

# 2016 CARBON NEUTRAL ACTION OVERVIEW REPORT



THE UNIVERSITY OF BRITISH COLUMBIA

Sustainability Office  
Okanagan Campus



# ENVISIONING A SUSTAINABLE FUTURE

UBC is a recognized leader in sustainability and the Okanagan campus has developed goals and initiatives that support and advance UBC’s sustainability commitments.

The UBC Okanagan Sustainability Office, Campus Planning and Development was established to help deliver on UBC’s sustainability commitments. We aspire to build capacity and foster leadership across the campus to broaden the impact of sustainability.

*Provincially mandated greenhouse gas (GHG) and sustainability reporting for the Okanagan campus is the responsibility of the Sustainability Office, Campus Planning and Development. The 2016 Carbon Neutral Action Overview Report contributes to UBC reporting submitted to the Climate Action Secretariat. This report provides an overview of the actions taken by the campus to reduce carbon emissions in 2016 and future planned actions to support British Columbia’s commitment to reduce the provincial GHG emissions by 80 per cent below 2007 levels by 2050.*

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# EXECUTIVE SUMMARY AND DECLARATION

2016 marked a year of noteworthy achievements for UBC’s Okanagan Campus relative to advancing our commitment to the BC Provincial Government’s Carbon Neutral mandate.

For the third consecutive year, the campus achieved an absolute reduction in carbon emissions, reporting a 6 percent decrease in 2016 over the prior reporting year. Factors contributing to this achievement include a continued focus on the implementation of demand-side energy reduction projects, ongoing infrastructure performance improvements, and participation in energy conservation activities. 2016 also marked the year the campus established an MOU with FortisBC for Partners in Energy Efficiency and developed a dedicated Energy Team to support the implementation of energy and carbon reduction activities.

Foundational to these accomplishments was the establishment of the Whole Systems Infrastructure Plan — (WSIP, 2016) in parallel to and in support of the UBC Okanagan Campus Plan (2015). The WSIP establishes a long-term roadmap and implementation plan to address energy, carbon, water, landscape, ecology, biodiversity and engagement. The objectives of the WSIP are wide reaching —from mitigating future climate change risks by reducing energy and carbon emissions, to reducing operational and

maintenance costs and limiting our exposure to future price volatility.

Going forward, UBC Okanagan will continue to focus on supporting future growth while reducing energy use and operational carbon emissions through the implementation of key recommendations of the WSIP. Over the short-term it’s anticipated that activities will focus on demand-side management for existing buildings, changing user behaviours and the expansion of the campus’ existing district energy systems to new facilities.



**Rob Einarson**  
Associate Vice-President,  
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University of British  
Columbia, Okanagan campus

## DECLARATION STATEMENT

This Carbon Neutral Action Report for the period January 1, 2016 to December 31, 2016 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2016 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2017 and beyond.

By June 30, 2017 UBC Okanagan campus’ final Carbon Neutral Action Report will be posted to our website at [sustain.ok.ubc.ca/reports/cnar](http://sustain.ok.ubc.ca/reports/cnar)

# EMISSIONS AND OFFSET SUMMARY

## EMISSIONS AND OFFSET SUMMARY

UBC Okanagan campus GHG Emissions and Offset for 2016 (tCO <sub>2</sub> e)	
GHG Emissions created in Calendar Year 2016:	
Total Emissions (tCO <sub>2</sub> e)	2,436
Total Offsets (tCO <sub>2</sub> e)	2,434
Adjustments to GHG Emissions Reported in Prior Years:	
Total Emissions (tCO <sub>2</sub> e)	0
Total Offsets (tCO <sub>2</sub> e)	0
Grand Total Offsets for the 2016 Reporting Year:	
Grand Total Offsets (tCO <sub>2</sub> e)	2,434

## RETIREMENT OF OFFSETS

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, UBC Okanagan campus (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2016 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment 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.

# 2016 EMISSIONS OVERVIEW

## GREENHOUSE GAS EMISSIONS

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

**Table 1: GHG Comparison by Source between 2015 - 2016**

Source	2015 Emissions (tonnes CO <sub>2</sub> e)	2016 Emissions (tonnes CO <sub>2</sub> e)	Change from 2015 to 2016
Buildings	2,370	2,227	-6%
Fleet	45	47	+4%
Paper	64	64	+0.3%
Fugitive	122	98	-20%
Total Emissions	2,601	2,436	-6%
Total Offsettable emissions	2,599	2,434	-6%

*\*Individual amounts may not sum exactly due to rounding.*

Table 1 demonstrates an absolute campus GHG emission reduction of six per cent over the 2015 reporting year, which will result in a \$4,331.25 carbon offset savings to the university. The largest source of in-scope emissions identified within the UBC Okanagan portfolio is derived from buildings, which were reduced by six per cent over the previous year. Factors contributing to this reduction include a focus on demand-side energy reduction through building optimization, routine capital investments, building re-commissioning, maintenance of the District Energy System (DES), and building occupant behaviour change. Detailed information on measures implemented to achieve a reduction in emissions over the previous and baseline years can be found in the ‘Actions to Reduce Emissions’ section of this report.

