

2020

Climate Change Accountability Report







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INTRODUCTION

ABOUT UBC

The University of British Columbia (UBC) is a global centre 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 66,000 students from Canada and more than 166 countries around the world and employ over 15,000 staff and faculty.

ABOUT THIS REPORT

This report contains mandatory information required to meet the revised provincial carbon reporting requirements for the 2020 emissions. As per the Provincial Directive¹ issued March 31, 2020, UBC 2019 Carbon Neutral Action Report (CNAR) was developed using the Greenhouse Gas (GHG) emissions created in 2018. The details of UBC 2019 GHG emissions are also provided as part of this report.

SUSTAINABILITY PLANS & PUBLICATIONS

UBC's Vancouver campus sustainability plans and reports, including annual GHG Inventories, previous Carbon Neutral Action Reports, and Annual Sustainability Reports are available at:

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

UBC's Okanagan campus previous Carbon Neutral Action Reports and Sustainability Reports are available at:

sustain.ok.ubc.ca/reports.html

¹ https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/guidance-documents/dir_of_clean_govt_notification_to_psos.pdf

EXECUTIVE SUMMARY

In December 2019, UBC's Board of Governors unanimously endorsed a Declaration on the Climate Emergency, to commit to accelerated emissions reductions at UBC Vancouver and UBC Okanagan. To support this endorsement, UBC Climate Action Plan 2030 (CAP2030) was initiated in early 2020 for both campuses. The draft plan with emerging targets and actions will be presented to UBC Board of Governors in Fall 2021 for approval.

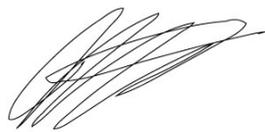
UBC continues to demonstrate leadership and innovation in helping to implement CleanBC; from promoting clean transportation initiatives including the expansion of E3 and EV fleets and charging infrastructure, to advancing the highest level of the Energy Step Code for the new Evolve and Skeena housing projects at Vancouver and Okanagan campuses. Rigorous efforts are in progress for the innovative low carbon energy Bioenergy Research and Demonstration Facility (BRDF) expansion. UBC is also planning for a rapid transit extension to connect UBC to the region and transforming an entire city block at UBC into a renewable energy hub.

In 2020, UBC achieved a combined 28% reduction in greenhouse gas (GHG) emissions against the 2007 baseline at our Vancouver and Okanagan campuses. Despite an overall 30% growth in floor space and 49% increase in student enrolment at both campuses since 2007, UBC has achieved a 51% emissions reduction per full-time equivalent (FTE) student.

With significant reduction in student housing capacity and on-campus operations due to COVID-19 pandemic in 2020, UBC Vancouver campus saw a 14% (8,665 tCO₂e) reduction in GHG emissions from 2019. Beyond CAP2030 development, our continued community engagement, energy conservation, and incremental improvements to reduce operational and embodied carbon in new and existing buildings through our Green Building Action Plan aim to achieve significant progress in reducing Vancouver campus GHG emissions.

UBC Okanagan achieved an 11% (275 tCO₂e) reduction in GHG emissions. Reduced campus occupancy enabled staff to implement multiple building and energy supply optimization projects and advance the development of broader carbon reduction strategies informing the UBCO CAP 2030. In the coming year, the campus will continue existing activities to reduce energy and carbon emissions with the UBCO CAP2030 and implement an updated 10-Year Strategic Energy Management Plan and a new Low Carbon Energy Strategy to address energy demand and supply side decarbonization.

For the second consecutive year, UBC was awarded first place by Times Higher Education Impact Rankings² (THE) for taking urgent climate action, and ranked first in Canada for making cities inclusive, safe, resilient, and sustainable. The climate emergency is one of the most pressing issues of our time, and UBC will continue to leverage its institutional and intellectual capacities to demonstrate sustainability and climate leadership. At this pivotal moment, the CAP2030 will chart an accelerated pathway building on past success and deploy new innovations with an aim to materially exceed the Paris 1.5C target³ for 2030 and move forward the University's long-term aspirational carbon goals to be achieved prior to 2050, and to expand UBC's efforts to address indirect emissions (Scope 3).



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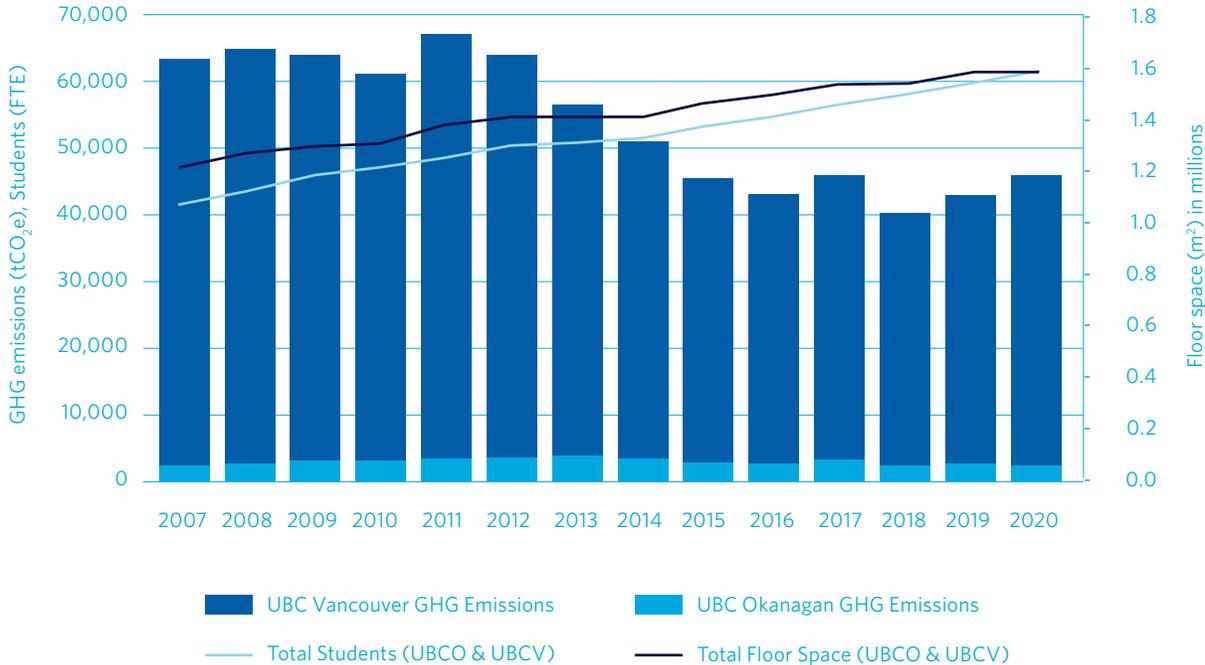
² https://www.timeshighereducation.com/impactrankings#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/undefined
³ <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

EMISSIONS OVERVIEW

EMISSIONS AND OFFSET SUMMARY

UBC tracks and reports the absolute and relative emissions for each campus against a baseline⁴ to measure performance against our Climate Action Plan targets.

FIGURE 1: UBC Emissions for Carbon Offsets and Growth, 2007 to 2020



2020 EMISSIONS AND OFFSETS

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

A summary of emissions attributed to UBC’s two campuses and off-campus properties are provided in Table 1 and Figure 2. Emissions for offsets for all properties and sites amounted to 52,134 tCO₂e in 2020; 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 2020 including biogenic emissions⁵ amounted to 60,316 tCO₂e, including 8,182 tCO₂e of biogenic emissions. The biogenic emissions (BioCO₂) from biomass combustion are reported separately but are not

⁴ This summary outlines GHG emissions of both Vancouver and Okanagan campuses since 2007
⁵ 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 as opposed to less sustainable biomass grown specifically for the production of biomass fuel as is the case in some other parts of the world.

EMISSIONS OVERVIEW

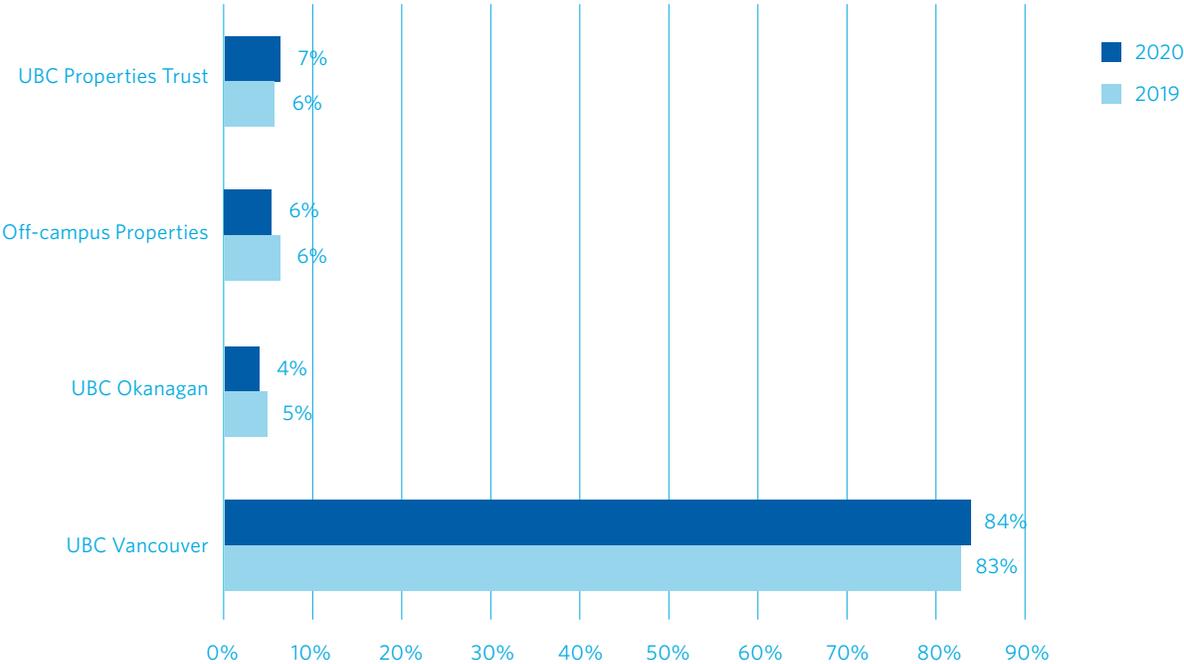
counted in emission totals for offset in accordance with Provincial reporting guidelines as the BioCO₂ released is part of the biogenic carbon cycle and would be released naturally during decomposition.

UBC 2020 total emissions reduced by 12% compared to 2019, but the total offsettable emissions increased by 7%. This was mainly attributed to the 59% drop in biogenic emissions due to the shutdown of the Bioenergy Research and Demonstration Facility (BRDF) at UBC Vancouver campus for expansion construction.

TABLE 1: 2019 & 2020 UBC Total GHG Emissions by Location

Total GHG Emissions (tCO ₂ e)	Emissions for offset		Emissions not required to be offset		Total Emissions	
	2019	2020	2019	2020	2019	2020
UBC Vancouver	40,400	43,628	20,067	8,175	60,468	51,803
UBC Okanagan	2,415	2,146	7	5	2,422	2,151
Off-campus Properties	3,071	2,955	2	2	3,073	2,957
UBC Properties Trust	2,857	3,405	0	0	2,857	3,405
UBC Total	48,744	52,134	20,076	8,182	68,819	60,316

FIGURE 2: 2019 & 2020 UBC Offsettable GHG Emissions Distribution



EMISSIONS OVERVIEW

Table 2 shows the 2020 emissions and the percentage change from 2019 for offsets from UBC’s two main campuses along with key performance indicators.

TABLE 2: 2020 Offsettable Emissions and Key Indicators UBC Vancouver and UBC Okanagan

Key Performance Indicator	Vancouver Campus	Okanagan Campus	UBC 2020 Total	UBC 2020 vs UBC 2019
GHG Emissions (tCO ₂ e)	43,628	2,151	45,779	7%
Floor Space (m ²)	1,605,006	155,233	1,760,239	0.5%
GHG Emissions per Square Meter (tCO ₂ e/m ²)	0.027	0.014	0.026	6%
Student Enrolment (FTE) ⁶	51,828	10,143	61,971	3%
Staff and Faculty Employees (FTE)	13,818	1,264	15,082	-0.2%
GHG Emissions per Student (tCO ₂ e/FTE)	0.84	0.21	0.74	4%

⁶ Numbers are calculated on a full-time equivalent basis, as opposed to headcount.

UBC VANCOUVER CAMPUS

UBC continues to excel in the Times Higher Education Impact Rankings (THE), placing first in Canada and seventh globally out of more than 850 participating institutions from 89 countries across six continents. For two consecutive years, UBC has retained the #1 position in the world for taking action to mitigate climate change. In addition, UBC ranked #1 for conserving life under water by protecting marine habitats - the only university to rank first in more than one goal.

