

2021

# Climate Change Accountability Report

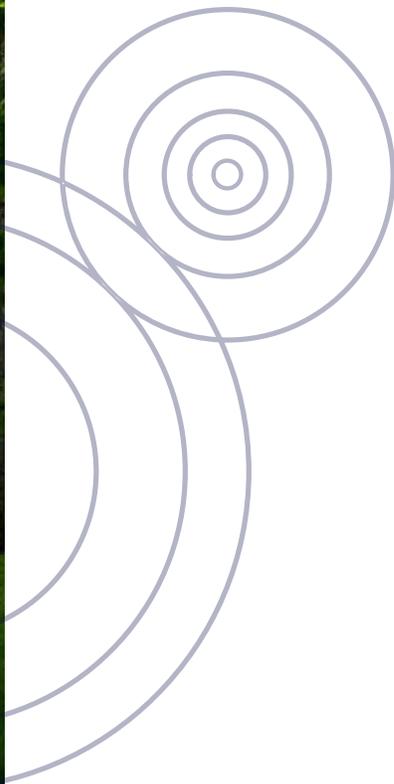






# 2021 CLIMATE CHANGE ACCOUNTABILITY REPORT

<b>Introduction</b>	<b>4</b>
About UBC	4
Sustainability Plans & Publications	4
<b>Executive Summary</b>	<b>5</b>
<b>Emissions Overview</b>	<b>7</b>
Emissions and Offset Summary	7
2021 Emissions and Offsets	7
<b>UBC VANCOUVER CAMPUS</b>	<b>10</b>
<b>UBC OKANAGAN CAMPUS</b>	<b>31</b>





# INTRODUCTION

## ABOUT UBC

The University of British Columbia (UBC) is a global center for teaching, learning and research, consistently ranked among the top 20 public universities in the world and recently recognized as North America's most international university. 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

Responding to the urgency of the climate and biodiversity crisis, UBC released the Vancouver Climate Action Plan 2030 and the Okanagan Climate Action Plan 2030 in 2021. These plans put the University on an accelerated path to net zero emissions for buildings and energy supply, as well as targeting significant emissions reductions for extended impact areas<sup>1</sup> – aligning, and in some cases surpassing, the 2030 emissions reductions required to achieve the Paris Agreement<sup>2</sup> goal of keeping global temperatures within 1.5°C. UBC also 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 is uniquely positioned to use its institutional and intellectual capacities toward a bigger collective impact to advance the United Nations Sustainable Development Goals with top-tier thought leadership that informs innovative sustainable development.

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. By establishing the UBC Climate Emergency Task Force and endorsing the new climate action plans, the UBC Board of Governors has confirmed that climate action continues to be a top strategic priority for the University. UBC has created governance structures to guide, align and direct climate and sustainability activities across the institution from the level of Board, executive leadership, through senior and mid management. UBC is committed to creating improved capacity and leadership across all levels of the organization by developing a Climate Action Accountability Framework.

In 2021, UBC achieved a combined 24% reduction in total offsetable greenhouse gas (GHG) emissions at both campuses (since 2007); despite an overall 31% growth in floor space and 52% increase in student enrolment. Overall, UBC has achieved a 50% GHG emissions reduction per full-time equivalent student since 2007.

UBC has recently invested in an expansion of the Bioenergy Research and Demonstration Facility (BRDF) which has been under construction for the past 18 months. The Vancouver campus saw a 5% (2,330 tCO<sub>2</sub>e) increase in total offsetable operational GHG emissions from 2020, caused primarily by the need to temporarily shut down the BRDF during this expansion construction project. Despite this shutdown, the campus achieved a 25% emissions reduction compared to 2007 baseline. Once the BRDF is fully functional, it is forecasted that campus operational GHG reductions will achieve an estimated 60% reduction from the 2007 baseline. In the coming year, the campus will expand efforts to reduce energy and carbon emissions through implementation of CAP2030 decarbonization activities, while a Climate Adaptation, Resiliency, and Biodiversity Strategy is being developed in parallel to the upcoming Campus Vision 2050<sup>4</sup> plan to support our community and help to mitigate future climate risks.

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/>  
4 <https://campusvision2050.ubc.ca/>

The Okanagan campus saw a 7% (229 tCO<sub>2</sub>e) increase in total offsetable operational GHG emissions from 2020, largely attributable to a 2021 update to the Provincial electricity emissions intensity factor<sup>5</sup> and growth in campus operations. However, when compared to the 2013 baseline, the campus achieved a 31% reduction in absolute GHG emissions in 2021. In the coming year, the campus will continue to reduce energy and carbon emissions by implementing its first Climate Action Plan 2030. This will be supported by the continued implementation of the updated 10-Year Strategic Energy Management Plan and a new Low Carbon Energy Strategy to address energy demand and supply side decarbonization. With a focus on preparing for climate change, the campus will complete a multi-hazards study to inform opportunities to reduce climate-related risks to campus infrastructure and provide a key input into the campus' broader climate adaptation, resilience and biodiversity planning.

In 2021, Times Higher Education once again ranked UBC among 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 campus as a test bed for climate solutions and deeper progress towards sustainable development.



**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

---

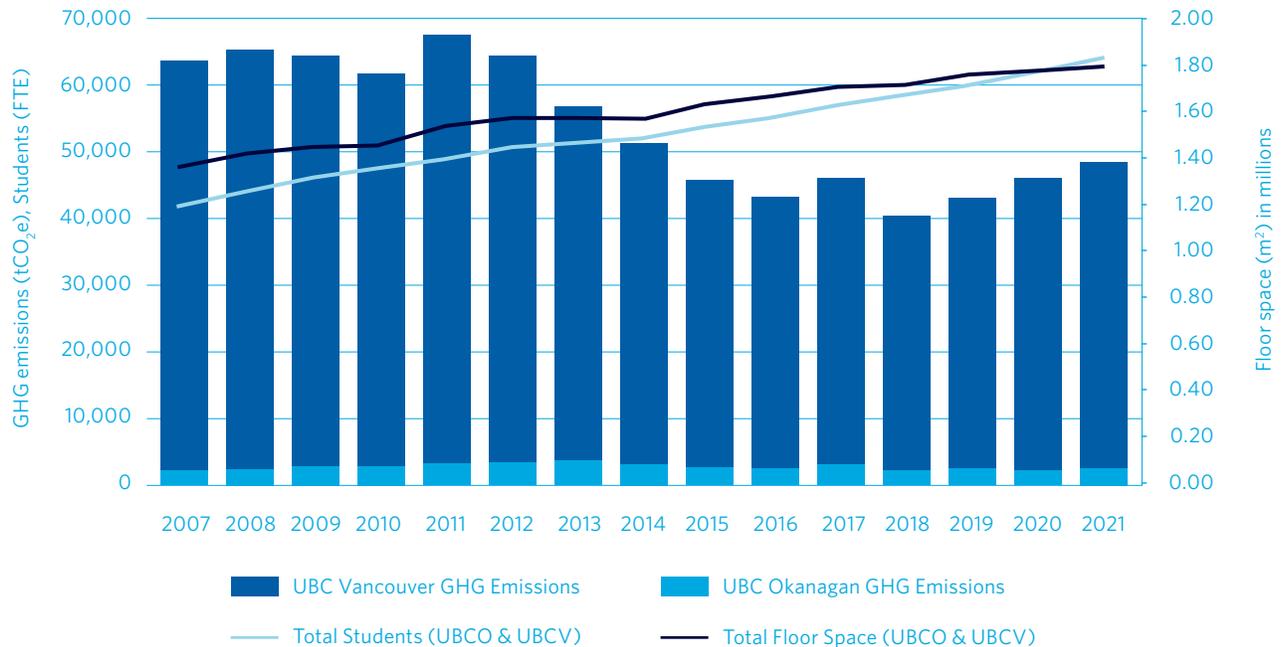
<sup>5</sup> In 2021, the Province assessed and increased the amount of carbon associated with electricity production—the electricity emissions intensity factor—which has a direct impact on the calculation of carbon associated with electricity usage by the campus.

# 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 offsetable emissions for each campus since 2007, as shown in Figure 1, to measure performance against our Climate Action Plan targets.

**FIGURE 1:** UBC Growth and Emissions for Carbon Offsets, 2007 to 2021



## 2021 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 2. The total offsetable emissions amounted to 54,816 tCO<sub>2</sub>e in 2021; 96% 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 2021 amounted to 59,825 tCO<sub>2</sub>e, including 5,009 tCO<sub>2</sub>e of biogenic emissions<sup>6</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.

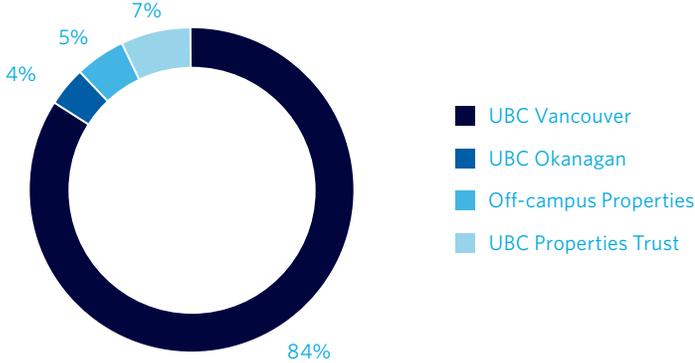
6 Biogenic emissions arise from biomass combustion, including wood waste, renewable natural gas and biofuels. The UBC Bioenergy Research and Demonstration Facility (BRDF) only uses clean wood waste from regional wood product manufacturing and municipal plant trimmings.

In 2021, UBC’s total emissions (including biogenic) reduced by 1% compared to 2020, but the total offsetable emissions increased by 5% (2,682 tCO<sub>2</sub>e). This was mainly attributed to the 39% drop in biogenic emissions due to the shutdown of the BRDF at the UBC Vancouver campus for the expansion project. Offsetable emissions will significantly reduce once the BRDF expansion is fully operational in 2022.

**TABLE 1: 2021 UBC Total GHG Emissions by Location (in tCO<sub>2</sub>e)**

Location	2021 Emissions for offset	Emissions not required to be offset <sup>7</sup>	Total GHG Emissions
UBC Vancouver Campus	45,958	4,804	50,762
UBC Okanagan Campus	2,295	204	2,499
Off-campus Properties	2,929	1	2,930
UBC Properties Trust	3,634	0	3,634
<b>UBC Total</b>	<b>54,816</b>	<b>5,009</b>	<b>59,825</b>

**FIGURE 2: 2021 UBC Offsetable GHG Emissions Distribution (Vancouver and Okanagan Campuses)**



<sup>7</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.

Table 2 shows the 2021 emissions for offsets from UBC's two main campuses along with key performance indicators.

