



Royal Roads
UNIVERSITY



Royal Roads University

2018 CARBON NEUTRAL ACTION REPORT

May 2019

LIFE.CHANGING

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CARBON NEUTRAL ACTION REPORT OVERVIEW

Declaration Statement

This *2018 Carbon Neutral Action Report* for the period January 1, 2018 to December 31, 2018 summarizes Royal Roads University's emissions profile, the total offsets to reach net-zero emissions, the actions taken in 2018 to reduce greenhouse gas (GHG) emissions and plans to continue reducing emissions in 2019 and beyond.

The final report will be posted on the university's [website](#) in accordance with government direction.

Overview

Royal Roads is committed to its stewardship responsibilities and continues to take a sustainable approach to maintaining its campus and online environments while investing for the future. Balancing the demands of a growing and diverse student population, the university continues to be a leader in sustainability in the provincial post-secondary sector through its operations and capital program. Putting plans into practice, every year, the university undertakes projects that aim to reduce GHG emissions in accordance with the *BC Climate Change Accountability Act* and Carbon Neutral Government Regulation. In addition to the mandated targets, Royal Roads' is committed to achieving the university's Board of Governors target of a 50% reduction in GHG levels by 2020.

Royal Roads reports 948 tonnes of carbon dioxide equivalent (tCO₂e) in 2018 compared to 1,016 tCO₂e produced in 2017. This is a 6.8% reduction from the previous year. Royal Roads has reduced its overall GHG emissions by 39% below 2007 levels.

Significant GHG reductions achieved in 2018 were the result of several upgrades. This included the installation of a high efficiency condensing gas boiler in the Centre for Professional and Continuing Studies, as well as other reductions in natural gas consumption in several main buildings (including Grant, the Library and the Gym). Through the university's capital program, energy-upgrade work completed in 2018 included the installation of LED lighting in existing facilities and on the campus roadways, parking lots and paths, and sustainability features in the Sherman Jen Building and the Centre for Professional and Continuing Studies. An updated energy audit was also completed in 2018, creating a roadmap for more capital and maintenance work that will contribute to further reductions in energy consumption and GHG emissions.

Royal Roads will continue to work toward reducing its GHG emissions in 2019 by focusing on infrastructure initiatives such as building retrofits and upgrades. The construction of the new Learning and Teaching Auditorium (LTA) will also continue, which includes repurposing and upgrading the disused pool building. The LTA will meet the university's targets to reduce GHG emissions by implementing an open-loop geo-exchange system and honouring the principles of the BC Energy Step Code.

This report details Royal Roads' carbon footprint for the 2018 calendar year. It includes a summary of energy and other sustainability actions undertaken to reduce the university's environmental footprint, and it outlines plans to further reduce the university's carbon footprint.

2018 Emissions and Offset Summary

Table 1: Royal Roads University GHG Emissions (tCO ₂ e) and Offset, 2018	
GHG Emissions 2018	
Total Emissions (tCO ₂ e)	948
Total BioCO ₂	9
Total Offsets (tCO ₂ e)	939
Adjustments to GHG Emissions Reported in Prior Years¹	
Total Emissions (tCO ₂ e)	0
Total Offsets (tCO ₂ e)	0
Grand Total Offsets	
Grand Total Offsets Required (tCO ₂ e)	939
Total Offset Investment (\$25 per tonne)	\$23,475

Retirement of Offsets

In accordance with the requirements of the BC *Climate Change Accountability Act* and Carbon Neutral Government Regulation, Royal Roads is responsible for arranging for the retirement of the offsets obligation reported above for the 2018 calendar year, together with any adjustments reported for past calendar years. Royal Roads 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, MBA, CPA CGA, RPA, DMC
Vice President & Chief Financial Officer
Royal Roads University

¹ Emissions reported in previous years are updated as a result of new information becoming available, errors discovered in previously entered data, or consumption data reporting period not aligning with required GHG reporting period.

