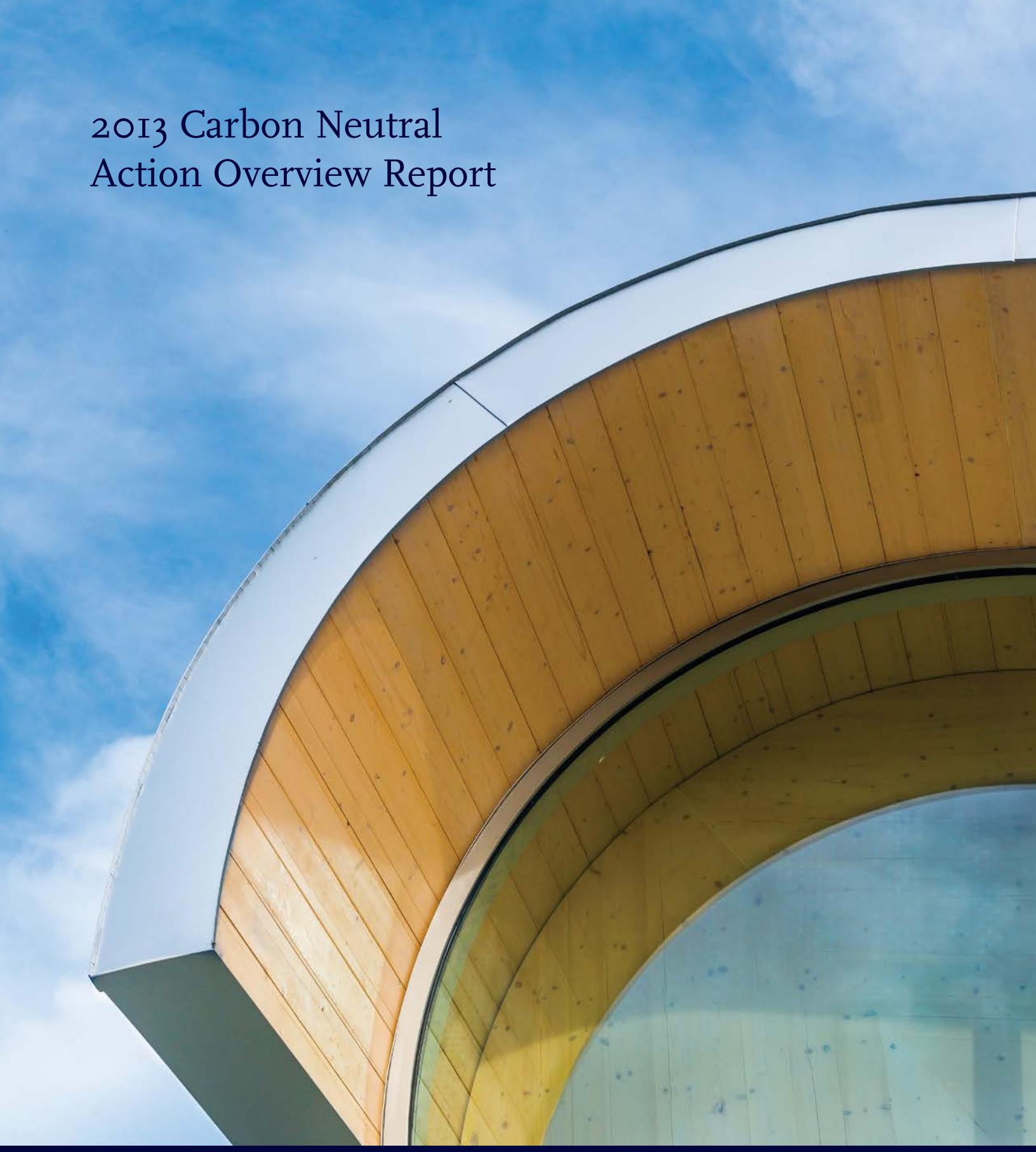
2013 Carbon Neutral Action Overview Report



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 Place & Promise: The UBC Plan.

The campus is committed to continue to responsibly steward sustainability at all organizational levels, to reduce its environmental impact and encourage a culture of sustainability. The Okanagan Sustainability Office was established to help deliver on UBC's sustainability commitments and aspires to foster leadership across the campus to broaden the impact of sustainability.