**TABLE 2:** 2021 Offsettable Emissions and Key Indicators for UBC Vancouver and UBC Okanagan

Key Performance Indicator	Vancouver Campus	Okanagan Campus	UBC 2021 total
GHG Emissions (tonnes CO <sub>2</sub> e)	45,958	2,295	48,253
Floor Space (m <sup>2</sup> )	1,611,485	166,538	1,778,023
GHG Emissions per Square Metre (tonnes CO <sub>2</sub> e/m <sup>2</sup> )	0.029	0.014	0.027
Student Enrolment (FTE) <sup>8</sup>	52,852	10,596	63,448
Staff and Faculty Employees (FTE)	15,684	1,569	17,253
GHG Emissions per Student (tonnes CO <sub>2</sub> e/FTE)	0.87	0.22	0.76

<sup>8</sup> Numbers are calculated on a full-time equivalent basis, as opposed to headcount

# UBC VANCOUVER CAMPUS



THE UNIVERSITY OF BRITISH COLUMBIA

vancouver campus



## SECTION CONTENTS

<b>Vancouver Campus Summary</b>	<b>12</b>
Declaration Statement	13
Emissions and Offsets Summary	13
Retirement of Offsets	13
<b>2021 Emissions Overview</b>	<b>14</b>
Overview	14
Comparison to Baseline Year	16
Comparing Emissions to Growth	17
Scope 3 Emissions	17
<b>2021 Emissions Reductions: Actions</b>	<b>19</b>
A. Stationary Sources (Buildings)	19
B. Mobile Sources (Fleet)	22
C. Paper Consumption	23
D. Fugitive Emissions	23
<b>Emissions Reductions Plans in 2022 and Beyond</b>	<b>24</b>
A. Stationary Sources (Buildings)	24
B. Mobile Sources (Fleet)	25
C. Paper Consumption	25
D. Fugitive Emissions	25
<b>GHG Emissions by Source</b>	<b>26</b>
<b>Public Sector Leadership</b>	<b>27</b>
A. Climate Risk Management	27
B. Other Sustainability Initiatives & Success Stories	28

# VANCOUVER CAMPUS SUMMARY

UBC's Board of Governors recently endorsed UBC Vancouver's latest Climate Action Plan, CAP2030, 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 (Scope 1 and 2) and a 45% GHG reduction for extended emissions (Scope 3 emissions including commuting, business air travel, food systems, embodied carbon, waste and materials) by 2030, reaching net zero operational emissions by 2035.

During 2021, Vancouver experienced significant climate events including spells of extreme heat, extreme cold, wildfire smoke, thunderstorms, and heavy precipitation – all symptomatic of the loss of climate stability due to climate change. These unusual weather patterns present a major challenge for UBC's teaching and research objectives as well as impacting community health. Climate adaptation and resilience planning is becoming increasingly necessary to protect campus infrastructure, ecological assets, students, staff and faculty against future climate risks.

In 2021, the UBC Vancouver campus achieved an operational GHG emissions reduction of 25% (15,124 tCO<sub>2</sub>e) from a 2007 baseline, despite a 41% increase in student enrolment and a 25% growth in campus building floor space. This success, coupled with the newly released CAP2030, builds on UBC's strong reputation as an international sustainability leader.

Key achievements for 2021 include:

- The much-awaited milestone as part of the Bioenergy Research and Demonstration Facility (BRDF) expansion project - the re-lighting of the gasifier, took place in November 2021. Once commissioning of the expanded BRDF is complete, an additional 12 Megawatts of renewable heating energy will be available to the District Energy System, representing a major step forward in campus decarbonization.
- UBC Energy & Water Services completed the installation of a new heat recovery chiller at the Chemistry Centre, which will recover waste heat

from a data centre and use it to heat the building. The project will reduce the building's heating related GHG emissions by approximately 90%.

- UBC completed development of the UBC LEED version 4.1 Implementation Guide for new buildings, which indicates mandatory and priority credits aligned with UBC's policies along with guidance and resources for each credit. These are expected to bolster UBC's drive to reduce operational and embodied carbon in buildings.
- The UBC Gateway building project is being designed to target Zero Carbon Building Certification - this was awarded the 2021 Canadian Architect Award of Excellence. It will co-locate the schools of nursing, kinesiology, language science and UBC health clinics and aims to be a gateway to the university. The project team is working closely with the Musqueam community to meaningfully incorporate culture and value in the project.

We forecast that with the implementation of CAP2030 actions, the Green Building Action Plan, and final 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 Climate Change Accountability Report for the period January 1, 2021 to December 31, 2021 summarizes our GHG emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2021 to reduce our GHG emissions, and our plans to continue reducing emissions in 2022 and beyond.

By June 30, 2022 University of British Columbia Vancouver campus' 2021 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 3: UBC Vancouver Emissions and Offsets Summary Table<sup>9</sup>**

UBC Vancouver 2021 GHG Emissions and Offsets	
<b>GHG Emissions created in Calendar Year 2021</b>	
Total Emissions (tCO <sub>2</sub> e)	57,326
Total BioCO <sub>2</sub>	4,805
Total Offsets (tCO <sub>2</sub> e)	52,521
<b>Adjustments to Offset Required GHG Emissions Reported in Prior Years</b>	
Total Offsets Adjustment (tCO <sub>2</sub> e)	-2
<b>Grand Total Offsets for the 2021 Reporting Year</b>	
Grand Total Offsets (tCO <sub>2</sub> e) to be Retired for 2021 Reporting Year	52,519
Offset Investment (\$25 per tCO <sub>2</sub> e)	\$1,312,971

## 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 2021 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>9</sup> This table includes combined details of Vancouver Campus, Off-Campus Properties, and UBC Properties Trust

# 2021 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 4 provides a breakdown of Vancouver campus GHG Inventory emissions from core, ancillary, and UBC-owned tenant buildings, fleet, fugitive<sup>10</sup>, paper and TRIUMF. UBC Vancouver campus now emits 25% (15,124 tCO<sub>2</sub>e) less offsetable GHG emissions compared to the 2007 baseline.

**TABLE 4:** Vancouver Campus Offsetable Emissions Comparison by Source (in tCO<sub>2</sub>e), 2007, 2020 & 2021

Source	2007 Emissions	2020 Emissions	2021 Emissions	% Change from 2007
Buildings	58,105	41,952	44,473	-23%
Fleet	1,973	555	811	-59%
Paper	1,003	119	101	-90%
Fugitive	-	1,003	573	
<b>Total Vancouver Campus Emissions</b>	<b>61,082</b>	<b>43,628</b>	<b>45,958</b>	<b>-25%</b>

The Vancouver campus emissions for offsets amounted to 45,958 tCO<sub>2</sub>e in 2021. A detailed breakdown of the campus emission sources is provided in Table 5. 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 5.

<sup>10</sup> Fugitive emissions are determined by the amount of refrigerants used to replenish regeneration equipment, such as building chillers during servicing

**TABLE 5: 2021 Offsetable Emissions for the UBC Vancouver Campus (in tCO<sub>2</sub>e)**

Source	2007 emissions	2021 emissions	% of 2021 Total
<b>UBC Vancouver Campus – Core buildings<sup>11</sup></b>	<b>46,478</b>	<b>34,203</b>	<b>74%</b>
DES (natural gas and light fuel oil) <sup>12</sup>	40,106	25,136	55%
Natural gas (direct burn)	3,515	7,778	17%
Electricity	2,856	1,247	3%
Biomass facility <sup>13</sup>	N/A	19	0.04%
Renewable Natural Gas <sup>14</sup>	N/A	23	0.05%
<b>UBC Vancouver Campus – Ancillary buildings<sup>15</sup></b>	<b>11,405</b>	<b>10,199</b>	<b>22%</b>
DES (natural gas and light fuel oil)	7,311	6,307	14%
Natural gas (direct burn)	3,108	3,307	7%
Electricity	986	580	1%
Biomass facility	N/A	5	0.01%
<b>TRIUMF<sup>16</sup></b>	<b>222</b>	<b>71</b>	<b>0.16%</b>
<b>Fleet</b>	<b>1,973</b>	<b>811</b>	<b>2%</b>
<b>Paper</b>	<b>1,003</b>	<b>101</b>	<b>0.22%</b>
<b>Fugitive</b>	<b>0</b>	<b>573</b>	<b>1%</b>
<b>Total Vancouver Campus Offsetable Emissions</b>	<b>61,082</b>	<b>45,958</b>	<b>100%</b>

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

12 District Energy System (DES)

13 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.

14 UBC is required to offset the CH<sub>4</sub> and N<sub>2</sub>O portions of renewable natural gas.

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

16 TRIUMF is a joint venture with other universities for physics research, it has historically been included in the UBC Vancouver Campus inventory since it is located on campus. UBC accounts for 1/14th of the TRIUMF emissions.

The emission reduction in 2021 was less than anticipated as the BRDF was shut down for the expansion project and the district energy system relied on the natural gas fired boilers at the Campus Energy Centre for most of its heating needs. In addition, colder weather led to a 4% increase in heating degree days that resulted in an increase in building heating demand. While fleet emissions increased by 46% compared to 2020, this is still below the 2019 pre-COVID level. Figure 3 shows the distribution of major offsetable emissions from UBC’s Vancouver campus.

**FIGURE 3:** 2021 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 0.87 tCO<sub>2</sub>e per student FTE in 2021, a 46% decrease since 2007, despite significant growth in buildings and student enrollment - Table 6 outlines key performance indicators for the UBC Vancouver campus.

