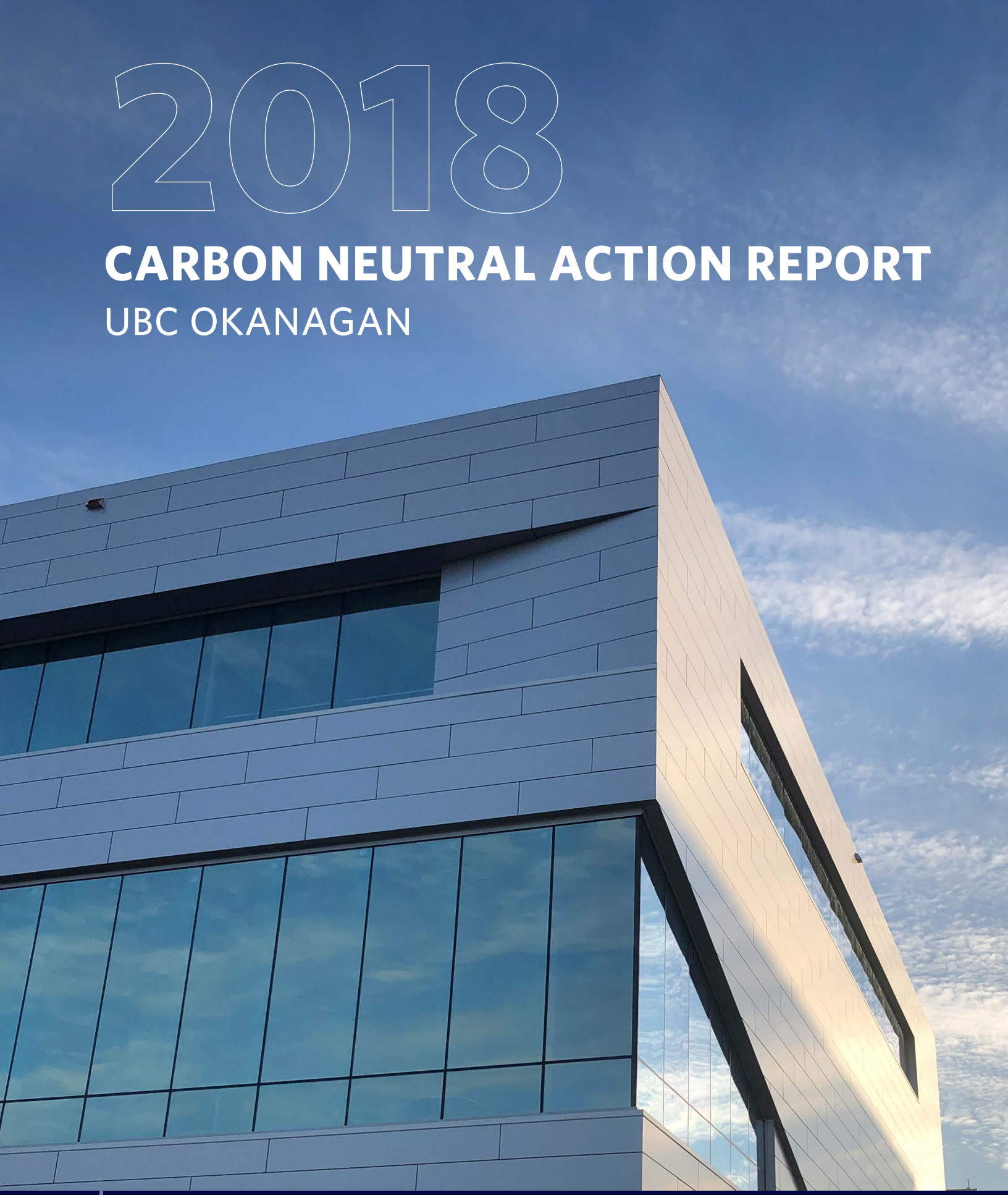
2018

CARBON NEUTRAL ACTION REPORT

UBC OKANAGAN



THE UNIVERSITY OF BRITISH COLUMBIA

Okanagan Campus

ENVISIONING A SUSTAINABLE FUTURE

UBC is a recognized leader in sustainability. Established in 2010, the UBC Okanagan Sustainability Office, Campus Planning and Development, is responsible for the advancement of sustainability on campus to support a vibrant, regenerative community. We aspire to integrate sustainability, build capacity and foster leadership across the campus to broaden the impact of sustainability.

The policies, plans and initiatives we deliver and support help to guide campus decisions and actions to achieve UBC's sustainability goals and the requirements of the B.C. Carbon Neutral Government Program. Our annual reports and external benchmarks provide an opportunity to share success, measure progress, and highlight our ongoing commitments.

SECTION CONTENTS

About this Report:

The UBC Okanagan Sustainability Office, Campus Planning and Development, is responsible to prepare and submit our campus' annual corporate emissions and Carbon Neutral Action Report (CNAR), documenting actions and future plans to reduce campus GHG emissions. The 2018 CNAR provides an overview of the actions taken by the campus to reduce carbon emissions in 2018 and future planned actions to support the Clean BC Strategy released in December 2018, which sets out new targets for the province to achieve a 40% reduction in GHG emissions by 2030, a 60% reduction by 2040 and an 80% reduction by 2050. This report is included as part of the UBC system-wide CNAR report submission to the Province of BC.

EXECUTIVE SUMMARY AND DECLARATION

In line with UBC's commitment to climate leadership, UBC Okanagan continues to focus its climate action efforts on improving the performance of new and existing buildings, with an emphasis on energy efficiency and connection to low carbon district energy systems. Overall, absolute campus carbon emissions dropped by 29 per cent from 2017 to 2018. Although impacted by a warmer than usual winter, contributing factors to the reduction include the implementation of policies and actions focused on buildings, the largest source of in-scope emissions. For example, a significant district energy optimization project was completed in multiple buildings resulting in greater compatibility between systems; and building controls recommissioning was completed for a more efficient cold weather operational response.