## Carbon Neutral Offsets in 2016

In accordance with the campus SMARTTool<sup>1</sup> reporting and as required by the Greenhouse Gas Reduction Targets Act (GGRTA), offsets required to achieve carbon neutrality in 2016 total 2,434 tCO<sub>2</sub>e. As part of the Okanagan campus’ 2016 GHG emissions profile, two tCO<sub>2</sub>e do not require offsets.

<sup>1</sup> Protocols established in 2016/2017 BC Best Practices Methodology for Quantifying Greenhouse as Emissions



# EMISSIONS REDUCTION ACTIVITIES

## ACTIONS TAKEN TO REDUCE GREENHOUSE GAS EMISSIONS IN 2016

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

### A. Stationary Fuel Combustion, Electricity (Buildings)

The largest source of in-scope GHG emissions on campus is derived from buildings, which comprises 91.5 per cent of in-scope emissions in 2016. However, notably, absolute stationary building emissions were reduced by 143 tCO<sub>2</sub>e or six per cent, compared to the 2015 reporting year. This demonstrates a continued emissions reduction trend over prior reporting years.

Contributing factors to this reduction include a focus on demand-side energy reduction through building optimization, routine capital investments, building re-commissioning, maintenance of the DES, and behaviour change.

#### ACTIONS:

##### Academic and Administration Buildings

- Completed replacement of Arts Building Chiller CH-2.
- Completed recommissioning and balance of air in Arts Building.
- Continued to implement sub-metering and BMS enhancement and adopted LEED® v4, which includes a component requirement to step up metering (increased levels of metering).
- Completed lighting upgrade design documents for Arts, Science, Creative and Critical Studies, and Administration buildings.
- Completed sourcing for additional District Energy System cooling opportunities. Findings support the addition of a third cooling tower, projected for installation in 2017.
- Implemented FortisBC's 'Partner in Energy' program that provides direct lighting rebates at the point-of-sale.
- Continued to implement UBC Okanagan Whole Systems Infrastructure Plan. Completed projects include:
  - I. Secured seed funding to implement Year 1 Energy Conservations Measures identified in the Plan.
  - II. Established an Energy Team and Energy Committee.
  - III. Completed and initiated implementation of 5-Year Strategic Energy Management Plan.
  - IV. Continued to assess routine capital plan to determine energy efficient implementation options that respond to recommendations of the Whole Systems Infrastructure Plan and Strategic Energy Management Plan.
  - V. Continued to develop and obtain endorsement of a campus-wide energy policy. A draft of an energy policy

for the Okanagan Campus has been generated. The initial draft was based on the Point Grey campus energy policy with modifications to account for the Okanagan climate.

VI. Developed a behaviour change plan—UBC Okanagan's Campus-Wide Three-Year Conservation Awareness and Action Strategy.

VII. Initialized update to campus green building guidelines and defined new construction recommendations for efficient buildings.

- Building Optimization Program, a partnership between UBC Okanagan and FortisBC, successfully completed in Administration and Science Buildings. Science achieved savings of six per cent (33,996 kWh) and 87 per cent (1,625 GJ) respectively accounting for a projected emission reduction of 81 tCO<sub>2</sub>e annually. These savings exceeded initial BOP targets of one per cent electrical savings and combined gas and Medium Temperature District Energy System (MDES) savings of 22 per cent.
- Administration Building MUA replacement completed. Projected annual savings include lower energy costs of \$14,400 and a reduction in gas consumption by 1,390 GJ. Despite an expected increase in electricity consumption of 33,333 kWh annually, the carbon emission impact is projected to be reduced by 69 tCO<sub>2</sub>e per year.
- Continued to implement Wi-Fi HVAC Occupancy Project to monitor building occupancy levels. More information can be found in 'Above and Beyond' section of this document.
- Developed proposal for lighting upgrades in the Administration and Creative and Critical Studies buildings. Initial estimates project that the campus will reduce its energy consumption by approximately 380,000 kWh and 0.98 tCO<sub>2</sub>e annually.
- Building optimization projects completed within Reichwald Health Science Centre and Engineering, Management and Education building include having both buildings' hydronic controls adjusted to allow for larger Low Temperature District Energy System (LDES) supply/return water temperatures and reduced flows.
- Adapted to UBC Technical Guidelines for Okanagan Campus.

