



# 2017 CARBON NEUTRAL ACTION REPORT



Sustainability in action.

May 30, 2018



## Executive Summary

This Carbon Neutral Action Report is for the period January 1st to December 31st, 2017. The report summarizes the University of Victoria's (UVic) greenhouse gas (GHG) emissions profile, the amount of offsets purchased to reach net zero emissions, the actions undertaken to reduce our greenhouse gas emissions and the university's plans to continue reducing emissions in 2018 and beyond. As of 2017, UVic is 18 percent below the 2010 GHG emissions baseline.

While emissions are below 2010 levels, in 2017 emissions totalled 12,712 tonnes of CO<sub>2</sub>e (tCO<sub>2</sub>e) representing an 11 percent increase (1,242 tCO<sub>2</sub>e) over the prior year. The increase is attributed to scope one emissions. Approximately 70 percent (870 tCO<sub>2</sub>e) of the observed increase was driven by an increase in natural gas use for buildings and systems connected to the UVic district energy system.

Several initiatives to reduce emissions were undertaken in 2017 including retrofit and optimization programs in three campus buildings, numerous energy efficiency studies, and breaking ground on the new District Energy Plant. The university saved approximately 80 tCO<sub>2</sub>e as a result of these initiatives and created a plan for further efficiency improvements next year. However, these savings were offset by increased heating demand in the winter months of 2017 resulting in an overall increase in emissions.

Mobile emissions increased by 7 percent in 2017. UVic Facilities fleet accounted for approximately 68 percent of the mobile emissions produced in 2017. However, fleet emissions increased by less than 1 percent. Stability in emissions can be partially attributed to continued electrification of the UVic fleet in 2017. Most of the increase was a result of consumption from academic research vehicles. The use of these vehicles fluctuates with research and teaching volume and therefore is expected to change from year to year. Electricity based greenhouse gas emissions were stable between 2016 and 2017.

In 2018, the university will continue to develop and implement climate action initiatives in support of achieving the goal of a 30 percent GHG reduction below 2010 levels by 2019. The completion of the new District Energy Plant in 2018 will help achieve this goal. This plant is expected to result in significant emissions reduction in 2019 and beyond. UVic will also implement further continuous optimization work in buildings across campus and begin implementing the 2018/2019 Energy Master Plan.



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## 2017 Greenhouse gas emissions

The total greenhouse gas emissions for the University of Victoria are **12,712 tCO<sub>2</sub>e** for the 2017 calendar year. Emission categories are outlined in Table 1 below:

REPORTING CATEGORY	2016 tCO <sub>2</sub> e	2017 tCO <sub>2</sub> e	% CHANGE
SCOPE ONE: University owned buildings & leased spaces: Natural gas, diesel, & heating fuel	10,226	11,451	12%
SCOPE TWO: University owned buildings & leased spaces: Electricity	732	729	0%
SCOPE ONE: Mobile combustion (Fleet)	360	386	7%
SCOPE THREE: Paper supplies	152	146	-3%
Total	11,470	12,712	11%



*The new District Energy Plant is scheduled to be completed and operational in 2018.*

*Table 1. Greenhouse gas emissions for the University of Victoria.*

In 2017, UVic observed a 1,242 tCO<sub>2</sub>e increase in emissions. The increase was attributed to scope one emissions. The major driver of emissions in UVic's portfolio is the district energy system. The system provides space and hot water heating in 33 buildings across campus and accounts for more than 870 tCO<sub>2</sub>e, or approximately 70 percent of the increase observed.

Significant increases were also observed in UVic external properties and campus buildings not connected to the district energy system. Approximately 360 tCO<sub>2</sub>e of the increase observed in 2017 was attributable to buildings outside the system. Emissions associated with diesel purchases for UVic back-up generators decreased as did the estimated scope one emissions. Overall, scope one buildings' emissions outside the district energy system accounted for 29 percent of the increase observed.

In 2017, UVic broke ground on a new District Energy Plant. The new Plant will include three new high-efficiency natural gas boilers. The plant will allow for the decommissioning of three older, less efficient, boiler plants on campus. New energy transfer stations will also be installed throughout the district energy system allowing

high temperature loads to be removed from the system. In total, these changes will allow UVic to reduce the temperature of the district energy loop and decrease the system wide emissions by approximately 10 percent (700 tCO<sub>2</sub>e).