Additionally, in 2018, the campus completed the Commons library expansion project, developed as a LEED Gold facility that is designed to rely solely on the campus' low carbon district energy system for heating. The campus also completed the design of UBC's first Passivhaus Building, a 220 unit residence, equivalent to Step 4 of the BC Energy Step Code. Plans have also been completed for Nechako, a mixed-use LEED Gold facility, featuring a 500 seat dining hall and 220 residence units. Informed by UBC Okanagan's recently updated Design Guidelines, it is anticipated that these projects will help build local capacity in leading energy efficiency and low carbon design, specialized trades and the application of innovative products and materials.

In the coming year, the campus will continue to implement the Whole Systems Infrastructure Plan to achieve co-benefits between energy, carbon, water, landscape, ecology, biodiversity and engagement projects. Key climate and energy focused initiatives include the development of a Net Zero Carbon District Energy Strategy to guide future low carbon district energy system development and investments. UBC Okanagan is also taking a climate leadership role by developing a Climate Action Plan (CAP). This plan will focus on key mitigation measures and climate adaptation and resilience opportunities, in recognition that climate change is and will continue to occur. It is anticipated that the alignment and completion of these projects will equip the campus with a forward looking, systematic framework for environmentally responsible growth and advance the campus toward its goal to "achieve a 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 Carbon Neutral Action Report for the period January 1, 2018 to December 31, 2018 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2018 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2019 and beyond.

By June 30, 2019, the University of British Columbia's Okanagan campus' final Carbon Neutral Action Report will be posted to our website at sustain.ok.ubc.ca/reports/cnar.

EMISSIONS AND OFFSET SUMMARY

EMISSIONS AND OFFSET SUMMARY

UBC Okanagan campus GHG Emissions and Offset for 2018 (tCO_2e)	
GHG Emissions created in Calendar Year 2018:	
Total Emissions (tCO_2e)	2,156
Total $BioCO_2$	3
Total Offsets (tCO_2e)	2,153
Adjustments to GHG Emissions Reported in Prior Years:	
Total Emissions (tCO_2e)	0
Total Offsets (tCO_2e)	0
Grand Total Offsets for the 2018 Reporting Year:	
Grand Total Offsets (tCO_2e)	2,153
Total Offset Investment	$53,825

RETIREMENT OF OFFSETS

In accordance with the requirements of the Climate Change Accountability Act (CCAA) and Carbon Neutral Government Regulation, UBC Okanagan (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2018 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy 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.

2018 EMISSIONS OVERVIEW

GREENHOUSE GAS EMISSIONS

The following greenhouse gas (GHG) emissions have been qualified using the BC Provincial Government's SMARTTool Reporting Framework.

Table 1: GHG Comparison by Source between 2017-2018

Source	2017 Emissions (tonnes CO_2e)		2018 Emissions (tonnes CO_2e)		Change from 2017 to 2018
Buildings	**2,842**	(93%)	**1,957**	(91%)	**-31%**
Fleet	**49**	(2%)	**65**	(3%)	**31%**
Paper	**64**	(2%)	**56**	(3%)	**-13%**
Fugitive	**99**	(3%)	**78**	(4%)	**-22%**
Total Emissions	**3,055**	(100%)	**2,156**	(100%)	**-29%**
Total Offsettable emissions	**3,053**	(100%)	**2,153**	(100%)	**-29%**

Table 1 provides a breakdown of campus GHG emissions by source. Of note, there was a 29 per cent decrease in total GHG emissions from 2017 to 2018 which will reduce UBC Okanagan's carbon offset liability by $22,500 (excl. tax). This reduction is a result of an 885 tCO_2e reduction in building emissions. Although impacted by a warmer than usual winter, the implementation of policies and actions that focused on buildings supported this achievement. Projects of note include the Low District Energy Systems (LDES) optimization in multiple buildings and recommissioning of building HVAC systems for a more efficient cold weather operation response. Specific measures implemented to reduce emissions over the previous year are detailed in the 'Actions Taken to Reduce Greenhouse Gas Emissions' section of this report.

CARBON NEUTRAL OFFSETS IN 2018

In accordance with the campus SMARTTool[1] reporting and as required by the Climate Change Accountability Act (CCAA), offsets required to achieve carbon neutrality in 2018 total 2,153 tCO_2e. As part of the Okanagan campus' 2018 GHG emissions profile, 3 tCO_2e do not require offsets.

[1] *Protocols established in 2016/2017 BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions.*

EMISSIONS REDUCTION ACTIVITIES

ACTIONS TAKEN TO REDUCE GREENHOUSE GAS EMISSIONS IN 2018

The following provides an overview of actions and plans reported in the CNAR Actions Form, Section 1.

A. Stationary Fuel Combustion Electricity (Buildings)

Buildings account for the largest source (91%) of in-scope GHG emissions on campus. Building emissions were reduced by 31 per cent or 885 tCO_2e from 2017. This is largely attributable to the continued implementation of energy reduction measures - including demand-side energy reduction, routine capital investments, the maintenance and expansion of the district energy system, and the recommissioning of building HVAC systems to respond efficiently during cold weather operation. All new capital projects are designed for optimal energy performance and connection to low carbon district energy systems.

ACTIONS:

Academic and Administration Buildings Portfolio

ENERGY CONSERVATION AND NEW BUILDINGS

In 2018, the Campus began implementing a **Five-Year Strategic Energy Management Plan** (SEMP). The SEMP provides a suite of energy conservation measures targeted to reduce energy consumption and GHG emissions.