The combinations of the recent Intergovernmental Panel on Climate Change (IPCC) Special Report⁷, ongoing global climate strikes, and UBC's Climate Emergency Declaration⁸ have all provided a renewed urgency in accelerating our efforts to avoid the catastrophic effects of climate change. In response to this, the current CAP2030 process is identifying pathways for even deeper carbon reductions by 2030 and addressing Scope 3 emission reductions.

7 www.ipcc.ch/sr15

8 climateemergency.ubc.ca



THE UNIVERSITY OF BRITISH COLUMBIA

vancouver campus



VANCOUVER CAMPUS SUMMARY

An impressive emissions reduction of 29% from the 2007 baseline was achieved in 2020 despite a 25% increase in building floor space and a 38% increase in students (FTE). Per capita, that translates to a GHG emission reduction of 48% per student since 2007.

The current development of the 2030 Climate Action Plan builds off of the significant progress made for the previous 2020 Plan, which helped achieve operational savings, improved building efficiency, and increased resiliency towards a strong reputation for UBC as an international sustainability leader.

Key Achievements 2020:

- The anticipated 12 MW biomass fueled hot water combustion boiler arrived on campus which is key to the Bioenergy Research and Demonstration Facility (BRDF) expansion plan. The new boiler will help increase the facility's capacity to generate 70% of the hot water (thermal production) needed in UBC's district energy system, and additionally improve operational efficiency, save annual operation costs, and reduce greenhouse gas emissions⁹.
- UBC Energy & Water Services enabled the second installation of an Aircurity system at the Centre for Comparative Medicine. This project has successfully reduced minimum airflow rates in the building while ensuring safe conditions for the occupants. This project is expected to reduce UBC's energy costs by nearly \$100K each year.
- The Building Operations department was awarded its third consecutive Platinum rating from E3 Fleet in 2020. E3 Rating initiatives were evaluated by a third-party auditor under the points based E3 Fleet Rating system. Platinum rating which is the top-level E3 Fleet rating is awarded to fleets that are carbon-neutral and meet (or exceed) E3's 10 green fleet criteria. To date, only two fleets have achieved platinum.
- Planning for the proposed Millennium Line UBC

Extension continued through 2020 as UBC entered a Memorandum of Understanding with the City of Vancouver, Musqueam, Squamish and Tsleil-Waututh Nations to work together to secure funding commitments for the project from senior levels of government. The project is now positioned to advance to the business case stage in 2021 and is on track for construction to start immediately following completion of the Broadway Subway Project in 2025.

- UBC's campus-wide bike share program continued to operate through the pandemic with 30,000 trips taken in 2020 covering over 40,000km. There are now over 80 designated bike share hubs installed across campus that make it easier for users to locate and park shared bikes - conserving bike rack space for other cyclists and maintaining an orderly and accessible public realm.

In 2020, UBC saw a significant reduction in on-campus operations; in person classes were done remotely and student housing and athletics were at a significantly reduced capacity. However, some faculty and staff were still coming to the office and research was still taking place, so many academic buildings continued to operate at full capacity. As a result, though UBC saw a significant reduction in energy and carbon emissions due COVID-19, it did not see a significant impact to its GHG inventory as three quarters of the reduction was from low carbon electricity. On a more positive note, UBC was able to make use of the reduced campus operations and additional incentive funding to move energy projects forward that would not have been otherwise feasible.

We anticipate that with the completion and implementation of CAP2030, Green Building Action Plan, and the BRDF expansion in 2021, our campus will continue reducing emissions beyond provincial requirements.

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⁹ While the BRDF expansion project has been under construction through the winter of 2020-2021, there has been increased reliance on the Campus Energy Centre which runs on natural gas for base thermal loads. This resulted in temporary increased emissions over this CCAR reporting period.

UBC VANCOUVER

DECLARATION STATEMENT

This Climate Change Accountability Report for the period January 1, 2020 to December 31, 2020 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2020 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2021 and beyond.

By June 30, 2021 University of British Columbia Vancouver campus' final 2020 Climate Change Accountability Report will be posted to our website at sustain.ubc.ca/about/plans-policies-and-reports#CNAR.

EMISSIONS AND OFFSETS SUMMARY

TABLE 3: UBC Vancouver Emissions and Offsets Summary Table*

UBC Vancouver 2020 GHG Emissions and Offsets	
GHG Emissions Created in Calendar Year 2020	
Total Emissions (tCO ₂ e)	58,164
Total BioCO ₂	8,176
Total Offsets (tCO ₂ e)	49,988
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets (tCO ₂ e)	1,804
Grand Total Offsets for the 2020 Reporting Year	
Grand Total Offsets Required (tCO ₂ e) to be Retired for 2020 Reporting Year	51,792
Total Offsets Investment (\$25 per tCO ₂ e)	\$1,294,800

*This table includes combined details of Vancouver Campus, Off-Campus Properties, and UBC Properties Trust

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 2020 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.

2020 EMISSIONS OVERVIEW



OVERVIEW

The greenhouse gas emissions in Table 4 has been 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, paper and TRIUMF. UBC Vancouver campus now emits 29% less offsettable GHG emissions compared to the 2007 baseline.

TABLE 4: Vancouver Campus Offsettable Emissions Comparison by Source, 2007, 2019 & 2020

Source	2007 Emissions (tCO ₂ e)	2019 Emissions (tCO ₂ e)	2020 Emissions (tCO ₂ e)	Change from 2007 to 2020	Change from 2019 to 2020
Buildings	58,105	38,988	41,952	-28%	+8%
Fleet	1,973	1,093	555	-72%	-49%
Paper	1,003	320	119	-88%	-63%
Fugitive ¹⁰	-	-	1,003	100%	-
Total Vancouver Campus Emissions	61,082	40,400	43,628	-29%	+8%

2020 GHG EMISSIONS IN DETAIL

The Vancouver campus emissions for offsets amounted to 43,628 tCO₂e in 2020. 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 this table.

¹⁰ Fugitive emissions are determined by the amount of refrigerants used to replenish chillers during servicing. In 2020, refrigerant emissions exceeded the less than 1% exemption threshold and thus were counted towards the 2020 CCAR report.

2020 EMISSIONS OVERVIEW

TABLE 5: 2020 Offsettable Emissions for the UBC Vancouver Campus

Source	2007 Emissions (tCO ₂ e)	2019 Emissions (tCO ₂ e)	2020 Emissions (tCO ₂ e)	Percent of 2020 Total
UBC Vancouver Campus - Core Buildings ¹¹	46,478	28,608	32,275	74%
DES (natural gas and light fuel oil) ¹²	40,106	1,056	23,012	52.7%
Natural gas (direct burn)	3,515	25,697	7,816	18%
Electricity	2,856	1,499	1,320	3%
Biomass facility ¹³	n/a	338	116	0.3%
Renewable Natural Gas ¹⁴	n/a	18	11	0.0%
UBC Vancouver Campus - Ancillary buildings ¹⁵	11,405	10,298	9,592	22%
DES (natural gas and light fuel oil)	7,311	300	5,424	12.4%
Natural gas (direct burn)	3,108	9,212	3,503	8%
Electricity	986	717	630	1.4%
Biomass facility	n/a	69	36	0.1%
TRIUMF ¹⁶	222	82	84	0.2%
Fleet	1,973	1,093	555	1.3%
Paper	1,003	320	119	0.3%
Fugitive	0	0	1,003	2.3%
Total Vancouver Campus Emissions	61,082	40,400	43,628	100%

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 CH₄ and N₂O 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 CH₄ and N₂O 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.

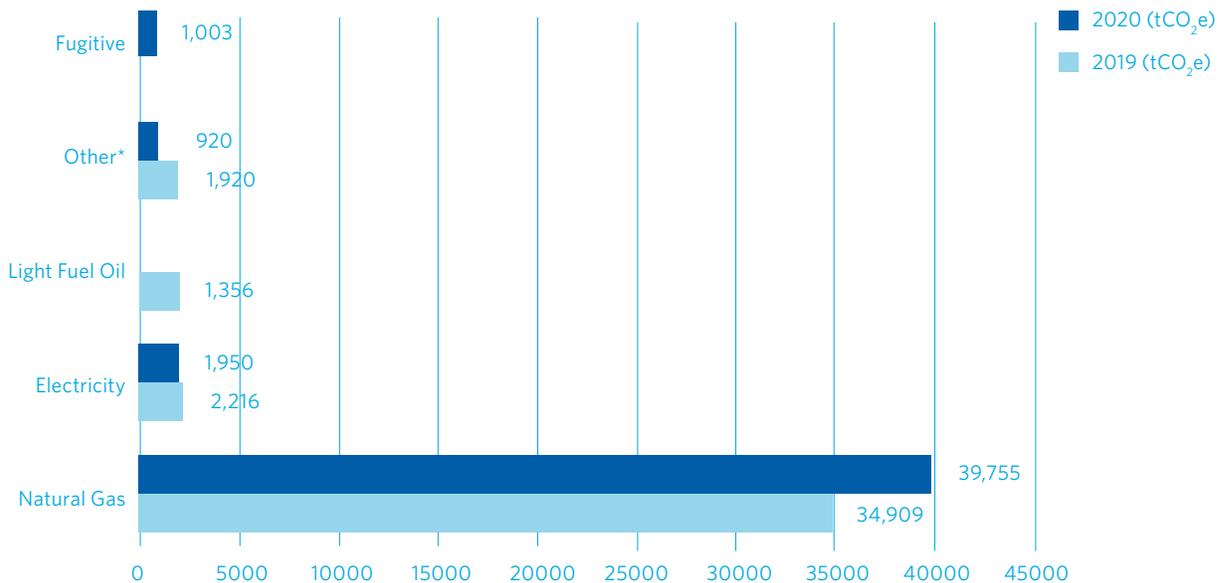
2020 EMISSIONS OVERVIEW

Figure 3 shows the distribution of major offsettable emissions from UBC’s Vancouver campus. The emission reduction this year was less than anticipated as the BRDF was shut down for the expansion project and the Academic Energy System (ADES) relied on the natural gas fired boilers at the Campus Energy Centre for most of its heating needs.

In 2020, due to an increase in routine servicing of chillers and similar systems, more fugitive emissions were reported compared to previous years. In 2020, fugitive emissions amounted to 2.3% of UBC Vancouver campus total emissions and exceeded the less than 1% exemption threshold, thus are reported for 2020 in accordance with the BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions. In prior years, UBC was usually below the 1% threshold, and therefore did not have to report or pay offsets for these sources.

As for other emissions, 2020 saw a 49% reduction of fleet emissions, and a 63% reduction of paper emissions compared to 2019 as a result of reduced on-campus operations due to COVID-19.

FIGURE 3: 2019 & 2020 Offsettable Emissions Distribution for the UBC Vancouver Campus



*Other includes, Fleet, Paper, Biomass, and Renewable Natural Gas

COMPARISON TO BASELINE YEAR

UBC Vancouver tracks and reports our relative emissions against a 2007 baseline to measure and demonstrate performance against our Climate Action Plan targets. In 2020, UBC’s Vancouver campus reduced offsettable GHG emissions by 29% compared to 2007. Once the BRDF is fully operational, we will be on track towards an anticipated 60% reduction below the 2007 baseline.

The emissions from campus buildings, along with fleet and paper amounted to 0.84 tCO₂e per student (FTE) in 2020, a 48% decrease since 2007. Between 2007 and 2020, the Vancouver campus building floor space increased by roughly 320,524 m² (25%), with several older buildings demolished to make way for the construction of new buildings, while student enrolment increased by over 14,000 FTE students (38%). Table 6 outlines key performance indicators for the UBC Vancouver campus.

