



Royal Roads
UNIVERSITY



ROYAL ROADS UNIVERSITY

2017 CARBON NEUTRAL ACTION REPORT

May 2018

LIFE.CHANGING

DECLARATION STATEMENT

This Carbon Neutral Action Report for the period January 1 to December 31, 2017 summarizes Royal Roads University's (Royal Roads) emissions profile, the total offsets to reach net-zero emissions, the actions taken in 2017 to reduce greenhouse gas (GHG) emissions and plans to continue reducing emissions in 2018 and beyond.

The Royal Roads' final *2017 Carbon Neutral Action Report* will be posted to [the university's website](#) in accordance with government direction.

EXECUTIVE SUMMARY

Royal Roads continues to exemplify leadership in sustainability. Every year, the university undertakes projects that focus on reducing GHG emissions. Overall, Royal Roads' emissions have decreased since 2010; however, the university experienced a slight increase in emissions in 2017 when it produced 1,016 tonnes of carbon dioxide equivalent (tCO₂e) compared to 1,013 tCO₂e produced in 2016. This increase can be attributed to a few factors including weather conditions, a rise in construction activities related to the Centre for Environmental Science and International Partnership (CESIP) and the Boathouse, and switching to larger boilers in Hatley Castle and the Nixon Building.

Through the university's capital infrastructure program, energy actions taken in 2017 included boiler replacement and direct digital control upgrades in Hatley Castle, and installation of LED lighting in existing facilities and around the campus.

Royal Roads will continue to work towards reducing its GHG emissions in 2018 by focusing on infrastructure initiatives such as building retrofits and upgrades. These include completing renovations to CESIP and the Boathouse, and upgrading LED lighting in the Recreation Centre and at Parking Lot 3.

The following report details Royal Roads' carbon footprint. It includes actions undertaken in 2017 to reduce GHG emissions and plans to further reduce the university's carbon footprint.

EMISSIONS AND OFFSET SUMMARY TABLE:

Royal Roads University GHG Emissions and Offset for 2017 (tCO ₂ e)	
GHG Emissions created in Calendar Year 2017:	
Total Emissions (tCO ₂ e)	1,016
Total Offsets (tCO ₂ e)	1,014
Adjustments to GHG Emissions Reported in Prior Years:	
Total Emissions (tCO ₂ e)	0
Total Offsets (tCO ₂ e)	0
Grand Total Offsets for the 2017 Reporting Year: <i>(This is the total of emissions that must be offset for Reporting Year 2017)</i>	
Grand Total Offsets (tCO ₂ e)	1,014

Retirement of Offsets:

In accordance with the requirements of the *Greenhouse Gas Reduction Targets Act* and Carbon Neutral Government Regulation, Royal Roads University is responsible for arranging for the retirement of the offsets obligation reported above for the 2017 calendar year, together with any adjustments reported for past calendar years. Royal Roads University hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy ensuring that these offsets are retired on the university's behalf, the university 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.

Executive sign-off:

