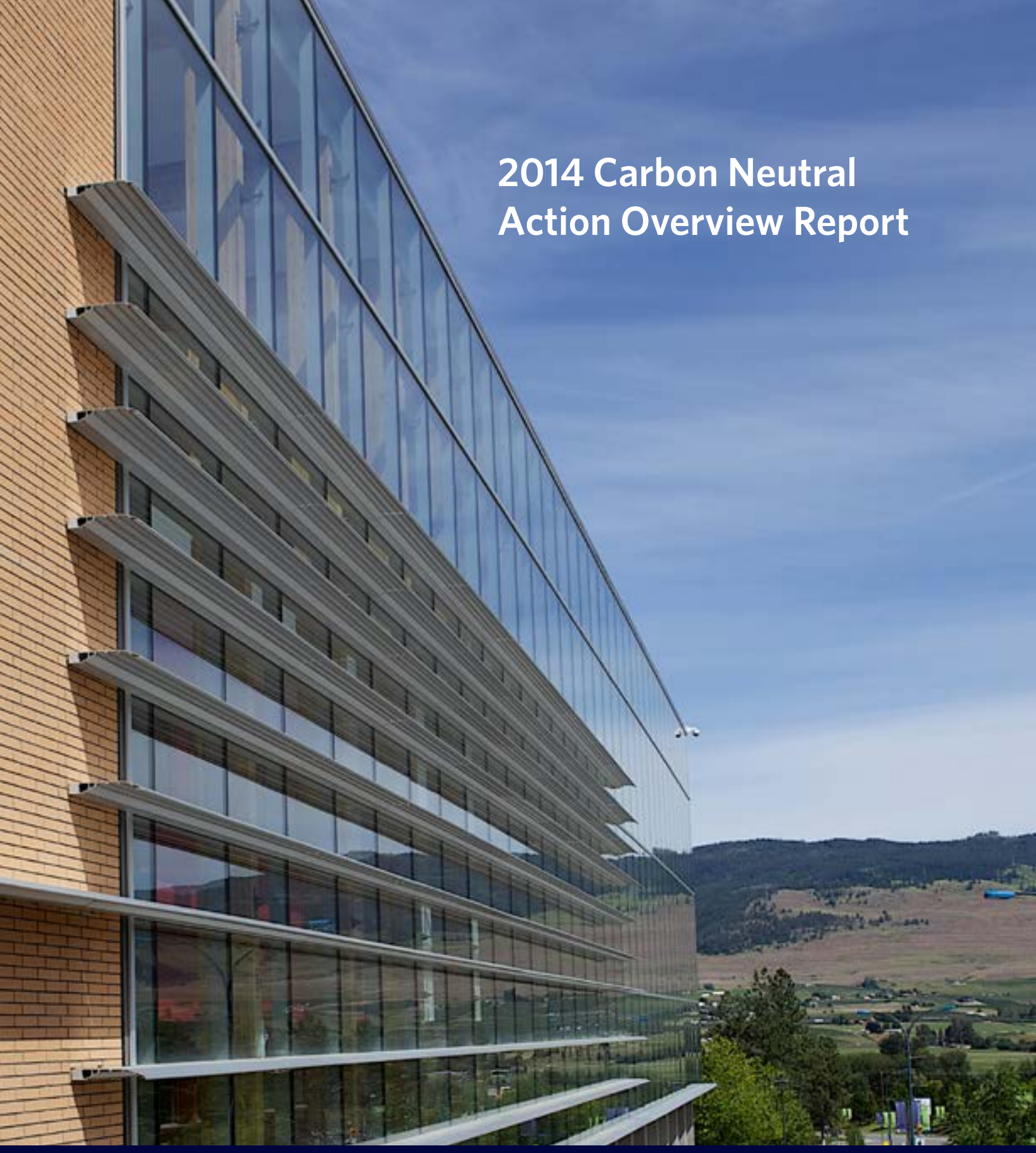

2014 Carbon Neutral Action Overview Report

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

sustainability

OKANAGAN CAMPUS

ENVISIONING A SUSTAINABLE FUTURE

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

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

Provincially mandated greenhouse gas reporting and Carbon Neutral Action Reporting for the campus are the responsibility of the UBC Okanagan Sustainability Office, Campus Planning and Development. The 2014 Carbon Neutral Action Overview Report contributes to UBC reporting submitted to the Climate Action Secretariat by providing high-level overview of the actions taken by the campus to reduce carbon emissions.