2020 EMISSIONS OVERVIEW

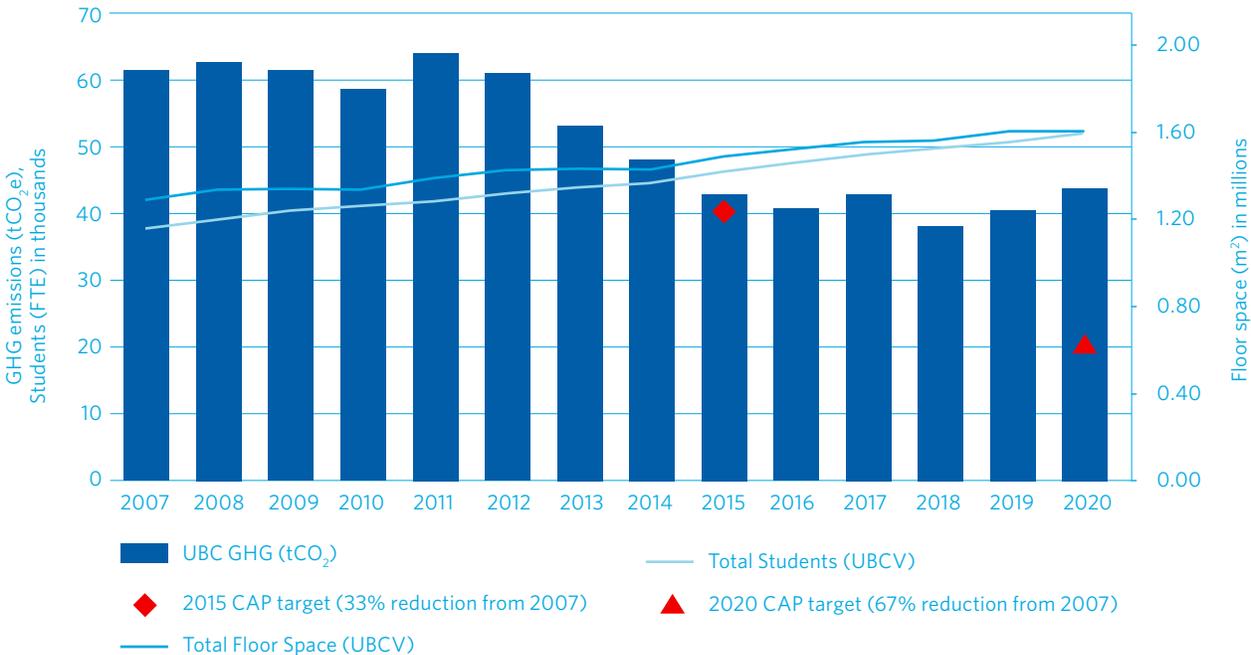
TABLE 6: 2020 UBC Vancouver Campus Key Performance Indicators

Key Performance Indicator	2007	2019	2020	% Change 2007 - 2020
GHG Emissions (tCO ₂ e)	61,082	40,400	43,628	-29%
GHG Emissions per Student (tCO ₂ e/FTE)	1.62	0.80	0.84	-48%
GHG Emissions per square meter (tCO ₂ e/m ²)	0.048	0.025	0.027	-43%
Floor Space (m ²)	1,284,482	1,605,006	1,605,006	+25%
Student Enrolment (FTE)	37,589	50,604	51,828	+38%
Staff and Faculty Employees (FTE)	10,509	13,861	13,818	+31%

COMPARING EMISSIONS TO GROWTH

Figure 4 illustrates the change in campus emissions since the 2007 baseline year, along with some key indicators of Vancouver campus growth and the 2015/2020 Climate Action Plan targets.

FIGURE 4: UBC Vancouver Campus Growth and Offsettable Emissions Reduction



2020 EMISSIONS OVERVIEW



SCOPE 3 EMISSIONS

Non-offsettable Scope 3 emissions in UBC’s inventory include those resulting from:

- Transportation (commuting) to and from campus;
- Business air travel for UBC staff and faculty;
- Building life cycle (embodied energy); and
- Solid waste management (e.g., landfilling of UBC’s waste).

Although UBC is not required to report or offset on Scope 3 emissions (except paper) under the Provincial Regulations, the Vancouver campus GHG inventory goes beyond provincial requirements by quantifying the optional Scope 3 emissions, which are outlined in Table 7. The current CAP2030 process is expanding its reach to include Scope 3 emissions in the university’s strategy and reduce these impacts beyond our reporting requirements.

TABLE 7: UBC Vancouver Campus Scope 3 Emissions, 2019 & 2020

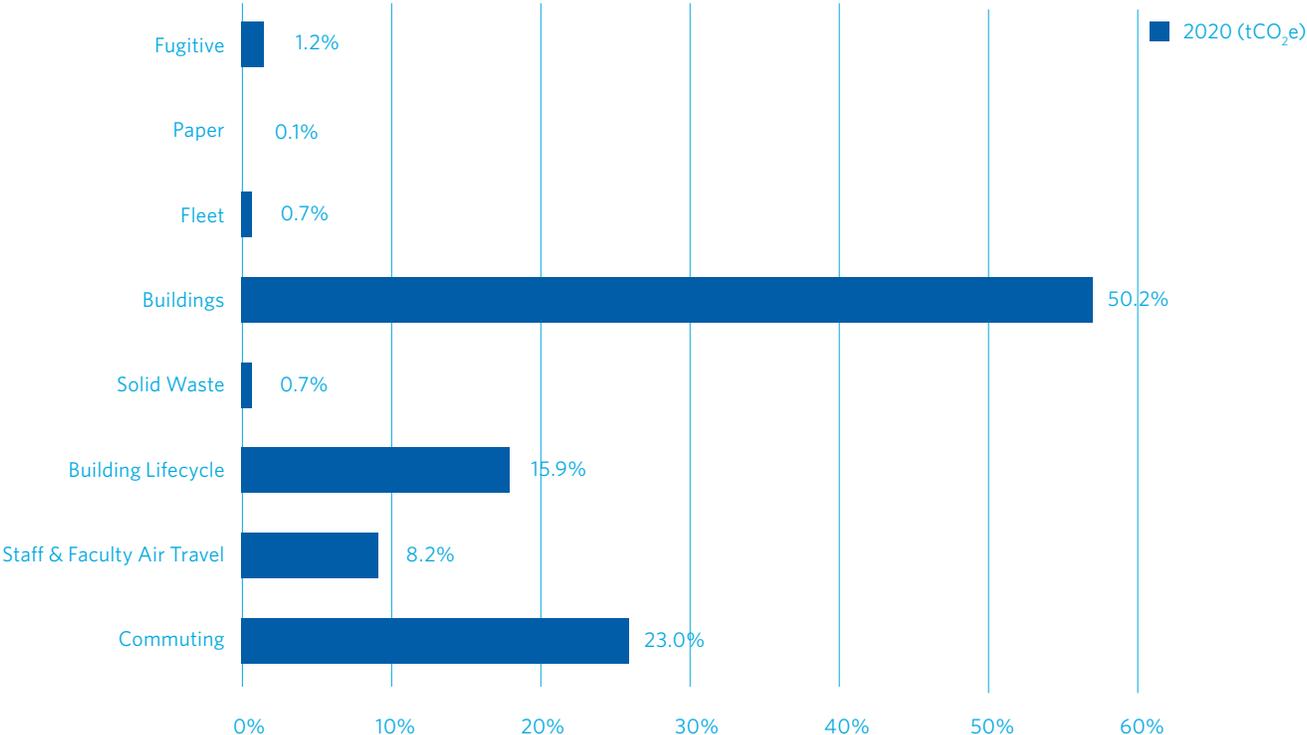
Source	2007 Emissions (tCO ₂ e)	2019 Emissions (tCO ₂ e)	2020 Emissions (tCO ₂ e)	Change from 2007 to 2020
Commuting	36,059	35,267	19,213	-47%
Business Flights	13,600	17,694	6,877	-49%
Building Lifecycle	10,190	13,241	13,241	+30%
Solid Waste	1,930	1,021	580	-70%

2020 EMISSIONS OVERVIEW

During the COVID-19 pandemic, UBC transitioned to online learning and remote working for many staff and faculty. Significant reduction in student housing capacity and on-campus operations were observed. With this decrease, commuting emissions were reduced by 46%, emissions from business flights dropped by 61%, and emissions from solid waste reduced by 43% compared to 2019.

Although these particular Scope 3 emissions fall outside the scope of the provincial requirements for carbon neutrality, Figure 5 shows the comparative proportions of emissions for the Vancouver campus.

FIGURE 5: UBC's Vancouver Campus Total Emissions for Scope 1, 2 and 3, 2020



ACTIONS TAKEN IN 2020 TO MINIMIZE EMISSIONS

UBC's Declaration on the Climate Emergency has provided impetus to accelerate CAP2030 timelines for decarbonization of its core operations, to expand the scope of action to indirect emissions that UBC has some control over, and to consider a climate justice lens in its future actions. The overall level of ambition of the CAP2030 is still being determined as recommendations are being fine-tuned and technical options being explored.

A draft target range for Scope 1 and 2 emissions of a 75% to 100% reduction goal by 2030 (below 2007 levels) has been put forward, materially exceeding the Paris 1.5C reduction pathway (generally seen as a 45% reduction by 2030). For Scope 3 emissions, a draft target of a 45% reduction has been proposed to meet the Paris 1.5C.



Bioenergy Research and Demonstration Facility

A. Stationary Fuel Combustion & Electricity (Buildings)

ENERGY SUPPLY

Bioenergy Research and Demonstration Facility

As part of the Climate Action Plan 2020 implementation, UBC has continued to advance the Bioenergy Research & Demonstration Facility expansion project, which will further reduce campus greenhouse gas emissions to about 60% below 2007 levels by 2022 by expanding low-carbon thermal capacity from 6 to 18 Megawatts. This facility uses regional, clean wood-waste (i.e. from wood product manufacturing and municipal plant trimmings) as the primary source of thermal energy.

EXISTING BUILDINGS

With over 400 institutional and residential buildings on campus, building operations is the largest component

of UBC's scope 1 and 2 GHG emissions. The UBC *Green Building Action Plan (GBAP)* outlines actions to accelerate higher levels of performance and net positive design as well as operate the largest portfolio of green buildings at a Canadian university. The GBAP is also developing best practice methods to measure and target reduced embodied carbon in both new and retrofit building projects.

In 2020, energy conservation and retrofit projects saved the University roughly 4 GWh of electricity and 12,000 GJ of natural gas. Major projects include the commissioning of the Aircuity Project at the Centre for Comparative Medicine, the installation of a heat recovery chiller module at Life Sciences, and several variable frequency drive upgrade projects. The cumulative annual savings from conservation projects since 2014 until Dec. 31, 2020 is ~29 GWh/yr of electricity and ~140,000 GJ/yr of natural gas. This amounts to saving of about \$3.2 million per year

ACTIONS TAKEN IN 2020 TO MINIMIZE EMISSIONS

or cumulative saving of about \$22 million from 2014-2020. Below are some of the energy conservation programs that took place in 2020.

Building Tune-Up Program

A newly revamped version of the program was initiated in 2020, jointly funded by BC Hydro and FortisBC. UBC has eight buildings participating in the first phase of this program which looks at previous energy conservation measures not implemented and continues to find new opportunities. The investigation for this phase of the Building Tune-Up Program will be completed by April 2021 and we anticipate any improvements to be implemented by April 2022.

LED Lighting Retrofit Campaign

UBC Energy & Water Services is working in partnership with Building Operations, BC Hydro, and the Province of British Columbia's Carbon Neutral Program to undertake a multi-phase fluorescent to LED retrofit project. The new LEDs provide improved lighting quality to building occupants, significantly reduce campus energy consumption, and decrease building maintenance over the long term.

To date UBC Vancouver Campus has replaced over 61,000 tubular T8 lamps in 39 buildings. This reduces the electrical demand of the University by over 750 kW, and saves over 3000 MWh in electrical energy consumption each year.

There are approximately 180,000 fluorescent T8 lamps across the entire core campus which could be replaced by LEDs. This could reduce UBC's electrical energy consumption by approximately 10.8 GWh, and would save the equivalent annual electricity consumption of 12 thousand homes in the lower mainland. The change allows an energy cost savings of \$756,000, and maintenance savings of \$90,000 each year.

Building Renewal

Many buildings have undergone energy efficiency upgrades over the years. In 2020, construction started on a major renovation to the Macleod Building was started within UBC's core campus. Along with seismic and functional upgrades planned for the 1964

building, energy efficient features, such as semi passive ventilation and a high performance re-skinned airtight and self shading façade are being incorporated and LEED Gold certification is targeted. The Hebb building which underwent renovation in 2019, was successfully LEED (Interior Design and Construction) Gold certified in 2020. The renewal of the 1960's modernist building included space reconfiguration to support contemporary pedagogy, seismic upgrades and energy efficient upgrades, such a high performance re-skinned airtight façade and updated mechanical system.

NEW BUILDINGS

In 2020, two major building construction projects commenced - the Arts Students Centre, and the Pacific Residences. Both projects are LEED registered and have been designed to meet UBC's energy targets.

Energy Targets Reduction 2020

In 2020 lower energy targets came into effect at UBC, as set out in the university's institutional energy target reduction schedule. This will further reduce energy use and GHG emissions in new buildings and renovations. Mandatory energy use intensity (EUI), thermal energy demand intensity (TEDI), and domestic hot water (DHW) targets for new construction and major renovations of different buildings are a part of UBC's green building policy. Energy targets are set to be further reduced in 2025 and 2030.

Climate Ready Building Requirements

Due to the warming climate, UBC has started to future proof buildings in order to provide a comfortable environment for occupants over a building's lifetime. UBC has developed Climate Ready Requirements for UBC Buildings that require thermal comfort modelling of spaces using future weather files. The requirements were updated in 2020 to reflect defined indoor peak temperatures required for different space types.

COMMUNITY ENGAGEMENT CAMPAIGNS

Shut the Sash

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

ACTIONS TAKEN IN 2020 TO MINIMIZE EMISSIONS



needs to be heated or cooled and moved through the hoods. When the fume hood sash is lowered, the air flow rate decreases and the amount of energy required is reduced. In 2020, lab users in Chemistry took part in a 6 week Shut the Sash competition to reduce energy loss through fume hoods. The 'Shut the Sash' campaign contributed \$5,200 in annual energy cost savings in these two sites alone. By replicating these behaviour changes across UBC's Vancouver campus, an estimated \$44,000 in annual savings could be achieved.