Signature

Date

Cheryl Eason

Vice President & Chief Financial Officer

Royal Roads University

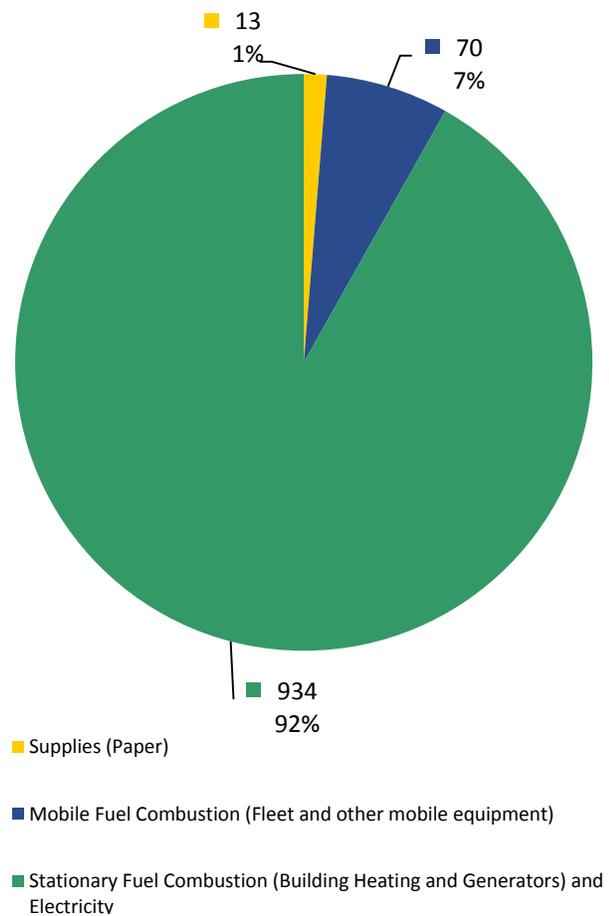
INTRODUCTION

Royal Roads continues to exemplify leadership in sustainability and in reducing its GHG emissions by taking real and substantive actions to improve its sustainability performance. Established as one of the university's core values, sustainability is embedded in Royal Roads' policies, academic programming and operations. As a leader in sustainability, Royal Roads has achieved a reduction in energy usage by more than 28% and a reduction of GHG emissions of over 30% since 2010.

As part of the Carbon Neutral Government Regulation, Royal Roads is responsible for reducing GHG emissions associated with its building operations, fleet vehicles and paper procurement. Royal Roads' emissions have decreased since 2010; however, the university saw a slight increase in overall emissions in 2017, producing 1,016 tCO₂e compared to 1,013 tCO₂e produced in 2016. For a detailed report on 2017 emissions refer to Appendix 1.

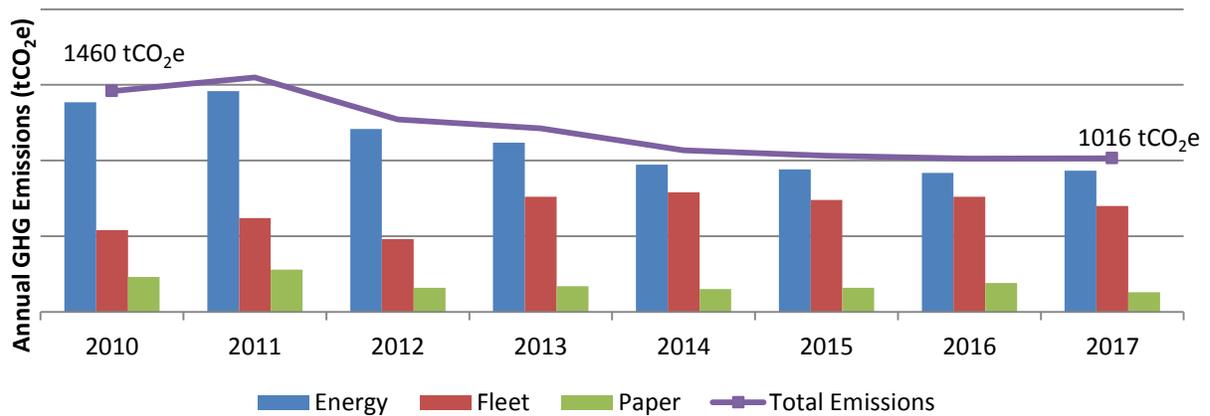
The majority of the university's emissions (92%) are produced by stationary fuel combustion and purchased electricity from the university's buildings (Figure 1). In 2017, the university's emissions associated with buildings increased despite efforts to reduce energy consumption and associated GHG emissions within the existing built environment every year since 2011. This increase can be attributed to factors that include weather conditions, increased construction activities related to CESIP and the Boathouse, and switching to larger boilers in Hatley Castle and the Nixon Building.

Figure 1: Royal Roads University GHG Emissions by Source for 2017 (tCO₂e)



Within its overall total of 2017 GHG emissions, those associated with mobile fuel combustion (fleet vehicles) and supplies (paper) declined compared to prior years, offsetting marginal increases in stationary fuel combustion. In 2017, Royal Roads' fleet vehicles produced 70 tCO₂e, while paper procurement accounted for 13 tCO₂e. This is compared to 2016 where fleet vehicles produced 76 tCO₂e and paper produced 19 tCO₂e. Royal Roads' carbon footprint (tCO₂e) from 2010 to 2017 is outlined in Figure 2.