Final commissioning of the campus' newest development, **the Commons library expansion**, was initiated. Targeted to attain LEED® Gold certification, the facility provides students with additional study, learning and collaborative space while using no natural gas for environmental comfort. Its HVAC system was integrated into the campus' low temperature district energy system (LDES), which is used to heat and cool the building, reducing the campus' reliance on traditional fuel sources.

The campus also completed the designs for two new major capital projects. Targeted to achieve LEED® Gold certification, the **Nechako Building** is a mixed-use facility that will provide 220 residence units, amenities and a 500-seat cafeteria to campus residents. **The Skeena Residence**, UBC's first Passivhaus Building is designed as a 220 unit student residence targeted to achieve Passivhaus Classic Certification, equivalent to Step 4 of the BC Energy Step Code.

EXISTING BUILDING TUNE UPS

District Energy System Optimization Projects

A significant **district energy system** optimization project was completed in the Fipke, University Centre, and Arts and Sciences Centre buildings in 2018. This resulted in a 44 per cent reduction in energy consumption and a 186 tCO_2e reduction in GHG emissions. Additional district energy projects completed in the past year include:

- The **Cooling Plant Expansion** – Final commissioning was completed on the additional cooling tower for the LDES system to increase its air-cooled capacity. This project was initiated to respond to existing cooling capacity deficiencies and to provide additional cooling capacity for future campus growth.
- The **Science Building Third Floor Heating Upgrade** – The Science's 3rd floor heating systems were connected to the campus LDES, removing it from the central heating plant. The project is estimated to save $6,000 per year in energy costs and reduce emissions by a 45 tCO_2e annually.

Building Upgrades

A **ventilation upgrade was completed in the Science Building** in 2018 that is estimated to reduce energy consumption by 2,600 GJ of natural gas and 415,000 kWh of electricity, saving the campus $52,000 in energy costs and 131 tCO_2e annually.

Heat Recovery Projects

The following completed **heat recovery projects** are estimated to lower natural gas consumption by 2,980 GJ and emissions by 149 tCO_2e annually:

- Connection of Science Building's Strobic fans to a heat recovery system;
- Completion of the Arts & Sciences Centre exhaust and Sciences' exhaust air heat recovery projects; and,
- Initiation of the Library data centre heat recovery project.

Operational Efficiency Projects

The campus continued to undertake efficiency maintenance projects on multiple buildings. **Enhanced operational efficiencies** have improved building occupant comfort and resulted in more efficient use of HVAC systems and heatpumps. General maintenance to remove particulate buildup from the district energy/science building heat exchanger has improved flow the building heatpumps and increased overall system capacity.

Through the **Electric Demand Management Project**, energy reduction measures continued to be investigated and strategies were reviewed to reduce campus electrical demand to respond to regional electric grid peaks for shorter periods of time.

Operational teams continued to complete **lighting upgrades** to existing interior and exterior campus lighting. Projects completed in 2018 include the replacement of fluorescent tubes with LED lights in the Arts building and in the outdoor street lighting.

DEPARTMENT ACTIONS

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

- The ongoing **replacement of desktop computers** with laptops and more efficient devices as part of IT, Media and Classroom Services Computer Replacement Program;
- **Upgrading devices from spinning to hard drives**, reducing waste production, power consumption and replacement costs to the University; and,
- Using a phase-in approach to conduct ongoing **program upgrades** to remove step down transformers and install power sharing with splice.

Student Housing and Hospitality Services Residences Buildings Portfolio

- A hot water tank replacement project was completed in the student residence, Monashee; and,
- Lighting upgrades were completed in various student residences on a failure-based requirement.

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

In 2018, fleet vehicles accounted for 65 tCO_2e, or 3 per cent of the campus' total emissions, an increase of 15 tCO_2e from 2017. The increase is attributed to the purchase of six new fleet vehicles and the increased use of faculty research vehicles.

ACTIONS:

- 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.
- Completed the **campus-wide launch of Skype™ for Business**, an alternative web-conferencing software, supporting the reduction of campus-level emissions produced from travel.

C. Supplies (Paper)

Emissions from paper accounted for 56 tCO_2e, or 3 per cent of total in-scope campus emissions in 2018, a 13 per cent reduction as compared to the previous year. The reduction is largely attributed to the introduction of the PaperCut™ Program's Tap-To-Release feature, which reduces over-printing.

ACTIONS:

- **Reduced printing equipment fleet** and replaced older inventory with new, more efficient machines, for an overall 33 per cent reduction in fleet.
- Initiated the **alternative options to printing** programs through the PaperCut™ print-tracking software. The software provides a platform that delivers reports to clients on printing volumes, including the environmental impacts from printing, such as the total $kgCO_2e$ emitted, trees used, and printing costs (see image in ACTIONS TO SUPPORT CAMPUS SUSTAINABILITY PERFORMANCE section).
- 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.

D. Fugitive Emissions

HFC emissions accounted for 4 per cent of total campus emissions, or 78 tCO_2e. This is 22 per cent fewer emissions than 2017. Regular maintenance and replacement of older and inefficient refrigerant equipment has kept campus fugitive emissions low in the past three years.

ACTIONS:

- **Replaced inefficient and older equipment** in buildings across campus, including the water source heat pump in Fipke.
- **Conducted preventative maintenance and upgrades** to HVAC system and associated appliances in the Library, University Centre, Arts, and Engineering/Management/Education buildings.

PLANS TO CONTINUE REDUCING GREENHOUSE GAS EMISSIONS IN FUTURE YEARS

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

A. Stationary Fuel Combustion Electricity (Buildings)

Academic and Administration Building Portfolio

CLIMATE LEADERSHIP

The campus will develop a **Net Zero Carbon District Energy Strategy** (NZStrategy) that will support campus growth and the achievement of a net positive performance in operational energy and carbon by 2050. In parallel, the campus will develop a **Climate Action Plan** (CAP), focused on climate change mitigation and adaptation strategies to minimize impacts and ensure resiliency against future climate events.