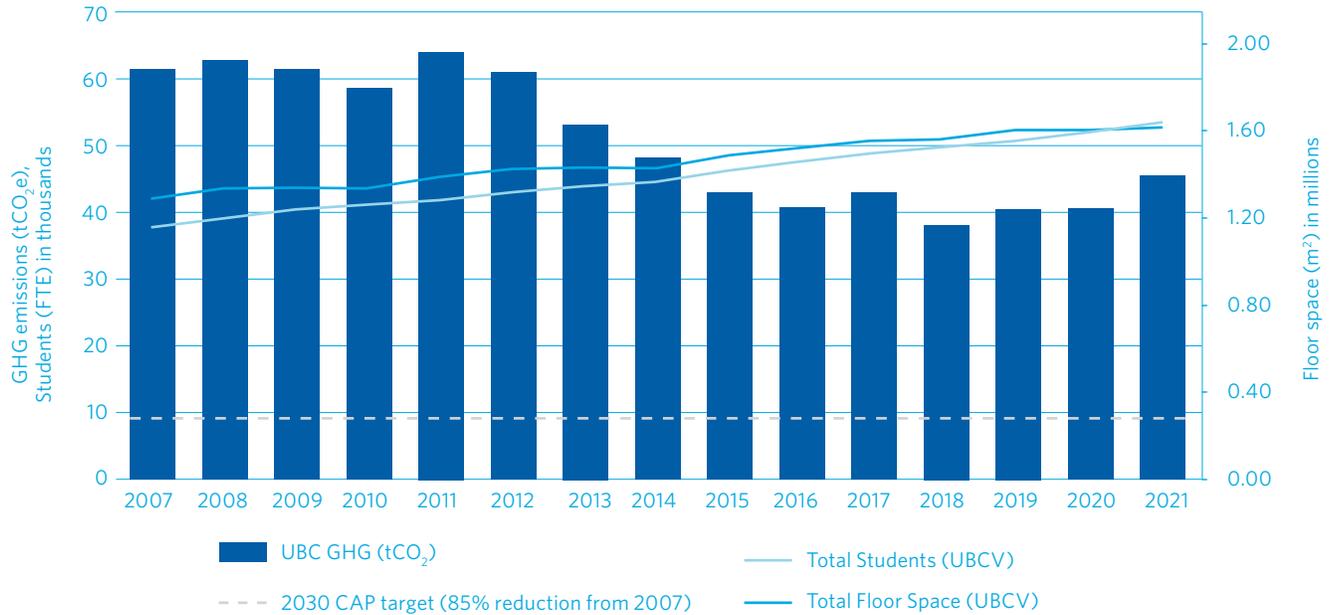
**TABLE 6:** 2021 UBC Vancouver Campus Key Performance Indicators

Key Performance Indicator	2007	2021	% Change from 2007
GHG Emissions (tCO <sub>2</sub> e)	61,082	45,958	-25%
GHG Emissions per Student (tCO <sub>2</sub> e/FTE)	1.62	0.87	-46%
GHG Emissions per square meter (tCO <sub>2</sub> e/m <sup>2</sup> )	0.048	0.029	-40%
Floor Space (m <sup>2</sup> )	1,284,482	1,611,485	+25%
Student Enrolment (FTE)	37,589	52,852	+41%
Staff and Faculty Employees (FTE)	10,509	15,684	+49%

## COMPARING EMISSIONS TO GROWTH

Figure 4 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 4:** UBC Vancouver Campus Growth and Offsetable Emissions Reduction



UBC Main Mall

## SCOPE 3 EMISSIONS

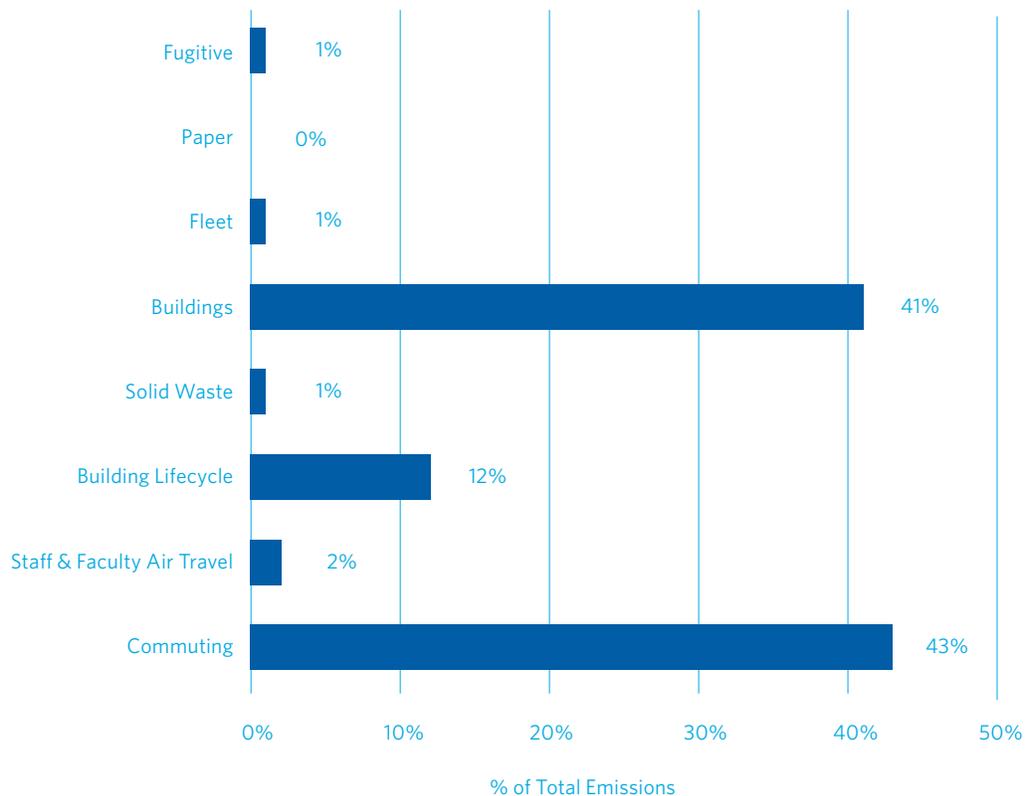
Under current legislation, UBC is not responsible for carbon offset payments associated with Scope 3 emissions (except paper). Despite this, UBC has made an explicit target in CAP2030 to reduce extended impact emissions by 45% below 2010 by 2030 (aligned with the reduction needed to achieve the Paris Agreement). The Vancouver campus GHG inventory quantifies the optional Scope 3 emissions which are outlined in Table 7.

**TABLE 7: 2021 UBC Vancouver Campus Scope 3 Emissions (in tCO<sub>2</sub>e)**

Source	2007 emissions	2021 emissions	% Change from 2007
Commuting	41,523	45,938 <sup>17</sup>	11%
Business Air Travel	13,600	1,845	-86%
Building Lifecycle	10,190	13,295	30%
Solid Waste	1,930	658	-66%

In 2021, the Vancouver campus adapted hybrid working arrangements and the campus community slowly transitioned back to on campus activities. Figure 5 shows the comparative proportions of these emissions for the Vancouver campus.

**FIGURE 5: UBC's Vancouver Campus Total Emissions for Scope 1, 2 and 3, 2021**



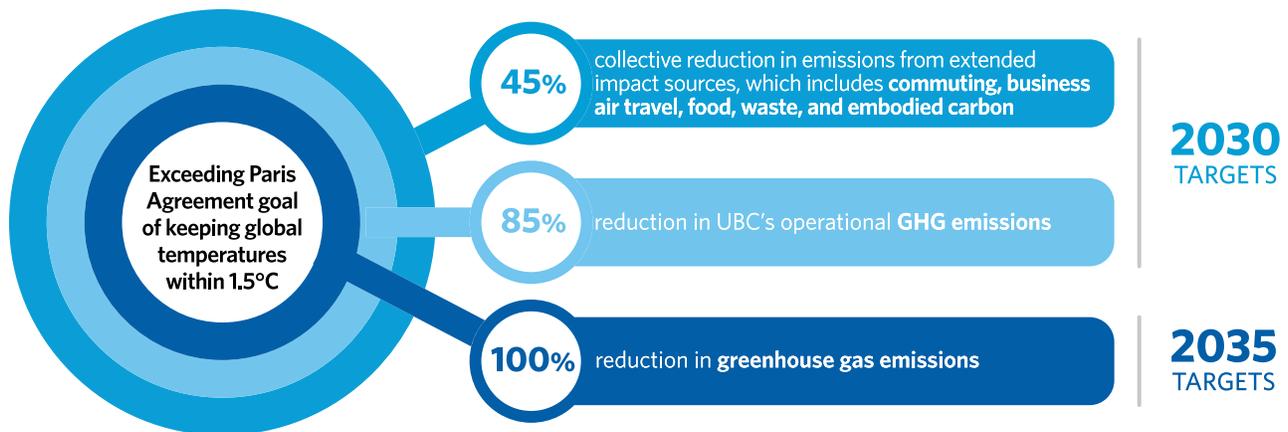
<sup>17</sup> An updated methodology was implemented for the 2021 reporting year to track commuting GHG emissions.

# 2021 EMISSIONS REDUCTIONS: ACTIONS

The recent Board of Governors endorsement of the UBC Vancouver Climate Action Plan 2030 (CAP2030<sup>18</sup>) 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 6: 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, all of which occurred over several months in 2021. Due to

the changing climate, UBC has started to future proof buildings, through the UBC Climate Ready Building Design Requirements, which are part of the Green Building Action Plan's Climate Adaptation component and provide guidance to project teams to incorporate key design strategies and identify future retrofits to reduce risk and life cycle costs of the university's buildings due to predicted climate change in our region.

In 2021, UBC completed development of the UBC LEED version v4.1 Implementation Guide to ensure strong alignment with CAP2030 and bolster UBC's drive to reduce operational carbon in buildings. UBC

18 <https://planning.ubc.ca/cap2030>



Bioenergy Research and Demonstration Facility

introduced pilot embodied carbon reduction targets for all major projects in 2021, to improve accuracy in embodied carbon reductions and to provide assistance through the development of a draft of guidance and methodology requirements for building life cycle assessment studies.

## 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 changes in provincial and federal policy through a variety of projects in 2021.

### 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 is now expanding 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. This expansion is expected to be fully operational later in 2022.



UBC Chemistry Building

## EXISTING BUILDINGS

Many buildings have undergone energy efficiency upgrades over the years. The Macleod building is currently in construction for its renewal. In addition to these large building renews, a number of energy efficiency upgrades are currently being 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.

In 2021, UBC Energy & Water Services completed a project many years in the making - a heat recovery chiller (HRC) was installed in the Chemistry Centre building. The new HRC was installed adjacent to an existing chiller, and will serve to offset its cooling load. The chillers in turn provide cooling to a compute cluster in the basement of the building. The heat absorbed from the compute cluster is then upgraded by the HRC to be used by the building for space heating. The project expects to reduce the building's GHG emissions from heating by approximately 90%, saving about 5,000 GJ of thermal energy per year.

## NEW BUILDINGS

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. To date, one third of the actions from UBC's Green Building Action Plan have been completed. Targets are now set for both operational emissions and embodied carbon reduction for individual new buildings on a pilot basis.

In 2021, the Brock Commons Phase 2 construction project commenced. This project is envisioned as a vibrant public space, mixed-use academic and student housing hub to serve the student community. The project has been designed to meet UBC's energy targets (energy intensity and thermal intensity) and achieve LEED gold certification with a minimum of 10 LEED 'optimize energy' points.

CAP2030 targets new buildings and renewals at a near zero operational emissions level. To prepare for these deep cuts in operational carbon, in 2021 UBC introduced GHG intensity targets for all new buildings and renewals. The targets are based on an archetype study which considers practical measures to reduce operational carbon in specific building types.



