Carbon Neutral Action Report

British Columbia Institute of Technology

2013

Executive Summary

In the classroom, with its research, or through its operations—the British Columbia Institute of Technology is well-known for transforming innovative ideas into real results. As a strong supporter of the province's mission to reduce energy use and greenhouse gas (GHG) emissions, the institute has applied this results-driven approach to its sustainability practices.

Over the years, BCIT has developed and launched several initiatives in support of the carbon neutrality of British Columbia's public sector. Putting sustainability strategy into action, the institute has made its campuses living laboratories, where examples of environmental stewardship are always evolving.

This Carbon Neutral Action Report (CNAR) details the many notable activities that BCIT has undertaken in 2013. For example, this past year, BCIT substantially completed construction for Energy OASIS, its electric car "fueling" stations project, which will be fully operational in 2014. The institute also completed a full upgrade of the HVAC system in its welding training building, reducing BCIT's emissions by up to 270 tonnes of CO_2 per year.

As the largest polytechnic institute in Western Canada, BCIT is integral to the social, economic, and environmental prosperity of the province. It is committed to constantly looking for innovative ways to tackle the challenges that affect the lives of all British Columbians.

Declaration Statement:

This is the 2013 Carbon Neutral Action Report for the British Columbia Institute of Technology. This report contains the institute's 2013 emissions profile, offsets purchased, the actions taken in 2013 to reduce GHG emissions and the institute's plans to continue reducing emissions in 2014 and beyond.

By June 30 BCIT's final CNAR will be posted on our website at www.bcit.ca/facilities/sustainability/energy.

Emissions and Offsets Summary:

BCIT GHG Emissions and Offsets for 2013 (tCO_2E)	
GHG emissions created in calendar year 2013	
Total emissions	8,567
Total emissions for offsets	8,565
Adjustments to GHG emissions reported in previous years	
Total emissions	-223
Total emissions for offsets	-223
Credit owing from PCT at end of 2012 reporting year	
Credit owing	n/a
Total emissions for offsets for the 2013 reporting year	**8,342**

Lorcan O'Melinn
Vice President, Finance and Administration

May 26/14.
Date

2013 Greenhouse Gas Emissions

In 2013, the total GHG emissions for BCIT was 8,567 tCO_2e.

Offsets Applied to Become Carbon Neutral in 2013

BCIT purchased 8,565 tCO_2e of offsets to become carbon neutral. The variance of two tCO_2e were from biomass emissions and do not require offsets.

Changes to Greenhouse Gas Emissions and Offsets Reporting from Previous Years

This report includes an adjustment of -223 tCO_2e emissions for the following:

- A correction to 2012 data to account for a natural gas meter at the BCIT Marine Campus that was reported twice in SMARTTool in error. This resulted in an emissions reduction of -275 tCO_2e.
- 52 tCO_2e were purchased as an adjustment to offsets from 2012. These offsets were for December 2012 invoices not yet received prior to the 2012 reporting.

Emissions Reduction Activities in 2013

Key initiatives taken between January 1, 2013 and December 31, 2013 to reduce greenhouse gas emissions include:

- Substantially completed construction for Energy OASIS project, which is a blueprint for future electric car "fueling" stations in Canada. A 250-kW photovoltaic system with a 500-kWh lithium-ion battery energy storage system has been constructed. The system powers two level-3 (DC Fast Charge) and two level-2 electric vehicle chargers. It also includes three ION 7650 smart meters and a power analyzer for data measurement of the system and its components. The OASIS

Energy OASIS, BCIT's electric car "fueling" station

system will be fully operational in 2014.

- Completed a full upgrade of the HVAC system in the NE8 welding training building. The constant volume make-up air units and fixed exhaust system were upgraded to a full on-demand variable air-volume delivery and extraction system. The new system allows for selective, localized ventilation while meeting air-quality requirements. It is estimated the new ventilation system will save up to 600,000 kWh/yr of electricity and up to 5,000 GJ/yr of natural gas. These savings will reduce BCIT's emissions by up to 270 tonnes of CO_2 per year.

- Fine-tuned and re-commissioned the DDC system at the Aerospace and Technology campus to optimize the operation of the ground-source heat pumps. The optimization of the heat pump process facilitates calling the boilers to operate only when needed. This allows more energy to be extracted from the ground and requires less supplemental natural gas to heat the building. This resulted in a natural gas consumption savings of 2,498 GJs and an electrical consumption savings of 675,840 kWh.