Ultra-Low Temperature Freezer Challenge

In 2020, UBC researchers participated in the International Freezer Challenge coordinated by My Green Labs and the International Institute for Sustainable Laboratories. The Challenge encouraged cold storage best management practices, including the adjustment of ultra-low temperature (ULT) freezer set points. An increase of 10 degrees Celsius reduces equipment energy consumption by 20%, on average. An energy efficient ULT freezer was awarded to one lab as a prize for participating in the Challenge. Researchers are also encouraged to upgrade to more energy efficient freezers through a ULT rebate program.

B. Supplies (Paper)

Approximately 56% of paper sourced for UBC in 2020 were with 30-100% post-consumer recycled (PCR) content. We continued to promote the Sustainable Purchasing Guide, which encourages the procurement of paper made from alternative fibre paper or paper with minimum 30% PCR content and eco-certified.

C. Fleet

UBC is responding to emerging technologies and transportation options in a number of ways, including, actions to support the transition to electric vehicles and prepare for autonomous vehicles by continuing to invest in electric vehicle charging infrastructure across campus including fast chargers, evolving parking management practices, and supporting research collaborations and pilots exploring autonomous vehicles and related technologies.

As of December 31, 2020 there are seventy-two Level 2, and four Level 3 electric charging stations on the campus.

D. Fugitive Emissions

UBC Technical Guidelines address mitigation for leak detection and prevention of refrigerant loss. 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. Additionally, they have improved communications with UBC operational departments who manage refrigeration and air conditioning equipment on campus. Our operational departments directly implement mitigation measures such as preventative maintenance of equipment by approved service contractors and following current guidelines.

PLANS TO CONTINUE REDUCING EMISSIONS IN 2021 AND BEYOND



Electric Vehicle Charging Infrastructure

The draft UBC CAP2030 is in the process of identifying pathways for deep carbon reductions by 2030. Bold 2030 emerging targets and actions are being drafted for new buildings, existing buildings, and embodied carbon in buildings.

A. Stationary Fuel Combustion & Electricity (Buildings)

ENERGY SUPPLY

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 determining best low-carbon electrification pathways for a variety of UBC buildings. Several of these studies were undertaken in 2020, with more underway or planned for 2021. Significant effort will be placed on identifying a low carbon option(s) for the Academic District Energy System (ADES), which presents more than 50% of UBC's emissions.

EXISTING BUILDINGS

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

Some energy conservation and retrofit projects planned in 2021 for existing buildings include:

- Installation of a heat recovery chiller in some on-campus buildings, including the Chemistry Centre and Chemistry North buildings. An additional module to the existing heat recovery chiller at the Life Sciences Centre will be made.
- Continuing the variable speed drive installation project in UBC's main lab buildings, LED relamping, and Round 3 of the Continuous Optimization Program.
- Retrofitting existing systems at the Bioenergy Research & Demonstration Facility to recover heat from flue gases.
- Supporting UBC Sustainability to deliver behaviour change and engagement programming to students,

PLANS TO CONTINUE REDUCING EMISSIONS IN 2021 AND BEYOND

staff, and faculty to encourage building energy conservation and advance a culture of sustainability across the UBC community.

NEW BUILDINGS

LEED Gold Certification

Three projects were completed in 2019/2020 and LEED registered with certification expected in 2021: The Undergraduate Life Sciences Teaching Labs, Gage Student Residence and Diesel Bus Transit Exchange and Kenny 4th floor Renovation. LEED certification usually takes about one year after construction completion.

UBC LEED Implementation Guide

We are currently updating our LEED v4.1 Guide for major projects to offer design teams guidance and update to better align with current UBC sustainability and climate policies; we expect the energy and atmosphere credits to be updated and more closely reflect energy costs and GHG emissions.

Building GHG Targets

In 2021 we expect to implement GHG targets for buildings, and further develop life cycle costing for efficient and low carbon building systems comparisons.

UBC is also exploring a Zero Carbon Building Standard for the new Gateway South project. This project will seek to achieve net-zero carbon certification through the Canadian Green Building Council's program, including for both operational and embodied carbon to serve as a demonstration project for advancing UBC's Green Building Action Plan and Climate Action Plan 2030.

B. Mobile Fuel Combustion (Fleet)

UBC will procure new vehicles and equipment that are zero emissions where feasible solutions exist. In the current CAP2030 process, we plan to expand and leverage Building Operations' fleet management program to all of UBC, continue to pursue fleet optimization and increased efficiency, and develop a comprehensive Zero Emissions Vehicle (ZEV) Charging,

Fuelling, & Maintenance Strategy to guide ZEV transitions on campus.

C. Supplies (Paper)

UBC applies a sustainability lens 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 RFP scoring criteria for all major bids.

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 Sustainable 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.

E. Scope 3: Extended Impact Emissions

While UBC is not required to offset scope 3 emissions (except paper) under the Provincial regulations, a number of initiatives outside of the CAP2030 process have been underway to address these "Extended Impact" emissions¹⁷.

CAP2030 is the first time UBC has made an explicit mandate to reduce "Extended Impact" emissions. This offers new opportunities to significantly reduce UBC's climate impacts through strategic actions and targets including:

Reduced Embodied Carbon in Buildings

Actions are being developed to address embodied carbon improvements in buildings such as providing guidance and methodology for building Life Cycle Assessment (LCA) studies, developing methodology

17 "Extended Impact" emissions are those that UBC does not directly own or control, but indirectly impacts through University activities and its ability to influence through behavioural change programs, sustainable supply chain procurement guidelines and others. These emissions are generally referred to as Scope 3 emissions and include sources such as commuting to and from campus, business air travel, food consumed on campus, waste, and building materials.

PLANS TO CONTINUE REDUCING EMISSIONS IN 2021 AND BEYOND



Gage Towers

for campus embodied carbon calculations and implementation of policy for low carbon building materials. The CAP2030 target is to establish an embodied carbon baseline and align new building and renewal designs with a 50% reduction target by 2030.

Reduced Business Air Travel

A business travel policy has been proposed to eliminate non-essential travel, and to better leverage virtual tools to provide alternatives to in-person research and scholarship. These actions are aiming to reduce business air travel emissions by 50% from pre-covid levels by 2030.

Climate Friendly Food Systems

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. By 2030, a target to achieve a 50% GHG emission reduction of food systems has been proposed.

Sustainable Commuting

UBC staff and faculty have expressed interest in

continuing to work from home at least a few days a week post-pandemic. Proposed actions include developing policies and tools to enable departments to incorporate teleworking and flexdays on an ongoing basis. These recommendations aim to achieve a 45% reduction in commuting emissions from 2010 levels by 2030.

Circular Economy: Waste and Materials

Plans to update the Zero Waste Action Plan by improving procurement and supporting critical waste management infrastructure are being developed. By 2030, UBC will apply a circular economy lens to enable a 50% reduction in waste, progressing toward a zero-waste community.

Sustainability and Climate Engagement and Outreach Programs

A cross-campus climate action campaign has been proposed to better implement social and behaviour change actions to address scope 3 emission reductions. By 2030, UBC aims to ensure two-thirds (66%) of UBC faculty, staff, and students will be aware of and actively contributing toward UBC's climate action goals.

SUCCESS STORIES



Michael Smith Labs

Lab Airflow Reduction at the Centre for Comparative Medicine

In 2020, UBC Energy & Water Services enabled the second installation of an Aircuity system at the Center for Comparative Medicine. Following the success of the Aircuity system at Michael Smith Labs, this implementation takes advantage of new guidelines from the Canadian Council on Animal Care (CCAC). Air samples from spaces in the building are routed to a bank of sensors, which test for various air contaminants, including VOCs and Ammonia. This information is then used to adjust air change rates, allowing for considerable reductions while ensuring safe conditions for occupants. This project is expected to reduce UBC's energy costs by nearly \$100K per year.

Energy Management Programs

In 2020, UBC completed its participation in BC Hydro's first-ever implementation of a Real-Time Energy Management program. This program used techniques and lessons learned from Hydro's long-standing Continuous Optimization program, but with a deeper emphasis on technology and data science. This was all enabled by UBC's ever-expanding rollout of the SkySpark platform.

In 2020, BC Hydro announced the latest version of the Continuous Optimization program in partnership with FortisBC. UBC is continuing to participate fully in the program, with seven buildings enrolled, and plans to continue when more become eligible. With lessons learned from the Real-Time Energy Management program, UBC is leveraging SkySpark and data analytics for deeper insights than ever before.

ABOVE AND BEYOND

A number of initiatives are underway to measure and reduce the extended impact emissions at UBC Vancouver Campus.

Zero Waste Food Ware Strategy

As part of the Zero Waste Action Plan, UBC led the nation with the Zero Waste Food Ware Strategy, launched in January 2020. The strategy is a step toward a zero waste future for food and beverage on campus, with three main elements:

1. Fees for single use items (initially, coffee cups)
2. Smarter, more sustainable materials for single use items, including discontinuing certain items such as foam cups, plastic straws, and plastic bags
3. Improved in-store recycling bins and signage for customers and staff.

With implementation paused during the pandemic, it will be resumed once food outlet restrictions are removed.

Amber Glass Recycling Program

The Amber Glass Recycling Program helps to reduce UBC's solid waste stream and its associated GHG emissions and environmental impacts by providing an

opportunity for labs to recycle glass containers that would otherwise be sent to the landfill for disposal. Non-hazardous amber glass bottles are collected by labs and recycled by being melted down to make new bottles or ground into sand-blasting material. The program was piloted in Michael Smith Laboratories in 2017 and has since diverted approximately 1000kg of glass annually. In December 2020, the program was expanded into the Life Sciences Centre.

Nitrile Glove Recycling Program

Gloves are one of the highest contributors to plastic waste from laboratories at UBC. The Kimberly-Clark RightCycle program provides an opportunity to recycle nitrile gloves instead of sending them to the landfill. Used, non-hazardous Kimberly-Clark brand gloves are collected and recycled into eco-responsible plastic products such as outdoor furniture. This program was piloted in the Centre for Comparative Medicine (CCM) between 2019 and 2020. In its first year, 512lbs of gloves were collected and recycled, leading to both cost savings as well as 224kg of net carbon savings. The program has continued, with plans to expand the program in 2021.

Sustainable Transportation

In 2020, opportunities to further reduce greenhouse gas emissions from commuting were explored which will be continued into 2021 for refinement. A few of the key initiatives identified which had the greatest impact on reducing the universities GHG's from commuting include the introduction of a discounted staff and faculty transit pass and increasing support for remote work.

Sustainability Coordinators Program

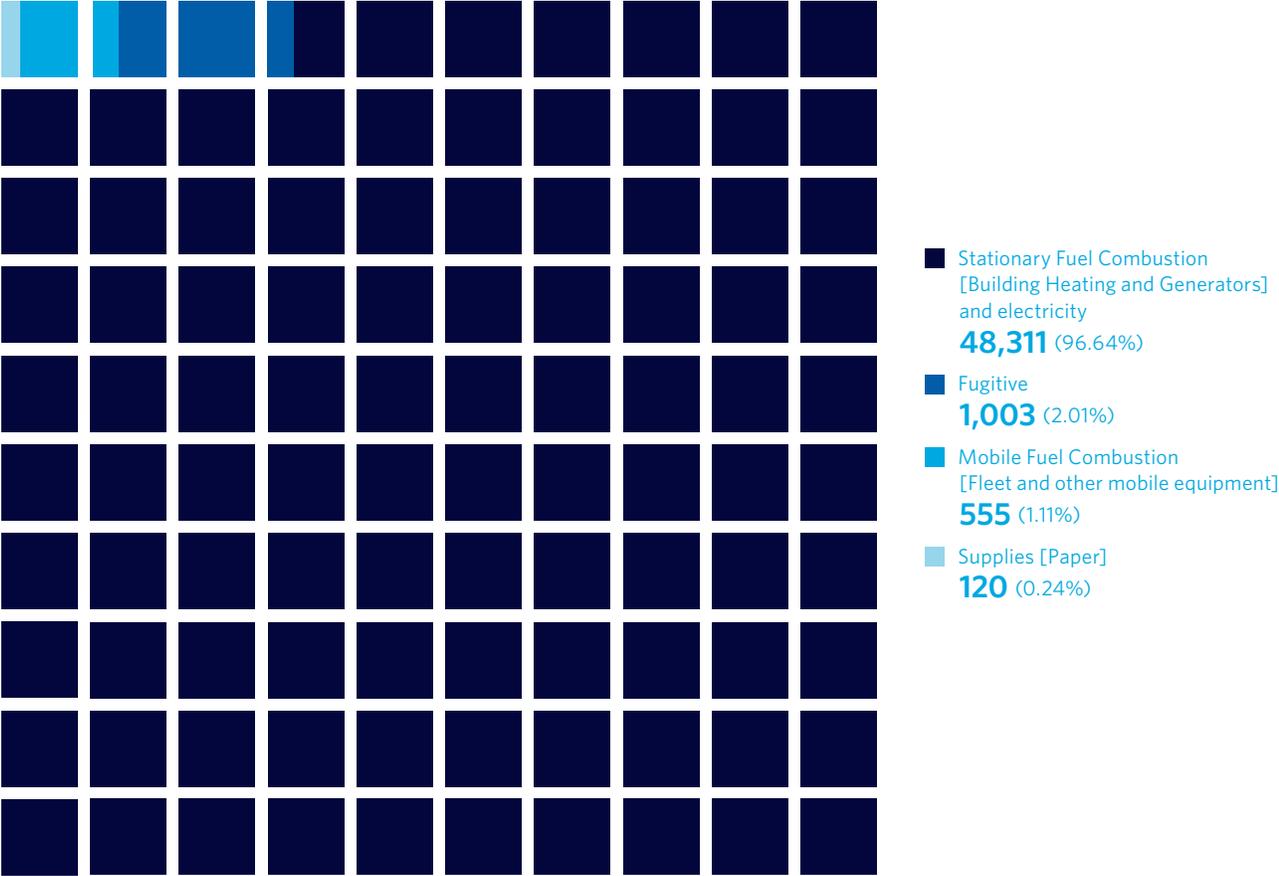
In 2020, the Sustainability Coordinator Program celebrated its 20th anniversary where it has grown to become a network of 120 coordinators working in offices, academic departments, operational units, and laboratories across the UBC Vancouver campus. The program provides these volunteers with opportunities and resources to promote and implement sustainable practices in their departments related to energy and waste, purchasing, transportation and food.