### Residence Buildings

- Completed LED bulb replacement in all resident buildings' common areas and in locations of easy access.

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

In 2016, fleet vehicles accounted for 47 tCO<sub>2</sub>e, or 1.9 per cent of campus total emissions, up two tCO<sub>2</sub>e from 2015. Increased use of the research and departmental operations vehicles are contributing factors to this rise. Although there was a slight increase in fleet emissions, the campus has achieved a 31 per cent absolute reduction in fleet emissions since 2010.

#### ACTIONS:

- Removed stand-alone gasoline storage unit, reducing fuel loss through evaporation.
- Reduced campus fleet by one Student Housing and Hospitality Services operations vehicle.
- Continued to implement measures to reduce reliance on fleet vehicles and diverted 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.

### C. Supplies (Paper)

Emissions from paper accounted for 63 tCO<sub>2</sub>e, or 2.6 per cent of total in-scope campus emissions in 2016. This demonstrates an increase of 0.3 per cent over the previous year. Although there was an absolute decrease in paper consumed over 2015 by 55 fewer packages, the type of paper purchased containing

the 30 per cent PCW minimum requirement increased, contributing to the increase of emissions.

#### ACTIONS:

- Full implementation of PaperCut™ system to students, roll-out of system to faculty and staff at departmental level.
- Completed the full integration of PaperCut™ print tracking software to faculty and departments; providing a platform that delivers reports to clients on printing volumes, generating awareness and promoting alternatives to printing.
- Continued program upgrades, using a phase-in approach, to remove step down transformers and install power sharing.
- Commenced pilot of Skype™ for Business, an alternative web-conferencing software.
- Continued to promote the purchase of 30 per cent at minimum or greater post-consumer recycled content paper.
- Continued to ensure wheat sheet paper is available to order from the custom list as an alternative source to tree-derived 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.
- Continued replacement of desktop computers with laptops and more efficient devices as part of IT, Media and Classroom Services' Computer Replacement Program.

### D. Fugitive Emissions

In 2016, in-scope HFCs accounted for 4 per cent of total campus emissions, producing 98 tCO<sub>2</sub>e. A reduction of 24 tCO<sub>2</sub>e over 2015 accounted for 20 per cent fewer emissions.

#### ACTIONS:

- Continued to conduct preventative maintenance and upgrades to HVAC system and associated appliances.

## PLANS TO CONTINUE REDUCING GREENHOUSE GAS EMISSIONS IN FUTURE YEARS

This section describes planned actions across buildings, fleet and procurement in the coming year.

### A. Stationary Fuel Combustion, Electricity (Buildings)

#### Academic and Administration Buildings

- Remove domestic hot water from Engineering, Management and Education building's central boilers to allow boilers to seasonally shut down.
- Implement replacement of the Arts and Gym building chillers and Mountain Weather Office's chiller, boiler and generator.
- Initialize recommissioning and balance air, water and controls in Creative and Critical Studies, University Centre and Engineering, Management and Education buildings.

- Continue to implement sub-metering and BMS enhancements for better measurement of energy consumption and conservation planning, including peak demand. New campus measurement and verification standards have been adopted to be in line with LEED V4.
- Lighting upgrade for Administration building projected to reduce energy consumption by 200,000 kWh and 0.52 tCO<sub>2</sub>e annually.
- LDES/MDES System Study to account for new building construction planned for the campus. It is important to consider both the capacity of the existing LDES and MDES systems as well as ensure that all HVAC systems in new



buildings are designed to function optimally with the district systems.

- Building optimization projects scheduled to occur in the Charles E. Fipke Centre for Innovative Research (Fipke), University Centre (UNC) and Arts and Sciences Centre (ASC) during 2017 include:
  - Fipke to receive upgrade of its central plant to a four-pipe system with hot and cold tanks.
  - UNC's existing systems have been reviewed by a consulting firm, who will be proceeding with detailed design work.
  - ASC's VRF system has been identified as being a key limit on the operation of the LDES system. A piping upgrade to this system has been proposed and detailed design work is proceeding.
- Cooling Plant Expansion—the addition of a cooling tower will increase the air-cooled capacity of the LDES system.
- Implement energy study recommendations for the Administration building's mechanical and envelope systems.
- Implement Supply Air Temperature Reset—upgrading the BMS control software to set supply-air temperatures based on average heating/cooling valve positions is expected to save the campus \$4,900 per year in heating and cooling costs and reduce energy consumption by 390 GJ of gas and 24,300 kWh of electricity, which reduces the campus' carbon emissions by 20 tCO<sub>2</sub>e annually.
- Implement Supply Air Pressure Reset—adjusting the supply-air pressure set points based on the heating/cooling demand in a building to allow for reduced fan speeds and corresponding reduced electrical consumption.
- Increase Heat pump Utilization—optimizing building supply water temperatures will allow existing heat pumps to operate for a larger fraction of the year. Implementation of this strategy is estimated to result in a reduction of natural gas consumption and an increase in electricity use for a net energy cost savings of approximately \$1,200 and a reduction in carbon emissions by 85 tCO<sub>2</sub>e annually.
- Implement CNCP project Lab Air Volume Control and Green Labs Education in Science Building laboratories (funding pending). This project is estimated to reduce the campus' energy consumptions by 2,600 GJ and 170,000 kWh and emissions by 131 tCO<sub>2</sub>e annually.