- Created The Loop (spearheaded by the IT Services department), an internal online venue for BCIT staff to connect with colleagues, share content, and collaborate. Many departments are sharing documents and having discussions within The Loop, reducing the need to hold in-person meetings, which reduces travel between buildings and campuses and decreases the need to print meeting agendas and create paper handouts.

- Completed the Schematic Design for a 200-kW biomass boiler system that will convert BCIT woodworking programs waste into energy used to heat building NE1.

- Registered the Aerospace and Technology and Downtown Campus in the BC Hydro/FortisBC continuous optimization program. Work is set to start in early 2014.

New water smart planter's contain a water storage receptacle that allow for self watering

- Completed phase 3 of parking lot lighting safety improvements by replacing 90 250-watt HID parking lot lights with 142-watt LED lights.
- Replaced campus square courtyard HPS lighting with high-efficiency LED lighting.
- Initiated a pilot program for interior LED harvesting lighting in the SE1 building's atrium.
- Installed two level-2 electric vehicle chargers at the Downtown Campus as well as two more at the SW1 Gateway building at the Burnaby Campus. One level-2 EV charger was upgraded at the CARI building.
- Installed a 15-kW photovoltaic system on the Gateway building roof and brought it online in November 2013.
- Installed a 75-kWh lithium-ion battery energy storage system for the SE8 Steam Turbine Generator.
- Replaced the cooling towers at buildings NE1 and SE2 with more energy-efficient units. The new NE1 tower is anticipated to save 60,000 kWh over the old unit.
- Implemented partial NE1 fourth-floor HVAC upgrade, converting from constant volume reheat to VAV reheat.
- Interlocked shop exhaust fans with occupancy sensors at the Aerospace and Technology campus, resulting in an average reduced run time of four hours per day per fan.
- Interlocked shop heating controls with hangar doors at the Aerospace and Technology Campus to prevent heating loss when the doors are open.
- Completed main air handling unit coil cleaning at the Downtown Campus and BCIT Marine Campus as an energy-saving project.
- Upgraded the Power Factor Correction capacitor bank at

Electric car charging at the AFRESH EV charge station

the Downtown Campus, reducing penalties levied and lowering overall energy consumption by 2.54 percent.

- Added the chiller at the BCIT Marine Campus to DDC controls, optimizing operation starts and control temperatures.
- Added a variable frequency drive to Exhaust Fan #2 at the BCIT Marine Campus. The unit was oversized and operating at 100 percent, and is now running at an average of 20 percent load.
- Added a damper section to stairwell open windows, reducing the heat load during occupied times at the BCIT Marine Campus.
- Recommissioned the boiler at the BCIT Marine Campus. This resulted in a reduced load on gas consumption.
- Began the design of the new 25-kV receiving and distribution centre improving electrical distribution for the south campus.

Actions to Reduce Provincial Emissions and Improve Sustainability

- Reinstated a "Sustainability" category in the BCIT Employee Excellence Awards and the first award was delivered.
- Launched a commute-smart campaign (held by The Green Team). The goal of the Commute Smart Challenge was to get the BCIT community out of their cars and try different ways of getting to work, reducing single-occupancy vehicle (SOV) trips to and from campus and to share stories about how this was done.
- Initiated a pilot program and installed 13 water-smart planter containers at the Burnaby Campus that included a water storage receptacle that allows for self watering and reduces wasted water.
- Transitioned from gas to electric equipment (including a 36V battery-operated WorX-brand lawn mower, 18.5V battery-operated Core-brand grass edger/trimmers, and 18.5V battery-operated power hedge pruners) for landscapers to use at the

BCIT's Aerospace and Technology Campus

Aerospace and Technology Campus and BCIT Marine Campus.

- Began recycling all plastic bags used in food production at the cafeterias. Styrofoam from IT Services and Receiving departments is also being recycled.
- Continued renewal program to upgrade flush valve sensors for sinks, toilets, and urinals on the northeast section of the campus to conserve water.
- Updated BCIT's cycling website with Local Bike News, Facilities information, Resources, and Events to encourage cycling to work/school and meetings (bcit.ca/cycling).
- Recognized by HUB as a bike-friendly business (https://bikehub.ca/bike-friendly-business/directory)
- Replaced the cafeteria kitchen washdown spray nozzles with Fortis energy-efficient models to conserve water.
- Created a dry streambed designed to mitigate water runoff outside the SE12 building. Flowering plant species were introduced to attract pollinating insects and provide nectar for birds. The installation of native plant species also aids in water conservation due to higher levels of drought tolerance.
- Submitted an institute-wide sustainability policy, number 1010: Economic, Social, and Environmental Sustainability, to public review for 30 days. Adoption will be in early 2014.

