Designs for two major capital projects were completed in 2022. With an aim of serving future regional needs, **UBCO Downtown** will expand UBC's presence in Kelowna, while actively working toward meeting LEED® Gold Certification and design compliance with Step 3 of the BC Energy Step Code. A solar wall system is incorporated on the south façade to preheat ventilation air passively during winter months before it is delivered to corridors in the residential tower.

Targeting a minimum LEED® Gold certification the **ICI Building's** final design integrates passive design principles with innovative measures to reduce operational energy and carbon emissions. Among its innovative design strategies, the project incorporates the longest **earth tube system**<sup>1</sup> in Canada and one of the longest in the world to cool and heat air passively. The project also incorporates a high-performance envelope, active heat recovery with heat recovery chiller, efficient lighting design, extensive occupancy and daylight controls. It is projected that the ICI Building will consume 63 per cent less energy and emit 92 per cent fewer emissions compared to a LEED® baseline facility.

<sup>1</sup> Earth tubes passively pre-temper all the ventilation air supplied to the labs and offices via ground heat exchange as it is pulled into a building.

## EXISTING BUILDINGS

In 2022, UBCO completed the implementation of recommended measures identified in the **recommissioning study completed on the Arts Building** and initiated a **recommissioning study on the EME Building**. The measures completed in the Arts Building are anticipated to conserve 31,700 kWh and 260 GJ of energy, reducing emissions by 13.3 tCO<sub>2</sub>e, annually, and the projected savings from the future implementation of the EME study are currently under review. The recommissioning studies were implemented to address the deficiencies in building operations that waste energy, such as increased equipment wear and tear, or decreased occupant comfort.

A **Demand Controlled Ventilation** study was implemented in a number of laboratory spaces within the **Arts and Sciences Centre** and **Charles E. Fipke Centre for Innovative Research**. Proposed measures, including reduced air changes in appropriate zones served and recommissioning new sensors, switches and programming changes, are expected to conserve 508,200 kWh and 2,370 GJ of energy, reducing GHG emissions by 124 tCO<sub>2</sub>e, annually.

## STUDENT RESIDENT BUILDINGS

In 2022, two legacy domestic hot water systems in the Cassiar Residence were replaced with two residential condensing boilers and storage tank systems that have 95 per cent efficiency ratings.

## IT INFRASTRUCTURE ACTIONS

A number of information technology projects designed to streamline efficiencies and reduce energy consumption were completed in 2022, including:

- Ongoing replacement of desktop computers with laptops that are newer and more efficient;
- Upgrading faculty and staff devices from spinning hard drives to solid state drives to reduce waste, power consumption and replacement costs;
- Continuing to phase out desktop towers with docking stations to reduce power consumption;
- Reducing the number of digital screens used for campus messaging and emergency alerts from 28 screens to 18 and replaced 12 older devices with new, energy-efficient models;
- 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 spaces that house the infrastructure;
- Key departments developing lifecycle plans for all 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;

- Removing iClicker hardware from all the classrooms in support of the iClicker phone/app solution thereby reducing power usage and e-waste;
- Continuing to replace 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.

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

In 2022, fleet vehicles accounted for 53 tCO<sub>2</sub>e, or two per cent of the campus total emissions. This is a 39 per cent or 15 tCO<sub>2</sub>e increase over 2021. This increase is attributed to the return of on-campus operations and research activities following the COVID-19 pandemic.

Despite the year-over-year increase, 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, and ongoing training and education to support sustainable fleet use; and,
- Continuing to monitor the effect 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 14 tCO<sub>2</sub>e. The return of on-campus working and learning activities in 2022 prompted the increase in paper consumption by over 1,100 packages, which accounted for a 133 per cent or 8 tCO<sub>2</sub>e increase in emissions over the last year.