Fleet vehicle/electric charger

## 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 2021 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. The 2021 Shut the Sash competition engaged labs in Chemistry D and E over six weeks to determine who could save the most energy from shutting fume hood sashes. Over the competition, almost 100,000 kWh of energy was saved across participating labs. If these practices were replicated across all variable air volume fume hoods at UBC Vancouver, this would result in an estimated \$30,000 in annual savings, or the equivalent electricity savings of 72 homes.

### Ultra-Low Temperature Freezer Rebate

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. Some new ULTs are significantly more energy efficient, but are also much more expensive. The ULT Rebate Program helps researchers to fund the replacement of inefficient units, or purchase new freezers for essential sample storage. In 2021, two UBC research labs received the rebate after jointly purchasing a new high efficiency Stirling ULT freezer.

## 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



UBC Stephen Toope Garden - certification under Sustainable Sites Initiatives (SITES)

autonomous vehicles and related technologies. As of December 31, 2021, there are seventy-two Level 2, and four Level 3 electric vehicle charging stations on the campus. Currently, 8% 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.

### **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 50% of paper sourced for UBC Vancouver Campus were with 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.

# EMISSIONS REDUCTIONS PLANS IN 2022 AND BEYOND



Communal plaza outside the AMS Nest

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

Despite significant decarbonization using biomass energy, UBC's district energy system is still responsible for approximately half of UBC's GHG operational GHG emissions. Detailed engineering studies are currently underway to create a decarbonization pathway for district energy to achieve CAP2030 goals.

Although the BRDF has been pivotal in UBC's decarbonization of its academic district energy system, the fact that it was designed when the system provided steam to campus means that the exhaust gases leaving

the plant are at fairly high temperatures. In 2021, UBC Energy and Water Services started on a project to capture heat from those gasses and reinject it into the district energy system. This will be achieved through a pair of two-stage economizers, capturing heat, and upgrading that heat where necessary using a heat pump. This project is anticipated to be installed later in 2022 and operational early in 2023, and is expected to reduce both natural gas and biomass consumption by 33,000 GJ each. A heat pump of this scale is a rarity in North America, and so the project has garnered funding from many sources: federal and provincial governments, as well as local energy utilities.

## 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 Energy & Water Services continue to update the Strategic Energy Management Plan (SEMP) outlining future energy conservation projects within existing buildings.

Key energy conservation projects planned for 2022 include:

- Continuing to install variable speed drive installation project in UBC's main lab buildings, LED re-lamping, and Round 3 of the Continuous Optimization Program.
- Retrofitting existing systems at the BRDF to recover heat from flue gases.
- Pursuing additional building retrofits and renewals (e.g. through seismic upgrades) to achieve further reductions in GHG emissions, energy and water.
- Supporting UBC Sustainability & Engineering to deliver climate action and engagement programming to students, staff, and faculty to encourage energy conservation within buildings and to advance a culture of sustainability across the UBC community.

## NEW BUILDINGS

In 2022, we expect to continue development of GHG targets for new buildings, further develop life cycle costing for efficient and low carbon building systems comparisons and develop policy to reduce embodied carbon in buildings.

Complementing UBC's Climate Action Plan update and the Green Building Action Plan, the Community Energy and Emissions Plan (CEEP) outlines strategies for a low carbon future for UBC's residential community, which falls outside of the CAP2030 institutional scope.

The CEEP contains an energy and emissions reduction strategy that will result in an 85% reduction in GHG emissions by 2050.

UBC's Arts Student Centre was completed in 2021 and its LEED certification is expected in 2022. Two other projects, the Undergraduate Life Sciences Teaching Labs and Gage Student Residence and UBC Bus Transit Exchange were already completed for which the LEED certification is expected soon - LEED certification usually takes about one year after construction completion.

## 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.

## C. Paper Consumption

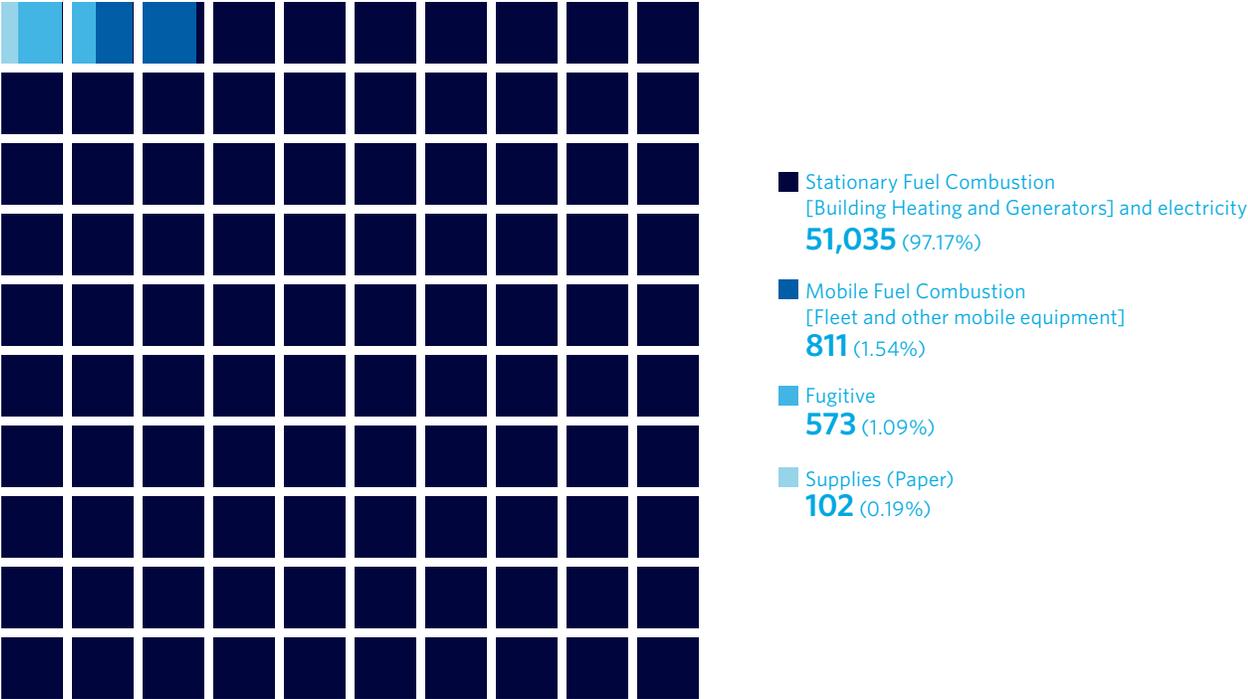
We plan to continue to promote the Sustainable Purchasing Guide to the campus community, especially for the departmental and unit administrators, and the network of Sustainability Coordinators across campus. The Sustainability Purchasing Guide is designed to help UBC staff, faculty, and students to purchase 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 7:** UBC Vancouver Total Emissions by Source (Vancouver Campus, Off-campus Properties, and UBCPT) for the 2021 Calendar Year (tCO<sub>2</sub>e\*)



**TOTAL EMISSIONS: 57,326**

Offsets Applied to Become Carbon Neutral in 2021 (Generated April 12, 2022)  
 Total offsets required: 52,521  
 Total offset investment (inc. GST): \$1,378,676  
 Emissions which do not require offset\*\*: 4,805

\* 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



UBC Beaty Biodiversity Museum Garden

## A. Climate Risk Management

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

UBC has undertaken several climate action planning processes, 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>19</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>19</sup> <https://planning.ubc.ca/sustainability/sustainability-action-plans/green-building-action-plan>



UBC Return-it Station

## 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 2021 highlights and successes include:

### CLIMATE FRIENDLY FOOD SYSTEMS

The SEEDS<sup>20</sup> 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.

### BUSINESS AIR TRAVEL

A new Sustainable Business Travel Program is being developed to help reduce emissions associated with staff and faculty air travel, by building awareness around more sustainable travel options and virtual alternatives, and developing broader initiatives to encourage less air travel across the institution.

<sup>20</sup> <https://sustain.ubc.ca/teaching-applied-learning/seeds-sustainability-program>

<sup>21</sup> <https://reuseit.ubc.ca/>

## ZERO WASTE ACTION PLAN UPDATE - COMMUNITY ENGAGEMENT

Community engagement is critical to the success of UBC's Zero Waste Action Plan, and in 2021 special focus was placed on food waste, a significant source of methane emissions, by applying a circular economy approach to enable a 50% reduction in waste by 2030. UBC piloted 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. The University also hosted zero waste trainings with nearly 200 food services staff and, after a year's hiatus due to COVID, relaunched its 30+ member student peer educator Zero Waste Squad to continue waste diversion education and outreach with high-impact community groups.

Additionally, the Reuse-it<sup>21</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. Return-It has partnered with UBC to launch the first Express & GO station on campus, allowing for quick and easy recycling of empty beverage containers. It's the most convenient way to return beverage containers for the deposit refund.



Green Labs Initiative

### 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 diverted approximately 1,000 kg of glass from the building annually. In 2021, the program was fully expanded into the Life Sciences Centre and the Chemistry Building, with more expansions planned in 2022. The Life Sciences Centre also recycled approximately 1,000 kg of amber glass in 2021, while the Chemistry building is on track to more than double that amount in 2022.

### LAB PLASTICS RECYCLING PROGRAM

Between 64 and 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 2021, 33 new laboratories signed up for the program, adding 66 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 with Green Labs, the Life Sciences Centre, and Spud, a grocery delivery company local to Vancouver. Spud employs a reuse model by delivering produce in a durable plastic bin and keeping food cold with ice packs. The ice packs collected in the Life Sciences Centre are sanitized and reused continuously for these food deliveries to help reduce waste.

### GREEN LABS FUND

In 2021, the Green Labs Fund received a number of great project proposals, and awarded the fund to two groups. A lab in the Department of Cellular and Physiological Sciences received \$4,000 to design, build and test a multi-nozzle cleaning system to efficiently clean large numbers of plastic drosophila (fruit fly) vials used in research projects. Once cleaned, the previously single-use vials are expected to be reusable up to 24 times and to eliminate hundreds of kilograms of unrecyclable plastic waste each year in a single lab. The second group, at the UBC Okanagan Undergraduate Chemistry Teaching Lab, received \$4,000 to update two experiments in the general chemistry curriculum and reduce the high volume of hazardous waste with the use of simulations, apps and videos. Each experiment will impact close to 700 students each term.

## PLANNING AND ADVOCACY FOR SKYTRAIN TO UBC

Planning for the proposed Millennium Line UBC Extension continued through 2021. With the project confirmed as a regional priority in the Translink Transport 2050 plan, it is expected to advance to the business case stage in 2022, keeping it on track for construction to begin once the Broadway Subway Project extension to Arbutus Street is complete in 2025. With continued regional and senior government support, the SkyTrain connection to UBC could open as early as 2030, reducing transit commute times and GHG emissions from commuting to campus.