The 2013 *Carbon Neutral Actions Overview Report* was produced by the University of British Columbia, Okanagan Sustainability Office, Campus Planning and Development. It supplements the Carbon Neutral Actions Template and provides a high-level overview of the actions taken by the campus to reduce carbon emissions and create a culture of sustainability.

ACKNOWLEDGEMENTS

Many campus sustainability champions have contributed to the development of this report. Your ongoing commitments to sustainability, collaboration and accomplishments have been instrumental to the advancement of our collective sustainability goals.

Thank you for your contributions.

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EXECUTIVE SUMMARY MICHAEL SHAKESPEARE

In 2013, UBC's Okanagan campus continued to deliver on its sustainability commitments, with particular emphasis on actions to reduce energy consumption and associated emissions that have led to measurable results.

The campus' environmental performance was demonstrated by a reduction in building, fleet and paper emissions over 2012 levels, despite the addition of a Fitness and Wellness Centre. Improvements in building carbon emissions per square meter and student FTE held steady in 2013, having demonstrated notable improvement since 2007, even with significant campus growth.

Environmental performance has been achieved through targeted energy and carbon reduction efforts in four key areas – district energy, green buildings, building optimization and community engagement.

A geo-exchange district energy system delivers aquifer ground-sourced heating and cooling and allows for energy sharing between buildings. Connected to the district energy system, the Fitness and Wellness Centre addition contemplates innovation in green building design through its adherence to LEED® Gold standards and the incorporation of carbon capturing and storing properties of locally-sourced pine beetle timber. A building optimization program, established in partnership with FortisBC, strategizes energy reduction in legacy academic buildings. A publicly accessible dashboard provides real-time building energy monitoring which complements "the Power of You", a community engagement based energy conservation and awareness strategy.

Moving forward, the campus will continue to focus on enhancing campus energy performance and community engagement. Continued optimization of the district energy system and retrofits and controls upgrades in legacy facilities will be undertaken to reduce energy consumption and associated carbon emissions. The foregoing actions will be complemented by campus planning efforts that contemplate future impacts of climate change and the development of innovative approaches to meet the challenges and opportunities ahead.

MICHAEL SHAKESPEARE, AVP Finance and Operations
University of British Columbia, Okanagan Campus

2013 CARBON NEUTRAL ACTION OVERVIEW REPORT

2013 GREENHOUSE GAS EMISSIONS

The following greenhouse gas emissions have been quantified using the BC Provincial Government's SMARTTool Reporting Framework. Fugitive Emissions have been reported in the CNAR online reporting tool.

Total Emissions Calendar Year	3,630 tCO2e
Buildings	3,017.4 tCO2e
Mobile Combustion	35 tCO2e
Office Supplies	73.5 tCO2e
Fugitive	504.1 tC02e

FUGITIVE EMISSIONS

The following fugitive emissions have been deemed by the British Columbia Provincial Government as out of scope for reporting:

- Gases used for research and medical purposes
- Type R22 HFC's from refrigerating units on campus
- Any emission sources that comprise less than 1% of the campus total greenhouse gases (GHG).

In-scope HFC's have been tracked since 2010 and are included in the Total Emissions Calendar Year 2013.

In 2013, in-scope HFC's were 504.1 tCO2e, approximately 13.9% of the campus' total emissions portfolio. This unanticipated increase is attributable to a chiller breakdown, which afforded the opportunity for replacement with a more energy efficient model.

The Okanagan campus anticipates a return to modest campus fugitive emissions as reported in previous years through continuous monitoring and preventative maintenance of chiller equipment. Facilities Management remains committed to tracking and monitoring HFC's and to making adjustments where possible to minimize future emissions from these and all sources.

OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2013

Total emissions offset to become carbon neutral in 2013 as provided by SMARTTool as "total for offset" is 3629 tCO2e. 1 tCO2e reported as part of the Okanagan campus' GHG emissions profile in 2013 does not require offsets.