Despite this year's increase, the campus achieved an 81 per cent emission reduction compared to our 2013 baseline, which was accomplished through ongoing paper reduction activities that include:

- Continuing to promote using Sugar Sheet™, a 100 per cent tree-free product derived from sugarcane processing bi-product, as an alternative to traditional paper through UBCO's preferred supplier;
- 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,

- Ongoing use of the Find-Me printing option through the PaperCut™ print-tracking software on all campus printers, which delivers reports to clients on print volumes to generate awareness of consumption and promote alternatives to printing. The software also allows users to print from any device on campus, and only releases jobs when the user taps their card at the device within four hours of submission.
  - In 2022, 195,000 pages were submitted to be printed, but not released within the four-hour time period, reducing GHG emissions by 877 kg CO<sub>2</sub>e, saving 2.42 trees.
  - In 2022, there continued to be a significant reduction in sheets of paper printed from pre-COVID-19 levels, down 130 per cent from 2019. This is attributed partly to ongoing reduced levels of people on campus due to hybrid working and learning arrangements, as well as a change in print settings which defaults to double-sided printing, thereby reducing the total number of sheets of paper used.

## D. FUGITIVE EMISSIONS

Hydrofluorocarbon (HFC) emissions accounted for three per cent of total campus emissions, or 87 tCO<sub>2</sub>e. This is a 235 per cent or 61 tCO<sub>2</sub>e increase over 2021 and is attributed to an increase in maintaining older and inefficient refrigerant equipment.

Despite the year-over-year increase, the campus has maintained a reduction trend compared to our 2013 baseline, recording an 83 per cent reduction through actions that 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 (Ptac) units, which reduces a facility's reliance on traditional fossil fuels and refrigerants.
- Continuing to replace inefficient and older equipment, while performing preventative maintenance and upgrades to existing HVAC systems and associated appliances.

# PLANS TO CONTINUE REDUCING EMISSIONS IN 2023 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, the university will continue to focus on implementing the UBCO CAP 2030 to reduce operational and extended GHG emissions. A number of actions initiated in 2022 will be completed in 2023, and new phases of plan implementation will begin.

UBCO will also continue to pursue **high performance building targets and policy standards** through the development and implementation of key strategies, including:

- The **UBCO Green Building Plan**, which will ensure the design and construction of new buildings, renovations and retrofits achieve a level of performance that support the UBCO CAP 2030 operational targets, Whole System Infrastructure Plan 2050 Goals and are aligned with applicable UBC plans/policies;
- Working with UBC Vancouver to develop **embodied carbon policy** to establish a clear pathway to achieve UBCO and UBCV's CAP 2030 embodied carbon reduction target;

- The **UBC Whole Building Lifecycle Assessment Guidelines** for design teams that will clarify UBC's requirements for capital projects toward the achievement of the UBCO CAP 2030 embodied carbon reduction target; and,
- The adaptation of **UBC's Climate Ready Building Requirements** for new construction at the Okanagan campus.

### ENERGY INITIATIVES

UBCO will continue to implement subsequent phases of the **Low Carbon Energy Strategy**. Pending funding approval, future studies and projects will include:

- Initiating Phase 2 of Geo-Exchange upgrade project with the installation of the ASHP;
- Completing the TES study;
- Extending the ICI Building four-pipe infrastructure study, which will serve heating and cooling demands of surrounding buildings from the future ICI cluster plant, to investigate alternative, more cost-effective piping systems; and,
- Reviewing the completed high-level concept design for an Upper Innovation Precinct Cluster Plant study, which is being carried out to explore thermal system configurations to meet the demands of two existing and two future residence buildings.



The implementation of projects approved from the new 10-year **Strategic Energy Management Plan** will continue in the coming year. Selected projects include the installation of an ASHP to support the ongoing target to decarbonize the campus; recommissioning of legacy facilities; implementation of the Science Building's heat recovery study recommendations; optimization of the district energy system's central plant; and finalizing the installation of the University House's ASHP. Combined, these projects are estimated to reduce energy use by 6,150 GJ and emissions by 307 tCO<sub>2</sub>e, annually.

UBCO will continue to displace a portion of natural gas used by the CHP, which provides heating to the campus legacy buildings, with **renewable natural gas**. The use of approximately 5,000 GJ of RNG will reduce the campus emissions profile by an estimated 249 tCO<sub>2</sub>e annually as it is considered carbon neutral and requires no offsets.