FUTURE BUILDINGS

All future buildings will be designed in accordance with the UBC Okanagan Design Guidelines that focus on leading green building standards. Examples include:

- The recently completed **Commons library expansion project** is currently undergoing final commissioning. Targeting LEED® Gold Certification, the Commons is estimated to consume less than half the energy compared to a minimally code compliant reference building.
- Construction of two new, sustainable housing developments:
  - **Nechako**, a mixed-use facility targeted to achieve LEED® Gold certification, will feature a 500 seat dining hall and 220 units.
  - **Skeena Residence**, a 220 unit residence, will become UBC's first Passivehaus Building, equivalent to Step 4 of the BC Energy Step Code.
- Continue process to **construct a modular building with an envelope that meets NECB 2011 standards**. This building will not use natural gas, instead electrical heat will be provided by air-source heatpumps. Demand controlled ventilation combined with heat recovery ventilators are planned to reduce electricity consumption.

EXISTING BUILDING TUNING UPS

District Energy System Optimization Projects

In the coming year projects implemented in the Reichwald Health Sciences and Engineering/Management/Education buildings will maximize the amount of heat extracted from the limited groundwater flow rate for use by the district energy system. The campus will also complete the **connection of the district energy system pipeline** between the Central Heating Plant and the Geothermal Building. Projected to save over 500 GJ of natural gas and 25 tCO_2e of emissions annually, the connection will enable the medium temperature district energy system (MDES) to provide heat to the low temperature district energy system (LDES). This mode of operation provides two main benefits:

- Boiler B-2 in the geothermal plant is a low-efficiency boiler and is in poor condition. A LDES/MDES connection would replace it.
- Boilers in the CHP can be made to operate more efficiently with a source of colder return water which can be provided using the MDES/LDES heat exchanger.

Operational Efficiency Projects

Key operational departments will continue to implement building systems' efficiency projects in the coming years, including **HVAC system efficiency maintenance**; investigation of strategies to reduce electrical demand through the **Electric Demand Management project;** and, completion of the **Library data center heat recovery project**, which is expected to reduce natural gas consumption by 480 GJ and emissions by 24 tCO_2e annually.

Building Recommissioning

Ongoing building upgrade projects will include the recommissioning of HVAC Systems with a focus on Carbon Dioxide Sensor Calibration and Cold Weather Operation:

- **Carbon Dioxide Sensor Calibration** – Sensors are used across campus to ensure occupants receive good indoor air quality by increasing ventilation rates on demand and are slated for recalibration or replacement. Recalibration of sensors that have drifted high and are bringing in more outdoor air than necessary will result in substantial energy savings; and,
- **Cold Weather Operation** – Ongoing control sequencing upgrades and additional measures to avoid an increase of natural gas consumption by building management systems during colder than expected weather.

WHOLE SYSTEMS INFRASTRUCTURE PLAN IMPLEMENTATION

Guided by the WSIP (2016), the campus will continue to implement energy and carbon reduction projects in coming years that include:

- Confirm the campus' aspirational **Greenhouse Gas and Energy Reduction targets**; and,
- Continue to implement **re-commissioning efforts** on campus that improve existing building operations.

DEPARTMENT ACTIONS

Key departments will continue to implement projects that support energy reduction at the campus level including:

- Continue to **replace desktop computers** with laptops and more efficient devices as part of IT, Media and Classroom Services Computer Replacement Program;

- **Upgrade devices** from spinning to hard drives, reducing waste production, power consumption and replacement costs to the University; and,
- Conduct ongoing **program upgrades** to remove step down transformers and install power sharing with splice.

Residence Building Portfolio

- **Replace makeup air equipment** in Monashee and Similkameen residences.
- Complete a **full review of automation** in residence buildings.
- Implement the **FortisBC Residential Rental Efficiency Program** to upgrade energy and water fixtures in Purcell.
- Continue to conduct **lighting upgrades** on a failure-based requirement.

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

- 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 Sustainable Fleet Procedures**, replacement of retired fleet vehicles with electric and energy-efficient models, and ongoing training and education to support sustainable fleet use.

C. Supplies (Paper)

- Initiate the **awareness messaging prompts and introduce the Find-Me printing option through the PaperCut™** print-tracking software. The software provides a platform that delivers reports to clients on printing volumes, generating awareness, promotes alternatives to printing and will soon allow users to print from any device on campus.
- Continue to **research alternative paper sources** for inclusion on custom order list as an alternative source to tree-derived paper, i.e. Frog Paper from Ricoh.
- Introduce communication to **increase user awareness around reduced paper consumption behaviours** that will align with implementation of printing charge increase.
- Continue to **promote the purchase of 30 per cent or greater post-consumer recycled content paper.**
- 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.