## SUSTAINABLE TRANSPORTATION PILOT PROGRAM FOR COMMUTING

With the completion of the CAP2030 development, efforts to are now expanding to reduce commuting emissions, which represents a significant source of GHG emissions. Conversations started with regard to a pilot program to offer a discounted staff transit pass to a select group of staff and a new funding source was created to fund sustainable transportation projects and initiatives.

## CAMPUS CARPOOLING

In 2021 UBC worked 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.

## GO BY BIKE WEEK

The Go By Bike Week encourages UBC units as teams to enjoy the fresh air and get outdoors, while reducing their carbon footprints. For two weeks during the spring and fall of 2021, UBC riders logged 2,107 trips "going by bike" around their neighbourhoods, commuting to UBC, running errands, and traveling elsewhere.



UBC Bike Share Program

# UBC OKANAGAN CAMPUS



THE UNIVERSITY OF BRITISH COLUMBIA

**okanagan campus**

## EXECUTIVE SUMMARY



In 2021, UBC Okanagan continued to demonstrate its commitment to environmental leadership and UBC's Climate Emergency Declaration.

Despite developing a new carbon reduction plan and implementing actions that align with the BC provincial government's carbon neutral mandate and our long-term net-positive goal, we were challenged by a 348 tCO<sub>2</sub>e increase in greenhouse gas (GHG) emissions compared to 2020. This is largely attributed to a 2021 update to the provincial electricity emissions intensity factor,<sup>1</sup> and our campus operations growth in the latter part of the year. When compared to the 2013 baseline, we achieved a 31 per cent reduction in absolute GHG emissions in 2021. UBCO continued to develop energy efficient, high performance buildings that contribute to the continued reduction of our overall campus GHG emissions over time. We also reduced our total offset liability by 203 tCO<sub>2</sub>e through renewable natural gas—a carbon neutral alternative fuel.

In 2021, UBCO received the UBC Board of Governor's endorsement for its first **Climate Action Plan 2030** (UBCO CAP 2030). Developed in response to UBC's Climate Emergency Declaration, the UBCO CAP 2030 establishes an ambitious set of scope 1, 2 and 3 GHG reduction targets that align with the Paris Agreement's target to limit global warming to 1.5°C. The UBCO CAP 2030 provides a bold course of actions to meet targets, ensures accountability, and demonstrates how we are accelerating emission reductions over time.

We also continued to advance the **Strategic Energy Management Plan** and the **Low Carbon Energy Strategy**. These documents informed the UBCO CAP 2030 operational GHG reduction targets and actions needed to achieve them on the path to our 2050 net positive operational energy and carbon goal.

In 2021, UBCO's newest residence, **Nechako Residence and Commons Block**, was completed. Targeting LEED® Gold certification, this new facility is connected to the campus' low-carbon district energy system to reduce the building's reliance on fossil fuels for energy supply. Nechako, coupled with the Skeena Residence—UBC's First Passive House building opened in 2020—has increased the sustainability of on-campus housing by 28 per cent.

In the coming year, UBCO will focus on the development of two new major capital projects currently in design. The **Interdisciplinary Collaboration and Innovation (ICI) building** will target a minimum LEED® Gold Certification, while aiming to reduce the carbon footprint of the building and its operations. With the aim to serve future regional needs, **UBCO Downtown Kelowna** will expand UBC's presence while working to meet LEED® Gold Certification and Step 3 of the BC Energy Step Code.

Implementation of the UBCO CAP 2030 will begin with the development of new strategic policy mechanisms to achieve the Plan's operational GHG emission reduction target. **UBC's LEED® Implementation Guide v4.1**, currently in development, will include energy and atmosphere requirements tailored to the Okanagan campus in an effort to reduce operational and embodied carbon. In support of the UBCO CAP 2030, decarbonization of the campus' energy supply will continue by implementing the **Low Carbon Energy Strategy**. **Campus engagement programs** will be updated to support successful delivery of the UBCO CAP 2030's collective impact.

### Rob Einarson

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

<sup>1</sup> In 2021, the Province assessed and increased the amount of carbon associated with electricity production—the electricity emissions intensity factor—which has a direct impact on the calculation of carbon associated with electricity usage by the campus.

## DECLARATION STATEMENT

This *PSO Climate Change Accountability Report* for the period January 1, 2021 to December 31, 2021, summarizes our greenhouse gas emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2021 to reduce our GHG emissions, and our plans to continue reducing emissions in 2022 and beyond.

By June 30, 2022, UBCO's final 2021 Climate Change Accountability Report will be posted to our website at [sustain.ok.ubc.ca/reports/ccar](https://sustain.ok.ubc.ca/reports/ccar).

# SECTION CONTENTS

<b>EXECUTIVE SUMMARY &amp; DECLARATION STATEMENT</b>	<b>32</b>
<b>2021 EMISSIONS OVERVIEW</b>	<b>34</b>
UBC Okanagan 2021 GHG Emission and Offsets	
Retirement of Offsets	
Carbon Neutral Offsets In 2021	
<b>EMISSION REDUCTION ACTIVITIES</b>	<b>35</b>
A. Stationary Fuel Combustion & Electricity (Buildings)	
B. Mobile Fleet Combustion (Standard and Non-Standard)	
C. Supplies (Paper)	
D. Fugitive Emissions	
<b>PLANS TO CONTINUE REDUCING EMISSIONS IN 2022 AND BEYOND</b>	<b>38</b>
A. Stationary Fuel Combustion & Electricity (Buildings)	
B. Mobile Fleet Combustion (Standard and Non-Standard)	
C. Supplies (Paper)	
D. Fugitive Emissions	
<b>CAMPUS EMISSION TRENDS</b>	<b>41</b>
<b>ABOVE AND BEYOND</b>	<b>42</b>
Climate Policy Development	
Collective Community Engagement	
<b>PUBLIC SECTOR LEADERSHIP</b>	<b>44</b>
Climate Risk Management	
<b>EMISSIONS PROFILE 2021</b>	<b>45</b>

# 2021 EMISSIONS OVERVIEW

## GHG EMISSION AND OFFSETS

GHG Emission created in Calendar Year 2021	
Total Emissions (tCO <sub>2</sub> e)	2,499
Total BioCO <sub>2</sub> (tCO <sub>2</sub> e)	204
Total Offsets (tCO <sub>2</sub> e)	2,295
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO <sub>2</sub> e)	0
Grand Total Offsets for 2021 Reporting Year	
Grand Total Offsets (tCO <sub>2</sub> e) to be Retired for 2021 Reporting Year	2,295
Offset Investment (\$25 per tCO <sub>2</sub> e)	\$57,375

### Retirement of Offsets

In accordance with the requirements of the *Climate Change Accountability Act* and Carbon Neutral Government Regulation, UBCO (**the Organization**) is responsible for arranging for the retirement of the offsets obligation reported above for the 2021 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 greenhouse gas (GHG) emissions have been qualified using the BC Provincial Government's Clean Government Reporting Tool Reporting Framework.

**Table 1** provides a breakdown of GHG emissions by source on the Okanagan campus. Of note, there was a 16 per cent (348 tCO<sub>2</sub>e) increase in Total Emissions compared to the previous year. However, due to the use of renewable natural gas, a carbon-neutral fuel, Total Offsets were only increased by seven per cent (149 tCO<sub>2</sub>e). This will increase the cost of offsets by \$3,725 (excl. tax) over the previous year. Despite the collective 56 tCO<sub>2</sub>e reduction of emissions demonstrated by fleet, paper and fugitive emission sources, building emissions increased by 405 tCO<sub>2</sub>e. The impact is largely due to the increase of the electricity emissions factor.<sup>2</sup>

We also grew our campus operations in the latter part of 2021. Notwithstanding, UBCO continued to implement specific energy and carbon mitigation measures that are detailed in the "Actions Taken in 2021 to Minimize Emissions" section of this report.

**TABLE 1 GHG COMPARISON BY SOURCE BETWEEN 2020-2021**

Source	2020 Emissions (tonnes CO <sub>2</sub> e)		2021 Emissions (tonnes CO <sub>2</sub> e)		Changes from 2020 to 2021	
	Value	%	Value	%	%	Value
Buildings	2,024	94%	2,429	97%	+20%	+405 tCO <sub>2</sub> e
Fleet	49	2%	38	2%	-21%	-10 tCO <sub>2</sub> e
Paper	10	0.5%	6	0.2%	-40%	-4 tCO <sub>2</sub> e
Fugitive Emissions	68	3%	26	1%	-61%	-42 tCO <sub>2</sub> e
<b>Total Emissions *</b>	<b>2,151</b>	<b>100%</b>	<b>2,499</b>	<b>100%</b>	<b>+16%</b>	<b>+348 tCO<sub>2</sub>e</b>
<b>Total Offsets</b>	<b>2,146</b>	<b>100%</b>	<b>2,295</b>	<b>100%</b>	<b>+7%</b>	<b>+149 tCO<sub>2</sub>e</b>

\* Totals may not sum due to rounding

## CARBON NEUTRAL OFFSETS IN 2021

In accordance with the Clean Government Reporting Tool, and as required by the *Climate Change Accountability Act* (CCAA), offsets required to achieve carbon neutrality in 2021 total 2,295 tCO<sub>2</sub>e. As part of the UBCO's 2021 GHG emissions profile, 204 tCO<sub>2</sub>e do not require offsets.

<sup>2</sup> BC Provincial Government: Electricity emission intensity factors for grid-connected entities.

# EMISSION REDUCTION ACTIVITIES

## ACTIONS TAKEN IN 2021 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 generations)

The largest source of campus in-scope GHG emissions is from buildings. In 2021, UBCO continued to target building energy efficiency and GHG reduction actions by implementing energy and carbon reduction plans and activities. However, an increase to the provincial electricity emissions factor, and the growth of campus operations in the latter part of the year contributed to a 20 per cent - or 405 tCO<sub>2</sub>e - increase in building emissions over the previous year.

### CLIMATE LEADERSHIP PLANNING AND POLICY IMPLEMENTATION

UBCO completed and received endorsement from the UBC Board of Governors for its first **Climate Action Plan 2030** (UBCO CAP 2030) in December 2021.

In line with the Paris Agreement target to limit global warming to 1.5°C, the UBCO CAP 2030 establishes ambitious goals to achieve a 65 per cent reduction of operational emissions and a 45 per cent reduction of extended emissions by 2030. The UBCO CAP 2030 provides a clear pathway to meet our GHG reduction targets, as well as accountability measures to demonstrate how we are enacting bold changes to address UBC's Climate Emergency Declaration. The Plan further supports the longer-term goal of achieving a net positive performance in operational energy and carbon by 2050, as established in the UBCO Whole Systems Infrastructure Plan.