Additionally, UBCO will continue working to advance and update the **Infrastructure HVAC Asset Management database**, potentially linking it to major capital retrofit projects on campus 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. This project will provide further input into the data analytics platform and asset management module of the **Enterprise Maintenance Management System**. The asset management module, to be adopted in the coming year, will provide a database of campus equipment that lists expected replacement dates in order to plan for equipment renewal and modernization consistent with long-term strategies.

## NEW BUILDINGS PROJECTS

Anticipated to achieve occupancy in 2026, **UBCO Downtown** aims to support future regional needs, while actively working toward meeting LEED® Gold Certification and Step 3 of the BC Energy Step Code. The proposed 100,000 sq. ft building will integrate sustainable measures into the final design while offering the campus community academic, research and residence space. Sustainable measures planned for integration into the final design of UBCO Downtown include a solar wall to supply energy for preheating outdoor air.

The design of the **ICI Building** was guided by collaboration, interdisciplinarity and Indigeneity. Targeting a minimum of LEED® Gold Certification upon completion, ICI's final operations design integrates passive design principles with the utilization of innovative measures to reduce its operational energy and carbon emission footprint. The 13,185 m<sup>2</sup> building will house state-of-the-art facilities, including wet labs, dry labs, meeting rooms, offices and workstations for graduate students. Teaching spaces will include a 200-seat active-learning lecture hall and 16- to 40-seat classrooms on each floor, while providing dedicated space that brings together researchers, experts, scholars, students and the community to collaboratively investigate and explore solutions to complex societal problems from multiple perspectives. The **Interior Salish Studies and the Bachelor of Nsyilxcn Language Fluency programs** will be offered in dedicated spaces within ICI. The planned Indigenous and community engagement space will provide language labs, a multi-purpose room, collection room, student lounge, Elder's room and Speaker-In-Residence office(s). This space is immediately adjacent to the 100-seat round community space which will be available for all campus users and incorporates Indigenous design ideas.



Rendering of The Interdisciplinary Collaboration and Innovation (ICI) Building courtesy of hcma Architecture + Design and Kieran Timberlake.



Rendering of The Interdisciplinary Collaboration and Innovation (ICI) Building courtesy of hcma Architecture + Design and Kieran Timberlake.

Future building projects targeting completion in the coming years will comply with UBCO's green building and sustainability policies and guidelines, including:

- An Outdoor Gathering Space that aims to advance Indigenous teachings and learnings through the support of land-based learning, teachings and nature interpretation in the Syilx Okanagan language;
- The Office Modular 2 that will provide additional office space to campus departments; and,
- The new Child Care Facility, co-located with the existing Daycare, will add 37 new childcare spaces to the current 57, a 66 per cent increase. It will also provide unique learning and training opportunities for UBC medical, nursing and psychology students.

## BUILDING RECOMMISSIONING

In the coming year, UBCO will undertake recommissioning studies and projects in the following buildings:

- Recommended measures identified in the EME Building's recommissioning study will be implemented. They will address identified deficiencies in the operation of the building that were wasting energy, increasing equipment wear and tear, or decreasing occupant comfort.
- Within the Science Building, recommendations of a study that looks at recovery of heat from the existing rooftop laboratory exhaust via a glycol runaround heat recovery system, will be implemented.

Finally, UBCO will initiate a night flushing 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. UBCO is developing a sequence of operation strategies to be implemented in all the academic buildings, where applicable.

## STUDENT RESIDENCE BUILDINGS

In the coming year, the LED light switch-out program will continue to be implemented on a failure-based need.