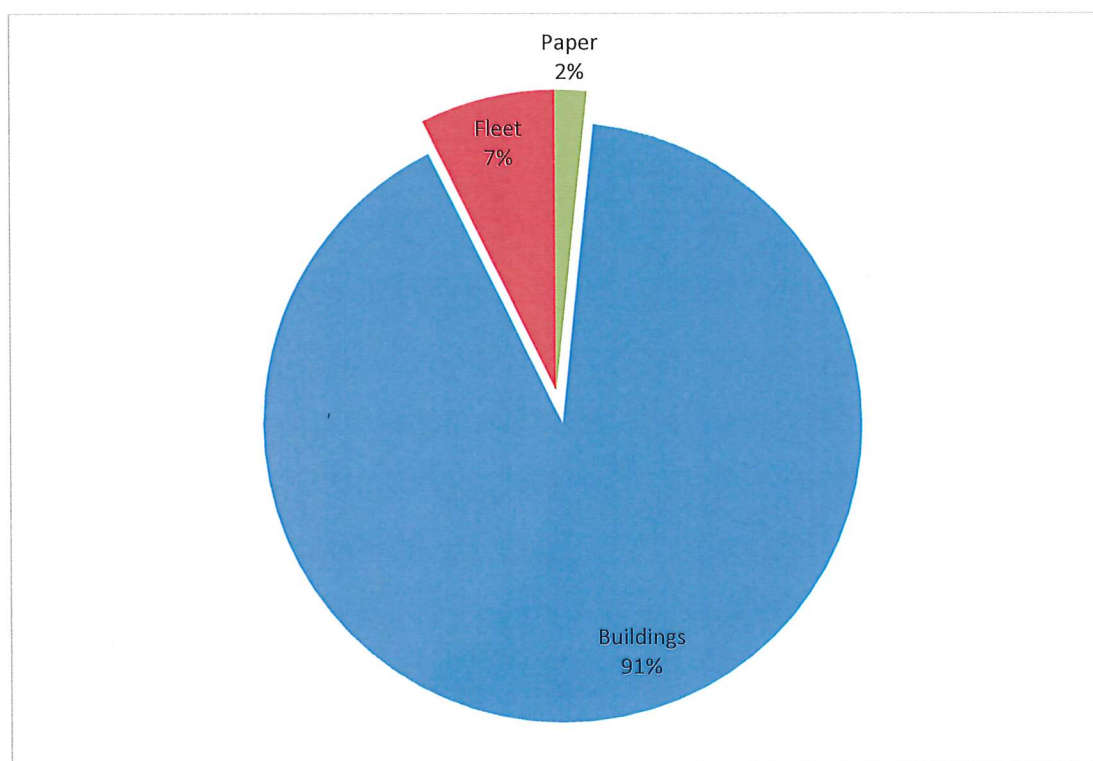
2018 GREENHOUSE GAS EMISSIONS PROFILE

Royal Roads has committed to reduce GHG emissions associated with its operation as mandated by the BC *Climate Change Accountability Act* and Carbon Neutral Government Regulation. The university is required to measure, reduce and offset carbon emissions from building operations (i.e., stationary fuel combustion and electricity), mobile fuel combustion (i.e., fleet and other mobile equipment) and paper (i.e., 8 ½ x 11, 8 ½ x 14 and 11 x 17 paper). For any GHG emissions produced, Royal Roads is required to offset these emissions on an annual basis at a value of \$25 per metric tonne of CO₂e.

2018 Greenhouse Gas Emissions

In 2018, Royal Roads' total GHG emissions were 948 tCO₂e and total offset investment was \$23,475 (not including tax). Building operations account for the largest source of GHG emissions at Royal Roads, followed by mobile fuel combustion and paper (Figure 1).

Figure 1: Royal Roads GHG Emissions by Source, 2018



Royal Roads has a total of 26 buildings on campus with a total building area of approximately 47,000 m², growing by approximately 1,700 m² as a result of the completion of the new Sherman Jen Building.