Amber Glass Recycling Poster

GHG EMISSIONS BY SOURCE

FIGURE 6: UBC Vancouver Total Emissions by Source (Vancouver Campus, Off-campus Properties, and UBCPT) for the 2020 Calendar Year (tCO₂e*)



TOTAL EMISSIONS: 49,988

Offsets Applied to Become Carbon Neutral in 2020 (Generated April 30, 2021)
 Total offsets required: 49,988
 Total offset investment (inc. GST): \$1,359,540
 Emissions which do not require offset: 8,176 **

* Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit of measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.

** Under the Carbon Neutral Government Regulation of the Greenhouse Gas Reduction Targets Act, all emissions from the sources listed above must be reported. As outlined in the regulation, some emissions do not require offsets.



UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC VANCOUVER CAMPUS

A. STATIONARY SOURCES (E.G. BUILDINGS, POWER GENERATORS): FUEL COMBUSTION, ELECTRICITY USE, FUGITIVE EMISSIONS.

Actions taken by your organization in 2020 to support emissions reductions from buildings.

a) Do you have a strategy to reduce emissions from stationary sources? **Yes**

b) Whether you have a strategy or not, briefly describe your organization's plans to continue reducing emissions from stationary sources:

I. Over the medium-term term (1-5 years)

- In December 2019, UBC's Board of Governors unanimously endorsed a Declaration on the Climate Emergency, to commit to accelerated emissions reductions that aligns and exceed the Paris Agreement of limiting global warming to 1.5C. Over 4000 UBC community members participated in the Climate Emergency engagement process with inputs used to inform the Climate Action Plan 2030 (CAP2030) actions. The CAP2030 process started in summer 2020, where over 150 UBC experts and stakeholders engaged throughout the summer to develop concrete actions to drive emissions reductions on 10 priority areas under Scope 1, 2 and 3.
- The overall level of ambition of the CAP2030 is still being determined as recommendations are being fine-tuned and technical options being explored. A draft target range for Scope 1&2 emissions of a 75% to 100% reduction goal by 2030 (below 2007 levels) and for Scope 3 emissions, a draft target of a 45% reduction has been proposed to meet the Paris 1.5C effort identified in the UBC Climate Emergency Declaration. The UBC Climate Action team is aiming for Board adoption of the final CAP2030 strategy by November - December 2030.
- 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 determining best low-carbon electrification pathways for a variety of UBC buildings. Several of these studies were undertaken in 2020, with more underway or planned for 2021. Significant effort will be placed on identifying a low carbon option(s) for the Academic District Energy System (ADES), which presents more than 50% of UBC's emissions.
- 2020 also saw significant advancement on building the Bioenergy Research and Demonstration (BRDF) Expansion project. The project is scheduled to come online in spring 2021, and will help reduce UBC's emissions to 60%-62% below 2007 levels.
- UBC continues to identify energy and emissions savings by optimizing the efficiency of existing buildings; from new buildings and major retrofits through the Green Building Action Plan (GBAP); and behaviour change programming to encourage energy conservation. GBAP has the vision to create a pathway for development of net- positive buildings, both academic and residential, which promote human and ecological wellbeing.
- UBC is also exploring a Zero Carbon Building Standard for the new Gateway South project. This project will seek to achieve net-zero carbon certification through the Canadian Green Building Council's program, including for both operational and embodied carbon to serve as a demonstration project for advancing UBC's GBAP and Climate Action Plan 2030.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC VANCOUVER CAMPUS

- Leveraging building retrofits and renewals (e.g. through seismic upgrades) to achieve reductions in GHGs, energy and water.
- Expanding the historical focus on GHG mitigation (e.g. lowering GHGs through energy demand and supply) to also include climate adaptation measures (e.g. designing buildings and public realm to address impacts of heat waves, storms, fires, etc.) as an additional phase of CAP development.
- Intensive demand-side management (DSM) activities are planned.

II. Over the long term (6-10 years)

- As described above, the current CAP2030 process is identifying pathways for deep carbon reductions by 2030, an accelerated timeline for achieving net-zero emissions, and addressing Scope 3 emissions.
- For the wider UBC Vancouver Campus, the climate action planning process will also explore opportunities to address Neighbourhood emissions through:
 - Updating the Community Energy and Emissions Plan (CEEP) with a focus on building, transportation and waste projections for neighbourhoods.
 - Development of a Neighbourhood Low Carbon Energy Strategy (LCES) which will identify policy approaches that ensure future energy supply and building performance will achieve defined GHG emissions targets.
- Implement the Green Building Action Plan (GBAP) through updates to Residential Environmental Assessment Program (REAP) building policy in two phases to address immediate energy & carbon, climate adaptation, water, health and wellbeing and biodiversity opportunities. REAP is aligned to BC Building Code's Energy Step Code (ESC) and with UBC Neighbourhood Low Carbon Energy Strategy with an intent to advance toward net zero buildings prior to 2032 and achieve defined targets of UBC's Community Energy and Emissions Plan. The GBAP outlines actions towards reduced energy use and GHG emissions from buildings. Ongoing continuous building optimization will also be performed to enhance the efficiency of our existing buildings.

c) Please describe your strategy's goals (if any) related to building retrofits.

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 were completed in existing buildings on campus, these include ongoing commissioning of the demand control ventilation system to the Centre for Comparative Medicine (Aircuity), completion of Continuous Optimization Round 2, initiation of C.Op Round 3, continuation of the LED retrofit campaign, building 3-way to 2-way control valve conversions, as well as many smaller retrofits. In 2020, additional energy conservation and retrofit projects saved the University roughly 4 GWh of electricity and 12,000 GJ of Natural Gas. The cumulative annual savings from conservation projects since 2014 until Dec. 31, 2020 is ~29 GWh/yr of electricity and ~140,000 GJ/yr of natural gas. This amounts to saving of about \$3.2 million per year or cumulative saving of about \$22 million from 2014-2020. Below are some of the energy conservation programs that took place in 2020.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC VANCOUVER CAMPUS

d) What percentage on average of your building portfolio is retrofitted each year?

Minor retrofits (e.g., low cost, easy to implement measures including caulking, lighting, adding roof insulation, etc.) (%)	1%
Major retrofits (e.g., replacing windows and doors, equipment replacement such as boilers, etc.) (%)	1%
Deep retrofits (e.g., replacing roof, replacing the heating, ventilation and air-conditioning system with a renewable technology like a ground-source heat pump, etc.) (%)	1%

e) Do you keep records of refrigerant gases category and refilling volumes?

Yes, UBC operational departments are required to keep complete up-to date inventories of refrigeration equipment and to report all Ozone Depleting Substances (ODS) releases, including annual top-up volumes to Safety and Risk Services.

-
- i. If yes, have you quantified and reported the associated emissions? Yes

f) What, if any, mitigation approaches have been considered? Please describe.

UBC Technical Guidelines address mitigation for leak detection and prevention of refrigerant loss. 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 and has improved communication with UBC operational departments/teams who manage refrigeration/air conditioning equipment on campus. Our operational departments directly implement mitigation measures such as preventative maintenance of equipment by approved service contractors and following current guidelines.

g) How many newly constructed buildings received at least LEED Gold certification in 2020? 2

h) How many newly constructed buildings did not receive LEED Gold certification? 3

(certification in progress)

-
- i. Please explain why LEED Gold certification was not obtained for those new buildings.

Three projects were completed in 2019/2020 and LEED registered with certification expected in 2021: The Undergraduate Life Sciences Teaching Labs, Gage Student Residence and Bus Transit Exchange and Kenny 4th floor Renovation. LEED certification usually takes about one year after construction completion.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC VANCOUVER CAMPUS

i) Other actions? Please describe briefly.

Building GHG targets

In 2021 we expect to implement GHG intensity reduction targets for buildings, and further develop life cycle costing for efficient and low carbon building systems comparisons.

Reduced Embodied Carbon in Buildings

Actions are being developed to address embodied carbon improvements in buildings such as providing guidance and methodology for building Life Cycle Assessment (LCA) studies, developing methodology for campus embodied carbon calculations and implementation of policy for low carbon building materials.

UBC LEED Implementation Guide

We are currently updating our UBC LEED v4.1 Implementation Guide for major projects to offer design teams guidance and update to better align with current UBC sustainability and climate policies; we expect the energy and atmosphere credits to be updated and more closely reflect energy costs and GHG emissions.

Climate Action

The Climate Emergency Task Force report at UBC has identified and recommended GHG emissions reduction in scopes 1, 2 and 3 need to be tackled by the university. As part of the emerging CAP2030 process, bold 2030 goals, actions and targets are currently being set for new buildings, existing buildings and embodied carbon in buildings.

B. MOBILE SOURCES (VEHICLES, OFF-ROAD/PORTABLE EQUIPMENT): FUEL COMBUSTION

Actions taken by your organization in 2020 to support emissions reductions from mobile sources.

a) Do you have a strategy to reduce emissions from mobile sources? (Y/N) **Yes**

b) Whether you have a strategy or not, briefly describe your organization's plans to continue reducing emissions from mobile sources

i. Over the medium-term term (1-5 years)

UBC will procure new vehicles and equipment that are zero emissions where feasible solutions exist. In the current CAP2030 process, we plan to expand and leverage Building Operations' fleet management program to all of UBC, continue to pursue fleet optimization and increased efficiency, and develop a comprehensive Zero Emissions Vehicle (ZEV) Charging, Fueling, & Maintenance Strategy to guide ZEV transitions on campus.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC VANCOUVER CAMPUS

c) How many electric vehicle charging stations (Level 2 and 3) does your organization have as of December 31, 2020?

level 2	72
level 3	4

d) Please briefly describe any other related actions (e.g. charging station feasibility studies, electrical panel upgrades, etc.)

UBC is responding to emerging technologies and transportation options in a number of ways, including, actions to support the transition to electric vehicles and prepare for autonomous vehicles by continuing to invest in electric vehicle charging infrastructure across campus including fast chargers, evolving parking management practices, and supporting research collaborations and pilots exploring autonomous vehicles and related technologies.

e) Please indicate the number of the vehicles in the following vehicle classes that are in your current fleet by fuel type and vehicle category:

	Battery Electric	Plug-In Electric Hybrid	Hybrid Electric Vehicle	Fuel Cell Electric Vehicle	Natural Gas or Propane	Gas	Diesel
Light duty vehicles (LDVs)	28	0	2	0	0	32	0
Light duty trucks (LDTs)	6	0	0	0	0	232	58
Heavy duty vehicles (HDVs)	0	0	3	0	2	44	28

f) If, in the above table, you indicated that your organization's fleet includes vehicles that use Gas, do any of these vehicles use E100? (Y/N) N

g) If, in the above table, you indicated that your organization's fleet includes vehicles that use Diesel, do any of these vehicles use B100? (Y/N) N

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC VANCOUVER CAMPUS

h) If your organization purchased gas or diesel vehicles in 2020, can you briefly explain why vehicles from the other categories were not chosen?

We purchased no vehicles in 2020.

Actions taken by your organization in 2020 to support emissions reductions from paper supplies.

a) Briefly describe your organization's plans to continue reducing emissions from paper use

I. Over the medium term (1-5 years)

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 Sustainable Purchasing Guide is designed to help UBC staff and faculty member or student, to purchase sustainable goods and services.

II. Over the long term (6-10 years)

Going forward, we will encourage UBC customers to purchase paper with high recycled content.

b) Do you have an awareness campaign focused on reducing office paper use (Y/N) No

c) Has your organization purchased alternate source paper (bamboo, hemp, wheat, etc.) Yes

d) Are there any other actions your organization took in 2020? Please specify:

Approximately 56% of paper sourced for UBC in 2020 were with 30-100% post-consumer recycled (PCR) content. We continued to promote the Sustainable Purchasing Guide, which encourages the procurement of paper made from alternative fibre paper or paper with minimum 30% PCR content and eco-certified.