## IT INFRASTRUCTURE ACTIONS

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

- Replacing desktop computers with laptops and more efficient 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 stepdown 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, including:

- Studying the potential of converting electric golf cart batteries to a more recyclable lithium-ion option.
- Continuing to reduce its reliance on fleet vehicles by consolidating off-campus trips and decreasing the number of trips taken by encouraging fleet carpooling, walking or cycling.
- 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, including:

- 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.
- Continuing to invest in improved and more sustainable technologies, which provide better performance with a reduced environmental impact. This includes implementing solutions that digitize fax transmissions (i.e., fax to email) to reduce paper consumption.
- Contemplate introducing additional fees to support convenience printers (i.e., printers that are set up in offices or lab spaces for convenience access, in addition to main fleet printers) to further encourage the use of fleet printing. Fleet printing increases efficiencies by consolidating devices and increasing access to printer capabilities (e.g., colour printing, etc.).

## D. FUGITIVE EMISSIONS

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

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



# CAMPUS EMISSION TRENDS



## COMPARING EMISSIONS TO GROWTH

**Figure 1** shows growth trends and total campus and building GHG emissions between 2007 to 2022. Despite the significant increases in floor area and student enrolment by over 133 and 157 per cent respectively since 2007, total GHG year-to-year emissions changes have remained fairly stable.

In 2022, UBCO reported a year-over-year increase in total emissions by 23 per cent. This is in part a result of how the campus has returned to more intense use of space, the retention of COVID-19 building operational protocols, and notably, the addition of five new buildings since 2019. The new buildings account for a 14 per cent increase in GSM and 41 per cent of the total increase in building emissions since 2019. The campus is

monitoring emissions at the building scale to identify buildings with higher energy demands and emissions from operational loads to support activities such as food services and research in an effort to identify opportunities to reduce emissions.

Another way to demonstrate campus GHG emissions performance that accounts for changes in growth is intensity-based. For example, Figure 2 demonstrates the emissions intensity trend relative to campus growth in floor area from 2007 to 2022. Despite the significant floor area growth, GHG emissions per building gross square meter (m<sup>2</sup>) dropped from 0.030 in 2007 to 0.018 in 2022, a reduction of 40 per cent.