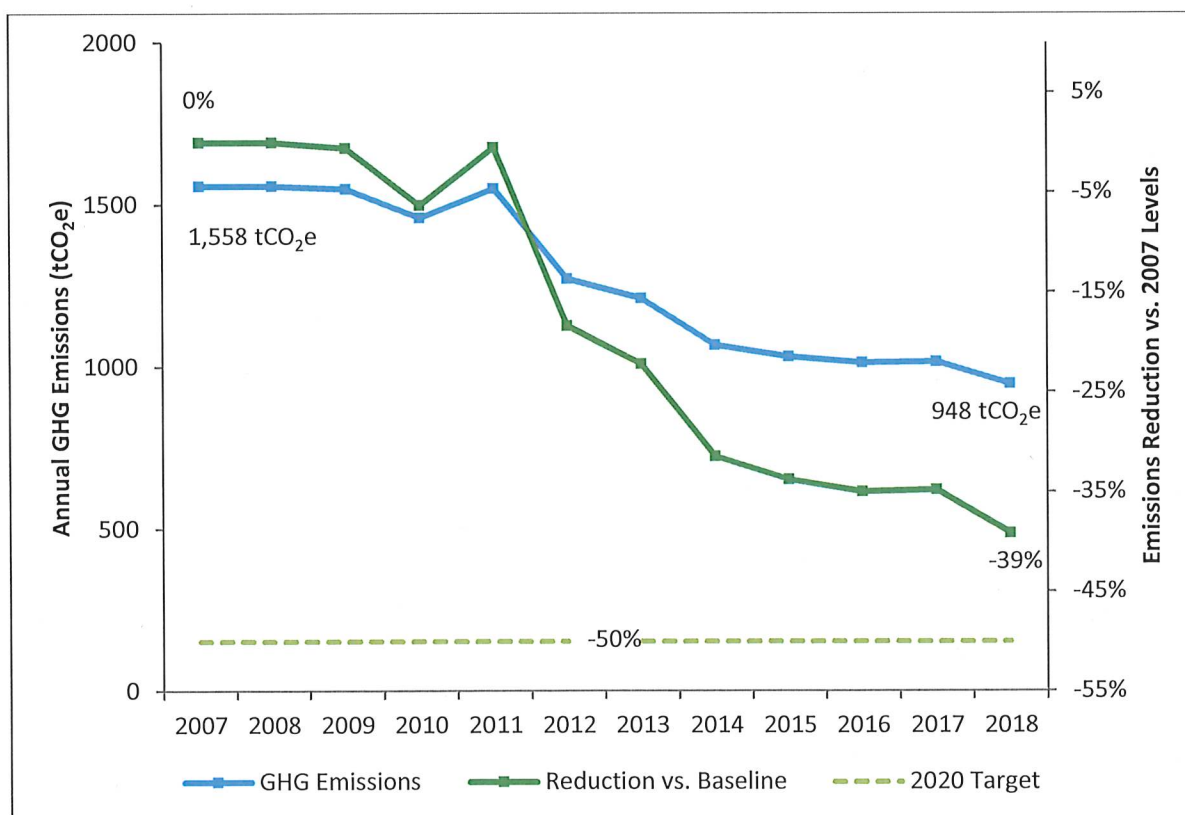
Many of these buildings on campus are designated heritage buildings. The heating and cooling systems in campus buildings vary. Many of the smaller outlying buildings use a combination of residential or light-commercial heat pumps, electric resistance heating or hydronic heating with gas. The larger core buildings are equipped with central air handling systems from local hydronic or steam boiler plants.

Overall, Royal Roads has achieved a reduction in total GHG emissions of 39% below 2007 levels (Table 2 and Figure 2). From 2017 to 2018, the university emitted 68 *less* tonnes of CO₂e.

Table 2: Royal Roads' GHG Emissions vs. 2007 Baseline

Year	Emissions (tCO ₂ e)	Percent Change
2007	1,558	0%
2008	1,558	0%
2009	1,549	-1%
2010	1,460	-6%
2011	1,550	-1%
2012	1,272	-18%
2013	1,212	-22%
2014	1,068	-31%
2015	1,032	-34%
2016	1,013	-35%
2017	1,016	-35%
2018	948	-39%

Figure 2: Royal Roads University GHG Emission Reductions, 2007-2018



Emissions by Source

The 2018 data indicates a decrease in emissions associated with stationary fuel combustion and electricity of approximately 8% and an increase in paper emissions of approximately 23% from 2017. There was no change in emissions associated with mobile fuel combustion between 2017 and 2018 (Table 3). Royal Roads' carbon footprint for each source of emissions and associated offset payments since the beginning of the Carbon Neutral Government Regulation can be found in Appendix 2.

Table 3: Comparison of GHG Emissions, 2017-2018			
Emission Source	2017 (tCO ₂ e)	2018 (tCO ₂ e)	Percent Change
Stationary fuel combustion and electricity	934	863	-8%
Mobile fuel combustion	70	70	0%
Paper	13	16	+23%
Total Emissions	1,017	948	-6.8%



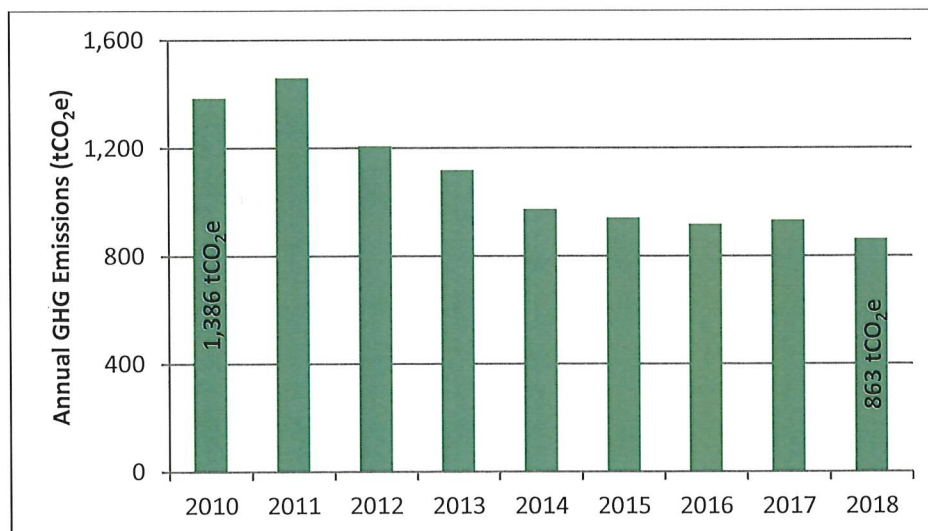
Stationary Fuel Combustion and Electricity

The largest source of GHG emissions at Royal Roads is stationary fuel combustion and electricity (91%). Building heating and electricity produced 863 tCO₂e in 2018.