Acknowledgements
Many individuals have contributed to the development of this report. Their commitment to sustainability, collaboration and achievements has been instrumental to the advancement of the campus' collective sustainability goals and we thank them for their contributions.

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SECTION CONTENTS

OKANAGAN CAMPUS SUMMARY

2014 represented a year of review for UBC's Okanagan campus. Having more than doubled student enrolment and nearly tripled campus floor space since 2005, it was a year where our commitment to sustainable development and continuous improvement in performance was demonstrated by an absolute reduction in emissions.

Combined project funding of over $300,000 secured by the campus through the BC Provincial Government's Carbon Neutral Capital Program and partnership with FortisBC, formed the basis of our carbon emission reduction activities in 2014 as detailed in this report.

Looking ahead, UBC is updating its Okanagan Campus Plan to address future campus development needs. Demonstrating our commitment to sustainability and fiscally responsible development, we are taking a whole systems approach to planning in order to optimize the campus' sustainability resources (energy, water, waste), facilities infrastructure and ecosystems planning.

We view this approach as a key prerequisite to UBC Okanagan's long-term sustainability roadmap that will define our continued actions to support climate stewardship, resiliency, and the overall health and wellbeing of our campus community.

C. MORCOM
Acting Associate Vice-President
Finance and Operations
The University of British Columbia - Okanagan Campus

EMISSIONS OVERVIEW

2014 GREENHOUSE GAS EMISSIONS

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

Table 1: GHG Comparison by Source between 2013 - 2014

Source	2013 Emissions (tonnes CO_2e)	2014 Emissions (tonnes CO_2e)	Change from 2013 to 2014
Buildings	3017.4 (83.1%)	2746 (87.9%)	-8.99%
Fleet	35 (1%)	42 (1.3%)	+20%
Paper	73.5 (2.0%)	69 (2.2%)	-6.12%
Fugitive	504 (13.9%)	268 (8.6%)	-46.83%
Total Emissions	3,630	3,125	-13.91%
Total Offsettable emissions	3,629	3,123	-13.94%

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

Fugitive Emissions

In 2014, in-scope HFCs were 268 tCO_2e, approximately 8.6 per cent of the campus' total emissions portfolio. While in-scope fugitive emissions decreased by 236 tCO_2e in 2014 as compared to 2013, it should be noted that 2013 levels were inflated due to an uncommon chiller failure that year.

Carbon Neutral Offsets in 2014

In accordance with the campus SMARTTool[1] reporting, offsets required to achieve carbon neutrality in 2014 total 3,123 tCO_2e. As part of the Okanagan campus' 2014 GHG emissions profile 1 tCO_2e does not require offsets.

Changes to Greenhouse Gas Emissions and Offsets Reporting from Previous Years

Following the public release of the 2013 Carbon Neutral Action Overview Report, it was determined that the total emissions and offsets applied for buildings (leased-space) required adjustment. For 2013 calendar year offsets were under reported by 3 tCO_2e.

1 Protocols established in the 2014 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions.

EMISSIONS REDUCTION ACTIVITIES

ACTIONS TAKEN TO REDUCE GREENHOUSE GAS EMISSIONS IN 2014

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

A. Stationary Fuel Combustion, Electricity (Buildings)

The largest source of in-scope GHG emissions on campus derive from buildings. Absolute stationary building emissions decreased by 271 tCO_2e or 9 per cent, compared to the 2013 reporting year, which demonstrates a continued reduction trend from 2012 figures.

Relative GHG emissions per square meter has improved by 14 per cent over last year, and by 34 per cent compared to 2007, despite a 90 per cent increase in square meter since 2007.

New energy efficient campus facilities, continued optimization of campus legacy facilities and the district energy system (DES) and the promotion of energy conservation actions among building occupants are among contributing factors toward performance improvements in this area.