FIGURE 1 TOTAL GHG EMISSIONS RELATIVE TO GROWTH: 2007-2022

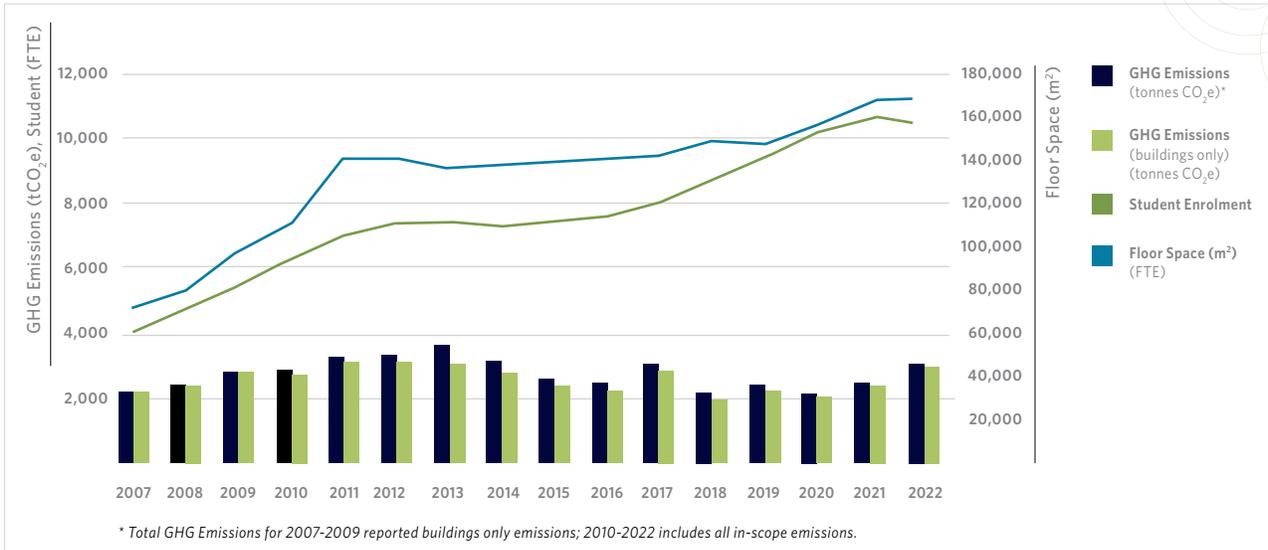
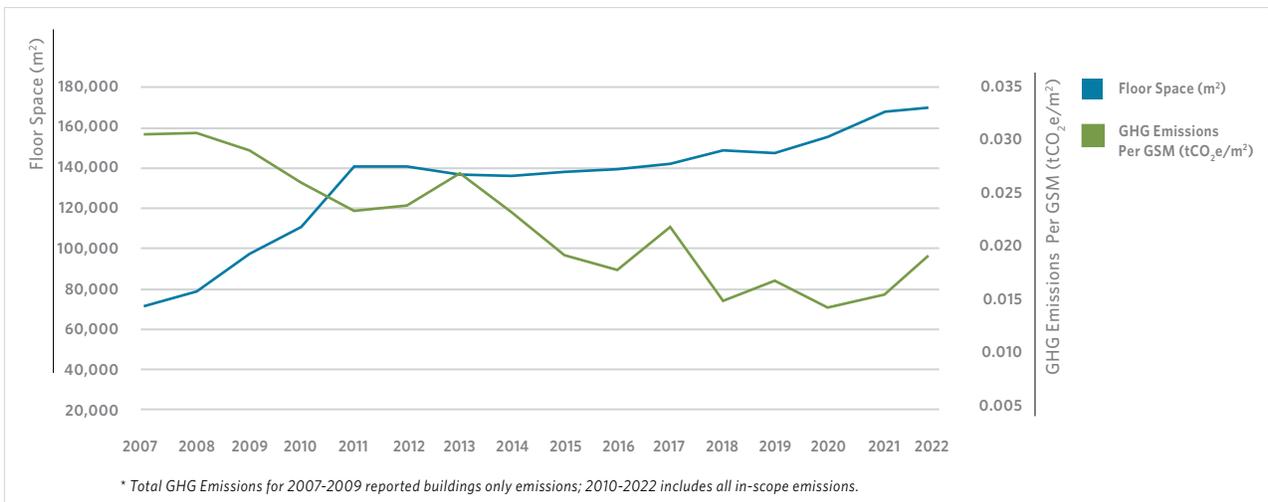


FIGURE 2 GHG EMISSIONS INTENSITY RELATIVE TO BUILDING GSM: 2007-2022



# PUBLIC SECTOR LEADERSHIP

## CLIMATE RISK MANAGEMENT

In 2022, UBCO completed a **Multi-Hazard Risk Assessment**. The objective was to identify risks to campus infrastructure systems and buildings and to evaluate the identified risks to support the development of resilience measures. The Multi-Hazard Risk Assessment supports and aligns with existing campus climate adaptation planning and activities articulated in the UBCO CAP 2030. This includes the UBCO Integrated Rainwater Management Plan (2017), with minimum retention targets based on predicted climate change, and the Whole Systems Infrastructure Plan (WSIP) that incorporates climate sensitivity analysis for energy and carbon reduction measures, landscape, ecology and biodiversity actions. Outcomes of the Multi-Hazard Risk Assessment include a risk register that identifies the highest risks for each infrastructure system and potential actions to investigate as part of a future Phase 2 project.

In parallel, the development of a **UBCO Climate Adaptation, Resilience and Biodiversity Strategy** is underway. The strategy will identify best practices in climate adaptation and prepare the campus for regulatory climate resiliency planning reporting requirements. The strategy is anticipated to identify how the campus' resilience and adaptive capacity to climate change can be optimized; demonstrate best practices in climate adaptation, resilience and biodiversity operational and land use planning and policies; and make recommendations for policy updates and actions to further prepare the campus and its ecological assets against climate risks. The strategy is also expected to identify opportunities for integration of Indigenous knowledge systems while identifying the co-benefits of adaption actions with mitigation strategies identified in the UBCO CAP 2030.