EMISSIONS REDUCTION ACTIVITIES

ACTIONS TAKEN TO REDUCE GREENHOUSE GAS EMISSIONS IN 2013

The following provides a high-level overview of actions and plans reported in the CNAR Actions Table.

A. Stationary Fuel Combustion, Electricity (Buildings)

The largest source of in-scope greenhouse gas emissions on campus derive from buildings. Absolute stationary building emissions decreased by over 106 tCO2e or 3.4%, compared to the 2012 reporting year, from 3,123.5 tCO2e in 2012 to 3,017.4 tCO2e in 2013 respectively.

Relative building greenhouse gas emissions per square meter has held relatively steady over the past several years, with an overall efficiency of 27% between 2007 and 2013 despite a 95% increase in square meter during this timeframe. Continued optimization of the campus district energy system, the integration of sustainable design concepts in building additions and renovations, and the promotion of voluntary actions to promote energy conservation among building occupants are among the contributing factors toward greater efficiencies and absolute emission reductions in this area.

ACTIONS:

- Completed the Fitness and Wellness Centre addition to the Gymnasium building to LEED® Gold standard, in line with the University's sustainable building and technical requirements.
- Replaced and upgraded a campus boiler in the Central Heating Plant with a new high efficiency condensing boiler which is anticipated to reduce campus greenhouse gas emissions by 145 tCO2e per year. The project was supported by FortisBC's Efficient Boiler Replacement Program which awarded the campus a $97,200 rebate. Complementary lighting retrofits were completed in the Central Heating Plant to replace incandescent lights with LED standard to reduce energy consumption and maintenance requirements.
- Replaced a damaged chiller with a new energy-efficient model to save 5% in annual energy costs.
- Completed 33% air-balancing of HVAC units into renovation of the Administration building for greater energy efficiency.
- Completed an intensification retrofit of valance lighting in the Administration building by replacing five hundred T12 34 watt fixtures (17,000 W) with three hundred T5 8 watt fixtures (2,400 W). The

transition away from inefficient T8 light bulbs to high-efficiency LED light bulbs resulted in 14,600 watts of immediate power savings.

- Completed the baseline phase of the Building Optimization Program in 2013, which involved monitoring building energy consumption in nine academic buildings, providing real-time feedback through a public dashboard.
- Launched first year of the Power of You (PoU) behavior change energy conservation and engagement strategy to encourage staff to take responsibility for reducing power consumption on campus.

B. Mobile Fuel Combustion

Although there was a slight increase in the number of campus fleet vehicles in 2013, the campus achieved a 22.7% reduction in fleet GHG emissions. This decrease was a result of a reduction in fuel consumption in faculty fleet and off-road vehicle fleet. In 2013, fleet accounted for 35 tCO2e, or 1% of total campus emissions. The campus has achieved a 48.5% absolute reduction in fleet emissions since 2010.

ACTIONS:

- 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.
- Replacement of two legacy gas golf carts with two new electric golf carts. Provided supplemental awareness training on the use of electrical vehicle charging stations on campus.
- 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 combining off-campus trips intended for staff errands and tasks.

C. Supplies (Paper)

In 2013, emissions from paper accounted for 73.5 tCO2e, or 2% of the total of in-scope campus emissions. While office paper use has increased by 14.7% since 2010, comparison between 2012 and 2013 demonstrates a 2.7% absolute reduction in GHG emissions attributed to this source.

ACTIONS:

- Sourced 100% of the University's paper supply with a minimum of 30%, 50%, or 100% post-consumer recycled content as standard University policy.
- Incorporated the procurement and use of wheat sheet paper as an alternate paper source.
- Developed an internal online ordering webpage to facilitate the purchase of non-virgin paper.
- Reduced office paper delivery to campus from five days to two days as part of OfficeMax Grand & Toy's "Right Day Delivery" to help reduce scope three emissions associated with delivery of office paper supplies to campus.