- Peak Load Management—electricity costs for the campus are a mixture of charges for energy consumption (kWh) and peak demand (kW). As such, reducing electrical demand at peak times can have significant impacts on campus energy costs. As the initial step-in managing peak loads, control strategies to reduce fan speeds and adjust supply water temperatures during peak periods will be implemented, which is expected to result in a reduction of peak demand charges by \$13,400 per year.
- Whole Systems Implementation Plan projects:
  - Full implementation of the Strategic Energy Management Plan.
  - Implementation of the behaviour change plan—UBC Okanagan's Campus-Wide Three-Year Conservation Awareness and Action Strategy—called the Power of You.
  - Expansion of the District Energy System.
- Integrate Library data center into geo-exchange system during the construction of the Teaching and Learning Centre.

#### Residence Buildings

- Continue to complete lighting upgrades on a failure-based requirement.
- Complete a full review of automation in residence buildings.
- Review timing and schedule for Monashee building's hot water tank replacement.

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

- Enhancements to bus loop to allow for improved traffic flow of high density modes of transportation, i.e. buses—further encouraging alternative modes of transportation be used by campus constituents.
- 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)

- Continue program upgrades, using a phase-in approach, to remove step down transformers and install power sharing with splice.
- Complete pilot of Skype™ for Business, an alternative web-conferencing software.
- Complete the full integration of PaperCut™ print-tracking software to faculty and departments, providing a platform that delivers reports to clients on printing volumes, generating awareness and promoting alternatives to printing.
- Review of current printing equipment inventory for improvements—reduce inventory size and replace with new, more efficient machines.
- Continue to promote the purchase of 30 per cent at minimum or greater post-consumer recycled content paper.

- Continue to ensure wheat sheet paper is available to order from the custom list as an alternative source to tree-derived 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 the replacement of desktop computers with laptops and more efficient devices as part of IT, Media and Classroom Services Computer Replacement Program.

#### D. Fugitive Emissions

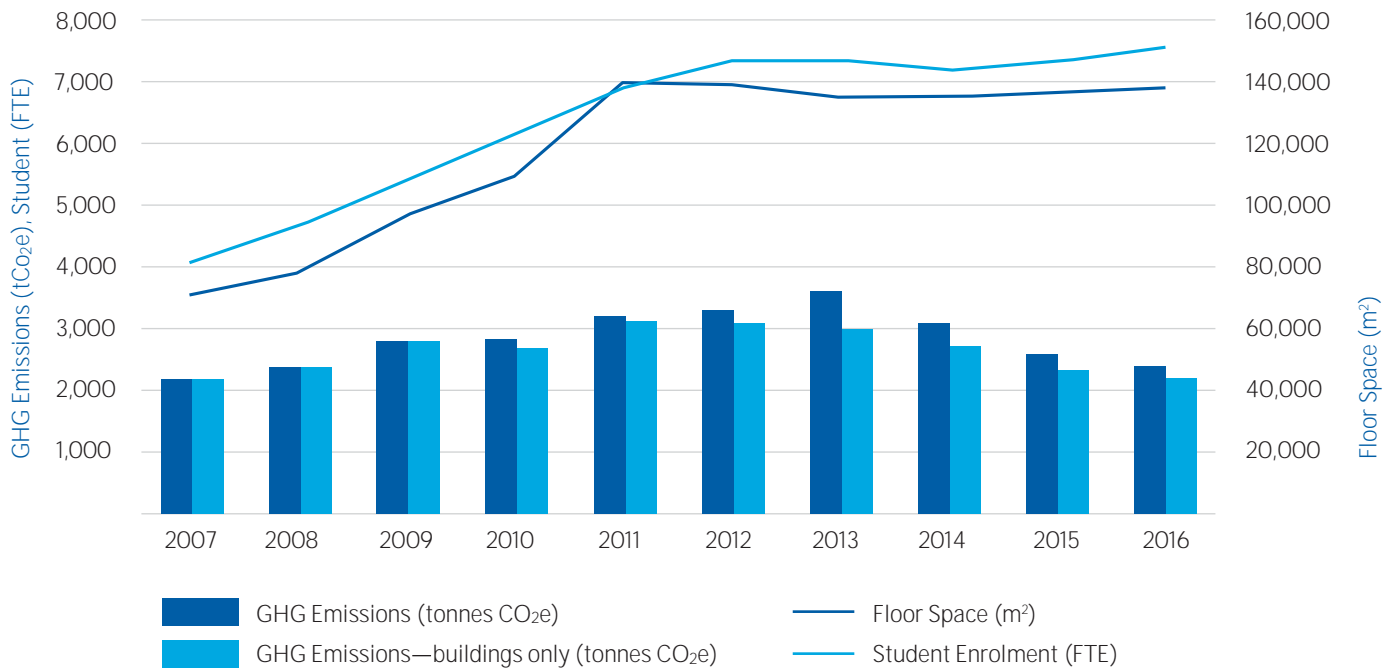
- Continue to conduct preventative maintenance and upgrades to HVAC system and associated appliances.