Figure 2: Royal Roads University GHG Emissions by Source (2010-2017)



Every year, the university undertakes innovative projects that focus on reducing GHG emissions. This steady approach has led to a progressive decline in its overall GHG emissions. Despite the increase observed in 2017, Royal Roads is on track towards meeting its emission reduction goals by 2020.

ENERGY CONSERVATION

Royal Roads integrates energy upgrades and sustainability initiatives into the university's capital infrastructure planning and project-delivery process. Several initiatives were completed in 2017 that contributed to a reduction in GHG emissions produced on campus, and a number of initiatives are planned for 2018 that will continue to reduce GHG emissions.

Actions Taken to Reduce GHG Emissions in 2017

- **Hatley Castle boiler replacement.** The new boiler was twinned with the existing boiler to provide a reliable source of energy-efficient heat for the Castle. The new boiler is estimated to reduce energy usage by 19% and 12.6 tonnes of CO₂e a year.
- **Direct Digital Control upgrade in Hatley Castle.** This will improve the control of heat to each room, increasing energy efficiency and comfort to users.
- **Upgrades to the Boathouse.** Project work includes a high-efficiency condensing gas boiler; air barrier and insulation of walls and new frame walls; new double-glazed windows; new shear plywood and insulation of the roof; a variable air volume unit; and new LED lights. Construction is expected to be completed in summer 2018. The new boilers are expected to be 94% efficient which is estimated to reduce the building's GHG emissions by 5.23 tonnes of CO₂e a year.
- **Installation of LED lights** in the Grant Building, Millward and Nixon buildings, and Hatley Castle museum and gift shop.
- **Continued construction related to CESIP that will meet the federal government's requirements for green infrastructure.** Highlights include highly energy-efficient condensing hot-water boilers; CO₂ sensors to modulate the heat/air supply to the number of people occupying a space; LED lighting; daylight controls; office plugs that turn off when load is switched off; and high-UV solar gain windows. The new facility is expected to be completed and ready for classes by September 2018.
- **Sponsorship of a Bachelor of Science (BSc) in Environmental Science Student Project.** The project purpose was to examine the electric loads produced by plug-in electrical devices on campus with the goal of reducing the energy consumption of plug-in loads (see project highlight on page 8).

Actions Planned to Continue Reducing GHG Emissions in 2018

- **Conduct a geothermal feasibility study** to determine the feasibility of a ground water heat pump system to provide an energy-efficient heating and cooling system to the western sector of campus.
- **Complete an energy audit** to update data last assessed in 2009 and provide recommendations to help the university meet future GHG emissions targets.
- **Replace all fluorescent technology lighting in the Recreation Centre with LED lights.** The estimated energy savings is 26,528 kWh/year and 0.28 tonnes of CO₂e/year.
- **Upgrades to campus exterior lighting, converting to an LED system.** The new lighting is estimated to reduce energy usage by 85% and 0.1 tonnes of CO₂e/year.
- **Assess the feasibility of alternative fuel options for Royal Roads' fleet vehicles** to help reduce fuel and GHG emissions.
- **Purchase additional electric golf carts for fleet vehicles.**
- **Continue to reduce paper emissions** by developing awareness campaigns focused on reducing printing and purchasing 30%- recycled copy paper.
- **Continue to monitor energy, fleet and paper-use during the year** to reduce GHG emissions and improve energy consumption.



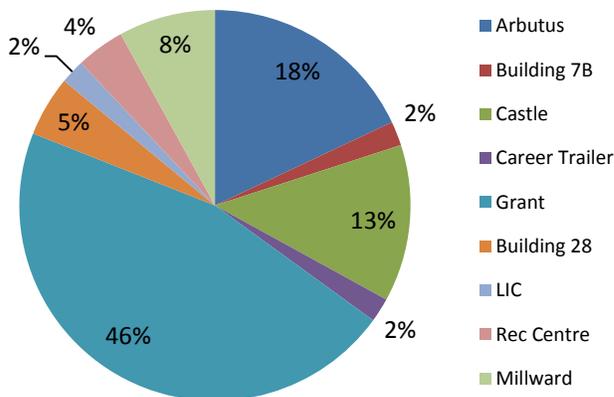
2017 Energy Project Highlight – Royal Roads University Workspace Power Audit

The Royal Roads Office of Sustainability partners with the BSc in Environmental Science program to sponsor student projects on sustainability initiatives relevant to the Royal Roads campus or the community. In 2017, the Office of Sustainability sponsored a group of students to study the electrical loads of plug-in devices at Royal Roads.