2020

CLIMATE CHANGE ACCOUNTABILITY
REPORT UBC OKANAGAN



THE UNIVERSITY OF BRITISH COLUMBIA

Okanagan Campus



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EXECUTIVE SUMMARY



UBC Okanagan's commitment to climate and environmental leadership continued in 2020 throughout UBC's Coronavirus (COVID-19) response. Campus operations emissions decreased by 11 per cent (271 tCO₂e), in part due to remote working and learning. In addition, reduced campus occupancy provided the opportunity for continued implementation of projects to optimize building and energy supply systems.

Over the last year, the campus continued the construction of new buildings designed to meet progressive energy and environmental performance targets. This was made possible because of staff and contractor's strict adherence to safe work practices and social distancing in accordance with provincial and health authority directives. The Net-Zero Energy-Ready award-winning **Skeena Residence** - a 220-unit building completed in 2020 - is on track to be the first Passive House certified university dormitory in Canada. Completion of this project and several other smaller projects in 2020 increased campus floor area by approximately five per cent.

Construction of the **Nechako Residence and Commons Block** continued in 2020 and is on schedule for completion in mid-2021. The mixed-use facility targeting LEED® Gold certification will house 220-units, a 450-seat dining hall and 24-hour social amenities. Schematic design of the **Interdisciplinary Collaboration and Innovation (ICI)** building began, targeting LEED® Gold certification as a minimum. Given the UBC Board of Governor's endorsement of the President's Climate Emergency Declaration and sustainability priorities in late 2019, staff will integrate the goal to reduce the carbon footprint of the building and its operations, as well as to identify cost-effective measures that reduce both embodied and operational carbon through the design development process.

In the coming year, the campus will continue existing activities to reduce energy and carbon emissions, and will complete a new campus plan - the **Climate Action Plan 2030 (CAP2030)** - to define a path to reduce carbon emissions, with targets and actions to achieve them. Critical to the CAP2030, implementation of an updated 10-Year **Strategic Energy Management Plan** and a new **Low Carbon Energy Strategy** will address energy demand and supply side decarbonization. It is anticipated that alignment and implementation of this work over the long-term will enable the campus to grow sustainably toward the achievement of its goal of net-positive performance in operational energy and carbon by 2050.

Rob Einarson

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

DECLARATION STATEMENT

This Climate Change Accountability Report for the period January 1, 2020 to December 31, 2020, summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2020 to reduce our greenhouse gas emissions, and our plans to continue reducing emissions in 2021 and beyond.





2020 EMISSIONS OVERVIEW

GHG EMISSION AND OFFSETS

GHG Emission created in Calendar Year 2020	
Total Emissions (tCO ₂ e)	2,151
Total BioCO ₂	5
Total Offsets (tCO ₂ e)	2,146
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO ₂ e)	262
Grand Total Offsets for 2020 Reporting Year	
Grand Total Offsets (tCO ₂ e) to be Retired for 2020 Reporting Year	2,408
Offset Investment (\$25 per tCO ₂ e)	\$60,200

Retirement of Offsets

In accordance with the requirements of the Climate Change Accountability Act and Carbon Neutral Government Regulation, UBC Okanagan (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2020 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 campus GHG emissions by source. Of note, there was an 11 per cent reduction in total GHG emissions from 2019 to 2020, which will reduce UBCO's carbon offset liability by \$6,725 (excl. tax). The majority of this reduction is a result of a 216 tCO₂e decrease in building emissions. Reduced building occupancy during the pandemic and the ongoing implementation of energy and carbon reduction measures contributed to this reduction. Projects of note include the ongoing optimization of the Low District Energy System (LDES) and continued implementation of recommissioning projects in multiple buildings. Specific measures implemented to reduce emissions over the previous year are detailed in the 'Actions Taken in 2020 to Minimize Emissions' section of this report.

TABLE 1 GHG COMPARISON BY SOURCE BETWEEN 2019-2020

Source	2019 Emissions (tonnes CO ₂ e)		2020 Emissions (tonnes CO ₂ e)		Changes from 2019 to 2020
Buildings	2,240	92%	2,024	94%	-10%
Fleet	64	3%	49	2.3%	-23%
Paper	55	2%	10	0.5%	-81%
Fugitive Emissions	65	3%	68	3.2%	+5%
Total Emissions *	2,422	100%	2,151	100%	-11%
Total Offsettable Emissions	2,415	100%	2,146	100%	-11%

* May not sum due to rounding

CARBON NEUTRAL OFFSETS IN 2020

In accordance with the campus Clean Government Reporting Tool, and as required by the Climate Change Accountability Act (CCAA), offsets required to achieve carbon neutrality in 2020 total 2,408 tCO₂e. This figure includes offsets required for 2020 in the amount of 2,146 tCO₂e, plus the offsets owing for 2019, a total of 262 tCO₂e. As part of the Okanagan campus' 2020 GHG emissions profile, 5 tCO₂e do not require offsets.



EMISSION REDUCTION ACTIVITIES

ACTIONS TAKEN IN 2020 TO MINIMIZE EMISSIONS

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

A. Stationary Fuel Combustion Electricity (Buildings)

The largest source of in-scope GHG emissions is from buildings. In 2020, UBC Okanagan continued to target building energy efficiency and GHG reduction actions by implementing energy and carbon reduction plans and activities. These measures, as well as reduced campus occupancy, contributed to a 10 per cent, or 216 tCO₂e, reduction in building emissions.

CLIMATE LEADERSHIP PLANNING & ENERGY MANAGEMENT

In 2020, UBC Okanagan undertook a number of actions in response to UBC's Climate Emergency Declaration. The campus continued to develop its first **Climate Action Plan 2030 (CAP2030)**, which will identify where the campus needs to focus its efforts and resources to enable the campus community, infrastructure, and buildings to address and respond to climate change. The breadth and scope of the plan will focus on reducing direct operational emissions, as well as indirect extended impact areas such as transportation, food and air travel.

A number of key initiatives were advanced in 2020 that inform the CAP2030's energy and carbon reduction strategies and proposed targets. Phase 3 of the **Low Carbon Energy Strategy**, which guides future low carbon district energy system development and investments, was completed. This included the design of high-lift heat pumps and thermal storage adjacent to the geo-exchange building. Pending approved funding, this measure will displace natural gas use and provide servicing to a cluster plant in or near the future Interdisciplinary Collaboration and Innovation (ICI) building, which will serve surrounding buildings.

The new 10-year **Strategic Energy Management Plan (SEMP)**, was completed in 2020. The SEMP provides a suite of demand-side management projects to reduce energy consumption and associated emissions. It is estimated that implementation of initial projects identified in the SEMP, pursuant to funding, will reduce annual energy consumption by 882,700 kWh and 11,260 GJ, reducing emissions by 564 tCO₂e.

UBC Okanagan also entered into a three-year partnership with the campus' School of Engineering faculty to develop a data analytics platform. This project aims to produce an intelligent data-driven energy monitoring and management system for micro-communities using statistical and advanced data analysis methods. While this platform is being finalized, a utility tracking tool that uses advanced programming language was developed to track overall campus utility consumption (e.g., electricity, natural gas, water, sewer), and building-level consumption at the monthly, quarterly, and annual interval.

Additionally, key departments have been 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 in one location, as well as further developing a meter tree. This project will provide further input to the Data Analytics platform the campus has been developing with the School of Engineering.

NEW BUILDINGS

Despite the global COVID-19 pandemic, UBC Okanagan completed the construction of **Skeena Residence**, on track to become the **first Passive House certified university dormitory facility in Canada**.

Early certification steps included an air tightness test (AHC), recorded as 0.08, exceeding the target of 0.6 AHC required for certification.

Additionally, the campus completed a 537 m² research greenhouse, the **Plant Growth Facility** and two administration facilities — the **Office Modular 1** and **Facilities Management trailer** — both of which are supplied by electrical heat from air-source heat pumps. Demand-controlled ventilation combined with heat recovery ventilators will reduce their electricity demands.

The Okanagan campus continued to build the **Nechako Residence and Commons Block**, a mixed-use facility that will help 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. The facility, which is targeting mid-2021 completion and LEED® Gold certification, will be the latest building to be connected to the district energy system, which provides the campus with a lower carbon energy supply.

Finally, the campus commenced the design phase of the new **Interdisciplinary Collaboration and Innovation (ICI)** building that will target, at minimum, LEED® Gold certification. The academic facility will be designed to foster interdisciplinary knowledge and support collaborative, team-based learning and innovative approaches to teaching, while contributing to the campus' sustainable development.



EXISTING BUILDINGS

Academic Building Upgrades

The implementation of a multi-year demand-controlled ventilation program to improve control ventilation rates of laboratory spaces and standardize programming for occupancy continued within the Science building. Upon completion, measures are expected to reduce laboratory energy use by 317,100 kWh and 4,950 GJ, decreasing emission by 250 tCO₂e annually.

Occupancy System Upgrades

The campus completed a WI-FI upgrade to improve individual occupancy monitoring through the building automation system (BAS). The BAS assesses occupancy information and responds to changes in occupancy by adjusting air handling equipment operation, conserving energy and reducing associated emissions.

Building Recommissioning Projects & Studies

The campus completed recommissioning projects on building HVAC systems with a focus on calibrating the carbon dioxide sensors. These sensors provide occupants with good indoor air quality by increasing ventilation rates on demand. Recalibration of sensors ensures ventilation rates do not exceed requirements, thereby reducing energy costs and consumption.

Recommissioning studies were conducted on three buildings in the last year – Engineering, Management and Education; Reichwald Health Sciences Centre; and, Upper Campus Health. The combined results of the proposed projects identified in the studies are anticipated to conserve 567,076 kWh and 2,497 GJ of energy annually, reducing carbon emission by approximately 124 tCO₂e per year.

Lighting Upgrades

Lighting upgrade work to switch to LED lights in academic and administration buildings continued over the last year. Efforts are projected to conserve 250,000 kWh of electricity annually.

DISTRICT ENERGY SYSTEM (DES) UPGRADES

In 2020, the following campus district energy system upgrades and expansion projects were completed:

- Implemented the low temperature district energy system (LDES) low flow pump project to reduce energy consumption and extend the life of the pumps used to circulate water through the low LDES loop. The campus replaced the 125hp pumps with a 15hp pump, which will improve the geothermal heat extraction effectiveness during shoulder seasons and reduce energy consumption by 30,000 kWh annually.
- Completed a portion of the Science building conversion project to a low temperature heating system, which will reduce the building's reliance on natural gas for its HVAC needs.

STUDENT RESIDENCE BUILDINGS

Operational Efficiency Projects

An HVAC upgrade was completed on the Monashee Residence in 2020. This included replacement of the make-up air system with energy recovery ventilators and the installation of centralized Variable Refrigerant Flow (VRF) system to replace all individual unit packaged terminal air-conditioning (Ptac) equipment. The VRF system provides a more efficient heating and cooling system and decarbonizes the building's main heat source by using a heat pump rather than gas-fired equipment.

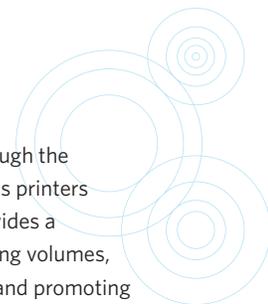
Lighting Upgrades

Staff continued to complete the LED light switch-out program on a failure-based process over the last year to reduce electricity consumption.

DEPARTMENT ACTIONS

Key departments have also implemented a number of projects that support energy reduction at the campus level, including:

- Ongoing replacement of desktop computers with laptops and more efficient devices;
- Upgrading staff and faculty devices from spinning hard drives to solid state drives (SSD), reducing waste, power consumption and replacement costs;
- Continuing to replace older power distribution units (PDUs) 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. PDUs containing high-efficiency transformers are two per cent to three per cent more efficient overall compared to PDUs with generic lower-efficiency transformers. Also, several step-down transformer uninterruptible power supply (UPS) units were replaced with power sharing, splice devices. These devices are more efficient, less noisy and generate less heat, therefore requiring less cooling power; and,
- Adjusting computer lab schedules in response to the pandemic, which were previously configured to power down at midnight and power on at 6am during the campus' routine building closure window each day. These parameters were removed to enable access to computers around the clock to support students studying in different time zones and maximize availability of software to complete course requirements remotely (through remote labs service). These adjustments were offset by the reduction in power consumption required by on-campus computing equipment. Remote work resulted in a significant number of devices powered off in preparation for long-term period of non-use.



B. Mobile Fuel Combustion (Standard and Non-Standard Fleet)

In 2020, fleet vehicles accounted for 49 tCO₂e, or two per cent of the campus' total emissions. This is 15 tCO₂e lower than 2019. The retirement of two research fleet vehicles, as well as an overall reduction in fleet vehicle use due to reduced campus operations in 2020, contributed to this reduction.