Efforts to reduce energy consumption and associated GHG emissions, resulted in an 8% decrease in the university's buildings. From 2017 to 2018, the stationary fuel combustion and electricity decreased by 71 tCO₂e. The change in emissions from 2017 to 2018 can primarily be attributed to the installation of a high efficiency condensing gas boiler in the Centre for Professional and Continuing Studies, and reduced natural gas consumption in several main buildings (including Grant, the Library and the Gym) achieved by turning the thermostats down. Other energy and emissions reductions are a result of building upgrades in the Centre for Professional and Continuing Studies and upgrading indoor/outdoor campus lighting to LEDs.

Overall GHG emissions associated with stationary fuel combustion and electricity has declined by 38% since 2010 (Figure 3), while the university's overall energy consumption has declined by 35% since 2010. Full details on Royal Roads' energy (GJ) consumption from stationary fuel combustion and electricity are provided in Appendix 3.

Figure 3: Stationary Fuel Combustion and Electricity, 2010-2018



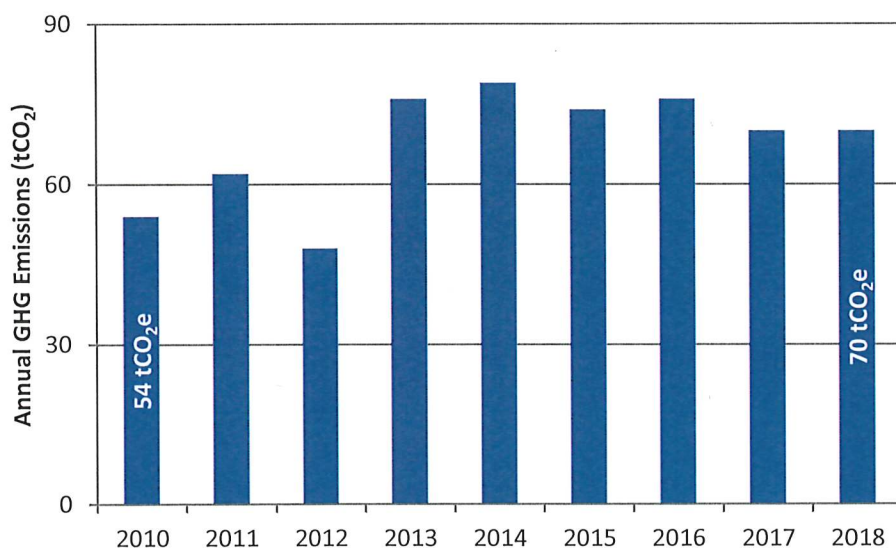


Mobile Fuel Combustion

The GHG emissions associated with Royal Roads' mobile fuel combustion produced 70 tCO₂e in 2018 and accounted for approximately 7% of Royal Roads' total GHG emissions. Royal Roads' emissions associated with mobile fuel combustion remained steady from 2017 to 2018.

The Royal Roads' fleet consists of gas-powered and electric vehicles as well as specialty garden equipment such as tractors, mowers and backhoes. Since 2010, the emissions associated with the university's mobile fuel combustion have increased by 30% (Figure 4). This can be attributed to campus growth and slight increase in the size of the fleet.

