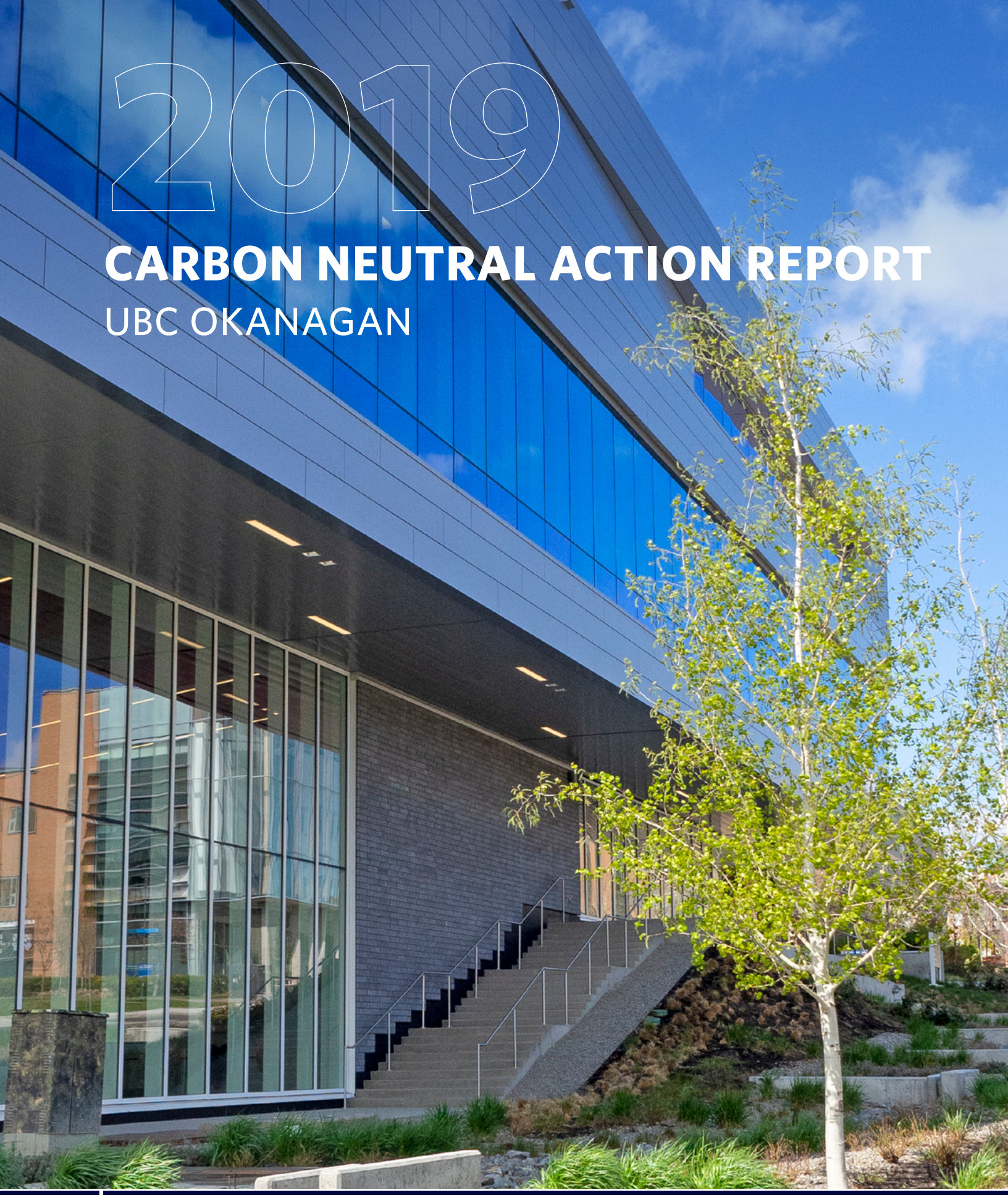
2019

CARBON NEUTRAL ACTION REPORT

UBC OKANAGAN



THE UNIVERSITY OF BRITISH COLUMBIA

Okanagan Campus

DECLARATION STATEMENT

This Carbon Neutral Action Report for the period January 1, 2019 to December 31, 2019 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2019 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2020 and beyond.