## CLIMATE POLICY IMPLEMENTATION

Following the UBC Board of Governors' endorsement of UBCO's the CAP 2030 in 2021, key stakeholders championed measures to advance the plan's targets to accelerate GHG emission reductions from campus operations and extended (indirect) sources. *Scope 1 and 2 actions, which include campus operations, have been identified in the previous sections of the 2022 CCAR.*

Key recommendations of the **UBCO Transportation Plan** (2021) implemented in 2022 that advance the achievement of UBCO CAP 2030's commuting GHG reduction target include:

- Establishment of a Sustainable Transportation Levy;
- The introduction of the **faculty and staff ProPass** that provides a 50 per cent subsidized monthly pass to transit commuters; and,
- The launch of a **Bike Share e-bike/scooter program** to support active commuting to, from and around campus.

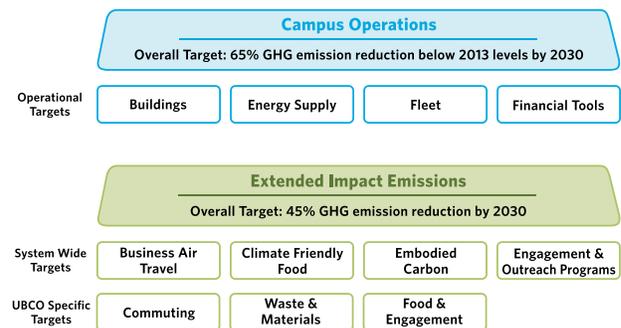
Waste and material actions completed in 2022 to advance the UBCO CAP 2030 waste and materials GHG reduction target include:

- The introduction of four-stream sorting stations—waste, recycling, refundables and composting—in the traditional student residence buildings;
- Composting/dehydrating all organics collected in the Pritchard Dining Hall, which supports zero food waste;
- Eliminating single-use plastics in Pritchard Dining Hall through the use of washable food ware;
- Relaunch of the Green2Go program at UBCO Food Services outlets; and,
- Continuing to send all campus food waste to the Spa Hills Compost facility, which offsets carbon emissions.

Actions implemented that focused on UBCO Food Systems consist of:

- Completing a **UBCO CAP Food GHG Baseline Project Report** and reduction strategies;
- Scaled-up local food procurement through **Land to Table Network Partnerships**; and,
- Offering plant-based options at every food station in Pritchard Dining Hall.

## UBCO CLIMATE ACTION PLAN 2030 TARGETS



## UBC OKANAGAN POLICIES THAT INCORPORATE CLIMATE ADAPTATION

UBC's Okanagan campus has demonstrated climate leadership through the development and implementation of policies that focus on climate mitigation and adaptation strategies.

Whole Systems Infrastructure Plan (WSIP, 2016)	Integrated Rainwater Management Plan (IRMP, 2017)	Climate Action Plan 2030 (UBCO CAP 2030, 2021)
<p>The UBCO Whole Systems Infrastructure Plan provides a foundation for campus growth and development over the next 20 years and beyond, and addresses energy, carbon, water, landscape, ecology, biodiversity and engagement to ensure that the campus is resilient to future changes in growth, utility rates and climate change.</p>	<p>The UBCO Integrated Rainwater Management Plan provides minimum rainwater retention targets— informed by stormwater modelling that incorporates predicted climate change—to achieve 100 per cent diversion of rainwater from the municipal system. The plan 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.</p>	<p>The UBCO Climate Action Plan 2030 establishes a course of action to accelerate the reduction of operational emissions by 2030 and identifies measures to reduce emissions in areas of extended impact, including commuting, food, waste and business air travel. The CAP 2030 acknowledges that addressing climate and ecological crises simultaneously is critical to adapt to climate change and sets forth immediate priority areas for adaptation in campus planning and operations.</p>