Dry streambed outside SE12 designed to mitigate water runoff

Plans to Continue Reduction of Greenhouse Gas Emissions in 2014

BCIT will be focusing on the following key areas to reduce greenhouse gas emissions in the coming year:

- The energy OASIS project in parking lot 7 at the Burnaby Campus has reached substantial completion. The OASIS system will be made fully operational in 2014 and consists of a 250-kW photovoltaic system, 500-kWh lithium-ion battery energy storage system for the photovoltaics, two level-3 (DC Fast Charge) electrical vehicle chargers, two level-2 electrical vehicle chargers, three ION 7650 smart meters, and a power analyzer for data measurement of the OASIS system and components.
- The design of the new 25-kV south campus receiving and distribution centre will be finalized and construction will begin. This will include preparation for the transition from 12.5-kV distribution to 25-kV.
- LED lighting upgrades are planned for the CARI building. Obsolete T12 and HID lighting will be replaced with LED.
- Campus building and outdoor night lighting levels will continue to be reviewed and reduced where practical.
- The ground-source heat pump plant in SW1 will be recommissioned.
- The campus utility master planning exercise will begin.
- The food-waste pilot program (implemented in January 2014 in the NE1 and SE2 cafeterias), will be expanded to help BCIT meet Metro Vancouver's 2015 zero-waste mandate.

Guichon Creek restored into a thriving habitat

2013 Carbon Neutral Action Report (CNAR) - Part 2 ACTIONS

Created Wednesday, February 05, 2014
Updated Monday, May 26, 2014
http://fluidsurveys.com/surveys/cas-z/2013-cnar-form-bps-actions/4db8719846ad03a6bc2b74d8b3cf385a/

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Please complete the following sections of the 2013 Carbon Neutral Action Report form. Save your work frequently to prevent it from being lost. You can also save a copy for your own use as either a WORD or PDF file using the buttons at the bottom of each page.

This is Part 2 of the Carbon Neutral Action Report form. This section reports on actions taken to reduce emissions during the 2013 calendar year. This information will be included in your final Carbon Neutral Action Report posted on the Ministry of Environment website.

When the form is complete press the submit button on the last page to automatically submit the information to the Climate Action Secretariat (CAS). Do not press submit before you are ready – this may result in a loss of work.

In addition to completing this survey (Part 1 2), you are required to submit your completed Overview (Executive Summary) and Self-Certification Checklist. The 2013 Overview template was included in the email sent and can also be found on the LiveSmart leaders Community.

Please ensure you meet the following reporting deadlines:

A DRAFT 2013 CNAR is due to CAS by March 31, 2014. The draft is comprised of the Overview ONLY (no excutive sign-off required).

The FINAL 2013 CNAR is due to CAS by May 30, 2014. The final 2013 CNAR includes Part 1 Part 2 survey form and Overview.

The Self-Certification Checklist is due to CAS by May 15, 2014.
For more information about the Carbon Neutral Government process, please refer to *Becoming Carbon Neutral 2013*, or should you have any questions please contact climateactionsecretariat@gov.bc.ca.

Organization Name

British Columbia Institute of Technology

Actions Taken to Reduce Emissions

1) Stationary Fuel Combustion, Electricity (Buildings):

Indicate which actions were taken in 2013:

Performed energy retrofits on existing buildings

Yes

Built or are building new LEED Gold or other "Green" buildings.

No

Undertook an evaluation of overall building energy use.