By June 30, 2020 the University of British Columbia's Okanagan campus' final 2019 Carbon Neutral Action Report will be posted to our website at sustain.ok.ubc.ca/reports/cnar.

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EMISSIONS AND OFFSET SUMMARY

EMISSIONS AND OFFSET SUMMARY

UBC Okanagan campus GHG Emissions and Offset for 2019 (tCO_2e)	
As per the ***Directive*** issued March 31, 2020, each PSO will use their 2018 GHG Emissions as a placeholder for the purposes of their 2019 CNAR.	
Total Emissions (tCO_2e)	2,156
Total $BioCO_2$	3
Total Offsets (tCO_2e)	2,153
Offset Investment	$53,825

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 2019 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.

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

ACTIONS TAKEN IN 2019 TO MINIMIZE EMISSIONS

A. Stationary Fuel Combustion Electricity (Buildings)

The largest source of in-scope GHG emissions is from buildings. UBC Okanagan continued to target building-wide energy efficiency and GHG reduction actions through the development and implementation of energy and carbon reduction plans and activities in 2019.

CLIMATE LEADERSHIP PLANNING & ENERGY MANAGEMENT

In 2019, UBC joined other organizations in declaring a climate emergency, with a renewed urgency to enhance climate action. The declaration reinforced key directions, including the development of UBC Okanagan's first **Climate Action Plan**. Initiated in 2019, the Climate Action Plan accelerate targets and actions for carbon reduction, while widening the scope to areas that extend beyond operational emissions.

The campus district energy system currently provides low carbon energy supply to campus buildings. The first phase of a **Low Carbon District Energy Strategy** was completed in 2019, which resulted in a pro forma model for the current system that will be used to measure against various energy supply strategies, and the second phase of work is underway. The strategy will be fundamental to the development of the Climate Action Plan. It will support decisions specific to setting campus GHG targets, future building retrofits and future campus infrastructure expansion.

NEW BUILDINGS

In 2019, UBC Okanagan was awarded **CleanBC's Better Buildings Net-Zero Energy-Ready Challenge's Construction and Design Incentive award** for Skeena Residence, its first **Passivhaus Project**. Commencing construction in 2019, **Skeena Residence** and **Nechako Housing Commons** are two major capital projects to help meet the demand for on-campus student housing and dining facilities, while contributing to the campus' sustainable development. As work on these projects is currently underway, further project details are provided in the 2020 section of this report.

Additionally, construction of an **Engineering Design Lab** was completed in 2019. This modular building is designed with an envelope that meets NECB 2011 standards and is supplied with electrical heat from air-sourced heat pumps. Demand controlled ventilation combined with heat recovery ventilators will reduce electricity consumption.

EXISTING BUILDINGS

Heat Recovery Projects

Data centers on campus produce a significant amount of waste heat year-round. In order to **recover and use waste heat produced by the Library Data Center** during colder weather, a hydronic connection was been made between the library data centre and the new adjacent Commons building's central heating/cooling plant. This connection will allow cooling for the data centre from the Commons' central plant and waste heat reuse in the Commons building. It is expected to reduce energy consumption by 480 GJ of natural gas and 53 MWhr of electricity, and reduce GHG emissions by 24 tCO_2e per year.

Academic Building Upgrades

A **ventilation system upgrade and optimization project** supported by over $82,000 in FortisBC electrical, gas and behavior change incentives, was completed in the Science Building. Measures implemented are expected to reduce energy costs by $52,000 and emissions by 131 tCO_2e, through the reduction of 2,600 GJ of gas and 415,000 kWhr of electricity annually.

Measures included:

- laboratory airflows rebalanced, variable-frequency drives on the building's main exhaust fan motors installed;
- connected several laboratories to a system that monitors laboratory exhaust chemical content in order to allow for ventilation rate optimization; and,
- upgrade of key fume hoods to variable air volume flow.

In addition to physical upgrades, the campus also introduced a **behavior change initiative - Shut the Sash**. Through user-based implementation, lab students and staff can support the physical upgrades by closing the fume hoods when not in use. The behavior change program reduced energy use by 8,401 kWh and 94 GJ and 5 tCO_2e over the six-week challenge.