ACTIONS:

- Two faculty research vehicles were removed from the campus' fleet inventory.
- Continued to implement measures to reduce reliance on fleet vehicles and divert the number of trips taken by encouraging fleet carpooling, walking or cycling, as well as consolidating off-campus trips.
- Continued stewardship of sustainable, mobile-fuel combustion through adherence to sustainable fleet procedures, replacement of retired fleet vehicles with electric and energy-efficient models, and ongoing training and education to support sustainable fleet use.
- While video conferencing software was available to the campus pre-pandemic, additional web-conferencing options were introduced in the last year to support working and learning from home. These options included a UBC Zoom license and the introduction of Microsoft Teams.
- Future review of work/learn from home options are currently being reviewed as a potential measure to support the reduction of campus-level emissions produced from commuting, which is a target currently under review as part of the development of the **Climate Action Plan 2030** (CAP2030).

C. Supplies (Paper)

Remote working and learning in 2020 resulted in a significant reduction in paper purchases and use. Emissions from paper accounted for 10 tCO₂e, or 0.5 per cent of total in-scope campus emissions in 2020, an 81 per cent reduction from 2019.

ACTIONS:

- Continued to offer Sugar Sheet™, a 100 per cent tree-free product derived from sugarcane processing bi-product, as an alternative to traditional paper through the campus' preferred supplier.
- Continued to promote the purchase of 30 per cent or greater post-consumer recycled content paper.
- Continued 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.

- Ongoing use of the Find-Me printing option through the PaperCut™ print-tracking software on all campus printers for students, staff and faculty. The software provides a platform that delivers reports to clients on printing volumes, generating awareness of printing consumption, and promoting 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 2020, 232,000 pages were submitted to be printed, but not released within the four-hour time period, thereby, reducing GHG emissions by 7,901 kg and saving 2.18 trees.
 - There was also a significant reduction in page impressions and vastly reduced on-campus staff and student numbers in 2020 due to the pandemic. Consequently, comparison to 2019 print volumes are unavailable.
- 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 to 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 three per cent of total campus emissions, or 68 tCO₂e. This is a five per cent increase in emissions over 2019, largely due to equipment repair. Despite this increase, regular maintenance and replacement of older and inefficient refrigerant equipment has kept campus fugitive emissions low over the past four years.

ACTIONS:

- Individual packaged terminal air-conditioner (Ptac) units were replaced by a centralized Variable Refrigerant Flow (VRF) system in the Monashee Residence building. The VRF system provides a more efficient heating and cooling system and decarbonizes the buildings main heat source by using a heat pump rather than gas-fired equipment.
- Conducted preventative maintenance and upgrades to HVAC system and associated appliances located in academic and residence buildings including the Gymnasium, University Centre and Purcell Residence.
- The completed Skeena Residence's design includes the use of centralized chillers for climate control instead of individual Ptac units, reducing the reliance on traditional fossil fuels and refrigerants.

PLANS TO CONTINUE REDUCING EMISSIONS IN 2021 AND BEYOND

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

A. Buildings

ACADEMIC AND ADMINISTRATION BUILDINGS

Climate Leadership Planning and Energy Management

The Okanagan campus will complete the development of the **Climate Action Plan 2030 (CAP2030)** in 2021. A number of quick start action items identified through the CAP2030 planning process have been initiated in 2021. These projects support the reduction of campus operational energy and emissions in support of the CAP2030's emerging longer-term targets.

The development of **project-specific performance targets** for new buildings based on the Okanagan climate and building archetype is underway. This project will establish Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and Greenhouse Gas Intensity (GHGI) targets for each archetype, as well as ECM bundles, costing and financial analysis.

Additionally, the development of a **LEED® V4.1 implementation scorecard** and relevant guidance specific to the Okanagan campus will be completed in 2021. This project will provide direction for LEED® implementation in new campus buildings to ensure Okanagan's climate, energy and environmental characteristics are reflected.

The campus will continue to bring sustainable action, awareness and education to the UBC Okanagan community via virtual and, where possible, on-site behavioral change and engagement programs. Initiatives will be designed to impact energy and carbon reduction and support the proposed scope 1, 2 and 3 targets currently under development in the CAP2030.

The campus will also continue to implement subsequent phases of the **Low Carbon Energy Strategy**, which identifies a path to decarbonization of the central plant, recommends projects that will reduce energy demand, connects existing buildings to central energy supply district energy system, and supports the advancement of the campus' long-term goals and emerging CAP2030 targets.

The implementation of projects approved from the new 10-year **Strategic Energy Management Plan (SEMP)** that were delayed due to the global pandemic will commence in the coming year. Project bundles selected include: ventilation demand-reduction, recommissioning, and energy conservation projects to be completed in the Science, Fipke and Arts & Sciences buildings. The SEMP implementation supports the advancement of the campus' long-term goals and CAP2030's proposed energy reduction targets.

The campus will enter into the second year of a three-year partnership with the campus' 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, informing future energy planning projects.

New Building Projects

The **Nechako Residence and Commons Block**, currently under construction, is on schedule to achieve a mid-2021 completion. The facility is targeting LEED® Gold Certification and will be connected to the campus' district energy system which provides a lower carbon energy supply.



The campus will continue with the design phase of an **Interdisciplinary Collaboration and Innovation (ICI)** building in 2021. Targeting a minimum LEED® Gold certification, this academic facility will be designed to foster interdisciplinary knowledge and support collaborative, team based learning and innovative approaches to teaching.

Additional 2021 and future building projects, include:

- Completion of the Innovation Precinct 1 renovation to provide interdisciplinary research space to faculty and students in early 2021;
- Future renovation of the University House;
- Planning for the development of the downtown Kelowna UBC Okanagan site; and,
- Planning for the future development of an outdoor gathering space, an athletics field house, and a second childcare expansion.

Building Recommissioning

Ongoing building upgrade projects will include the recommissioning of HVAC Systems with a focus on cold weather operation. Ongoing control sequencing upgrades and additional measures will be undertaken to avoid an increase of natural gas consumption by building management systems during colder than expected weather.

Implementation of recommissioning study recommendations in the following facilities will support energy and emission reductions in the coming year:



- Deployment of measures from the Arts Building study to address deficiencies in the operation of the building that are wasting energy, increasing equipment wear and tear or decreasing occupant comfort are anticipated to save 58,900 kWh and 130 GJ of energy and reduce carbon emissions by 7 tCO₂e annually.
- The Engineering, Management and Education building's projects are projected to conserve 494,665 kWh and 233 GJ of energy, reducing carbon emissions by 11.6 tCO₂e per year.
- The Reichwald Health Sciences Centre's projects are projected to result in annual savings of 4,717 kWh and 1,958 GJ in energy and a reduction of carbon emissions by 97 tCO₂e.
- The Upper Campus Health building measures are projected to save 8,794 kWh and 176 GJ in energy, reducing carbon emissions by 8.8 tCO₂e annually.

STUDENT RESIDENT BUILDINGS

Key departments will continue to implement the LED light switch-out program on failure-based need.

DEPARTMENTAL ACTIONS

In addition, key departments will continue to implement projects that support energy reduction at the campus level, including:

- Replacement of desktop computers with laptops and more efficient devices as part of UBC Okanagan's IT Computer Replacement Program;
- Phasing out desktop towers with docking stations to reduce power consumption; and,
- Applying a phase-in approach to conduct ongoing program upgrades to replace step-down transformer uninterruptible power supply (UPS) units with power sharing, splice devices.

B. Mobile Fleet Combustion (Standard and Non-Standard Fleet)

- A new 2021 Ford 150 Hybrid truck will be purchased for operational fleet use in the coming year.
- Continue to implement measures to reduce reliance on fleet vehicles and divert the number of trips taken by encouraging fleet carpooling, walking or cycling, as well as consolidating off-campus trips.
- Continue stewardship of sustainable mobile-fuel combustion through adherence to internal sustainable fleet procedures, replacement of retired fleet vehicles with electric and energy efficient models, as well as ongoing training and education to support sustainable fleet use.

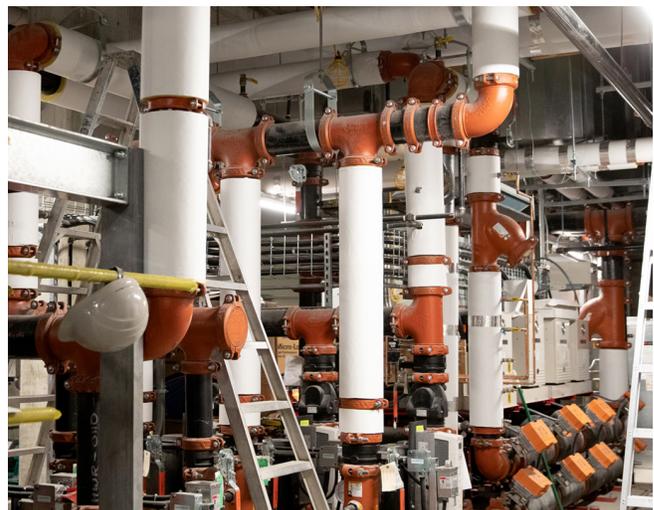
C. Supplies (Paper)

- Implement awareness messaging prompts through the PaperCut™ print-tracking software to increase user awareness about reducing paper consumption behaviors 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 (fax to email) to reduce paper consumption.
- Contemplate the introduction of 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) in an effort to further encourage use of fleet printing and efficiencies gained through consolidation of devices and increased access to printer capabilities (e.g., colour printing, etc.).

D. Fugitive Emissions

- The campus will be centralizing additional cooling loads, reducing the amount of equipment requiring refrigerant on campus.
- A review will be undertaken to implement the use of district scale CO₂ heat pumps to replace HVAC equipment which relies on traditional fossil fuels and refrigerants to heat and cool campus buildings.
- Continue to replace inefficient and older equipment and conduct preventative maintenance and upgrades to HVAC systems and associated appliances.
- The final design of the Nechako Residence and Commons Block will include the use of centralized chillers for climate control instead of individual Ptac units within individual residences, reducing the facility's reliance on traditional fossil fuel and refrigerants.



CAMPUS EMISSION TRENDS

COMPARING EMISSIONS TO GROWTH

Figure 1 shows trends in campus growth and absolute campus and building emissions from 2007 to 2020. Despite the increase in both floor area and student enrollment by over 100 per cent since 2007, absolute GHG emissions have remained fairly stable. Similarly, GHG emissions from buildings alone have dropped by seven per cent since 2007. Contributing factors consist of continued implementation of efficiency measures to improve building energy performance, including connection to low carbon district energy systems. Programs implemented over the previous year, which include HVAC recommissioning projects to

improve building operational system responses to cold weather, are outlined in the 'Actions Taken in 2020 to Minimize Emissions' section of this report.

Another way to demonstrate campus GHG emissions performance that account 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 2020. Despite the significant floor area growth of 116 per cent, GHG emissions per building gross square meter (m²) dropped from 0.030 in 2007 to 0.014 in 2020, a reduction of 54 per cent.