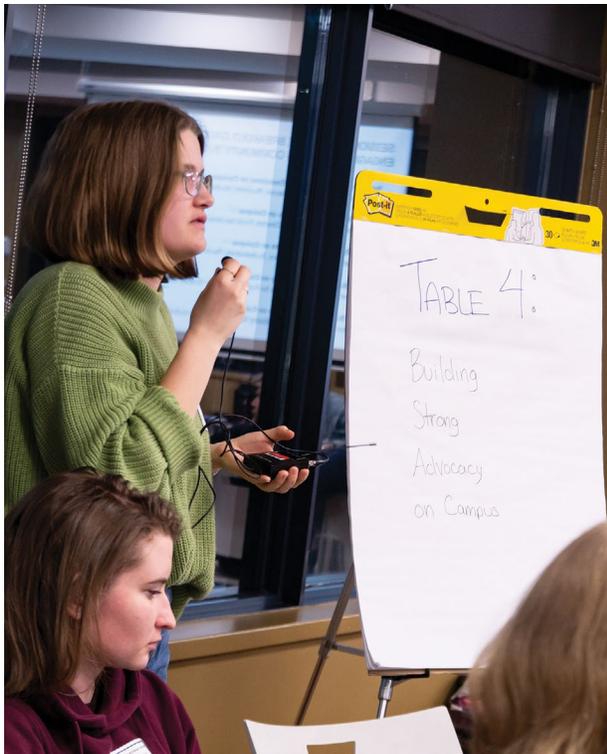


## COLLECTIVE COMMUNITY ENGAGEMENT

Community engagement is at the cornerstone of advancing action on climate change, particularly in the areas of extended impact—such as reducing carbon emissions from commuting, food and waste.

In early 2022, UBCO completed a study to identify how community engagement strategies could be informed by lessons learned during the COVID-19 pandemic. The **Community Engagement Strategies for Climate Change Coming Out of the Pandemic** report recommended that, as communities emerge, we use lessons learned from the pandemic to address gaps in community resilience by integrating more effective ways to engage the community at grassroots and national levels. Specific recommendations included tailoring messages to accommodate different groups within a community; structuring and applying scientific information at the community level using localized scenarios that are understandable and meaningful to the public; and, providing the community with a sense of collectivism that help motivate people to change their behaviours. Key recommendations were considered by UBCO in a series of refreshed community engagement climate programs and activities implemented in 2022.

Arising from the new UBCO CAP 2030, a faculty-led **UBCO Climate Action Plan Implementation engagement working group (CAP-E)** formed and hosted its first **UBCO Teach-In** on



**Climate/Justice** in conjunction with the Worldwide Teach-In. Held virtually, 61 students, faculty and staff shared best practices in community climate action and engagement. The event featured concurrent panels of UBCO faculty members from a variety of disciplines across campus who tackled complex, interconnected climate and justice issues and solutions. A panel of UBCO staff introduced the newly launched CAP 2030 and participants shared views for achieving ambitious and equitable climate change action on campus. More information can be found at: [sustain.ok.ubc.ca/teach-in](https://sustain.ok.ubc.ca/teach-in).

## Extended Emissions (Scope 3) Reduction Activities

UBCO participation in the annual spring and fall **GoByBike Weeks** continued to demonstrate a strong, enduring commitment by students, faculty and staff to use active transportation. This was evident in instances where travel to and from campus and for personal commuting was appropriate. During these hybrid events, 74 riders logged 316 trips, rode over 5,190 km and reduced commuting emissions by 1,125 kgCO<sub>2</sub>e. The campus also hosted **Mode-Shift: A campus commuting** event, which brought awareness to the campus community on alternative transportation options available to move to, around and from campus. These options include the electric bike and scooter programs and a bike rental and service program offered through UBCycles. UBCO faculty and staff ProPASS and UBCO student UPASS programs were also provided, which offer substantial discounts to transit riders.

UBCO also encouraged waste reduction through events that promoted reuse and recycling behaviours. The **Sort It Out: Choose to Reuse** event engaged over 400 community members, provided attendees with material sorting education, distributed 250 reusable travel mugs, and reported that 65 per cent of attendees regularly use a travel mug to reduce waste.