Student Residence Building Upgrades

The campus participated in the FortisBC Rental Apartment Efficiency Program. The completed projects will reduce energy by 600 GJ, reduce carbon by 30 tCO_2e, conserve 2,920,000 L of water, and reduce associated costs by $5,000 annually.

Operational Efficiency Projects

An **Electric Demand Management Project** reviewed strategies to reduce the campus' electrical demand to respond to regional electric grid peaks for shorter periods.

Exterior and interior **Lighting upgrades** were completed including the replacement of fluorescent tubes with LED lights in the Charles E. Fipke Centre for Innovative Research, the Arts & Sciences Centre, and the outdoor street lighting.

Building HVAC systems were recommissioned to support energy efficient **Cold Weather Operation**. Control sequencing upgrades and additional measures were implemented to avoid increased natural gas consumption during colder than expected weather. Buildings that were upgraded in 2019 were Creative & Critical Studies, Upper Campus Health and the University Centre.

DISTRICT ENERGY SYSTEM (DES) UPGRADES

In 2019, the following campus district energy system upgrades and expansion projects were completed:

- a new connection from the low district energy system (LDES) to the central heating plant (CHP). The CHP provides natural gas heating and cooling to five legacy buildings; the connection will significantly reduce this requirement;
- a low flow pump upgrade on the LDES, which will reduce electricity consumption by approximately 30,000 kWh per year and improve the use of groundwater;
- an Aquifer Recharge Pilot Program that will support increased system capacity through a bypass of the infiltration basin; and,
- additional vector wells for future expansion of the DES.

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;
- **device upgrades** from spinning to hard drives, reducing waste, power consumption and replacement costs; and,
- phase-in approach to **conduct ongoing program upgrades** to remove step down transformers and install power sharing with splice.

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

In 2019, the Okanagan campus procured three new fleet vehicles, one of which included a hybrid car. Additional actions to reduce fleet emissions over the last year include the following:

- **Retired two legacy gas vehicles** from the facilities management fleet.
- 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 internal 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)

Actions implemented to reduce paper emissions in 2019 include:

- Researched alternative paper sources for inclusion on custom order list as an alternative source to tree-derived paper. As a result, **Sugar Sheet™**, a 100% tree-free product derived from sugarcane processing bi-product, is offered by 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.
- Completed deployment 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 2019, 469,000 pages were submitted to be printed, but not released within the 4-hour time period, therefore reducing GHG emissions by 2,111.2 kg and saving 5.83 trees.
  - Compared to 2018, over 38,000 fewer pages were printed across campus.
- 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.
- **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

The campus has effectively implemented projects to reduce the annual release of fugitive emissions over the last six years. In 2019, the campus continued to replace inefficient and older equipment and conduct preventative maintenance and upgrades to HVAC systems and associated appliances.

PLANS TO CONTINUE REDUCING EMISSIONS IN 2020 AND BEYOND

A. Stationary Fuel Combustion Electricity (Buildings)

CLIMATE LEADERSHIP PLANNING & ENERGY MANAGEMENT

The campus will continue the development of the **Climate Action Plan**, in alignment with the increased ambition of UBC's Climate Emergency Declaration for completion in Spring 2021. The vision, scope and schedule of activities are underway, with the first step of integrating emerging campus operations themes of the Climate Emergency engagement process. The plan will leverage and integrate parallel planning efforts, cross-campus climate action planning efficiencies, and the wider community engagement process. The plan will also include additional Scope 3 GHG reduction opportunities such as commuting, low carbon food, and embodied carbon.

Subsequent phases of the **Low Carbon District Energy Strategy** will be completed. Energy supply strategies will be tested for sensitivity to various conditions including climate change risks, utility costs, carbon costs, regulatory changes and flexibility of fuel sources, resiliency and cost of capital. It is anticipated that this work will support the Climate Action Plan, including decisions specific to setting campus GHG targets, as well as future building retrofits and campus infrastructure expansion.