Figure 4: Mobile Fuel Combustion, 2010-2018



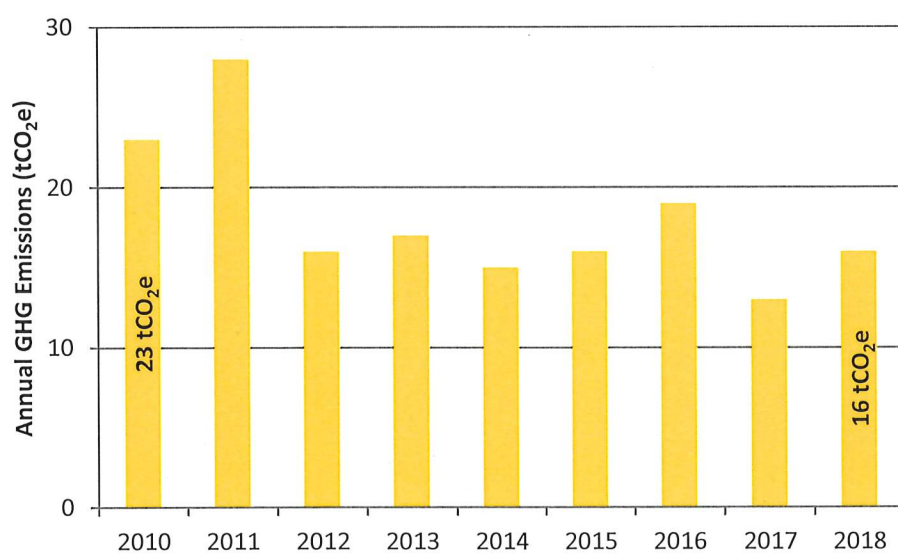


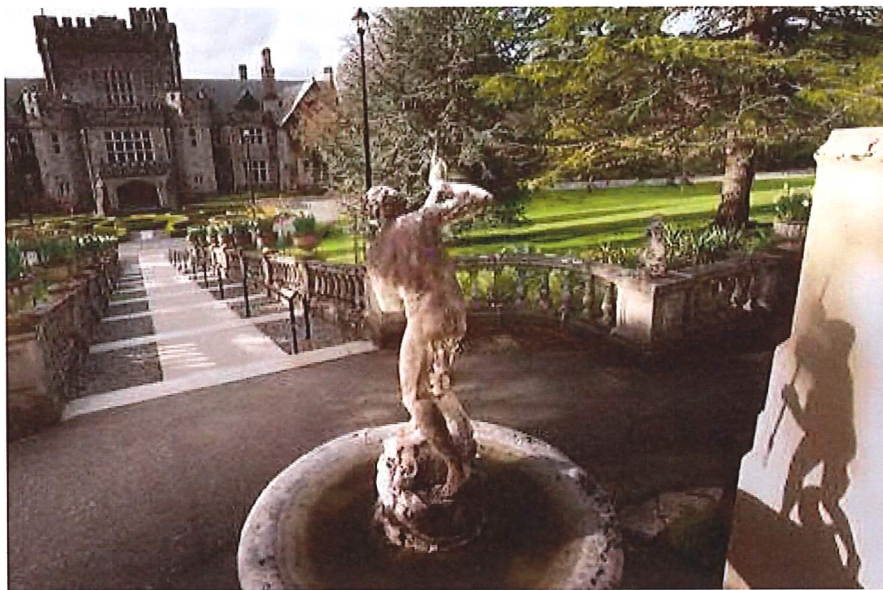
Paper

The emissions associated with paper accounted for 2% of Royal Roads' total GHG emissions in 2018. Royal Roads' GHG emissions associated with paper increased marginally over the prior year. In 2018, paper emissions produced 16 tCO₂e, compared to 13 tCO₂e produced in 2017.

The university continues to take actions to reduce emissions from paper such as purchasing 30% post-consumer recycled content paper, defaulting printers to double-sided, and increasing online course materials and submissions of student assignments electronically. As a result, the university's overall emissions associated with paper have decreased by 30% since 2010 (Figure 5).