PLANS TO CONTINUE REDUCING GREENHOUSE GAS EMISSIONS 2013-2014

A. Stationary Fuel Combustion, Electricity (Buildings)

- Roll-out the implementation phase of the Building Optimization Program to reduce energy consumption and emissions through technical retrofits and controls changes in legacy academic buildings.
- Continue existing efforts in campus community engagement to reduce energy consumption through the Power of You program.
- Continue to reduce energy consumption and associated GHG emissions by replacing inefficient equipment with high efficiency models.
- Continue to optimize the district energy system (DES) for greater operating efficiencies.
- Continue to provide education to the campus on the Pulse Public Energy Dashboard to provide building occupants with real time energy consumption feedback.
- Continue to maximize efficient space allocation in campus facilities.
- Continue to monitor and mitigate fugitive emissions by preventative maintenance and upgrades.

B. Mobile Fuel Combustion

- Encourage on-site contractors to adhere to anti-idling practices on campus.
- Continue the replacement of retired fleet vehicles with electric and energy efficient models, as well as purchase of new vehicles to energy efficient standard.
- Promote carpooling, car-sharing, and other forms of sustainable transportation on campus.

C. Supplies (Paper)

- Enable the use of print tracking software to provide reporting to clients on printing volumes to generate awareness and promote alternatives to printing.
- Continue to promote minimum 30% or greater post-consumer recycled paper content.
- Ensure that wheat sheet paper is available to order from the custom list as an alternative source to tree-derived paper.
- Implement digital signs, and related communications platforms to share campus news, activities, and events to reduce the reliance on paper-based promotional materials.

WHEAT PAPER AS AN ALTERNATE PAPER SOURCE

At UBC Okanagan, DOUG ANDREWS, Manager, Payment and Procurement strongly supports the use of alternate paper sources such as wheat sheet paper. See opposite page for further details.

ABOVE AND BEYOND:

Additional Measures to Reduce Emissions and Promote a Culture of Sustainability 2013

ENERGY CONSERVATION PHILOSOPHY & PRACTICES

THE POWER OF YOU

The Power of You is a two-year, executive endorsed, energy reduction awareness and engagement program developed by the Sustainability Office, in collaboration with many operational units on campus. Sponsored by FortisBC, the program was developed to encourage voluntary energy conservation actions on the part of campus constituents to complement the Building Optimization Program for greater energy reduction and associated cost avoidance. Data gathered from a campus baseline survey informed the program's development which involved volunteer recruitment and training and a range of engagement and energy conservation activities. In its first year, activities and awareness centered on energy conservation practices, such as turning off the lights and powering down computers and lab equipment, with targeted outcomes. For instance, a Lights Out Challenge yielded a participation rate of 49% and an 11% reduction in energy consumption in academic buildings over the one-hour time period compared to baseline. Conserving this amount of energy every noon hour for a year would save the campus $44,000 annually.

Power of You volunteers

The second year of the Power of You program will be developed and deployed in 2014/15 and will remain focused on community engagement and education toward voluntary actions to achieve ongoing environmental stewardship and conservation.

SUSTAINABLE RENOVATION OF LEGACY CAMPUS BUILDINGS

In 2013, significant renovations were undertaken to the University's Administration building. Aligned with UBC's sustainability commitments and technical guidelines, lighting retrofits, air balancing, and small structural renovations were completed to achieve sustainability performance and best practices in construction. Adjusting and regulating air flows contributed to a more comfortable indoor temperature and environment, improved humidity control, and increased heating and cooling efficiency, as well as energy savings.

Complementing the focus toward greater energy efficiency, the renovation project incorporated responsible waste management, the re-use and recycling of resources and the incorporation of low VOC materials. One thousand and seventy-one kilograms (1071 kg) of post-renovation demolition carpet tiles, which had an estimated remaining life expectancy of 20+ years, were donated to Habitat for Humanity. Existing doors and metal frames were also salvaged or re-purposed. Actions taken during the Administration building renovation highlight a coordinated approach and overall commitment to sustainability across all operational levels.

CENTRAL HEATING PLANT BOILER REPLACEMENT

Nearing a 25 year lifecycle, in 2013 a decision was made to replace an existing campus boiler with a new, high efficiency condensing boiler in the campus' Central Heating Plant. When running as supplemental to the district energy system, the new boiler is expected to increase energy efficiency, reduce utility costs and reduce campus GHG emissions by 145 tCO2e per year. The new boiler has resulted in improved operation and life cycle of the Central Heating Plant and flexibility in the case that future loads decrease.