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

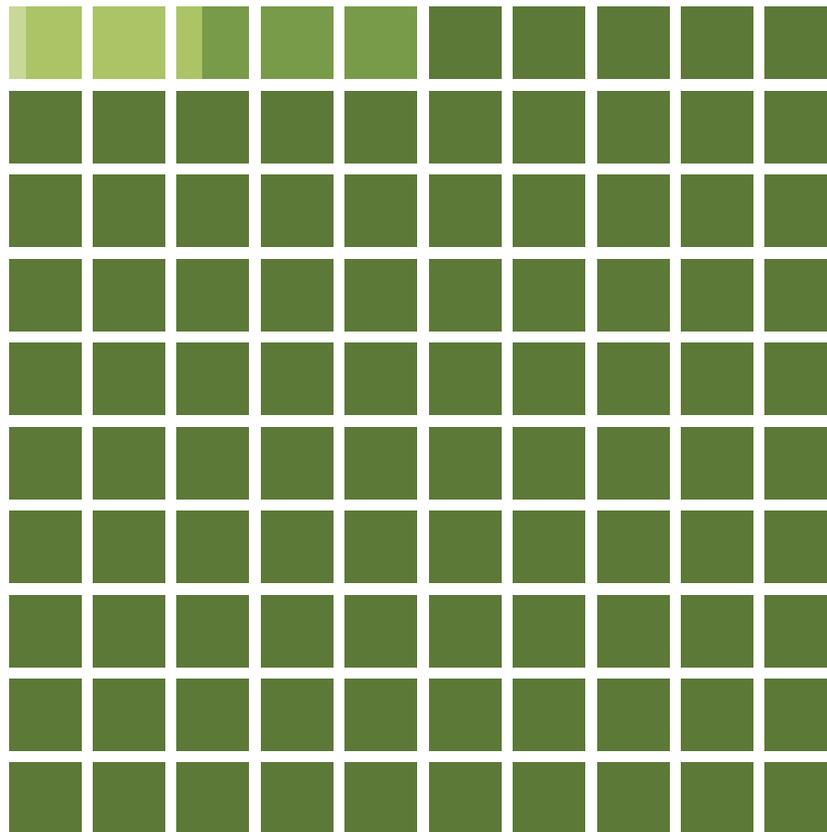
The Power of You, UBCO's signature community engagement program, delivered on campus engagement activities that aligned with the return of on-campus activities. In 2022, the campus initiated the **Power of You: Cozy and Closed** program that encourages energy reduction behaviours. Additional support of this program was implemented through the nightly energy reduction audits completed by key operational departments. Staff turned off or powered down over 2,903 lights and 83 projectors or screens, and closed 93 windows as a direct result of these initiatives.

In the coming year, subject to resources, UBCO will continue to develop and implement collective community engagement programs using an evidence-based strategy to affect high-impact areas that reduce GHG emissions, a key area of focus in the UBCO CAP 2030.

# EMISSIONS PROFILE 2022



## UBC OKANAGAN GREENHOUSE GAS EMISSIONS BY SOURCE FOR THE 2022 CALENDAR YEAR (tCO<sub>2</sub>e\*)



<span style="display: inline-block; width: 15px; height: 15px; background-color: #2e6b2e; margin-right: 5px;"></span> Buildings	<b>95%</b>
2,931 tCO <sub>2</sub> e	
<span style="display: inline-block; width: 15px; height: 15px; background-color: #4f814f; margin-right: 5px;"></span> Fugitive Emissions	<b>3%</b>
87 tCO <sub>2</sub> e	
<span style="display: inline-block; width: 15px; height: 15px; background-color: #76a576; margin-right: 5px;"></span> Fleet	<b>2%</b>
53 tCO <sub>2</sub> e	
<span style="display: inline-block; width: 15px; height: 15px; background-color: #a6c9a6; margin-right: 5px;"></span> Paper	<b>0.5%</b>
14 tCO <sub>2</sub> e	

**Total Emissions**  
3,085 tCO<sub>2</sub>e

*Offsets Applied to Become Carbon Neutral in 2022*

*(Generated April 18, 2023) Total offsets required: 2,930.  
Total offset investment: \$73,250.*

*Emissions which do not require offsets: 155.\*\**

*\* Tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) is a standard unit of 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 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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