A new **ten-year Strategic Energy Management Plan** will be developed in 2020. It will identify demand-reduction strategies, conservation projects, model various fuel-shifting opportunities, and create more detailed, shelf-ready projects to be considered over the first five years. It is expected that this work will support GHG target development associated with the Climate Action Plan by demonstrating GHG reduction opportunities as they relate to energy consumption.

Continued **behavioral change and engagement programs** (including potential virtual engagement opportunities) will provide opportunities to engage the campus in energy and carbon reduction planning and actions. Programs will target high impact opportunities in offices, labs and student residences, and will build on successes such as **"Shut the Sash"** - an opportunity for lab students and staff to support the physical upgrades by closing the fume hoods when not in use.

The campus has also entered into a **partnership with the campus' School of Engineering faculty to develop a data analytics platform**. Upon completion, the platform will provide improved data management, reporting capabilities and analytical tools, providing data to future energy planning projects.

NEW BUILDINGS

The **Whole Systems Infrastructure Plan** policy framework, the **UBC Okanagan Design Guidelines**, and new/emerging policy directions will continue to inform the design and construction of major capital projects.

Projects underway in 2020 include **Nechako Housing Commons**, a mixed-use 'hub' combining 220 student resident housing units with 24-hour services and amenities and a 500-seat dining hall. Social shared spaces integrated into the building's design will offer students many opportunities for social engagement. **Targeted to achieve LEED® Gold certification** this project is currently under construction, targeting completion in 2021. The facility will be connected to the campus' district energy system which provides a low carbon energy supply.

Currently under construction and targeting completion in August 2020, the **Skeena Residence** will provide 220 student resident units with house lounges, informal study space, activity room and laundry facilities. The project is targeting **Passive House (Classic) certification**, an internationally recognized energy standard, characterized by a highly efficient building envelope and heat recovery ventilation system. Equivalent to highest steps of the BC Energy Step Code, the project's design helps to achieve a net-zero energy-ready level of performance while minimizing incremental costs by incorporating integrated design and project delivery. Selected as a winner of **CleanBC's Better Buildings Net-Zero Energy-Ready Challenge Awards**, the project supports the City of Kelowna's Energy Step Code implementation by building local capacity in upper step design, specialized trades, and application of innovative products.

In 2020 the design of an **Interdisciplinary Collaboration and Innovation (ICI) facility** targeting LEED Gold certification will begin. This academic facility will be designed to foster interdisciplinary knowledge and support collaborative, team-based learning and innovative approaches to teaching.

Additional 2020 and future building projects include:

- Two modular buildings supplied by electrical heat from by air-source heat pumps. Demand-controlled ventilation combined with heat recovery ventilators will reduce electricity demand.
- Innovation Precinct 1 renovation to provide interdisciplinary research space to faculty and students.
- Research greenhouse construction with potential for cost-effective energy conservation and low carbon energy supply.
- The future development of an outdoor gathering space.

2019 construction of the Nechako Housing Commons targeting completion in 2021.

EXISTING BUILDINGS

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 ensure occupants receive good indoor air quality by increasing ventilation rates on demand. Recalibration of sensors ensures ventilation rates do not exceed requirements, in order to reduce energy costs.
- **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.

DISTRICT ENERGY SYSTEM UPGRADES

District energy system upgrades planned in 2020 include the following:

- The complete review of the current geothermal groundwater injection system to determine if a **Groundwater Upgrade Project** to support increased capacity is viable. If so, the addition of more recharge wells may be considered to enhance the existing infiltration basin.
- Implementation of the **LDES low flow pump project** to reduce energy consumption and extend the life of the pumps used to circulate water through the low temperature district energy system (LDES) loop. The campus will be replacing 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.
- Complete the **conversion of the Science building to low temperature heating system**, reducing the building's reliance on natural gas for its HVAC needs.

DEPARTMENT ACTIONS

Operational Efficiency Projects

Key operational departments will continue to implement building systems' efficiency projects in the coming years, including HVAC system efficiency maintenance and investigation of strategies to reduce electrical demand through the Electric Demand Management project.

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 IT, Media and Classroom Services Computer Replacement Program;
- **device upgrades** from spinning to hard drives, reducing waste, power consumption and replacement costs; and,
- phase-in approach to **conduct ongoing program upgrades** to remove step down transformers and install power sharing with splice.