FIGURE 1 ABSOLUTE GHG EMISSIONS RELATIVE TO GROWTH: 2007-2020

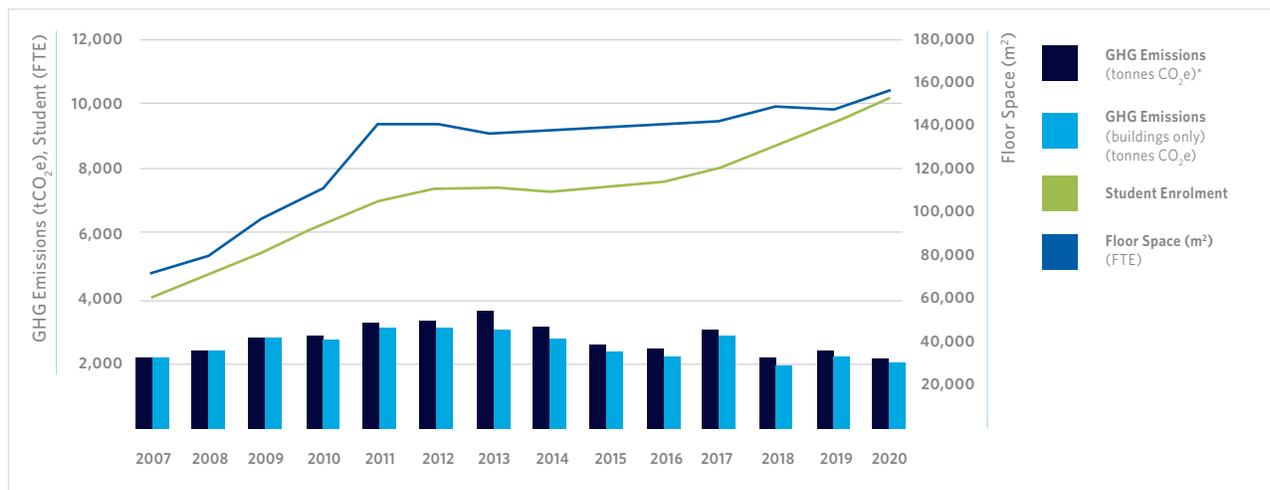
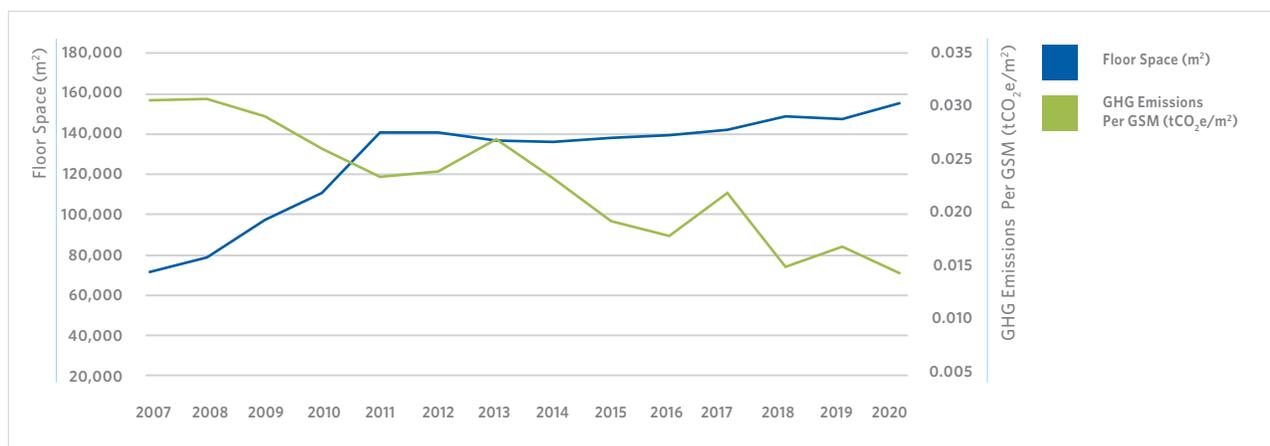
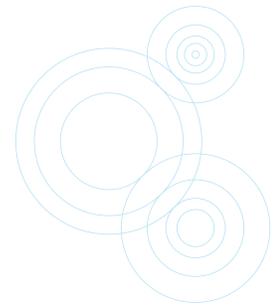


FIGURE 2 GHG EMISSIONS INTENSITY RELATIVE TO BUILDING GSM: 2007-2020





ABOVE AND BEYOND

UBC'S ENDURING CLIMATE LEADERSHIP IN 2020

Climate Emergency Declaration and Action

UBC's Climate Emergency Declaration provides a clear mandate for UBC to accelerate action towards emission reduction, and to go beyond operations to influence extended emissions from areas, such as commuting and air travel. These are areas in which the campus can have an impact as individuals and as an institution by actively participating in shifting behaviors and choices, and to advocate for innovation and leadership on climate action.

Despite challenges in 2020, the campus continued to deliver on a number of strategic priorities, including our response to the Climate Emergency. While the CCAR highlights UBCO's actions and plans to reduce operational emissions, the campus also moved ahead with the development of its first **Climate Action Plan (CAP2030)**. An important component of this process is the development of the **UBCO Transportation Plan**, which provides direction to shift towards more sustainable modes of travel to support ongoing campus growth and reduce commuting emissions.

Virtual Community Engagement

In 2020, the pandemic response resulted in a number of changes to behaviors with environmental impacts. The reduction in commuting, travel, and building occupancy presented the campus with the opportunity to adapt its communications and engagement programs, and to encourage the potential for enduring change going forward. UBCO's behavior change

program, **The Power of You**, shifted from on-campus to on-line, focusing on sustainable modes of transportation to support active transportation and commuting in future.

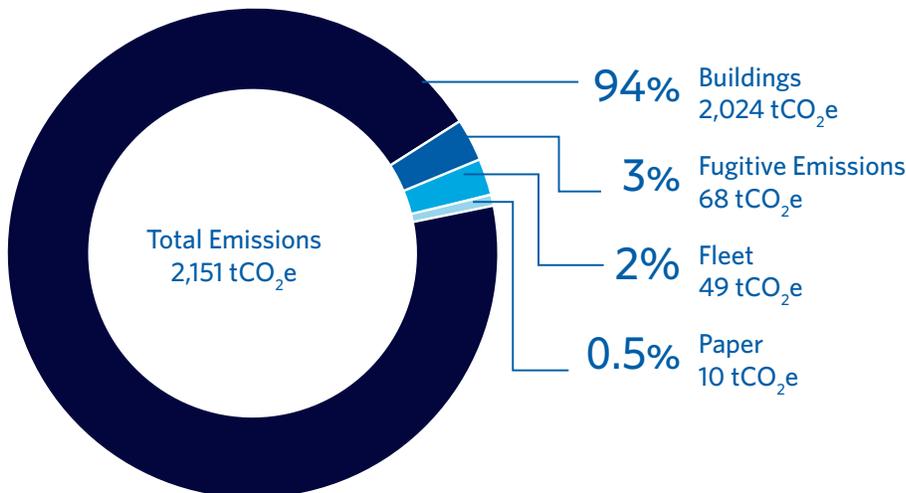
Engagement activities over the past year, included wrap-up of a **Green Labs Shut the Sash Challenge** and Awards Celebration engaging over 40 undergraduate students. **Virtual cycling webinars** were offered to promote road sense awareness and education to support active transportation and commuting, the participation of staff, faculty and students was welcomed.

Campus-wide actions taken by key operational departments in 2020 (pre-pandemic) in response to the established **Power of You Lights Out and Power Down** campaigns involved a staff-led audit across academic and administration buildings. As a direct result of the nightly audits, over 3,750 lights and 17 projectors/screens were turned off or powered down, and 118 windows were closed at night. Since the initiation of these voluntary audits in 2015, dedicated staff members have turned off or powered down 30,683 lights and 502 projectors/screens and closed 3,053 windows, contributing to campus energy conservation efforts.

In the coming year, subject to resources, the campus will realign its existing behavior change program with the emerging CAP2030. A new climate change awareness and education strategy is envisioned to support achievement of the emerging CAP2030 targets focused on reducing Scope 1, 2 and 3 emissions.

EMISSIONS PROFILE 2020

UBC OKANAGAN GREENHOUSE GAS EMISSIONS BY SOURCE FOR THE 2020 CALENDAR YEAR (tCO₂e*)



(Generated April 8, 2021) Total offsets required: 2,146. Total offset investment: \$53,650.

Emissions which do not require offsets: 5.**

* Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit of measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.

** Under the Carbon Neutral Government Regulation of the Greenhouse Gas Reduction Targets Act, all emissions from the sources listed above must be reported. As outlined in the regulation, some emissions do not require offsets.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC OKANAGAN CAMPUS

A. STATIONARY SOURCES (E.G. BUILDINGS, POWER GENERATORS): FUEL COMBUSTION, ELECTRICITY USE, FUGITIVE EMISSIONS.

Actions taken by your organization in 2020 to support emissions reductions from buildings.

a) Do you have a strategy to reduce emissions from stationary sources? (Y/N) Yes

b) Whether you have a strategy or not, briefly describe your organization's plans to continue reducing emissions from stationary sources:

I. Over the medium-term term (1-5 years)

Refer to the *Plans to Continue Reducing Emissions in 2021 and Beyond* section of the 2020 CCAR.

II. Over the long term (6-10 years)

Refer to the *Plans to Continue Reducing Emissions in 2021 and Beyond* section of the 2020 CCAR.

c) Please describe your strategy's goals (if any) related to building retrofits.

As part of the ongoing SEMP, recommissioning studies were conducted on the following three buildings in the past year: Engineering, Management and Education; Reichwald Health Sciences Centre; and Upper Campus Health, with a focus improving efficiencies and reducing energy consumption and associated emissions. The combined results of completed projects identified in the studies are anticipated to conserve up to 567,076 kWh and 2,497 GJ of energy, reducing carbon emission by approximately 124 tCO₂e annually.

d) What percentage on average of your building portfolio is retrofitted each year?

Minor retrofits (e.g., low cost, easy to implement measures including caulking, lighting, adding roof insulation, etc.) (%)	10%
---	-----

Major retrofits (e.g., replacing windows and doors, equipment replacement such as boilers, etc.) (%)	5%
--	----

Deep retrofits (e.g., replacing roof, replacing the heating, ventilation and air-conditioning system with a renewable technology like a ground-source heat pump, etc.) (%)	2%
--	----

e) Do you keep records of refrigerant gases category and refilling volumes? (Y/N) Yes

I. If yes, have you quantified and reported the associated emissions? Yes

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC OKANAGAN CAMPUS

f) What, if any, mitigation approaches have been considered? Please describe.

Refer to the *Actions Taken in 2020 to Minimize Emissions* and *Plans to Continue Reducing Emissions in 2021 and Beyond* sections of the 2020 CCAR.

g) How many newly constructed buildings received at least LEED Gold certification in 2020? 0

h) How many newly constructed buildings did not receive LEED Gold certification? 2

i. Please explain why LEED Gold certification was not obtained for those new buildings.

The Commons building was completed in 2019 and is currently undergoing *LEED*[®] certification. Skeena Residence was completed in August 2020 and will not be applying for *LEED*[®] certification, instead it is undergoing the process to achieve Passive House Classic certification, equivalent to Step 4 of the BC Energy Step Code.

i) Other actions? Please describe briefly.

Continued construction of Nechako Residence and Commons Block, a 220-unit and mixed-use facility targeted to achieve *LEED*[®] Gold certification upon completion. The campus commenced with the design phase of the Interdisciplinary Collaboration and Innovation (ICI) facility that will be targeting *LEED*[®] Gold certification upon completion.

B. MOBILE SOURCES (E.G. VEHICLES, OFF-ROAD/PORTABLE EQUIPMENT): FUEL COMBUSTION.

Actions taken by your organization in 2020 to support emissions reductions from mobile sources.

a) Do you have a strategy to reduce emissions from mobile sources? (Y/N) Yes

b) Whether you have a strategy or not, briefly describe your organization's plans to continue reducing emissions from mobile sources:

i. Over the medium-term term (1-5 years)

Refer to the *Plans to Continue Reducing Emissions in 2021 and Beyond* section of the 2020 CCAR.

The vehicle replacement process at the Okanagan campus process identifies that fossil fuel powered vehicles will be replaced with an EV or Hybrid at end-of-life, where available.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC OKANAGAN CAMPUS

c) How many electric vehicle charging stations (Level 2 and 3) does your organization have as of December 31, 2020?

level 2	12
level 3	0

d) Please briefly describe any other related actions (e.g. charging station feasibility studies, electrical panel upgrades, etc.)

None completed in 2020. The twelve existing Level 2 EV charging stations are available for use by the Okanagan campus constituents and extended community. The campus will be installing a thirteenth Level 2 charging station in Lot F, adjacent to the new Nechako Residence and Commons Block in 2021.

e) Please indicate the number of the vehicles in the following vehicle classes that are in your current fleet by fuel type and vehicle category:

	Battery Electric	Plug-In Electric Hybrid	Hybrid Electric Vehicle	Fuel Cell Electric Vehicle	Natural Gas or Propane	Gas	Diesel
Light duty vehicles (LDVs)	0	0	2	0	0	1	0
Light duty trucks (LDTs)	0	0	1	0	0	13	0
Heavy duty vehicles (HDVs)	0	0	0	0	0	3	3

f) If, in the above table, you indicated that your organization's fleet includes vehicles that use Gas, do any of these vehicles use E100? (Y/N) **No**

g) If, in the above table, you indicated that your organization's fleet includes vehicles that use Diesel, do any of these vehicles use B100? (Y/N) **No**

h) If your organization purchased gas or diesel vehicles in 2020, can you briefly explain why vehicles from the other categories were not chosen?

The one operational vehicle purchased was a hybrid light-duty SUV, no full gas or diesel reliant vehicles were purchased in 2020.

UBC ACTIONS SURVEY

CLIMATE CHANGE ACCOUNTABILITY REPORT SURVEY - PART 1 / UBC OKANAGAN CAMPUS

C. PROCUREMENT SOURCES (E.G. PAPER SUPPLIES)

Actions taken by your organization in 2020 to support emissions reductions from paper supplies.

a) Briefly describe your organization's plans to continue reducing emissions from paper use:

I. Over the medium term (1-5 years)

Refer to the *Plans to Continue Reducing Emissions in 2021 and Beyond* section of the 2020 CCAR.

II. Over the long term (6-10 years)

Refer to the *Plans to Continue Reducing Emissions in 2021 and Beyond* section of the 2020 CCAR.

b) Do you have an awareness campaign focused on reducing office paper use (Y/N) Yes

c) Has your organization purchased alternate source paper (bamboo, hemp, wheat, etc.) Yes

d) Are there any other actions your organization took in 2020? Please specify:

Refer to the *Actions Taken in 2020 to Minimize Emissions* section of the 2020 CCAR.