As explained above, energy-efficient retrofits are ongoing at the university with the goal of reducing GHG emissions. Improvements were made to building heating, cooling and domestic water heating systems; however, electric loads that are produced by plug-in electrical devices have not been assessed in campus buildings to determine energy consumption and reduction. Plug-in loads can significantly contribute to a building's energy load¹; therefore, it was important for Royal Roads to determine the

energy consumption from these plug-in devices.

Figure 3: Total kWh/Year for Buildings on Royal Roads Campus



Source: Blue Boundary Consulting, 2017

The students conducted a campus-wide inventory to determine the amount and type of devices on campus. They followed-up with metering (measuring kWh with a Kill-A-Watt EZ Power Meter) a sub-sample of devices such as toasters, refrigerators, microwaves, water coolers, coffee makers, fans, lamps and space heaters to determine the impact these devices have on overall energy consumption. The project provided results on which buildings and devices contributed the largest amount of energy (Figure 3).

The largest estimated electrical load was space heaters, contributing significantly more than all the other devices combined. In one year, they consume 107,325 kWh, which is enough to power approximately 10 homes a year. The study points out that the majority of the buildings and offices on campus have poor heating and circulation due to the age and original purpose of some buildings; consequently, many employees use space heaters to keep warm.²

As a result of the project, Royal Roads will begin to replace the current space heaters with more efficient heaters that use 85% less energy. As well, the Physical and Environmental Resources department in conjunction with the Office of Sustainability will develop policies around standards for centralized kitchen areas and what appliances to provide.

¹ Kamilaris, A., Kalluri, B., Kondepudi, S., and Wai, T.K. 2014. A Literature Survey on Measuring Energy Usage for Miscellaneous Electric Loads in Offices and Commercial Buildings. Retrieved from: https://www.researchgate.net/publication/261370953_A_literature_survey_on_measuring_energy_usage_for_miscellaneous_electric_loads_in_offices_and_commercial_buildings.

² Blue Boundary Consulting. 2017. Royal Roads University Workspace Power Audit, Bachelor of Science in Environmental Science; Major Project.

SUSTAINABILITY INITIATIVES

In addition to the building retrofits and energy upgrades through the university's capital infrastructure program, several other sustainability projects and initiatives at Royal Roads fostered a culture of change and encouraged positive environmental outcomes.

- Continued partnership with the BSc in Environmental Science program to sponsor student projects on sustainability initiatives relevant to Royal Roads campus or the community.
 - 2017 projects:
 - Bird-friendly Certification and Award Program
 - Royal Roads University Workspace Power Audit
 - 2018 projects:
 - Climate Change Adaptation For Royal Roads University
 - Sustainable Beekeeping at Royal Roads University
- Made strides towards composting and recycling targets outlined in Royal Roads' [2015-2020 Sustainability Plan](#) (see project highlight on page 10).
- Implemented Sustainability Awareness Week from April 17 to 24, 2017. Events included E-Waste Awareness and Fuel-Efficient Driving; bike workshops; energy-efficiency tips with BC Hydro; and a walking tour of Royal Roads' campus.
- Installed four water refill stations in two campus buildings in early 2018. As project funds become available, additional refill stations will be installed in other buildings to help reduce consumption of single-use plastic water bottles on campus.
- To prevent bird strikes, decals will be attached to the windows of campus buildings that reflect ultraviolet sunlight.
- Proposed four electric-vehicle (EV) charging stations for campus, bringing the total to six EV chargers.
- Expand the bike infrastructure with additional new bike shelters and racks on campus.
- Sustainability awareness continues to be integrated into student orientation (i.e., recycling orientation for incoming international students) and academic programs (i.e., Recycling Case Challenges with Bachelor of Commerce and Bachelor of Business Administration students).
- Drafted Royal Roads' first *Sustainable Purchasing Guide* in the fall of 2017. The Sustainability Office hosted Campus Coffee in February 2018 to promote the new guide and invited vendors to the campus to showcase eco-friendly products on the market in office supplies, cleaning products and promotional material.
- The Royal Roads' Student Sustainability Committee will host an event on campus in May 2018 aimed at the removal of invasive plant species on the campus core.