Building heating demand accounted for 99 percent of the increase in emissions observed. Figure 1 demonstrates that the campus experienced a 13 percent increase in heating degree days (HDD) over 2016. Heating degree days are measured by identifying days with an average temperature below 18°C (heating days) and summing the total number of degrees below that temperature for each day (heating degree days). Further, in 2017 the campus experienced a 19 percent increase in HDD than 2015, which was the university's lowest emission year to date. Notably, the number of heating degree days in 2017 was approximately the same as 2010, making this an effective comparison year. The university achieved an 18 percent reduction in CO<sub>2</sub>e emissions between 2010 and 2017 while adding a large amount of new floor area.

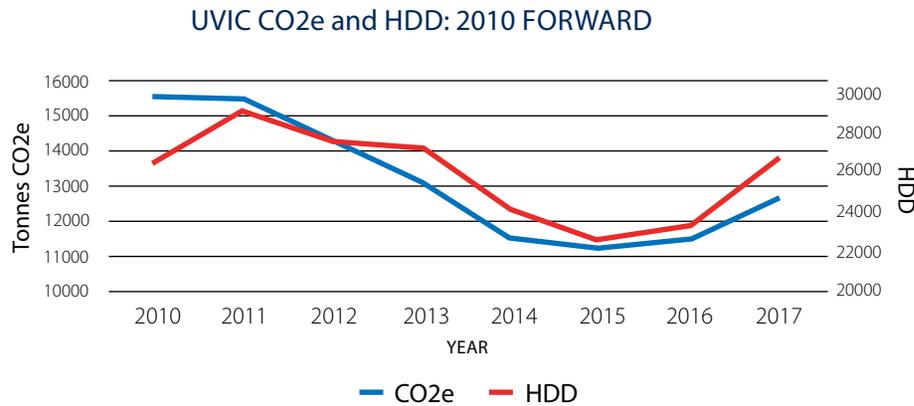


Figure 1: CO2e emissions and HDD at the University of Victoria 2010-2017

Mobile emissions increased by 7 percent in 2017. UVic Facilities fleet accounted for approximately 68 percent of the mobile emissions produced in 2017. However, fleet emissions increased by less than 1 percent. UVic continued the electrification of its fleet in 2017/2018 financial year. The facilities fleet added 4 additional used Nissan Leafs. UVic also added a number of new vehicle charging stations. Academic research vehicles were the primary driver of the emissions increase in 2017. The use of these vessels fluctuates with research and teaching volume and therefore is expected to change year to year.

Electricity use on the UVic campus decreased; however, there was an increase among off campus buildings, including shared facilities. Estimated electricity consumption also decreased. Changes in electricity use in the UVic building portfolio were relatively minor.

Paper use continued to decrease in 2017. A 2 percent reduction in paper consumption was observed along with a 3 percent reduction in associated emissions. UVic purchased less virgin paper content, which has a higher emission factor than recycled content, as well as less paper overall as compared to 2016. The virgin paper content fluctuates year to year, but overall it has been trending upward since the university's first provincial mandated greenhouse gas inventory in 2010.

Figure 2 below shows that natural gas accounts for 90 percent of total emissions, while electricity accounts for 6 percent. Emissions associated with fleet vehicles and paper purchases comprise the remainder.

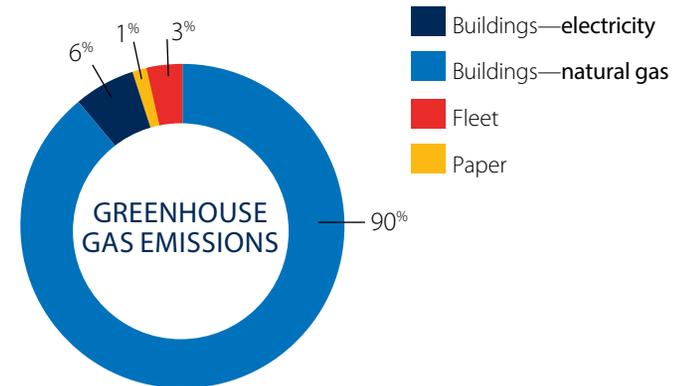


Figure 2: 2017 Greenhouse gas emissions percentage of each reporting category for the University of Victoria

## Changes to greenhouse gas emissions and offsets reporting from previous years

No changes were made to previous years' inventories.