D. Fugitive Emissions

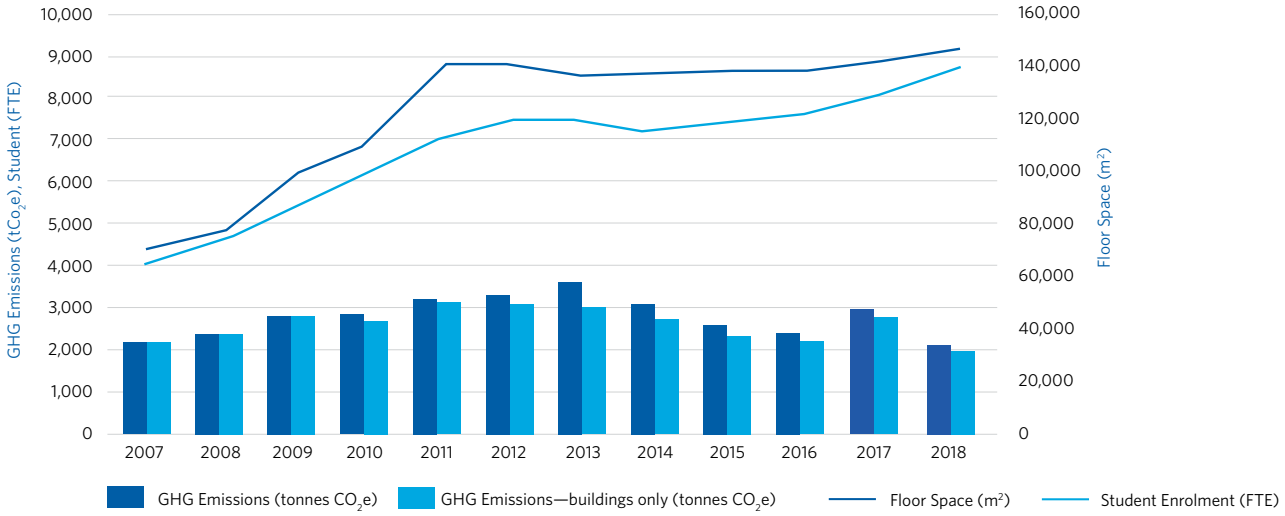
- Continue to **replace inefficient and older equipment**.
- Continue to **conduct preventative maintenance and upgrades to HVAC system and associated appliances**.

CAMPUS EMISSIONS TRENDS

COMPARING EMISSIONS TO GROWTH

Figure 1 shows trends in campus growth and absolute campus and building emissions from 2007 to 2018. Despite the increase of 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 10 per cent since 2007. Contributing factors include continued implementation of efficiency measures to improve building energy performance including connection to low carbon district energy systems. Following a blip in 2017's campus GHG performance, caused by inefficient operational responses to the colder than normal winter by multiple buildings, the campus has again recorded a reduction in emissions by 29 per cent in 2018. 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 to Reduce Greenhouse Gas Emissions In 2018' section of this report.

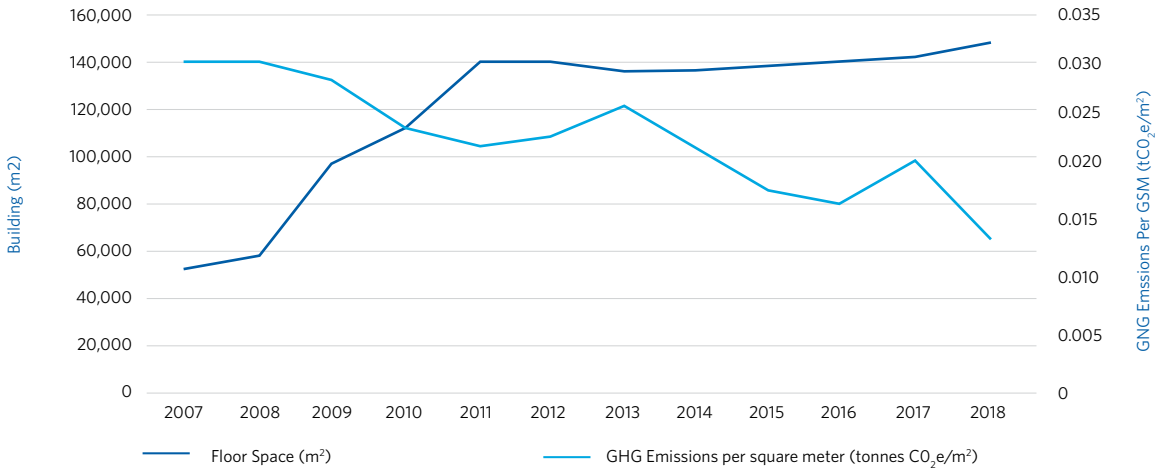
Figure 1 Absolute GHG Emissions Relative to Growth: 2007-2018



**Total GHG Emissions for 2007-2009 reported buildings only emissions; 2010-2018 includes all in-scope emissions.*

Another way to demonstrate campus GHG emissions performance that accounts for changes in growth, is intensity-based. For example, Figure 2 demonstrates the emissions intensity trend relative to campus growth in floor area from 2007 to 2018. Despite the significant floor area growth, GHG emissions per building gross square meter (m2) dropped from 0.030 in 2007 to 0.015 in 2018, a reduction of 52 per cent.

Figure 2 GHG Emissions Intensity Relative to Building GSM: 2007-2018



ABOVE AND BEYOND:

INTEGRATING SUSTAINABILITY IN CAMPUS PLANNING

Whole Systems Approach to Sustainability Planning

UBC Okanagan's Whole Systems Infrastructure Plan (Plan) responds to a call to deepen our approach to sustainability through systems thinking. Implementing the plan addresses interconnected issues related to energy, carbon, water, landscape, ecology, biodiversity and engagement.

Actions implemented in 2018 include:

- Continued implementation of **the Integrated Rainwater Management Plan** (IRMP) to manage rainwater that falls on campus at the source through the application of Low Impact Development techniques with co-benefits to the campus ecology and biodiversity;
- Implementation of the **Strategic Energy Management Plan**, which provides a suite of energy conservation measures targeted to reduce energy consumption and GHG emissions in existing buildings;
- Continued implementation of the **Conservation Awareness and Action Strategy**, targeting energy conservation and carbon reduction behaviours campus-wide;
- Completed the **Commons library expansion**. Developed to achieve LEED® Gold certification, this facility will rely solely on the campus' low carbon district energy system for heating; and,
- Completed the update of **UBCO's Design Guidelines** that integrates sustainability and high performance standards into the design process for all new capital projects. Implementation of the guidelines led the development of the following buildings where it is anticipated that these projects will help build local capacity in leading energy efficiency and low carbon design, specialized trades and the application of innovative products and materials.
  - **Nechako Building that has been designed to achieve LEED® Gold Certification**. This mixed-use facility will provide the student community 220 residence units, a 500-seat cafeteria, and access to quiet study and social amenities space.
  - **Skeena Residence, UBC's first Passivhaus Building**, has been designed as a 220 unit student residence targeted to achieve Passivhaus Classic Certification, equivalent to Step 4 of the BC Energy Step Code.