We also began developing several UBCO CAP 2030 policy mechanisms to support the achievement of operational GHG reduction targets. The **UBC LEED® v4.1 Implementation Guide** will, for the first time, include guidance specific to the climate, energy and environment on the Okanagan campus. When completed in 2022, the Guide will provide project teams with the UBC-specific direction required to optimize LEED®, which is tailored to each campus. The Guide will identify credits that are mandatory and/or expected because of their alignment with UBCO policies.

### ENERGY INITIATIVES

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

- The SEMP projects that were implemented in 2021 are estimated to have reduced energy and emissions by 655,000 kWh, 2,800 GJ and 146 tCO<sub>2</sub>e, annually.
- UBCO completed a review of recommended projects identified in phase four of the Low Carbon Energy Strategy that support the UBCO CAP 2030 reduction targets in the coming years.

A portion of natural gas used by the Central Heating Plant (CHP) - which provides heating to the campus' legacy buildings - was substituted with **renewable natural gas** (RNG). The use of RNG reduced the campus' 2021 emissions profile by 203 tCO<sub>2</sub>e. As it is considered carbon neutral, no offsets are required.

A **Net Positive Modelling Study** on UBCO began in 2021 to inform project-specific performance targets for new buildings based on the Okanagan climate and building archetype. Upon completion, this project is anticipated to establish Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and Greenhouse Gas Intensity (GHGI) targets for each archetype, as well as Energy Conservation Measures (ECM) bundles, costing and financial analysis. Applicability of the proposed strategies to existing building retrofits will also be considered.

UBCO entered into the second year of a three-year partnership with the campus' School of Engineering faculty to develop and implement an **energy monitoring and data management platform**. Upon completion, the platform will provide improved data management, reporting capabilities and analytical tools, informing future energy planning projects.

Additionally, UBCO continued working to 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 in one location, as well as further developing a meter tree. This project will also provide additional input into the data analytics platform UBCO is developing with the School of Engineering.

## NEW BUILDINGS

UBCO completed construction of the **Nechako Residence and Commons Block**, a mixed-use facility that helps to meet the demand for on-campus student housing by supplying 220-resident units along with 24-hour social amenities and a 450-seat dining facility, in 2021. The facility, targeting LEED® Gold certification, is connected to the campus' district energy system that provides a lower carbon energy supply. Among its sustainable features, the facility provides a low-waste, plant-forward cafeteria, and meets the campus' 100 per cent rainwater retention goal through a multi-level raingarden.

UBCO's **Skeena Residence** attained **Passive House Certification** following its 2020 completion. This accomplishment makes UBCO the first campus in Canada to achieve a passive house-certified student residence.

Finally, UBCO began planning for a future mixed-use building for **UBCO Downtown Kelowna** and continued the design of a new **Interdisciplinary Collaboration and Innovation (ICI) building**. With an aim of serving future regional needs, the downtown building will expand UBC's presence in Kelowna, while actively working toward meeting LEED® Gold Certification and Step 3 of the BC Energy Step Code. The ICI building will target a minimum of LEED® Gold Certification and will integrate the goal to reduce the carbon footprint of the building and its operations.

## EXISTING BUILDINGS

UBCO completed a **recommissioning study on the Arts Building** in 2021. The final report is expected to identify deficiencies in the operation of the building that are wasting energy, such as increasing equipment wear and tear, or decreasing occupant comfort. Upon implementation of all recommended improvement measures, it is expected that 58,900 kWh and 130 GJ of energy will be conserved, reducing emissions by 9 tCO<sub>2</sub>e, annually.

A **Demand Controlled Ventilation (DCV)** upgrade project was completed in the 15 laboratories in the **Science Building**. The ventilation rate of non-critical laboratory spaces is not strictly controlled, causing significantly higher air changes per hour than required for occupant health and comfort. The use of upgraded control equipment and strategies to reduce and standardize air changes during both occupied and unoccupied hours will be considered. Proposed measures are expected to reduce energy use by 66,800 kWh and 800 GJ, lowering GHG emissions by 43 tCO<sub>2</sub>e, annually.

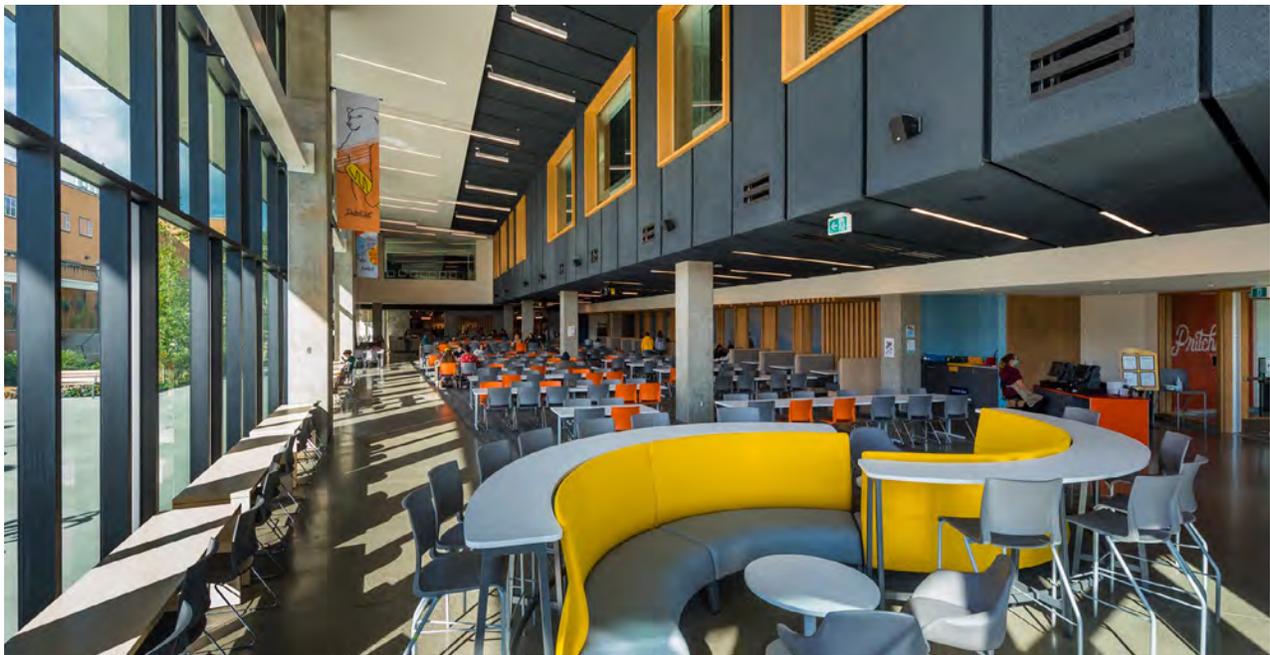
In addition to physical upgrades completed in the Science building, the campus ran the **2<sup>nd</sup> Annual Shut the Sash Challenge** to support energy conservation through user-based action. Lab students and staff support the physical upgrades by closing fume hoods when not in use. The education and awareness program supported the reduction of energy use by 33,031 kWh and 123 GJ and 7.5 tCO<sub>2</sub>e over the six-week challenge.

**Lighting upgrade** work to switch out inefficient light bulbs to LED lights in academic and administration buildings continued in 2021. To date, these efforts are estimated to have conserved 600,000 kWh of electricity, and reduced emissions by 6 tCO<sub>2</sub>e, annually.

## IT INFRASTRUCTURE ACTIONS

A number of information technology projects designed to streamline efficiencies and reduce energy consumption were completed in 2021, including:

- ongoing replacement of desktop computers with laptops that are newer, and more efficient;
- upgrading staff and faculty devices from spinning hard drives to solid state drives to reduce waste, power consumption and replacement costs;



- continued replacing older power distribution units with newer and more efficient models across campus. These devices distribute electric power to racks of computers and networking equipment located in campus data centres and building communication rooms;
- replacing several step-down transformer uninterruptible power supply units with power sharing, splice devices. These devices are more efficient, less noisy and generate less heat; and
- powering off many on-campus devices that were not being used during the COVID-19 pandemic.

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

In 2021, fleet vehicles accounted for 38 tCO<sub>2</sub>e, or two per cent of the campus' total emissions. This is a 21 per cent (10 tCO<sub>2</sub>e) reduction from 2020. This reduction is attributed to the decreased use of campus operational fleet due to the COVID-19 pandemic.

Additional actions taken in the last year to reduce fleet-related emissions, include:

- the purchase of a new 2021 Ford 150 Hybrid truck for operational fleet use, reducing the reliance on traditional fuel purchases;
- the addition of two Level 2 charging stations for electric vehicles. The campus now offers 14 dedicated electric vehicle parking stalls to commuters;
- continued reducing reliance on fleet vehicles by consolidating off-campus trips, decreasing the number of trips, and encouraging fleet carpooling, walking or cycling;
- continued 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
- continued monitoring the impact of remote work/learn on campus fleet vehicle emissions.

## C. Paper Consumption

Ongoing remote working and learning in 2021 resulted in a second year of significant reductions in paper purchases and paper use. Emissions from paper accounted for 6 tCO<sub>2</sub>e, or 0.2 per cent of total in-scope campus emissions in 2021, a 40 per cent reduction from 2020.

Additional paper reduction activities, include:

- Providing 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.
- Promoting the purchase 30 per cent or greater post-consumer recycled content paper on the campus' procurement website.

- Continued use of digital screens and related communications platforms to share news, activities, and events to reduce the reliance on paper-based promotional materials.

- Ongoing use of the Find-Me printing option through the PaperCut™ print-tracking software on all campus printers for students, faculty and staff. The software 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 2021, 167,000 pages were submitted to be printed, but not released within the four-hour time period, reducing GHG emissions by 524 kgCO<sub>2</sub>e, saving 1.45 trees.

- In 2021, there continued to be a significant reduction in page impressions, down 40 per cent from 2020, and 330 per cent from 2019. This is attributed to vastly on-campus reduced student and staff numbers due to the COVID-19 pandemic.

- Continued 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 developed 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.

## D. Fugitive Emissions

Hydrofluorocarbon (HFC) emissions accounted for one per cent of total campus emissions, or 26 tCO<sub>2</sub>e. This is a 61 per cent (42 tCO<sub>2</sub>e) reduction from 2020 that is attributable to regular maintenance and replacement of older and inefficient refrigerant equipment.

Additional actions taken in the last year include:

- The final phase of construction of the Nechako Residence and Commons Block included the installation of centralized chillers for climate control, instead of individual Packaged Terminal Air conditioners (Ptac) units within individual residences. Centralized chillers reduce the facility's reliance on traditional fossil fuels and refrigerants.
- Continued to centralize campus cooling loads to reduce the amount of equipment requiring refrigerants on campus.
- Continued replacing inefficient and older equipment, while performing preventative maintenance and upgrades to existing HVAC systems and associated appliances.