## EMISSIONS IN GREATER DETAIL

### COMPARISON TO BASELINES

Figure 1 provides a comparison of absolute campus and building emissions since 2007 relative to growth. From 2007 to 2016, student enrolment increased by 86 per cent while floor space has increased by 94 per cent. Despite growth, absolute emissions have been decreasing over the last three years largely due to the implementation of energy conservation measures initiated through building optimization programs and continual investment into the district energy system's infrastructure and operation, which significantly reduces the campus' reliance on gas-fired heating equipment.

Figure 1 Absolute GHG emissions relative to growth 2007-2016





# ABOVE AND BEYOND: Promoting a Culture of Sustainability

## ENERGY CONSERVATION PHILOSOPHY AND PRACTICES

### Whole Systems Approach to Sustainability Planning

The UBC Okanagan Whole Systems Infrastructure Plan (Plan), developed in parallel to an in support of the UBC Okanagan Campus Plan (2015), received UBC Okanagan Executive-endorsement in 2016. The Plan identifies key recommendations and processes required to assess and plan for future infrastructure needs that support campus growth and wellbeing. It further establishes a long-term roadmap for improving the overall performance of the campus, performance targets, and a five-year implementation plan to achieve campus sustainability performance across built and natural environments to 2030 and beyond.

The development of policy and strategies integral to successful advancement of the Plan's objectives and achievement of its 2050 Whole Systems goals during 2016 included:

- Formation of a campus Energy Team;
- Development and implementation of the Strategic Energy Management Plan;
- Completion of the behaviour change plan 'Campus-Wide Three-Year Conservation Awareness and Action Strategy' targeting energy conservation and carbon reduction;
- Expansion of district energy to the new Teaching and Learning Centre. This will provide low carbon heating and cooling to the facility and the enabling infrastructure for a future fuel switch to a renewable supply.



Artist rendering of the new Teaching and Learning Centre.

### 2050 WHOLE SYSTEMS SUSTAINABILITY GOALS

-  1 Achieve a net positive performance in operational energy and carbon
-  2 Implement a framework that supports low embodied carbon in future development
-  3 Optimize water quality, supply and security
-  4 100 per cent diversion of stormwater from municipal systems
-  5 Strive towards full waste recovery/reuse
-  6 Enhance and/or restore the site's ecology

## ENERGY AND CARBON REDUCTION PROGRAMS PROVIDING RESULTS

### Strategic Building Optimization = Reduction and Conservation

UBC Okanagan supports building optimization programs that are integral to reducing energy consumption and carbon emissions and fundamental to achieve the Whole Systems Infrastructure Plan's long-term goals. Following the successful UBC Okanagan/FortisBC-partnered Building Optimization Program and in response to key framework actions identified within the Whole System Infrastructure Plan, the campus formed an Energy Team and developed the Strategic Energy Management Plan (SEMP). The SEMP was developed to implement existing building energy conservation measures to achieve five-year plan targets, reduce energy consumption of district energy systems, and make capacity available for future growth of the campus.

Conservation measures identified for implementation in the SEMP are anticipated to yield savings of \$229,953 in operational costs and reduce the campus' energy consumption by 13,882 GJ and 2,128,133 kWh. These conservation efforts are expected to reduce UBC Okanagan's carbon emissions by 715 tCO<sub>2</sub>e annually.

The building optimization programming will receive paralleled support through the 2017 implementation of the campus' behaviour change program, called the Power of You.