ACTIONS:

- First full year of operation of new high efficiency condensing boiler in the Central Heating Plant which projected 145 tCO_2e reduction per year.
- Implemented domestic hot water upgrade projects in two original academic facilities anticipated to reduce carbon emissions by *40 tCO_2e per year.
- Implementation of twenty-two Energy Conservation Measures (ECMs) in three original academic facilities under the Building Optimization Program, projected to save *43 tCO_2e per year.
- Incorporated sustainability considerations into deferred maintenance and routine capital project decisions to achieve energy and carbon savings.
- Conducted lighting retrofits and upgrades across campus.
- Fostered energy-reduction behaviour change among staff to support energy efficient actions such as turning off lights and alternatives to space heating devices.

**Emissions savings based on 2014 emission factors for natural gas consumption by buildings, as illustrated in Table 1: Stationary Fuel Combustion (p. 12) of the 2014 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions*

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

In 2014, fleet accounted for 42 tCO_2e, or 1.3 per cent of total campus emissions, up by 7 tCO_2e, largely due to a reclassification of heavy-duty vehicle fuel efficiency factors. Although there was an increase in fleet emissions from 2013, the campus has achieved a 33 per cent absolute reduction in fleet emissions since 2010.

ACTIONS:

- Replaced legacy gas golf carts with new electric models, resulting in one gas golf cart remaining in fleet inventory planned for replacement with electric in 2015.
- Completed an inventory control program for custodial supplies to centralize orders to reduce 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.
- Implemented 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.

C. Supplies (Paper)

In 2014, emissions from paper accounted for 69 tCO_2e, or 2.2 per cent of total in-scope campus emissions. While emissions from office paper have increased since 2010, comparison between 2013 and 2014 demonstrates a 6.1 per cent absolute reduction in GHG emissions attributed to this source.

ACTIONS:

- Audited print fleet to identify areas for improved energy efficiencies which supported a reduction of individual devices connected to the campus network and associated space intensification of devices
- Established default duplexing of all student print jobs.
- Preliminary work undertaken to implement PaperCut™ print tracking software to track, report and encourage the reduction of paper consumption by users.
- 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.
- Implemented high efficiency digital signs and related communications platforms to share campus news, activities and events to reduce the reliance on paper-based promotional materials.

PLANS TO CONTINUE REDUCING GREENHOUSE GAS EMISSIONS 2015-2016

A. Stationary Fuel Combustion, Electricity (Buildings)

- Complete implementation phase of building optimization program in 2015 in two remaining legacy buildings. An anticipated *145 tCO_2e annual reduction is projected for 2015 projects.
- Develop proposals to convert gas-fired hot water tanks in a legacy academic facility to heat pumps for domestic hot water use.
- Implement a proposal for chiller replacements in two legacy academic buildings.
- Re-commission and balance air, water and controls in one building per year.
- Continue to implement sub-metering and BMS enhancements for better measurement of energy consumption and conservation planning, including peak demand.
- Complete auditing of campus lighting systems to baseline to inform future lighting upgrades in buildings and parking lots.
- Focus on Okanagan Campus Plan update implementation with Whole Systems Infrastructure Plan as the main component.

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

- Continue replacement of any remaining legacy gas golf carts with new electric models for an electric-only fleet by 2016.
- Continue the 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.
- Continue to encouraging fleet carpooling, walking or cycling, and consolidating off-campus trips to reduce operational reliance on fleet vehicles.
- Launch Okanagan Car Share Co-op on campus to provide flexible and affordable alternative transportation options, reducing needs for multiple single-occupant/owner vehicles on campus, and decreasing dependence on fossil fuels.

C. Supplies (Paper)

- Complete the full implementation of PaperCut™ print tracking software to provide reporting to clients on printing. volumes to generate awareness and promote alternatives to printing.
- Xerox fleet enhancement.
- 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 implement and increase digital signs and related communications platforms to share news, activities and events to reduce the reliance on paper-based promotional materials.
- Increase replacement of desktop computers with laptops and more efficient devices as part of IT, Media & Classroom Services Computer Replacement Program.