In the coming year, the campus will continue to focus on its ability to support ongoing energy and emission reduction as well as plan for its future resiliency to climate change through the development of the following:

- The campus' **Net Zero Carbon District Energy Strategy** (NZStrategy) to support campus growth and the achievement of a net positive performance in operational energy and carbon by 2050;
- **UBC Okanagan's energy and carbon reduction targets**; and,
- The UBC Okanagan **Climate Action Plan** (CAP) that will focus on not only key mitigation measures but also, recognizing that climate change is and will continue to occur, climate adaptation and resilience opportunities.

Artist's rendering of the Skeena Residence Building, built to Passivhaus Standard.

WHAT IS PASSIVHAUS?

Passivhaus certification is an internationally recognized high-performance building standard developed in Germany that focuses on the design, construction and operation of energy efficient buildings. Buildings designed and constructed to the Passivhaus standard are characterized by high levels of comfort with low energy consumption – up to 90 percent less space heating and energy consumption than conventional buildings – hence the term "passive" as they need little active heating or cooling to stay comfortable throughout the year. This is achieved by design that minimizes air leakage through the building envelope (e.g. windows, insulation, and heat recovery ventilation), while maintaining indoor air quality and thermal comfort, and achieving the required performance standard of a specific climate zone. For instance, design strategies to minimize east and west-facing glazing as well as high performance glazing reduce summer overheating. The combination of insulation and components have accommodated regions where temperatures often fall below -20 to -30 degrees C.

The Skeena Project has undertaken thermal comfort modeling to inform design strategies to meet with requirements for the Okanagan, including future climates.

ENERGY CONSERVATION

Science's Heat Recovery Project Conserves Energy and Reduces GHG Emissions

The Okanagan campus' Science Building, a legacy facility, has undergone a number of modifications over time that have reduced the efficiency of its ventilation system. In 2018, the campus initiated the Heat Recovery Project which included the implementation of the following measures to address the inefficiencies:

- Rebalancing of laboratory airflows;
- Installation of variable-frequency drives on the building's main exhaust fan motors;
- Several laboratories were connected to a system that monitors laboratory exhaust chemical content in order to allow for ventilation rate optimization; and,
- Key fume hoods were upgraded to variable air volume flow.

To maximize efficiencies from the fume hood upgrade, an occupant awareness initiative will be developed and initiated through the campus' Power of You Program in the coming year.

The completed project is estimated to save $52,000 in energy costs, reduce energy by 2,600 GJ of gas and 415,000 kWh of electricity, and lower emissions by 131 tCO_2e annually.

Campus-Wide Behaviour Change through The Power of You

The Okanagan campus continued to implement the Campus-Wide Conservation Awareness and Action Strategy (Power of You, 2016) in 2018. Designed support the WSIP's recommendation to "[establish] engagement and awareness programs necessary to facilitate conservation-based behaviour on campus by all (faculty, staff, and students)", the Power of You supports building optimization efforts and the advancement of the campus' 2050 Goals through campus-wide engagement.

Engagement programs designed to target a broad range of performance areas through a variety of platforms in 2018 included:

- 3rd Annual Labs: Sort It Out and Power Down event
- 2nd Recycling 101 Event: Recycle Your Empty Coffee Cup event
- Wash In Cold Water, a 10-week residence laundry communication campaign; and,
- The inaugural Holiday Campus Shutdown communication and engagement campaign.

These opportunities resulted in the collection of 168 sustainability-focused Pledge commitments, 5 department-level commitments to support energy conservation during the holiday closure, a 40 per cent reduction in hot water consumed by Nicola housing residents, and 48 per cent increase in the use of re-usable cups and dishware over the previous year.

In addition to the above, campus-wide actions taken by key operational departments in 2018 in response to the 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 6,500 lights and 30 projectors/screens were turned off or powered down and 70 windows were closed at night, contributing to campus energy conservation.

In 2019, the Okanagan campus will continue to engage all campus constituents, campus-wide with campaigns to support the achievement of the campus' long-term goals. Planning is currently underway to deliver a province-wide awareness campaign called the BC Cool Campus Challenge at UBC Okanagan. Developed in partnership with FortisBC in response to the 2018 pipeline explosion, the Challenge will be undertaken by six BC post-secondary campus' with a focus on reducing energy consumption and emissions during the winter season.

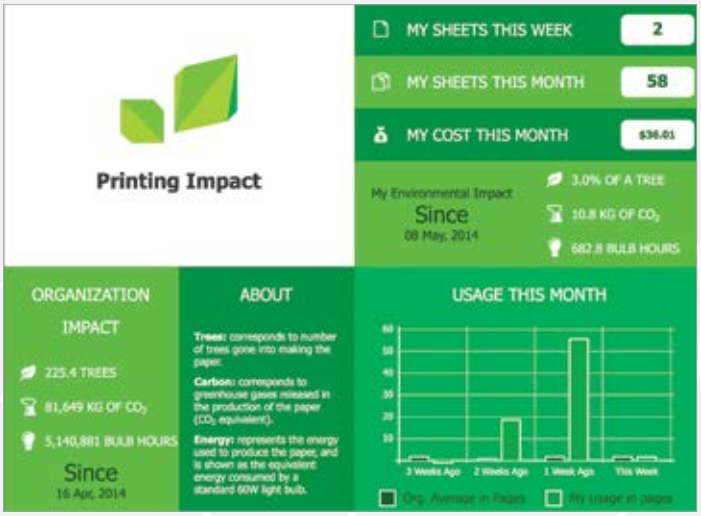
ACTIONS TO SUPPORT CAMPUS SUSTAINABILITY PERFORMANCE

PaperCut™ = Paper Reduction

PaperCut™ is a user-driven, online based printing program designed to improve security, reduce costs, and lower the campus' environmental footprint through paper reduction.