Yes

Please list any other actions taken to reduce emissions from Buildings:

-Completed a full upgrade of the HVAC system in the NE8 welding training building. The constant volume make-up air units and fixed exhaust system were upgraded to a full on-demand variable air-volume delivery and extraction system. The new system allows for selective, localized ventilation while meeting air-quality requirements. It is estimated the new ventilation system will save up to 600,000 kWh/yr of electricity and up to 5,000 GJ/yr of natural gas. These savings will reduce BCIT's emissions by up to 270 tonnes of CO2 per year.
-Fine-tuned and re-commissioned the DDC system at the Aerospace and Technology campus to optimize the operation of the ground-source heat pumps. The optimization of the heat pump process facilitates calling the boilers to operate only when needed. This allows more energy to be extracted from the ground and requires less supplemental natural gas to heat the building. This resulted in a natural gas consumption savings of 2,498 GJs and an electrical consumption savings of 675,840 kWh.
-Completed the Schematic Design for a 200-kW biomass boiler system that will convert BCIT woodworking programs waste into energy used to heat building NE1.
-Registered the Aerospace and Technology and Downtown Campus in the BC Hydro/FortisBC continuous optimization program. Work is set to start in early 2014.
-Completed phase 3 of parking lot lighting safety improvements by replacing 90 250-watt HID parking lot lights with 142-watt LED lights.
-Replaced campus square courtyard HPS lighting with high-efficiency LED lighting.
-Initiated a pilot program for interior LED harvesting lighting in the SE1 building's atrium.
-Installed a 15-kW photovoltaic system on the Gateway building roof and brought it online in November 2013.
-Installed a 75-kWh lithium-ion battery energy storage system for the SE8 Steam Turbine Generator.
-Replaced the cooling towers at buildings NE1 and SE2 with more energy-efficient units. The new NE1 tower is anticipated to save 60,000 kWh over the old unit.
-Implemented partial NE1 fourth-floor HVAC upgrade, converting from constant volume reheat to VAV reheat.
-Interlocked shop exhaust fans with occupancy sensors at the Aerospace and Technology campus, resulting in an average reduced run

time of four hours per day per fan.
-Interlocked shop heating controls with hangar doors at the Aerospace and Technology Campus to prevent heating loss when the doors are open.
-Completed main air handling unit coil cleaning at the Downtown Campus and BCIT Marine Campus as an energy-saving project.
-Upgraded the Power Factor Correction capacitor bank at the Downtown Campus, reducing penalties levied and lowering overall energy consumption by 2.54 percent.
-Added the chiller at the BCIT Marine Campus to DDC controls, optimizing operation starts and control temperatures.
-Added a variable frequency drive to Exhaust Fan #2 at the BCIT Marine Campus. The unit was oversized and operating at 100 percent, and is now running at an average of 20 percent load.
-Added a damper section to stairwell open windows, reducing the heat load during occupied times at the BCIT Marine Campus.
-Recommissioned the boiler at the BCIT Marine Campus. This resulted in a reduced load on gas consumption.
-Began the design of the new 25-kV receiving and distribution centre improving electrical distribution for the south campus.

2) Mobile Fleet Combustion (Fleet and other vehicles):

Indicate which actions were taken in 2013:

Do you have a fleet?

Yes

Replaced existing vehicles with more fuel efficent vehicles (gas/diesel)

No

Replaced existing vehicles with hybrid or electric vehicles

No

Reduced the overall number of fleet vehicles

No

Took steps to drive less than last year

Yes

Please list any other actions taken to reduce emission from fleet:

-Updated BCIT's cycling website with Local Bike News, Facilities information, Resources, and Events to encourage cycling to work/school and meetings (bcit.ca/cycling).
-Recognized by HUB as a bike-friendly business (https://bikehub.ca/bike-friendly-business/directory)
-Created The Loop (spearheaded by the IT Services department), an internal online venue for BCIT staff to connect with colleagues, share content, and collaborate. Many departments are sharing documents and having discussions within The Loop, reducing the need to hold in-person meetings, which reduces travel between buildings and campuses and decreases the need to print meeting agendas

and create paper handouts

3) Supplies (Paper):

Indicate which actions were taken in 2013:

Used less paper than previous year

No

Used only 100% recycled paper

No

Used some recycled paper

Yes

Used alternate source paper (Bamboo, hemp, etc.)

No

Please list any other actions taken to reduce emissions from paper use:

-Created The Loop (spearheaded by the IT Services department), an internal online venue for BCIT staff to connect with colleagues, share content, and collaborate. Many departments are sharing documents and having discussions within The Loop, reducing the need to hold in-person meetings, which reduces travel between buildings and campuses and decreases the need to print meeting agendas and create paper handouts
-The use of SharePoint as a document management system is increasing within the organization. Many documents are being saved to departmental SharePoint sites to prevent the need to print them. A SharePoint course was held at the 2013 PD Day in June.