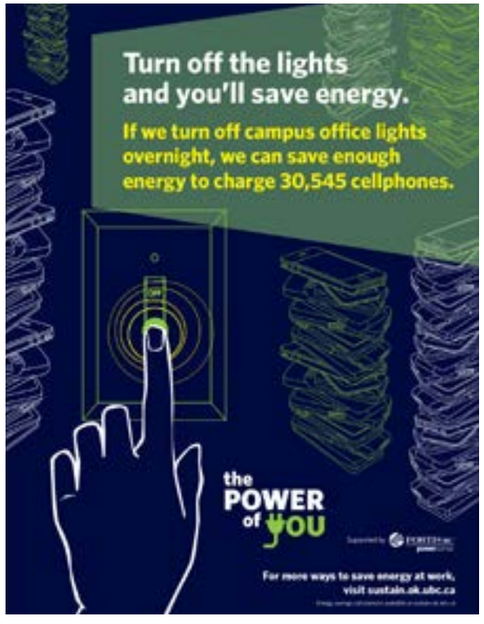
ABOVE AND BEYOND:
Promoting a Culture of Sustainability

ENERGY CONSERVATION PHILOSOPHY & PRACTICES

The Power of You

It is well-established that promoting and supporting behaviours that impact energy use can have as much or greater impact on energy savings than implementing physical retrofits alone. Founded on community based social marketing principles, in 2014, UBC Okanagan's Power of You energy conservation behaviour change program continued to provide education to staff, faculty and students with an aim to foster, promote, and assess the impact of voluntary actions to conserve energy and reduce carbon emissions. The program was made possible through $5,000 in sponsorship cash contributions and $4,000 in-kind items secured from FortisBC, in addition to the time of community ambassadors, responsible for the provision of education and support to UBC staff, faculty and students at the Power of You outreach activities and events.

In 2014, a range of educational activities took place, including Ugly Sweater Day in support the World Wildlife Fund Canada's National Sweater Day; a Focus on Labs energy reduction campaign; and a one-hour no-power challenge in support of Earth Hour. Volunteer teams were trained and deployed to lead various initiatives across the campus, helping to promote the ability of individual actions to generate collective impact. Reported use of energy conservation tools increased from 16 per cent to 53 per cent.



Departments Take the Lead to Reduce Campus Energy Consumption

In 2014, key operational departments demonstrated strong leadership in energy conservation on campus, predicated on observations of lights-on after hours in unoccupied spaces.

Based on a staff-led audit to monitor and identify areas on campus where energy efficient behaviour of building occupants could be improved, 888 lights, 18 windows and 9 projectors were turned off or closed at night. Voluntary actions and leadership to conserve energy on campus by UBC Okanagan staff demonstrate proactivity toward sustainability engagement efforts.

The Building Optimization Program

The Building Optimization Program, a partnership between UBC Okanagan and FortisBC, strategizes energy reduction in legacy academic buildings through technical retrofits and controls commissioning. In 2014, twenty-two Energy Conservation Measures (ECMs) were implemented throughout three legacy academic buildings. Collectively, the ECMs undertaken anticipate an annual reduction of 438,369 kWh and 835 GJ. This translates to a savings of 42.61 tCO_2e per year, with total energy savings more than $29,000 per year. Total sponsorship secured from FortisBC to run the three year program amounts to nearly $200,000, required to fund energy management system software, energy audits of legacy academic buildings and gas meter upgrades.

ACTIONS TO SUPPORT SUSTAINABILITY PERFORMANCE

Campus Irrigation Project

In 2014, the campus initiated an irrigation upgrade project that anticipates significant improvements in irrigation efficiency and water conservation and associated costs. The initial phase of this three year program focused on auditing existing systems and identifying deficiencies related to distribution uniformity, water savings and maintenance. Initial recommended actions will prioritize zones; install water meters by zone, and transition from spray to drip irrigation.

Lighting Upgrades and Rebates

Multiple interior and exterior lighting upgrade projects were conducted in 2014, which received nearly $8,000 in FortisBC rebates. Lighting upgrades included removing ballasted pot lights and disconnecting T-12 fluorescents and installing LED bulbs and wallpacs.

Biannual Campus Waste Audit

The campus conducted its fourth biannual waste audit in 2014 on three different waste streams - garbage, recycling, and organic waste (compost).