In 2018, the campus population grew by eight per cent, yet paper purchases decreased by 16 per cent. This accounts for the purchase 0.96 packages per individual in 2018 – a reduction of 22 per cent over 2017. A contributing factor to this reduction is attributed to the continued implementation of the Tap-To-Release feature enabled on the PaperCut™ platform that was introduced to the campus in 2016. The use of this feature enabled the campus to save 207,706 sheets (415 packages) of paper from over-printing, effectively reducing campus printing costs by $30,500 in the last year.

Future roll-out of the PaperCut™ software applications will further support the campus emission reductions goals in the coming year. Two new features will be released campus-wide in 2019 that include user awareness prompts, which in addition to the Printing Impact report (see picture 1) will also provide real-time awareness messaging through pop-ups, and a Find-Me print release option, which will allow users to release their print jobs on any printer campus-wide.



Sample of the Printing Impact report provided through PaperCut™.

Treatment of Chemistry Wastes and Reduction of Experimental Inputs

UBC Okanagan's laboratory personnel continue to demonstrate that their research activities do not have to impact the environment. At the request of Risk Management Services and the Engineering department in 2018, a faculty member from the Chemistry department was approached to develop a research project that focused on the treatment and waste reduction of two large hazardous waste streams generated in the undergraduate chemistry programs.

The researchers utilized granulated activated carbon as the absorbing agent in the two experiments. Results from both demonstrated successful absorption of hazardous compounds, effectively reducing waste generation by half, while also reducing experiment costs and the effects waste generation has on the environment. The researchers also developed a guide for laboratory technicians to follow in order to successfully treat the hazardous waste in future years.

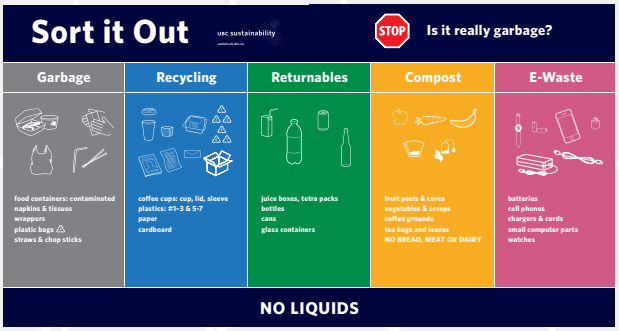
Campus Waste Audit

UBC Okanagan conducted its 5th Bi-Annual Waste Audit in October 2018. Used as an assessment tool to identify the campus' waste behaviours, the audit reviews the waste, recycling and compost streams and offers recommendations to improve sorting behaviours and waste reduction. This year's audit also provided an onsite awareness booth that supplied information on the event, identified the waste streams available to the campus, and responded to participant questions. Staff will use the audit to guide the development of Scope 3 GHG reduction opportunities in the upcoming Climate Action Planning process.

The 2018 audit assessed 9,661 litres of material – 5,211L of garbage, 3,887L of recycling, 523L of returnables, and 40L of organics (compost). The results demonstrated a 13 per cent improvement in recycling stream compliance as compared to 2016.

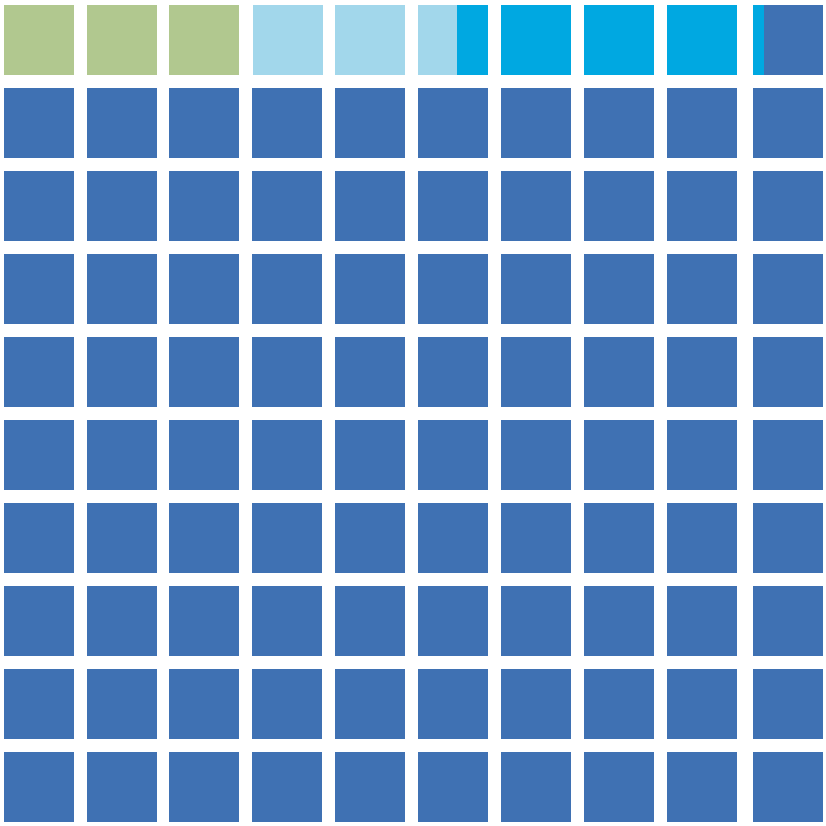
Prior to the audit, the campus undertook a review of the existing recycling signage and stations. As an outcome, the campus initiated upgrades to the recycling facilities, including sign design and content updates, content updates, established message continuity across campus, and constructed two larger recycling station collection centres within the Administration Building and University Centre dining halls, increasing the visibility and accepted material volume for all four waste streams. The campus also held awareness and education events during the year that included Waste 101: Recycle Your Empty Coffee Cup and Labs: Power Down and Sort It Out. The outcomes of these upgrades and events supported the improvement of single-use cup/paper recycling by 10 per cent over the 2016 audit and diversion of over 2,700 liters of clean laboratory material from the landfill.