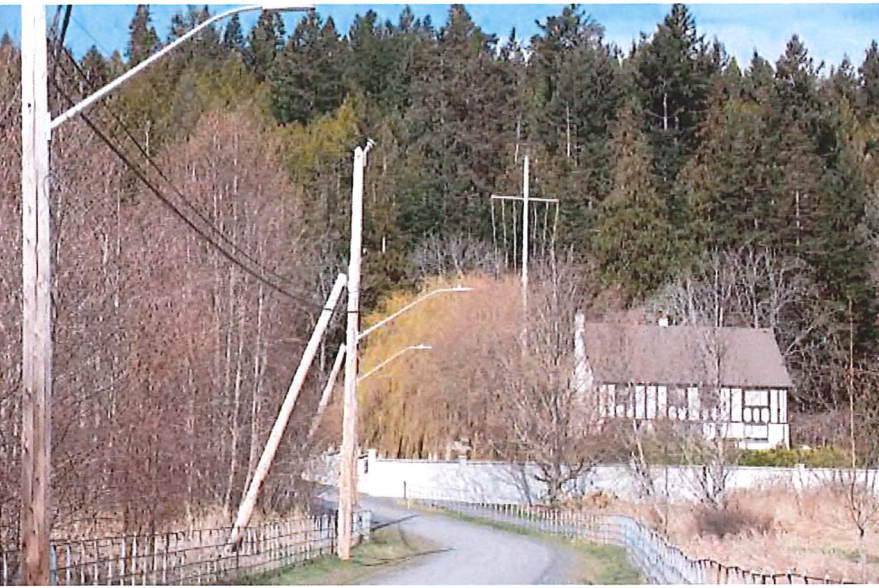
Figure 5: Paper, 2010-2018





ACTIONS TAKEN TO REDUCE GHG EMISSIONS IN 2018

- ✓ **Upgraded campus lighting.** Exterior and interior campus lighting converted to an LED system. The new lighting is estimated to reduce energy usage by over 60% and lead to operational savings from reduced maintenance costs.
- ✓ **Renovated the Centre for Professional and Continuing Studies.** Project work included installing 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.
- ✓ **Renovated the historic Mews building and completed construction of the Sherman Jen Building.** See project highlights in Appendix 4 for a list of energy and sustainable features installed in the Sherman Jen Building.
- ✓ **Open-loop geo-exchange system.** Conducted phase 1 (background review) for a geo-exchange system in the west campus.
- ✓ **Drafted a multi-year fleet lifecycle management plan** that outlines the process of purchasing and managing current and new fleets in a manner that will minimize GHG emissions and fuel costs.
- ✓ **Purchased two electric golf carts for fleet vehicles** to help lower GHG emissions.
- ✓ **Completed an energy audit** to update data last assessed in 2009 and created a roadmap for capital and maintenance work to further reduce energy consumption and GHG emissions.
- ✓ **Lowered thermostats in campus buildings** to help reduce consumption of natural gas.
- ✓ **Initiated the first phase of campus horizontal infrastructure upgrades.** The upgrades will improve power, data, water and drainage services.
- ✓ **Purchased 30% post-consumer recycled content paper.** Over 94% of computer paper packages purchased was 30% post-consumer recycled content paper. The university is investigating ways to improve its paper-purchasing footprint.
- ✓ **Creation of Royal Roads' "Resilience Team."** Integrating the sustainability function with the evolving enterprise risk management framework and capital program to position the university to be a more resilient organization.



ACTIONS PLANNED TO CONTINUE REDUCING GHG EMISSIONS IN 2019

- **Include energy upgrades and sustainability/resilience design principles** in the university's capital and operating planning and project-delivery processes.
- **Plan and construct the LTA.** The new LTA will positively impact the university's targets for reducing GHG emissions by implementing energy initiatives that will honour the principles of the BC Energy Step Code.
- **Advance to detailed design and installation of an open-loop geo-exchange system.** Preliminary design and viability studies are expected to be completed by end of May 2019. Implementation of the system will potentially lead to a reduction of 55 tonnes of GHG emissions per year.
- **Continue campus lighting upgrades.** The new lighting is expected to reduce energy consumption, enhance maintenance benefits and improve safety on campus.
- **Update building heating systems** to improve efficiency and save energy.
- **Upgrade the exterior and interior of the Grant Building.** Data cabling work will lead to upgrades to the network, new heating system will reduce energy use, and roof work will improve energy efficiency and protect against damage from weather.
- **Complete next phases of upgrades to horizontal infrastructure.** Improve efficiencies to power, data, water and drainage systems throughout the campus.
- **Repair the solar hot water panels on campus buildings.** The repairs will improve solar heating of the domestic hot water system.
- **Develop and plan for climate mitigation and adaptation.** Begin research and analysis work leading to a multi-year plan that assesses climate risk, and outlines strategies to mitigate and adapt to the changing climate in BC.
- **Purchase three additional electric golf carts and replace the Ford Escape SUV with an electric utility vehicle, consistent with the fleet lifecycle management plan.** These alternative vehicles will help further reduce Royal Roads' GHG emissions related to its fleet. Specifically, the Ford Escape has the highest use and fuel costs, and accounts for over 25% of fleet emissions.
- **Update printer/copier services.** The new services will require individuals to send a print job to a central print queue, allowing individuals to print from any printer. This will help reduce wasted print jobs and paper.
- **Assess printing and office paper.** The assessment will study paper use on campus, recommend alternative paper products and develop paper reduction campaigns.
- **Organize Sweater Day event to raise awareness about consuming heat, saving energy and reducing GHG emissions.** Encourage staff to turn down the thermostats or turn off personal space heaters in offices to help reduce energy consumption.