# PLANS TO CONTINUE REDUCING EMISSIONS IN 2022 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 2022, UBCO will focus on implementing the **UBC Okanagan Climate Action Plan 2030** (UBCO CAP 2030) to reduce operational and extended GHG emissions. A number of quick-start actions initiated in 2021 will be completed in 2022, and new phases of plan implementation will begin.

**UBC's LEED® v4.1 Implementation Guide** will be completed and launched in 2022. The Guide will provide project teams with the UBC-specific guidance required to optimize LEED® on both UBC campuses, including specific guidance for the Okanagan campus for the first time. The Guide will identify credits that are mandatory and/or expected because they align with UBCO policies.

UBCO will also continue to pursue **high performance building targets and policy standards** to meet the UBCO CAP 2030's operational and extended GHG emission reduction targets. Low embodied carbon policy options will begin to be considered based on whole building life cycle studies that will be completed for major capital projects, including the **UBCO Interdisciplinary Collaboration and Innovation Building (ICI)**.

### ENERGY INITIATIVES

UBCO will implement subsequent phases of the **Low Carbon Energy Strategy**. Pending funding approval, future projects will include the development of an initial district heating and cooling 4 pipe distribution. This distribution will run from the Innovation Precinct cluster plant to serve pre-existing buildings to the north of campus, as well as high-lift heat pumps and thermal storage adjacent to the geo-exchange building. This project will displace natural gas use and provide servicing to heat pumps that generate hot and chilled water. This water will be distributed to all new buildings within the associated building cluster (cluster plant). This cluster plant will be located within the future ICI building. Implementation of deep retrofits are also planned on existing buildings, including Creative & Critical Studies, Engineering, Management & Education, Arts, Sciences, and the gymnasium.

The implementation of projects approved from the new 10-year **Strategic Energy Management Plan** will continue in the coming year. Selected projects include ventilation demand-reduction, recommissioning, and energy conservation projects in the Science building, Charles E. Fipke Centre for Innovative Research, and Arts & Sciences Centre. Combined, these projects are estimated to reduce energy use by 458,000 kWh and 4300 GJ, and emissions by 216 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** (RNG). 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.

Completion of **project-specific performance targets** for new buildings will establish Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and Greenhouse Gas Intensity (GHGI) targets for each campus building archetype as well as ECM bundles, costing and financial analysis.

UBCO will also enter into the final year of a three-year partnership with UBCO's School of Engineering faculty to develop and implement a **data analytics platform**. Upon completion, the platform will provide improved data management, reporting capabilities and analytical tools, to inform future energy planning projects.

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 to the 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

Anticipated to achieve occupancy in 2025, the **UBCO Downtown Kelowna** building 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 offer academic, research and residence space. It is also intended to enhance community engagement through the provision of a public atrium space, an engagement learning suite for community programs, meetings and workshops; a creative innovation space; and a gallery capable of welcoming artwork from around the world to the Okanagan.

Targeting a minimum LEED® Gold certification, the final design for the future **Interdisciplinary Collaboration and Innovation (ICI) building** will integrate the goal to reduce its building and operational carbon footprint. Aiming to achieve occupancy

in 2025, ICI is intended to foster interdisciplinary knowledge and support collaborative, team-based learning and innovative approaches to teaching.

Future building projects 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
- a second childcare expansion that will increase the available childcare spaces by 37, a 66 per cent increase.

## EXISTING BUILDINGS

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

- Creative & Critical Studies will be studied to provide deep retrofit recommendations and individual replacement options for main and terminal HVAC equipment. The following deliverables are expected from this study:
  - Overall HVAC system retrofit strategy to fulfill a major building upgrade.
  - Recommendations for replacement of individual system and terminal HVAC equipment if equipment fails before end of life.
  - Updates to equipment lists to include replacement suggestions and costs.
- Studies will be conducted on the Arts & Sciences Centre, Charles E. Fipke Centre for Innovative Research, as well as the Science and Arts buildings to determine the feasibility of upgrading the laboratory demand controls for ventilation systems. The ventilation rate of non-critical laboratory spaces is not strictly controlled causing significantly higher air changes per hour than required for occupant health and comfort. The use of upgraded controls equipment and strategies will be considered to reduce and standardize air changes during both occupied and unoccupied hours.
- Charles E. Fipke Centre for Innovative Research will also undergo a feasibility study to increase waste heat recovery of exhaust air. Currently, the strobic system – which is composed of three fans – exhausts air to the atmosphere without any heat recovery. The feasibility study is expected to provide a sufficient level of detail to support a business case whether or not to proceed with the energy conservation measure. Additionally, heat in the building is currently being served by stand-alone boilers and heat from the low temperature district energy system. This study will also consider installation of a glycol runaround loop to recover heat from the exhaust allowing for the heat to be used to pre-heat supply air to another unit.



UBCO will also renovate the **University House**, a single-family house and the first building constructed on campus. The intent of the project is to co-locate core departments in a shared space to maximize opportunities for collaboration. Energy saving measures to be implemented during the renovation include replacing the existing propane heating system with an air source heat pump and installing additional insulation.

UBCO will also initiate a night time flush program. Night flushing, or night ventilation, is a passive cooling technique that utilizes the outdoor diurnal temperature swing and the building's thermal mass to pre-cool a building through increased outdoor airflow at night. This allows radiant cooling to take place during the day when the building is occupied. UBCO is developing a sequence of operation strategy to be implemented in all the academic buildings, where applicable.

Finally, two legacy domestic hot water systems in the Cassiar Residence will be replaced with two residential condensing boilers and storage tank systems that have 95 per cent efficiency ratings. Additionally, 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 devices as part of UBCO's IT Computer Replacement Program;
- phasing out desktop towers with docking stations to reduce power consumption;
- applying a phase-in approach to replace step-down transformer uninterruptible power supply units with power sharing, splice devices; and
- reducing the number of digital screens used for campus messaging and emergency alerts from 28 screens to 18 and replace 12 legacy screens with newer, more energy efficient models.

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

- Study the potential of converting electric golf cart batteries to a more recyclable lithium ion option.
- Complete the construction of a new equipment shed for UBCO's 100 per cent electric golf cart fleet. The new building – which will be serviced by electricity – will aid in prolonging the life of the fleet and other battery powered equipment by protecting it from the extreme fluctuations in temperature. The building also offers a space to perform maintenance, reducing the transportation of equipment to an off-campus, third-party mechanic.
- UBCO will continue reducing its reliance on fleet vehicles by consolidating off-campus trips, and decreasing the number of trips taken by encouraging fleet carpooling, walking or cycling.
- Continue to encourage sustainable mobile-fuel combustion by adhering to internal sustainable fleet procedures, replacing of retired fleet vehicles with electric and energy-efficient models, and ongoing staff training and education to support sustainable fleet use.



## C. Paper Consumption

- Implement 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.
- Continue 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™.
- Continue 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.
- Continue 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 setup in offices or lab spaces for convenience access, in addition to main fleet printers) to further encourage the use of fleet printing. Field printing increases efficiencies by consolidating devices and increasing access to printer capabilities (e.g., colour printing, etc.)

## D. Fugitive Emissions

- Research and identify alternative refrigerants for those being phased out (i.e., R410a and R134a).
- Continue to centralize cooling loads from buildings to reduce the amount of equipment requiring refrigerant on campus, where possible.
- Implement 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.
- Continue to replace inefficient and older equipment.
- Conduct preventative maintenance and upgrades to HVAC systems and associated appliances.
- Continue to replace individual Ptcac units in residences, on an as-needed basis.

# CAMPUS EMISSION TRENDS



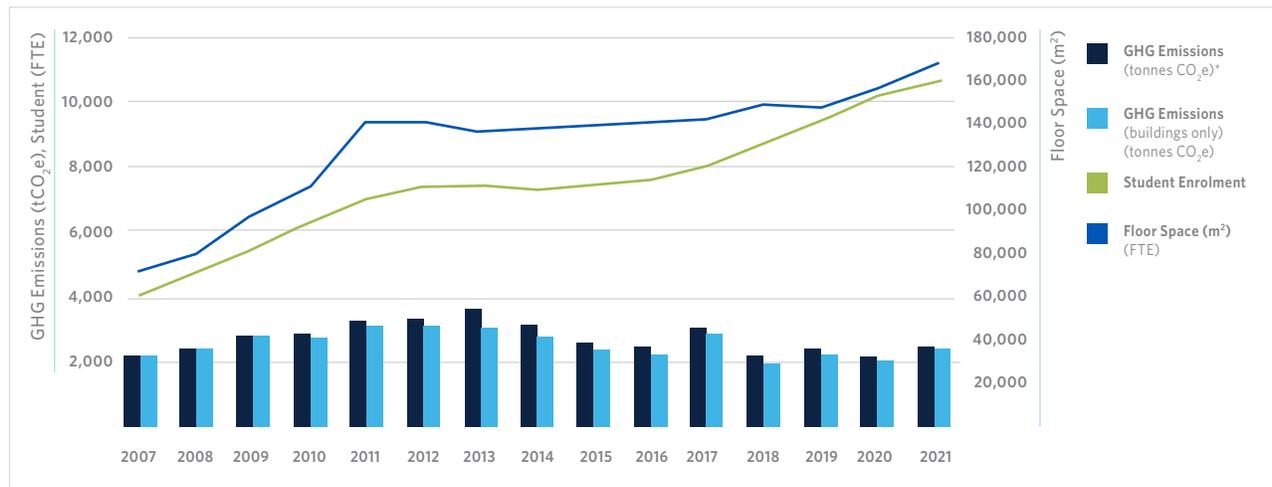
## COMPARING EMISSIONS TO GROWTH

**Figure 1** shows growth trends and total campus and building greenhouse gas emissions between 2007 to 2021. Despite the significant increases in floor area and student enrollment by over 130 and 160 per cent respectively since 2007, total GHG emissions have remained fairly stable.