Recycling programming upgrades and initiatives will continue in 2019 and include the addition of another large recycling station in the Commons and the introduction of recycling station carousels, which have been designed to hold hallway tri-stations in place.



GHG EMISSIONS BY SOURCE

UBC OKANAGAN GREENHOUSE GAS EMISSIONS BY SOURCE FOR THE 2018 CALENDAR YEAR (tCO_2e*)



The following greenhouse gas emissions have been quantified using the BC Provincial Government's SMARTTool Reporting Framework.

3.0% 65	Mobile Fuel Combustion (Fleet and other mobile equipment)
2.6% 56	Supplies (Paper)
3.6% 78	Fugitive Sources
90.8% 1,957	Stationary Fuel Combustion (Building Heating and Generators) and Electricity

TOTAL EMISSIONS: 2,156

OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2018

(Generated April 5, 2019 1:59 p.m.)

Total offsets required: 2,153. Total offset investment: $53,825.
Emissions which do not require offsets: 3. **

*Tonnes of carbon dioxide equivalent (tCO_2e) 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.

2018 CARBON NEUTRAL ACTION OVERVIEW REPORT FOR UBC'S OKANAGAN CAMPUS

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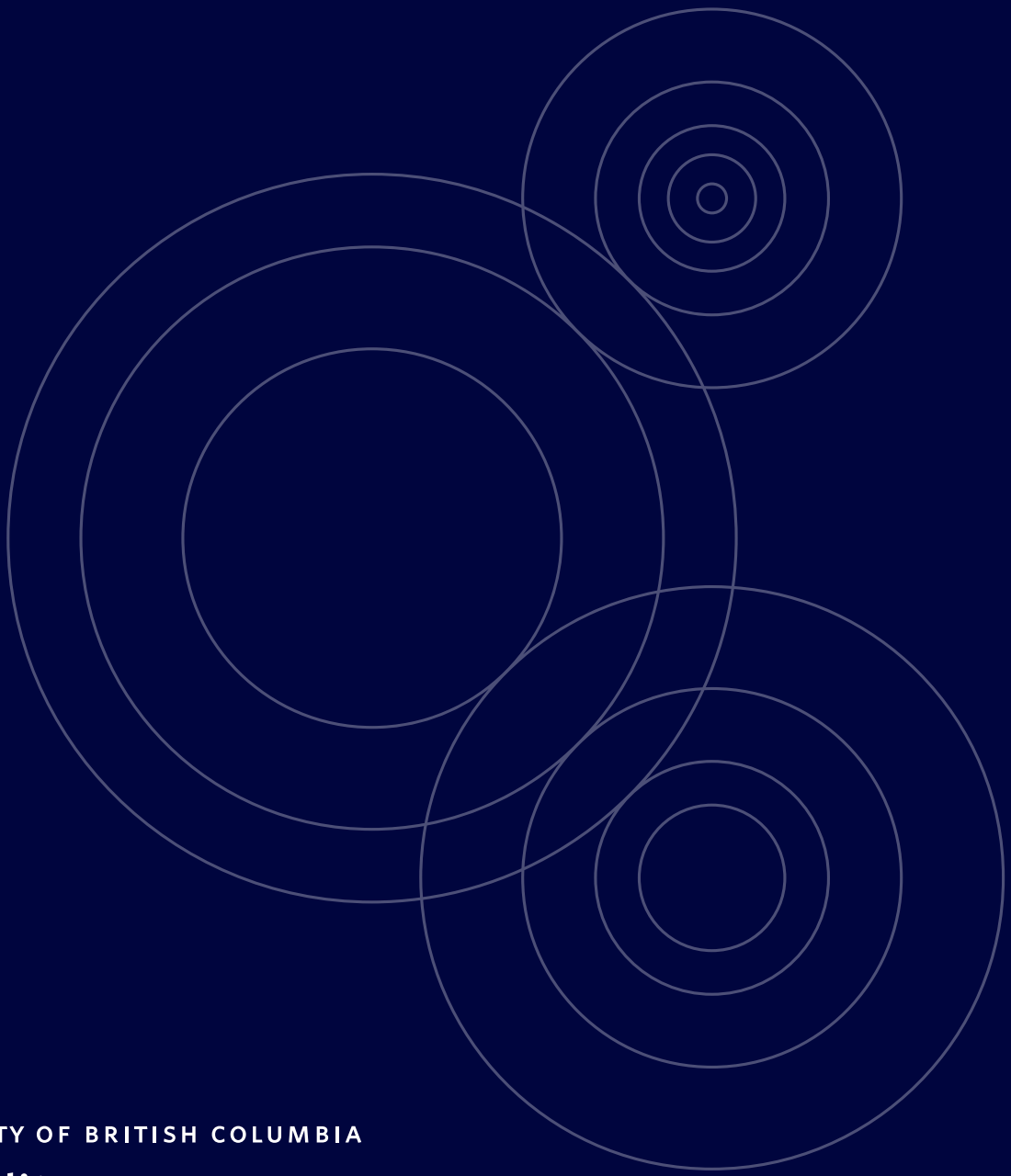

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