### The Power of You Program

UBC Okanagan's Campus-Wide Three-Year Conservation Awareness and Action Strategy (Strategy) was developed in 2016. Responding to a key recommendation of the Whole Systems Infrastructure Plan, the Strategy evolved from the successful foundation established by the inaugural phase of Power of You program. Broadening the scope of the Power of You program to include active initiatives and communication-based campaigns, the Strategy was designed to impact all performance areas—energy, carbon, waste, water and ecology—and intends to build capacity and encourage voluntary actions by all campus constituents, campus-wide.

Actions taken by key operational departments in 2016 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 3,700 lights and 67 projectors were turned off or powered down and almost 1,000 windows were closed at night, contributing to campus energy savings. These figures also represent an improvement of behavioural actions implemented by staff and faculty over 2015's audit when 7,000 lights and 250 projectors and monitors were turned off or powered down and over 1,500 windows were closed at night.

In 2017, campaigns targeting energy, water and waste performance will be introduced to the campus through a variety of focused communication and event activities designed to bring awareness, build capacity and drive action to impact the campus' operational and environmental performance.





## Wi-Fi Technology Reduces Carbon Emissions

Wi-Fi services have provided UBC Okanagan's community with high-speed access to e-mail, the internet and campus network for the better part of a decade. Through the implementation of the Wi-Fi HVAC Occupancy Project in 2016, the campus effectively broadened the application of this technology to monitor building occupancy levels through the tracking of Wi-Fi frequencies.

Utilizing technology designed by Sensible Building Science. ([sensiblebuildingscience.com](http://sensiblebuildingscience.com)), a UBC based start-up in Vancouver, a monitoring system fundamentally tracks building occupancy levels through the use of the campus' wireless network. The data collected by the system is transmitted to the campus' building management system (BMS) and, based

on technical programming entered by the Energy Team, the BMS is instructed to adjust building's environmental systems accordingly; accommodating current occupancy requirements by increasing or decreasing the utilization of the heating, cooling and air ventilation (HVAC) systems.

The implementation of this innovative monitoring system was first deployed in the Arts and Engineering, Management and Education buildings and is expected to be rolled out in the remaining academic and administration buildings in 2017. Projected savings estimate an annual decrease of the campus' utility costs by over \$19,000 through a reduction in energy consumption by 620 GJ and 166,700 kWh. These savings will effectively reduce the campus' annual carbon emissions by 31 tCO<sub>2e</sub>.

## ACTIONS TO SUPPORT CAMPUS SUSTAINABILITY PERFORMANCE

### Campus Waste Audit

The UBC Okanagan campus continues to encourage environmental stewardship through behaviour change initiatives that impact a range of environmental performance areas, including waste. Waste reduction programs implemented at UBC Okanagan have been designed to directly reduce the amount of waste generated through encouragement of diversion at the point of disposal, reducing the production of the greenhouse gas methane (CH<sub>4</sub>) released when material is left to break-down at the landfill.

In 2016, the campus undertook its fifth Bi-Annual Campus Waste Audit. The audit, which entails reviewing a day's worth of disposed material collected from 13 academic and administrative buildings waste streams, was conducted by Facilities Management personnel and 17 campus volunteers.

An amalgamated total of 6,939 litres of material—3,609 litres of garbage, 3,303 litres of recycling, and 27 litres of organic waste (compost)—was collected, deposited in the campus' main courtyard, and audited. All material was physically sorted into five categories—recycling, returnable, compost, garbage, and other—with 18 sub-categories indicating material type (i.e. paper, refundable and returnable cans and glass, etc.).

Providing overall satisfactory results this year, the outcomes of the compost and waste audits demonstrated improvements in sorting behaviours. The compost audit contained 94 per cent organic material, improving by five per cent over 2014's audit. The garbage audit revealed that 22 per cent of the material found in this waste stream was 'true' garbage, an improvement over the previous audit which reported 15 per cent. The results of the recycle audit showed that 62 per cent was true recycling, 26 per cent was returnable



and compostable material and the remaining 11 per cent was considered waste. This stream's results demonstrated a slight decline in diversion behaviours by four per cent over the previous audit's results.

Responding to the audit's recommendations, projects targeting improvement to UBC Okanagan's diversion rate are scheduled to commence in early 2017, including the launch of a UBC Okanagan specific online waste resource, a recycling event targeting the use and proper disposal of single-use cups on campus, and the initiation of a recycling station signage update.

Waste reduction activities voluntarily undertaken by campus members in 2016 that demonstrate a personal commitment to environmental stewardship included a lunch-hour waste cleanup event. A group of volunteers cleaned an area surrounding the new multi-use pathway entrance located near the flyover and, through their efforts, over 286 pounds of litter from the Bulman Road access was collected and disposed of responsibly.