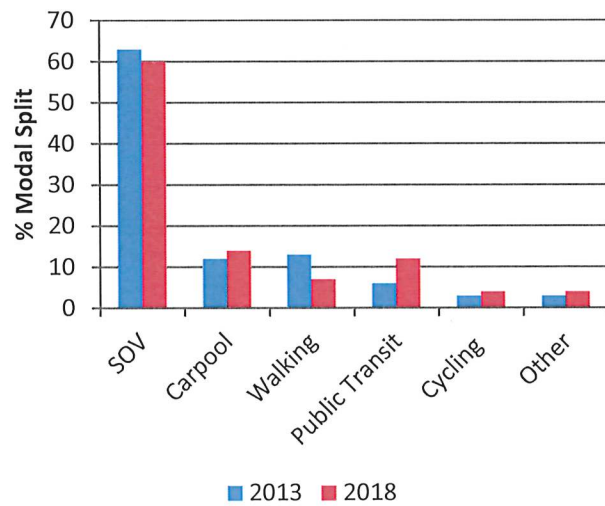
2018 SUSTAINABILITY HIGHLIGHTS

In addition to the building retrofits and energy upgrades through the university's capital program, several other sustainability projects and initiatives at Royal Roads fostered a culture of change and encouraged positive environmental outcomes in 2018.

Transportation

Royal Roads is committed to managing transportation to, from and on campus in a manner that will reduce the GHG emissions associated with single occupant vehicle (SOV) travel. **SOVs to campus have decreased to 60%** of overall commuters, while the total number of individuals cycling, taking public transit and carpooling has seen an increase (Figure 6).

Figure 6: Royal Roads' Travel Modal Split



Parking studies and walkability analyses were completed in 2018 to enhance traffic flow, increase walkability on campus and reduce the carbon footprint from SOV travel.

To encourage **environmentally friendly commuting**, Royal Roads added new bike shelters and racks on campus, participated in Bike to Work Week, and installed additional

electric vehicle (EV) charging stations on campus, bringing the total to eight EV chargers.

To raise awareness about **vehicular emissions**, the Bachelor of Business Administration students in partnership with the Office of Sustainability conducted commuter audits in October 2018, giving willing commuters a sense of the emissions associated with their commute to Royal Roads and the option to offset their daily, weekly, monthly or yearly commute in the form of donations to the SAFE fund².

Waste and Recycling

The university made strides toward its composting and recycling targets in 2018. **Nine outdoor multi-stream recycling units were installed** on campus to increase the diversion of the outdoor waste-bin system. As well, **new recycling signage** that focuses on images as opposed to icons and wording was introduced on campus to simplify the education and decision-making process of discarding/recycling waste (Figure 7).

Figure 7: New Recycling Signage



² SAFE (Sustainable Action for the Environment) fund supports sustainability projects and initiatives led by staff, students, alumni and faculty both on and off campus.

An additional eight **water bottle refill stations** were installed in buildings on campus to reduce plastic water bottle consumption and waste.

Communications and Engagement

The university held **green-focused events** throughout 2018 including Sustainable Purchasing Fair, an E-Waste Awareness and Collection campaign, Fair Trade Awareness campaign, commuter audits, Invasive Species Pull, waste reduction events and Earth Week activities.

Sustainability awareness continues to be integrated into **student orientation** (e.g., recycling orientation for incoming international students) and **academic programs** (e.g., recycling case and sustainability challenges with Bachelor of Commerce and Bachelor of Business Administration students).

Stewardship

Inspired by a student project completed in 2018, the university is considering introducing a **beekeeping operation** on campus to enhance the resilience of Vancouver Island's honey bee population. A beekeeping operation on campus presents a unique opportunity to increase the sustainability appeal of Royal Roads by contributing to the preservation of ecological integrity, providing a local source of food production, and creating an interactive teaching tool for students.

Royal Roads is committed to promoting a **bird-friendly campus**. Decals that reflect ultraviolet sunlight were attached to the windows of the Learning and Innovation Centre (LIC) to prevent bird strikes. Additional decals were purchased in 2019 that will be installed on the annex of the Millward Building where there are multi-floor curtain walls on the south side of the facility.

The Terry Power Strategic and Advanced International Studies Outdoor Classroom was built at the Sherman Jen Building. The **outdoor classroom** celebrates the unique sense of place here at Royal Roads.

The Department of National Defence organizes annual **invasive species removal** on campus. In conjunction with this program, the university organized its own invasive species plant-pulling day in May 2018. An area approximately 600 square metres was revitalized on campus. The event elicited 23 volunteers who removed approximately 14 cubic metres of invasive plants (Figure 8).

Figure 8: Removal of Invasive Species (Before and After)



SUSTAINABILITY INITIATIVES PLANNED FOR 2019

In 2019, Royal Roads will focus on both strategic and operational initiatives that promote sustainability and resilience, and support the university's goals to reduce GHG emissions, including:

- Undertake a campus-wide waste audit to determine Royal Roads' waste diversion rate
- Develop a waste and recycling plan for the campus
- Update the *Sustainability Plan* and document progress to date within the framework of an updated *Five-year Business Plan* and *Capital Plan*
- Continue to make Royal Roads a bird-friendly campus by installing more decals on windows to prevent bird strikes
- Promote communications and engagement by organizing campus-wide events aimed at sustainability awareness for staff and students including Sweater Day, Clothing Swap, Earth Week, Invasive Species Pull, Recycling Awareness, E-Waste Collection, commuter audits and Bottle Drive
- Establish a beekeeping operation on campus
- Promote campus-wide sustainability and resilience by participating in orientation programs for employees and students.