Student Housing and Hospitality Services: Residence Buildings Portfolio

- Addition of **building automation** system to Monashee residence.

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 internal 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)

- Implement **awareness messaging prompts through the PaperCut™** print-tracking software to increase user awareness around reduced 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**.
- 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 **replace older student Xerox printers with new Ricoh devices**. These new devices will enable students to use "FindMe Printing" 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. These changes reduced the number of low usage printers and fleet costs across campus, standardized the student printing fleet for increased efficiency, support and maintenance, and lowered the potential for mixed up print jobs reducing paper waste.
- Continue to **invest in improved and more sustainable technologies** which provide better performance with a reduced environmental impact. This includes implementing solutions which digitize fax transmissions to reduce paper consumption.

D. Fugitive Emissions

Continue to replace inefficient and older equipment and conduct preventative maintenance and upgrades to HVAC systems and associated appliances.

SUCCESS STORIES

2019 construction of the Skeena Housing targeting completion in 2020.

In 2019, UBC Okanagan was awarded **CleanBC's Better Buildings Net-Zero Energy-Ready Challenge's Construction and Design Incentive Award** for **Skeena Residence, its first Passivhaus Project**. The Net-Zero Energy-Ready Challenge (NZERC) is one of CleanBC's programs aimed at making buildings all over the province less polluting, more comfortable and energy-efficient. Net-zero energy-ready buildings are designed and built to be so efficient that they could meet all or most of their own energy consumption requirements with renewable energy technologies.

The Skeena Residence will be a six story, 6,750 GSM facility, consisting of 220 units with house lounges, informal study space, activity room and laundry facilities. The project is targeting Passive House (Classic) certification, an internationally recognized energy standard characterized by a highly efficient building envelope and heat recovery ventilation system. Equivalent to highest steps of the BC Energy Step Code, the project's design helps to achieve a net-zero energy-ready level of performance while minimizing incremental costs by incorporating integrated design and project delivery. As a winner of CleanBC's Better Buildings Net-Zero Energy-Ready Challenge Awards, the project supports the City of Kelowna's Energy Step Code implementation by building local capacity in upper step design, specialized trades, and application of innovative products.

Supporting the growing demand for on-campus student housing and student recruitment and retention, the residence will enhance campus life environment and services, which will help students succeed academically and socially. The new residence will also influence the social, economic and environmental sustainability of our growing campus and neighboring community, while adapting and managing future climate risks. Specific measures include:

- Integration of leading-edge green building **"Living Lab" research** for UBCO Faculty and green building innovation of provincial, national and international significance.
- Designed to achieve a **minimum indoor water use reduction of 35 per cent** compared to a base building design.
- Facilities to **manage all rainwater on-site** while providing social amenity and ecological co-benefits.
- Inclusion of **non-invasive landscape plants appropriate for site conditions, climate and design intentions**, and restoring appropriate plants and plant communities native to the ecoregion of the site.
- Reduction of commuter traffic and **support for active transportation modes**.