A day's worth of waste from twelve different academic buildings and areas on campus was collected for assessment. Twenty-one student and staff volunteers outfitted in protective gear and equipment were engaged in the audit. All waste was physically or visually sorted into five categories - recycling, returnable, compost, garbage, and other - with fourteen sub-categories indicating material type (i.e. cardboard, tin, glass, etc.). 8,377 litres of garbage, 3,304 litres of recycling, and 54 litres of organic waste was audited, resulting in an amalgamated 11,736 litres of waste audited.

The recycling and compost audits generally revealed satisfactory recycling and composting compliance. 71 per cent recyclable contents were placed in the recycling stream and 89 per cent compostable contents were placed in the compost stream. Recommendations called for consistent and improved waste stream signage, increased education about diversion of disposable cups from the waste stream, and research of composting systems that can accommodate organic waste, disposable coffee cups and foodware.

Bigbelly Smart Waste and Recycling Systems

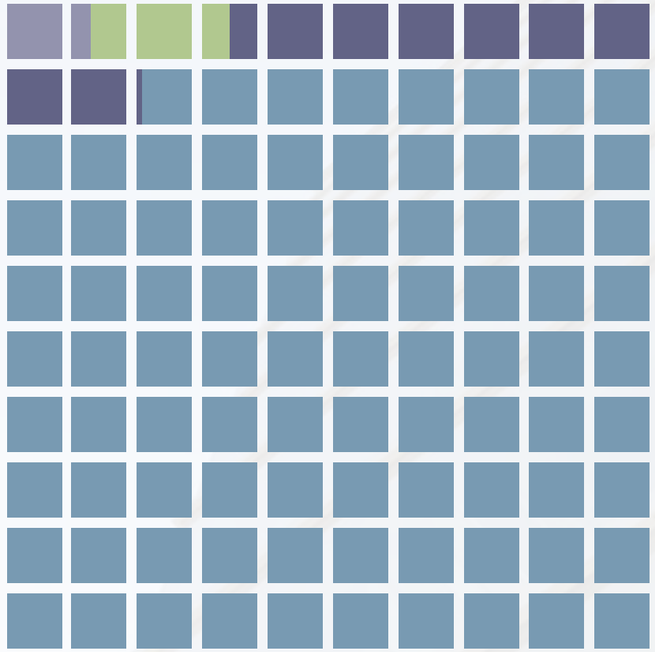
UBC's Okanagan campus piloted alternative waste and recycling platforms to achieve the University's ambitious sustainability goals. The University identified the need for a waste disposal solution that is easy to service, encourages litter reduction, diverts recycling into a separate waste stream, and saves staff labour.

To meet project needs, with an award of Carbon Neutral Capital Program Funding secured by the campus from the BC Provincial Government, the campus selected the Bigbelly Smart Waste and Recycling System. The solar-powered compactors are dual-stream waste stations (trash and recycling) within a single unit, leveraging renewable solar energy and information technology to help realize efficiency gains. Installation of seven Bigbelly stations on campus in 2014 anticipates annual GHG savings of 20 tCO_2e.

Campus Community Engagement

The campus continues to support student engagement in sustainability projects that yield benefit to campus planning and operations and student learning. Examples of projects undertaken by engineering students in 2014 include a campus district energy system and plant operational study, electrical energy and sustainability co-op study and a sustainable community project. Key outputs from the district energy and electrical study have been subsequently applied to a campus-scale sustainable infrastructure planning exercise, planned for completion in 2015.

GHG EMISSIONS BY SOURCE



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

1.3% 42	Mobile (fleet and other mobile equipment)
2.2% 69	Supplies (Paper)
8.6% 268	Fugitive (Refrigerants)
87.9% 2,746	Stationary (Building Heating and Generators) and Electricity

TOTAL EMISSIONS: 3,125

OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2014

(Generated March 30/2015 3:14 p.m.)

Total offsets required: 3,123. Total offset investment: $78,075.
Emissions which do not require offsets: 1. **

* 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.

2014 CARBON NEUTRAL ACTION OVERVIEW REPORT FOR UBC'S OKANAGAN CAMPUS

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sustainability