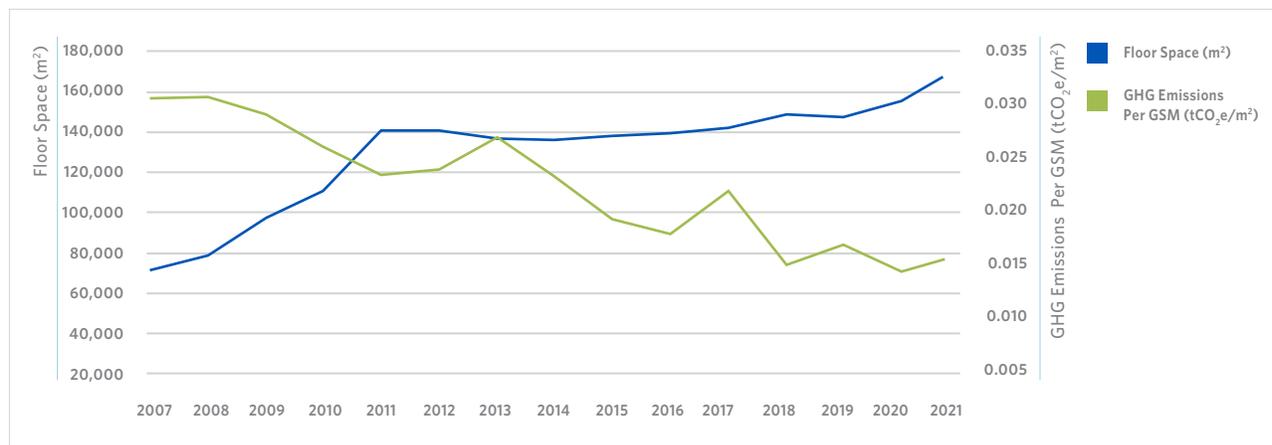
In 2021, UBCO reported an increase in total emissions by 16 per cent. The increase in the electricity emissions factor as well as the growth of our campus operations in the latter part of 2021 were factors that contributed to this change.

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 2021. Despite the significant floor area growth, GHG emissions per building gross square meter (m<sup>2</sup>) dropped from 0.030 in 2007 to 0.015 in 2021, a reduction of 51 per cent.

**FIGURE 1 ABSOLUTE GHG EMISSIONS RELATIVE TO GROWTH: 2007-2021**



**FIGURE 2 GHG EMISSIONS INTENSITY RELATIVE TO BUILDING GSM: 2007-2021**



# ABOVE AND BEYOND

## CLIMATE POLICY DEVELOPMENT

UBC's Climate Emergency Declaration provides a clear mandate to accelerate action to reduce UBC's operational GHG emissions, but it also extends beyond campus operations to emissions from areas such as waste, commuting and air travel.

In 2021, the UBC Board of Governors endorsed UBCO's first **Climate Action Plan 2030** (UBCO CAP 2030). The UBCO CAP 2030 establishes a bold course of action to accelerate GHG emission reductions from campus operations and extended (indirect) sources. These sources include how we travel to campus, our food choices, the amount of waste we produce, and how much business air travel we do leading up to 2030.

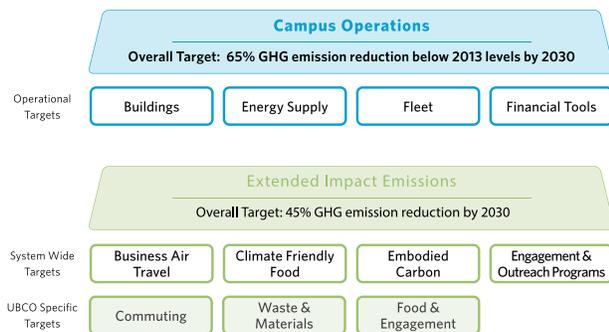
The UBCO CAP 2030 provides the overarching campus climate policy direction needed to make informed, strategic policy and investment decisions. UBCO CAP 2030 aims to reduce GHG emissions, medium-to-longer-term operational costs associated with increased carbon pricing, as well as demonstrate UBC's commitment and leadership to address climate change. This Plan takes adaptive measures in response to climate change and articulates UBCO's immediate climate adaptation response and actions going forward.

The UBCO CAP 2030 addresses how climate action is envisioned to advance across operational and extended impact emission areas, and is rooted in supporting the academic mission. It provides a critical platform for climate-informed teaching, learning and research and aligns with the vision and values of multiple campus plans. Notably, this Plan supports Outlook 2040's vision of a globally-connected, regionally-engaged campus, is responsive to 'grand' global challenges including climate change, and further progresses UBCO towards its long-term goal to achieve a net positive performance in operational energy and carbon by 2050.

Successful delivery of the UBCO CAP 2030 will rely on the engaged participation of the entire UBC community to achieve collective impact. This is especially true for addressing UBC's extended impacts, such as commuting, air travel, food and waste. Supported by UBCO's program development, tools, resources, and purchasing policies, students, faculty and staff have an opportunity to take action and contribute to these emissions reductions through their individual choices.

Developed in parallel to the UBCO CAP 2030 and completed in 2021, the **UBCO Transportation Plan** provides direction to shift towards more sustainable modes of travel. To support ongoing campus growth and reduce commuting emissions, the Plan establishes a roadmap for meeting the transportation needs of the campus through to 2040, describes the University's Vision for the future of transportation, and articulates related objectives, targets, strategies and actions. Implementation of this plan is required to achieve the UBCO CAP 2030's commuting GHG reduction target.

## UBCO CLIMATE ACTION PLAN 2030 TARGETS





## COLLECTIVE COMMUNITY ENGAGEMENT

In 2021, despite hybrid work/learn arrangements in response to the COVID-19 pandemic, UBCO continued to find innovative ways to engage its campus community in climate action.

### Extended Emissions (Scope 3) Reduction Activities

Early in 2021, programs focused on commuting and waste emission reduction activities were implemented. Campus participation in the annual spring and fall **GoByBike Week** demonstrated a strong, enduring commitment by our students, faculty and staff to use active transportation (i.e., in instances where travel to and from campus was appropriate, and also for personal commuting) for their daily commutes. During these virtual events, riders logged 942 trips, rode over 15,900 kms and reduced commuting emissions to and from campus by 3,448 kgCO<sub>2</sub>e.

UBCO also initiated a **pilot program to collect and recycle single use medical masks** and gloves from occupied laboratories and departments that handle non-hazardous materials. The pilot project has resulted in the successful collection and diversion of 13 kgs of material from the landfill. It is anticipated that expansion of the recycling program to additional laboratories will occur in mid-2022, following a review of the pilot's outcomes.

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

The Power of You, UBCO's signature behaviour change program, delivered on campus engagement activities that aligned with the return of on campus activities. In 2021, the program offered a **2<sup>nd</sup> Annual Shut the Sash Challenge** to encourage laboratories to close their fume hoods when not in use. This initiative engaged over 40 undergraduate students and resulted in a reduction of 33,031 kWh, 123 GJ and 7.5 tCO<sub>2</sub>e over the six-week challenge.

Additionally, key operational departments completed campus-wide actions. This included nightly energy reduction audits in response to the **Power of You: Lights Out** and **Power Down** campaigns. Staff turned off or powered down over 1,735 lights and 10 projectors/screens, and closed 48 windows as a direct result of these initiatives. Since the initiation of these voluntary audits in 2015, dedicated staff members have contributed to campus energy conservation efforts by completing 1,154 audits, turning off 32,420 lights, powering down 512 projectors/screens, and closing 3,101 windows.

In the coming year, subject to resources, UBCO will realign its existing behaviour change program with an evidence-based strategy affecting high impact areas to reduce GHG emissions, a key area of focus in the UBCO CAP 2030.

# PUBLIC SECTOR LEADERSHIP

## CLIMATE RISK MANAGEMENT

Driven by local conditions, recent climate events and rapid regulatory changes, UBCO is incorporating climate adaptation, resiliency and biodiversity considerations into campus planning and operations.

### Early Integration of Climate Adaptation Planning

Early development and implementation of key sustainability plans and policies that respond to the risks associated with climate change are described in this section.

The **UBCO Whole Systems Infrastructure Plan** (WSIP, 2016) outlines high-level, sustainable campus development tactics to ensure that UBCO is resilient to future growth, as well as changes to utility rates and the climate. The WSIP set UBCO's first climate action goal to achieve a "net positive performance in operational energy and carbon" by 2050. The Plan integrates climate sensitivity analysis for energy and carbon reduction measures; landscape, ecology and biodiversity actions and proposed performance indicators.

The **UBCO Integrated Rainwater Management Plan** (IRMP, 2017), was developed to responsibly manage the rainwater that falls on campus. It also supports natural hydrological cycle with co-benefits to campus ecology and biodiversity. As part of the IRMP's development, UBCO completed the following assessments:

- an overland flood path assessment to identify buildings in the campus core at risk of flooding in extreme rainfall events, and
- an assessment of its existing grey water infrastructure, which is currently at capacity.

The Plan achieved 100 per cent diversion of rainwater from the municipal system by utilizing stormwater modelling and predicted climate changes to provide infrastructure resiliency. The successful achievement demonstrates best practice in green infrastructure and low impact development.

Adherence to, and implementation of, the IRMP's recommended measures—including the use of Low Impact Development techniques and overland flow path routing—are essential to reducing the impacts of future risks related to climate change.

Additional climate adaptation planning developed to-date identify short, mid and long-term opportunities:

- Climate modelling for new buildings (e.g., Skeena Passive House Project).
- Biodiversity and ecology recommended performance indicators, actions and co-benefits and implementation of multiple actions (WSIP, 2016).
- Climate Adaptive Design Recommendations (UBCO Design Guidelines, 2018).

- Wildlife and Species protection and restoration planning (ongoing).
- More active and passive cooling into its buildings to mitigate future impacts.

### Current and Future Climate Adaptation Planning

While the UBCO CAP 2030 focuses on climate mitigation to reduce fossil fuel impacts, responding to climate change will also require the development of adaptation strategies to reduce the effects of climate change. Climate adaptation, resilience and biodiversity planning will prepare UBCO to protect its infrastructure and ecological assets against future climate risk. It will also lay the groundwork for new regulatory climate resiliency planning and reporting requirements, expected to result from the release of Clean BC's Climate Preparedness and Adaptation Strategy, in 2022.

Actions required to build campus adaptation and resiliency are described in the UBCO CAP 2030 and include the following key areas:

- There will be a continued immediate campus response to the recent heat wave and wildfires, with a focus on building retrofits, addressing indoor air quality measures for wildfire smoke.
- UBCO will develop procedures and protocols for facility managers in response to increased summer temperatures, and decreased outdoor air quality due to wildfire smoke for new and existing buildings (e.g., implement CO<sub>2</sub> sensors in air handler units as a proxy for Indoor Air Quality Monitoring, as well as automated smoke mitigation operational sequences to reduce amount of indoor air when critical thresholds are reached).

UBCO has also begun the development of a **multi-hazards study** to inform short, medium and long-term opportunities to reduce climate-related risks to campus infrastructure.

From a policy perspective, UBCO will begin to focus on adapting UBC's **Climate Ready Building Requirements** for new construction. UBCO will also begin to scope the development of a broader Climate Adaptation, Resiliency and Biodiversity Strategy that incorporates other related plans, policies and initiatives as a subsequent UBCO CAP 2030 phase.

# EMISSIONS PROFILE 2021



## UBC OKANAGAN GREENHOUSE GAS EMISSIONS BY SOURCE FOR THE 2021 CALENDAR YEAR (tCO<sub>2</sub>e\*)