MARTIN GIBB, Manager, Operations and Utilities, was a key player in the Boiler Replacement Project.

DO IT IN COLD WATER

Student Residence Cold Water Washing Pilot

As a component of the Power of You Program, "do it in cold water" – a student-focused behavior change pilot project was developed to engage students living in the Nicola Residence in actions they could take to reduce energy consumption and associated greenhouse gas emissions on campus.

The Nicola Residence is home to nearly 200 students, and is equipped with many amenities, including laundry facilities. With an overall objective to encourage the use of cold water settings for laundry washing as an alternate to hot or warm settings, students were engaged in a series of information sessions to generate awareness and determine ways in which they could participate in the initiative.

Water meters were installed to measure the volume of hot water used in the laundry facilities. Following a baseline phase, the pilot was deployed. Behaviour change strategies involved personal engagement with students in common areas, the use of social media such as Facebook and targeted education provided by Resident Advisors. The use of visual cues and reminders such as posters and tracking sheets posted at each machine helped the students document the frequency of cold-cold, warm-cold, and hot-warm load choices. The program's outcomes were evaluated primarily by measuring changes in the volume of hot water used for washing, supplemented with information from tracking sheets and survey information gathered pre and post program implementation.

As a result of changing their laundry washing choices, the students achieved an overall reduction of hot water use for laundry by 27%. It is anticipated that increased awareness will endure as the pilot outcomes and conservation philosophy are broadly shared.

THE HANGAR FITNESS & WELLNESS CENTRE ADDITION

The University's new Fitness and Wellness Centre (FWC), known as the "The Hangar" due to its design references to aviation, was completed to occupancy in 2013. An addition to the existing campus Gymnasium facility, the FWC was built to LEED® Gold equivalent standard.

A key consideration of the project was the optimization of innovative wood construction technology. To align with the Okanagan aesthetic and maximize sustainability, the FWC was crafted primarily with locally sourced beetle-kill wood configured in cross-laminated timber panels (CLT). The carbon-capturing and carbon-storing properties of this structure help to mitigate the campus' carbon footprint while maximizing environmental performance, malleable design, affordability, and structural reliability. Further, the CLT provides a natural finished surface, where interior finishing would have otherwise been required. In addition to multiple environmentally-sound properties, CLT also provides excellent acoustics, fire protection, strength, and thermal insulation.

The FWC's energy efficiency has been designed to exceed the Model National Energy Code for Buildings by a projected 45%. It is connected to the campus geo-exchange district energy system for heating and cooling requirements, crucial to maintain the temperature required for optimal sport performance, while reducing associated costs and emissions. Exterior sunshades and glazing were utilized to reduce cooling demands and improve the building's heating and cooling efficiency. Low-flow water fixtures installed are projected to reduce water consumption by approximately 40%. Supported by the University's first campus as a living laboratory xeriscaping project, drought-resistant, native plants were incorporated into the landscape design to manage low-water conditions and further reduce water demands and associated maintenance requirements. The FWC is a prime example of innovative green building design and construction practices that the University is committed to achieve in its building and renovation projects.

INNOVATION AND RECOGNITION

KELOWNA CHAMBER OF COMMERCE BUSINESS EXCELLENCE AWARDS – GREEN INNOVATOR

One of only three nominees for the prestigious Business Excellence Awards presented by the Kelowna Chamber of Commerce in 2013, UBC's Okanagan campus was acknowledged as a nominee for its strategic approach and achievements in sustainability. The nomination recognized the campus for its innovative approaches to environmental sustainability; for its methodology, accountability, and measurement of environmental impacts; and for incorporating green initiatives into its campus facilities and overall campus design. UBC's business strategy, innovative practices, measurable results, and competitive advantage were key principles recognized. UBC's enduring commitment to sustainability at the governance level and demonstrated sustainability achievements at all organizational levels was recognized as a model to other organizations seeking to advance their sustainability agenda.