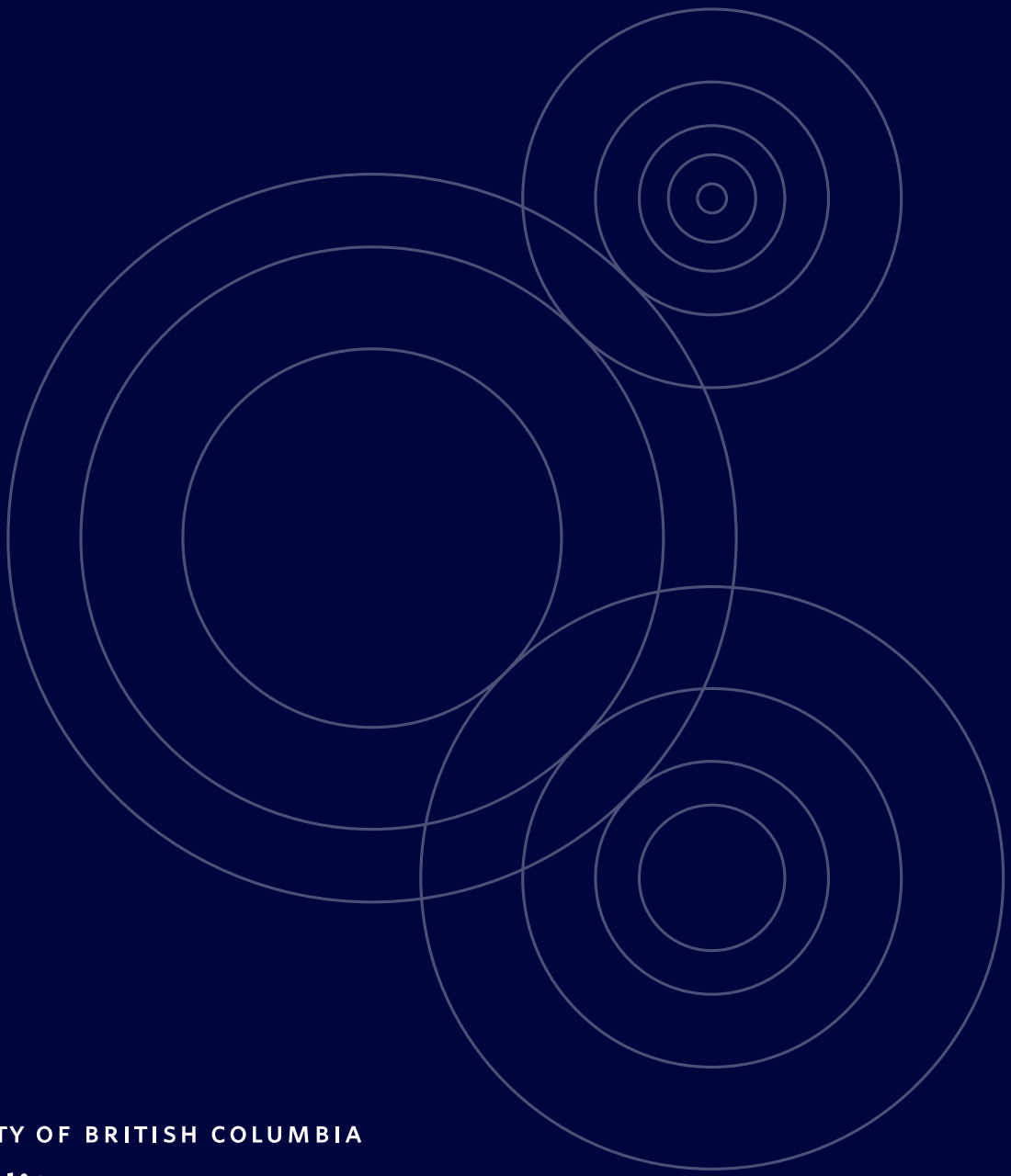
INITIATIVES TO SUPPORT ADDITIONAL GHG EMISSIONS REDUCTIONS

The UBC Okanagan Transportation Plan is currently being initiated to support implementation of the 2015 Campus Plan to respond to advances in planning and development on and surrounding the campus, and contribute to UBC's commitment to address the Climate Crisis. The Transportation Plan will support the Climate Action Plan's overall strategy to address scope 3 commuting emissions by providing transportation targets and supportive policies/actions; and recommendations for infrastructure improvements and Transportation Demand Management (TDM) strategies that reduce GHG emissions through improved campus connectivity, sustainable transportation opportunities and reduced Single Occupancy Vehicle (SOV) use. This work is targeting completion mid-December 2020.

In 2019, UBC Okanagan collaborated with the City of Kelowna to offer the **Campus Commuter Challenge**. The national event encourages the campus community to commute to campus using active and sustainable modes of transportation including cycling, transit, walking, carpooling and telecommuting.

With nearly 300 participants joining over two weeks, the Okanagan campus successfully won the challenge and avoided the release of 7,120 kg of carbon emissions into the atmosphere – the equivalent of 1.5 passenger vehicles driven for one year.

2019 CARBON NEUTRAL ACTION OVERVIEW REPORT FOR UBC'S OKANAGAN CAMPUS



THE UNIVERSITY OF BRITISH COLUMBIA

sustainability