### Student Leadership in Laboratory Sustainability

Lab Armor Beads™, a product of Lab Armor®, are a non-toxic, non-vaporizing material designed to replace water in water bath systems traditionally utilized in laboratories. Benefits identified from the use of this product include an estimated improvement in energy efficiency over standard water baths by approximately 50 per cent (Lab Armor, LLC, n.d.), water conservation, and a reduction in waste production due to contamination—all of which support the campus' 2050 Whole Systems Infrastructure Plan's long-term energy, carbon, water and waste reduction goals.

Demonstrating a proactive approach to effectively reduce a UBC Okanagan biology laboratory's environmental impact, a Biology PhD student obtained 2016 UBC Green Labs Funding for the purpose of purchasing Lab Armor Beads™. Based on the projected use of this product, it is estimated that biology laboratory will minimize its hazardous waste production, reduce its water consumption by 1,092 litres, and conserve approximately 138 kWh of electricity annually.

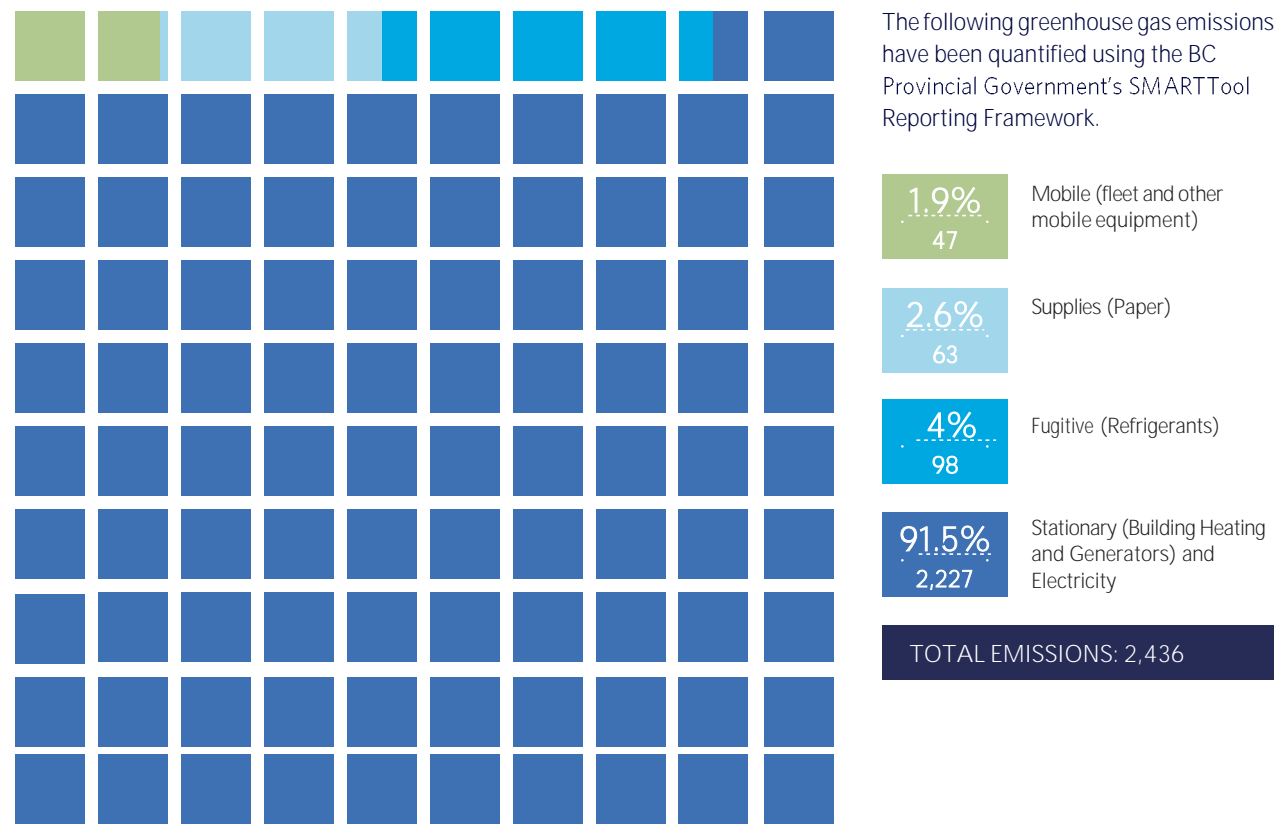
The ongoing integration of sustainable practices and implementation of energy conservation measures into UBC Okanagan research laboratories provides the campus with an invaluable opportunity. An upcoming project, scheduled for implementation in 2017, is the Lab Air Volume Control and Green Labs Education in the Science building's laboratories. Early projections indicate that energy reductions will total 278,900 kWh and 1,050 GJ, saving the campus \$26,600 in operational costs and reducing carbon emissions by 58 tCO<sub>2e</sub> annually.