REICHWALD HEALTH SCIENCES CENTRE

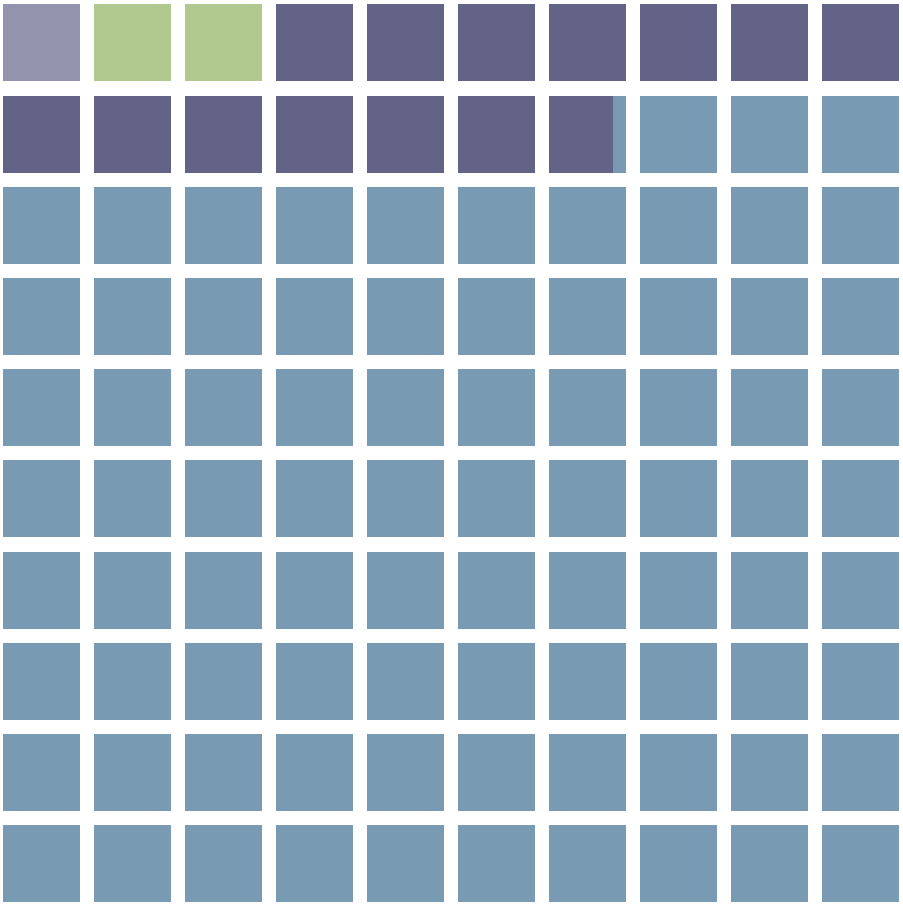
The Reichwald Health Sciences Centre (RHS) was a Gold Winner in the 'Best Outside of the Box' category during the 2013 Tommie Awards hosted by the Canadian Home Builders' Association of the Central Okanagan. LEED® Gold certified RHS was recognized for its sustainable construction, design features, and technologies to conserve water, energy, and reduce campus GHG emissions.

FORTISBC'S EFFICIENT BOILER PROGRAM REBATE

In 2013, the UBC Okanagan campus received $97,200 in a FortisBC Efficient Boiler Program rebate for the replacement of an inefficient boiler in the Central Heating Plant. Playing a direct role in reducing energy consumption and GHG emissions, the new boiler also works to save the campus operating costs and improves the performance of campus facilities. Implementing measures to reduce utility consumption through the installation of new energy efficient equipment, in conjunction with financial rebate opportunities, demonstrates continuous improvements led by the Okanagan campus to conserve energy.

GREENHOUSE GAS EMISSIONS BY SOURCE

FOR THE 2013 CALENDAR YEAR (tCO_2e*)



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

1.0% 35	Mobile (fleet and other mobile equipment)
2.0% 74	Supplies (Paper)
13.9% 504	Fugitive (Refrigerants)
83.1% 3,017	Stationary (Building Heating and Generators) and Electricity

TOTAL EMISSIONS: 3,630

OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2013

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Total offsets required: 3,629. Total offset investment: $90,725.
Emissions which do not require offsets: 1. **

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

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

2013 CARBON NEUTRAL ACTION OVERVIEW REPORT FOR UBC'S OKANAGAN CAMPUS

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