Sustainability Project Highlight – Recycling Improvements

Royal Roads is constantly looking at ways to improve its recycling and composting programs and achieve 80% waste diversion. It has planned three new initiatives: installing multi-stream outdoor units, rebranding the waste/recycling streams, and modifying current bin placements.

New outdoor multi-stream units were purchased and implemented to improve the waste diversion on campus; specifically, the outdoor waste-bin system which is considered the largest source of cross-contamination on campus due to the lack of sorting options. In 2017, the university located outdoors two multi-stream recycling units with dedicated streams for compost, recyclables and refundables, and in early 2018, it purchased an additional nine units that include a fourth stream for garbage. These will be placed around campus in areas where there is a lack of sorting options.

New outdoor four-stream units have been purchased and implemented on campus to improve Royal Roads' waste diversion.



The 2016 waste audit and educational sessions with incoming students revealed that the current number of streams and “accepted item” visuals on the bins cause confusion and uncertainty, which ultimately hinders diversion with misplaced items and/or contamination. As a result, the university is rebranding the recycling signage to simplify the education and decision-making process of discarding/recycling waste. The new recycling branding will focus on images as opposed to icons and wording.

Another initiative planned for 2018 is to move multi-stream bins from the Learning & Innovation Centre (LIC) to the Millward and Nixon buildings. The Millward and Nixon buildings currently have the poorest waste-diversion rates of all the buildings on campus due to inconsistent and disorganized bins, and limited signage. The relocated bins will be branded with the new signage and placed in high-traffic areas.

The proposed new initiatives are expected to improve the university’s overall waste diversion. Results will be measured by a waste audit in the fall of 2018.

CONCLUSION

Every year, Royal Roads undertakes projects to reduce GHG emissions. As a result of proper planning, a team approach and modest funding, it has reduced GHG emissions by over 30% since 2010.

The university will continue to monitor energy use, and identify and determine opportunities to improve its energy performance. This includes projects scheduled for 2018 that will further reduce the university's GHG emissions and strengthen its leadership in sustainability.

As the university continues to experience growth in both student population and building infrastructure, Royal Roads will remain focused on reducing its environmental footprint in order to meet its sustainability targets for 2020.

APPENDIX 1



SMARTTool Greenhouse Gas Inventory Report

Reporting Entity: Royal Roads University

Reporting Year: Calendar Year 2017

	Measure	Quantity	Greenhouse Gases in Tonnes			
			CO ₂	CH ₄	N ₂ O	tCO ₂ e ¹
Scope 1 (Direct) Emissions						
Mobile Combustion (Fleet)	Litres	27,985.67	62.78	0.01	0.01	67.32
Stationary Combustion, Reported ³	GigaJoules	18,036.81	894.27	0.02	0.02	899.55
Total Scope 1 Emissions			957.04	0.02	0.03	966.88
Scope 2 (Indirect) Emissions						
Purchased Energy, Reported ³	GigaJoules	11,489.04	34.47	0.00	0.00	34.47
Total Scope 2 Emissions			34.47	0.00	0.00	34.47
Scope 3 Emissions						
Business Travel and Office Paper						
Office Paper	Packages	2,239.00	12.91	0.00	0.00	12.91
Total Scope 3 Emissions			12.91	0.00	0.00	12.91
Emissions from Biomass						
Total Biomass Emissions			2.19	0.00	0.00	2.19
Total Emissions, Calendar Year 2017			1,006.61	0.02	0.03	1,016.45

1. Global Warming Potential (GWP) has been applied only to the tCO₂e values.

2. Estimated data has been calculated based on the methods described in the Methodology Document.

3. Reported data refers to consumption which has been directly billed to the organization.

This information is provided by the Government of British Columbia, and is subject to verification.