Actions Taken to Reduce Emissions - continued

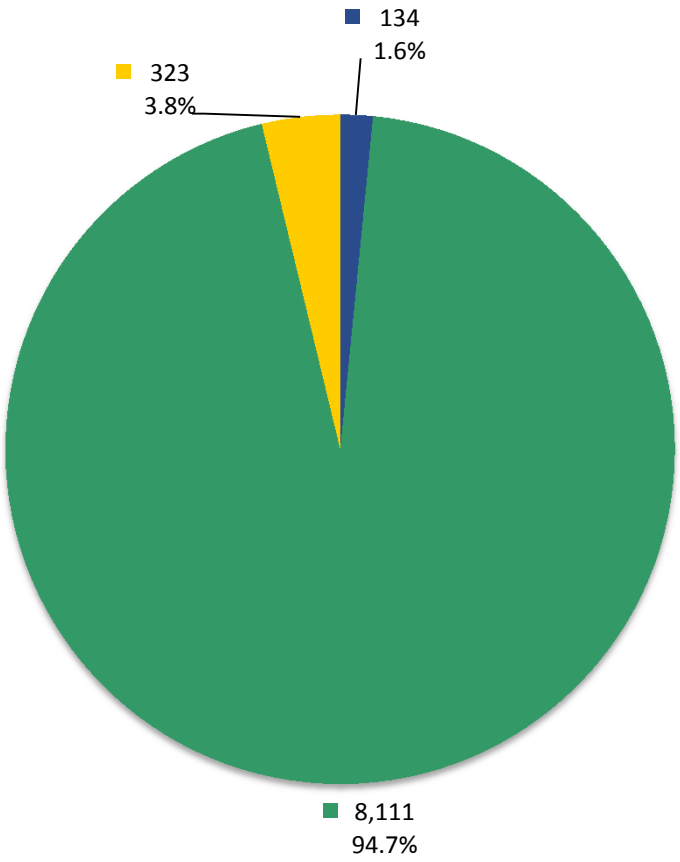
Explain how you plan to continue minimizing emissions in 2014 and future years:

-The energy OASIS project in parking lot 7 at the Burnaby Campus has reached substantial completion. The OASIS system will be made fully operational in 2014 and consists of a 250-kW photovoltaic system, 500-kWh lithium-ion battery energy storage system for the photovoltaics, two level-3 (DC Fast Charge) electrical vehicle chargers, two level-2 electrical vehicle chargers, three ION 7650 smart meters, and a power analyzer for data measurement of the OASIS system and components.
-Registered the Aerospace and Technology and Downtown Campus in the BC Hydro/FortisBC continuous optimization program. Work is set to start in early 2014.
-The campus utility master planning exercise will begin.
-Begin construction for the 200-kW biomass boiler system that will convert BCIT woodworking programs waste into energy used to heat building NE1.
-The design of the new 25-kV south campus receiving and distribution centre will be finalized and construction will begin. This will include preparation for the transition from 12.5-kV distribution to 25-kV
-The ground-source heat pump plant in SW1 will be recommissioned.
-The south wing free air cooling system at the Aerospace and Technology campus will be reviewed.
-A variety of upgrades to lighting systems will be made, including:
o Expanding the interior lighting LED program as funding permits
o Continue design/development and planning for next generation building perimeter lighting & replace HID wall packs with LED
o LED lighting upgrades are planned for the CARI building. Obsolete T12 and HID lighting will be replaced with LED.
o Outside lighting at the Royal Oak campus will be replaced with LED
o Campus building and outdoor night lighting levels will continue to be reviewed and reduced where practical
-Dampers on the CARI building DDC system will be replaced to improve efficiency
-The DDC system for the SW02 building will be upgraded

If you wish to list any other "sustainability actions" outside of buildings, fleet, paper and travel check "yes". This reporting is optional.

No

British Columbia Institute of Technology
Greenhouse Gas Emissions by Source
for the 2013 Calendar Year (tCO_2e*)



Total Emissions: 8,567

- Mobile Fuel Combustion (Fleet and other mobile equipment)
- Stationary Fuel Combustion (Building Heating and Generators) and Electricity
- Supplies (Paper)

Offsets Applied to Become Carbon Neutral in 2013 (Generated May 21, 2014 2:30 PM)

Total offsets required: **8,565**. Total offset investment: $**214,125**. Emissions which do not require offsets: **2** **

*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.