APPENDIX 1: SMARTTool Greenhouse Gas Inventory Report

*NOTE: Due to a data error, this page has been removed
until information can be corrected in the 2019 reporting year.*

APPENDIX 2: Emissions by Source

Table 4 provides Royal Roads' carbon footprint for each source of emissions and associated offset payments since the beginning of the Carbon Neutral Government Regulation (the regulation required public sector organizations to start measuring, reducing and reporting on GHG emissions in 2010).

Table 4: Royal Roads' Carbon Footprint, 2010-2018					
Year	Total Emissions (tCO ₂ e) ^a	Stationary Fuel Combustion and Electricity (tCO ₂ e)	Mobile Fuel Combustion (tCO ₂ e)	Paper (tCO ₂ e)	Carbon Offsets (\$) ^b
2010	1,460	1,386	54	23	36,500
2011	1,550	1,460	62	28	38,675
2012	1,272	1,272	48	16	31,750
2013	1,212	1,119	76	17	30,225
2014	1,068	974	79	15	26,650
2015	1,032	942	74	16	25,775
2016	1,013	918	76	19	25,250
2017	1,016	934	70	13	25,350
2018	948	863	70	16	23,475
Notes:					
a) Some emissions do not require offsets					
b) \$25/tCO ₂ e; does not include GST					

APPENDIX 3: Energy Consumption

Table 5 provides Royal Roads' energy (GJ) consumption from stationary fuel combustion (building heating and generators) and electricity from 2010 to 2018. Overall, the university's energy consumption has declined by 20%.

Table 5: Energy (GJ) from Stationary Fuel Combustion and Electricity, 2010-2018			
Year	Energy (GJ)		
	Stationary Combustion^a	Purchased Electricity	Total
2010	24,910	13,904	38,814
2011	26,552	13,540	40,092
2012	22,176	10,191	32,367
2013	21,102	12,166	33,267
2014	18,519	11,585	30,104
2015	18,297	11,262	29,558
2016	17,749	10,745	28,494
2017	18,037	11,489	29,526
2018	16,509	12,306	28,814
Note:			
a) Stationary combustion from natural gas or diesel			

APPENDIX 4: Sherman Jen Building



The well-designed and heavily insulated building is expected to save 1,230 GJ in total energy and reduce 44 tonnes of total carbon emissions per year.

Heating, cooling and plumbing:

- Condensing boilers for heating and hot water provide 98% energy efficiency
- Upgraded insulation requires less heating and cooling to maintain interior temperatures
- Natural and cross ventilation including large exterior folding glass walls (NanaWall system) that open to provide cooling airflow
- Mechanical ventilation activates when spaces are occupied, thanks to CO₂ sensors in rooms
- Low-flow plumbing saves water use and prevents unnecessary waste

Sustainable building choices:

- Healthy, sustainable and durable building finishes
- Close to 60% of total floor area made of existing wood frame structure
- New and reclaimed BC-sourced wood used throughout the building
- Building materials such as ceiling tiles and insulation, as well as furniture are made from post-consumer recycled content

Electrical and lighting:

- Curtain walls take advantage of natural light, reducing the need for daytime lighting
- Smart technology window glass adjusts its tint level to block glare, UV radiation and solar overheating of spaces, and will help prevent bird strikes
- Lighting controlled by motion sensors in classrooms, offices, washrooms and storage rooms
- Lighting in classrooms, atrium and corridors automatically dim according to the amount of natural light in the spaces
- Interior and exterior LED lights are 30% more efficient than fluorescents
- Exterior lights are shielded and direct light downwards to reduce nighttime light pollution
- 50% of office electrical outlets turn off when a space is unoccupied to reduce wasted electricity through trickle loads

Recycling and waste:

- Branded multi-stream recycling
- Water bottle refill stations
- Limited industrial construction waste as a result of reusing existing building
- During demolition process, non-hazardous materials were recycled, while other materials offered to the public for reuse

Transportation:

- Six EV chargers installed in nearby parking areas
- End-of-trip bike facilities provided

Site:

- Vegetation around the building being returned to natural state and replanted with native plant species
- Protection of historical integrity of the heritage building
- Applied learning in an outdoor classroom space
- Wood benches carved by Indigenous artists welcome visitors to the building and celebrate Vancouver Island First Nations communities and culture