# GHG EMISSIONS BY SOURCE

UBC OKANAGAN GREENHOUSE GAS EMISSIONS BY SOURCE  
FOR THE 2016 CALENDAR YEAR (tCO<sub>2</sub>e\*)



## OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2016

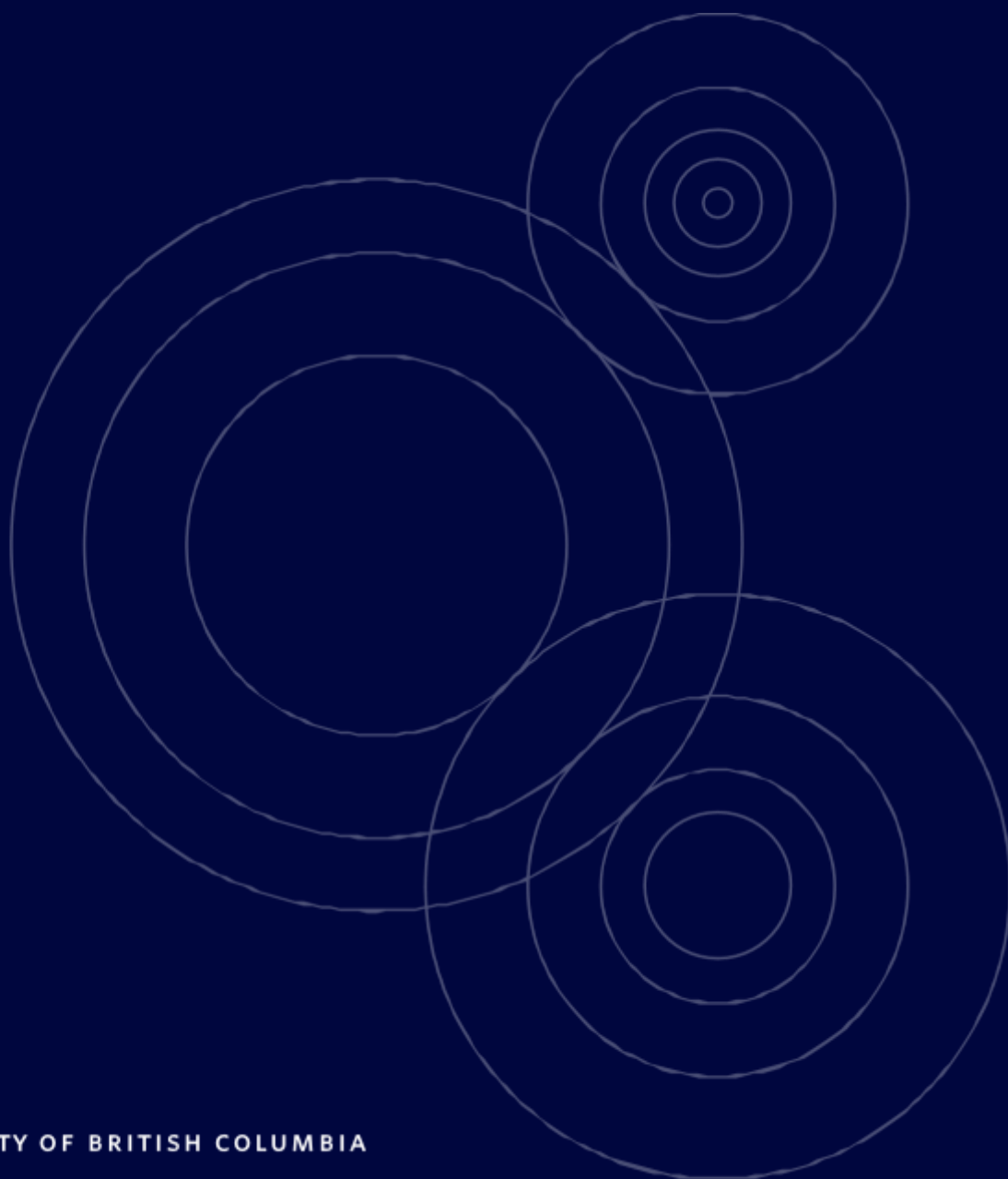
(Generated March 21, 2016 1:41 p.m.)  
Total offsets required: 2,434. Total offset investment: \$60,850.  
Emissions which do not require offsets: 2. \*\*

\*Tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) is a standard unit of measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.  
\*\* Under the Carbon Neutral Government Regulation of the Greenhouse Gas Reduction Targets Act, all emissions from the sources listed above must be reported. As outlined in the regulation, some emissions do not require offsets.





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