## Offsets applied to become carbon neutral in 2017

The total greenhouse gas emissions for the University of Victoria in the year 2017 were 12,711 tCO<sub>2</sub>e, which includes all properties owned by the university on and off campus, properties leased from other entities for university business, and shared properties.

This total excludes fugitive emissions as it was estimated that stationary fugitive emissions from cooling do not comprise more than one percent of the University of Victoria's total emissions and an ongoing effort to collect or estimate emissions from this source would be disproportionately onerous. For this reason, emissions from this source have been deemed out-of-scope and have not been included in the University of Victoria's total greenhouse gas emissions profile.

As required by Section 5 of the Carbon Neutral Government Regulation, 18 tCO<sub>2</sub>e emissions resulting from the use of bio-fuels were reported as part of UVic's greenhouse gas emissions profile in 2015. However, they were not offset as they are out-of-scope under Section 4(2) of the Carbon Neutral Government Regulation.

The total Greenhouse gas emissions that the University of Victoria is required to offset is 12,694 tCO<sub>2</sub>e for 2017.

## Actions taken to reduce greenhouse gas emissions in 2017

Fifteen building energy efficiency projects were completed in the 2017/2018 financial year; these included:

- The retrofit of UVic exterior walkway lighting to LED
- Building heating and lighting control upgrades to the:
  - Visual Arts Building
  - Fine Arts Building
- A variable speed drive installation in the University Centre ventilation system
- Energy saving opportunity studies in
  - The Ian Stewart Complex
  - Centre for Athletics Recreation and Special Abilities
  - The Continuing Studies Building
  - The Michael Williams Building
  - The Stadium Building
  - The Cunningham Building
  - The Human and Social Development Building
  - The Business and Economic Building
  - The David Strong Building
- A lighting upgrade in the McPherson Library

In total, the 15 associated projects will prevent an estimated 80 tonnes of emissions from being emitted annually.

The campus shutdown during the Christmas holiday period was again coordinated by the Controls Group within Facilities Management. The heating and lighting schedules reduced starting December 23th and remained as such until January 2nd. As a result, UVic prevented over 30 tCO<sub>2</sub>e emissions from being emitted.



Construction began on the District Energy Plant in 2017. The project will be completed in 2018. This upgrade is expected to mitigate approximately 700 tCO<sub>2</sub>e emissions annually.

UVic continued the electrification of its fleet in 2017/2018 financial year. The facilities fleet added 4 additional used Nissan Leafs. UVic also added a number of new vehicle charging stations.

With funding from BC Hydro's Energy Wise Network program, the Sustainability Action Team program continued with behavioural change activities involving staff, students and faculty in two categories: Green Offices and Green Labs.

- Staff in the Facilities Management building took on a Turn Off the lights campaign. The campaign resulted in a 9 percent decrease in lighting hours for that building.
- The Green Labs program continued with chemistry lab guided group discussions. This program acquired commitments from individual lab users to safely use the setback switches on fume hoods more frequently. The program increased the use of setback mode by an average of 12 percent over the 8 months following the program.

## Plans to continue reducing greenhouse gas emissions

The University of Victoria will further reduce greenhouse gases in 2018 through the following activities:

- Conduct optimization work and or lighting upgrades to achieve 134 tCO<sub>2</sub>e emission and approximately 900,000 kWh savings in:
  - The Ian Stewart Complex
  - CARSA
  - The Continuing Studies Building
  - The Michael Williams Building
  - The Centennial Stadium Building
  - The Cunningham Building
  - The Human and Social Development Building
  - The Business and Economic Building
  - The David Strong Building
- Implement projects through the UVic Revolving Sustainability Loan Fund
- Conduct lighting and energy saving studies in the five other campus buildings
- Complete the new District Energy Plant
- Implement the 2018 Energy Master Plan
- Complete the 2018 Campus Cycling Plan, which will enable the university to increase the rate of cycling to campus

For additional information on sustainability, along with greenhouse gas reporting and energy initiatives at the University of Victoria, please see our website at

[uvic.ca/sustainability](http://uvic.ca/sustainability)

