



2016

carbon neutral action report

SIMON FRASER UNIVERSITY



ACKNOWLEDGEMENTS

This report was produced by Simon Fraser University. It provides a high-level overview of the actions taken by the SFU campuses to reduce greenhouse gas emissions and promote a culture of sustainability.

For more information about sustainability programs at SFU, please visit our website:

www.sfu.ca/sustainability

And the SFU Sustainability Reporting Initiative (SRI) at:

www.sfu.ca/sri

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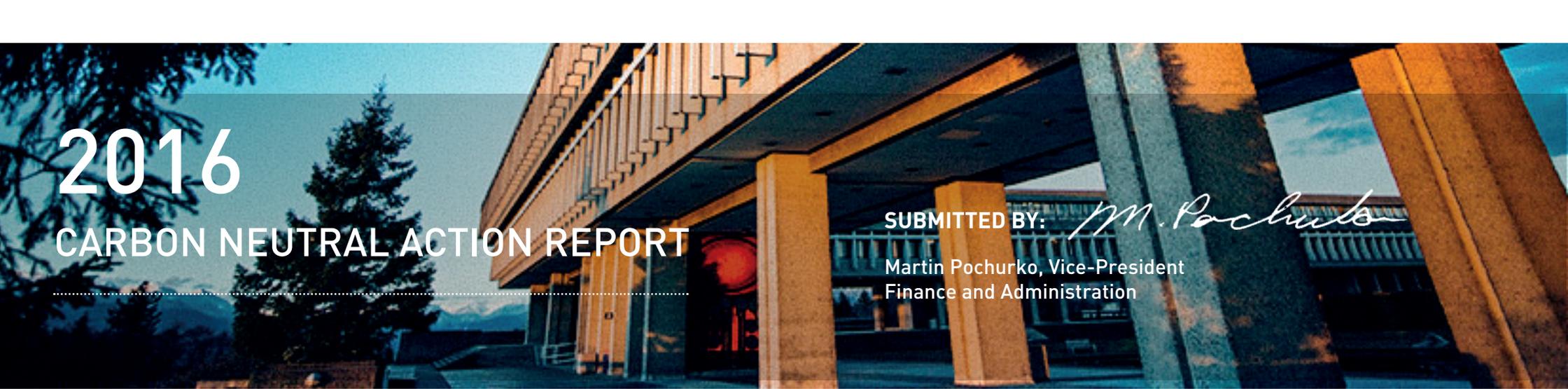
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2016

CARBON NEUTRAL ACTION REPORT

SUBMITTED BY:

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Finance and Administration

EXECUTIVE SUMMARY

In 2016, Simon Fraser University (SFU) focused on institution-wide strategic planning, capacity building, and continued energy-efficiency retrofits to reaffirm its commitment to overall greenhouse gas (GHG) emissions reductions. Despite the small increase in GHG emissions from 2015, SFU has exceeded the interim GHG reduction target of 18% below 2007 levels with a reduction of nearly 23% below the baseline, and remains on track with its long-term GHG reduction targets of 33% and 80% below the 2007 baseline by the years 2020 and 2050, respectively.

SFU executed a number of energy efficiency and conservation projects, for total estimated reductions of 1,100,000 kWh of electricity and 7,500 GJ of natural gas, through the Carbon Neutral Capital Program (CNCP), its internal Sustainable Utilities Revolving Fund and through incentives from BC Hydro and FortisBC. These projects have and continue to significantly contribute to SFU's overall GHG emissions reductions.

Furthermore, SFU announced the expansion of its Surrey Campus with the construction of the 15,000-square-metre Sustainable Energy and Environmental Energy Program (SE3P) Building. This building is designed to meet high green building standards and is targeting a LEED Gold Certification, making it an ideal space for the proposed interdisciplinary engineering

program that will support BC's growing clean tech and sustainability energy sector.

Through its various employee and student focused programs, SFU successfully contributed to the reduction of GHG emissions from paper sources. In 2016 SFU planned an expansion of the Green Offices and Green Labs Program to other operational areas to further contribute to reduction in GHG emissions through demand-side energy management.

Through its ongoing strategic planning, SFU continues to make great strides in its effort to minimize its ecological footprint. In 2016, SFU voluntarily committed to a 30% decrease in the carbon footprint of its investment portfolio by 2030 and set ambitious energy reduction and renewable energy targets through its Strategic Energy Management Plan 2015/16-2020/21, such as shifting 80% of the fossil-based energy to renewables by 2020. It also announced its intention to partner with Corix Multi-Utility Services Inc. to explore renewable energy production through biomass on its Burnaby campus. This is all in line with SFU's newly released 20-Year Sustainability Vision and Goals that identified renewable energy and continued GHG emissions reductions as a community priority for SFU's sustainable future.

OVERVIEW

This Carbon Neutral Action Report for the period January 1, 2016 to December 31, 2016 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2016 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2017 and beyond.

By June 30, 2017, Simon Fraser University's final Carbon Neutral Action Report will be posted to our website at: <http://www.sfu.ca/sustainability.html>

Martin Pochurko, Vice-President
Finance and Administration



May 31, 2017

1.0 GREENHOUSE GAS EMISSIONS & OFFSETS

1.1 GREENHOUSE GAS EMISSIONS IN 2016

Total absolute greenhouse gas (GHG) emissions for Simon Fraser University's operations in 2016 were 14,803 tCO₂e.¹ Emissions increased by approximately 3.5% overall compared to 2015 levels; this is largely due to a 4.5% increase in heating degree days (cooler and longer winter) in comparison to 2015. The impact of the unseasonably cold winter in 2016 on GHG emissions is visible in the increase in GHG emissions from building sources. In 2016, the emissions from fleet also increased slightly due to increase in fleet size. Despite the slight increase in GHG emissions between 2016 and 2015, SFU remains on track for long-term emission reductions, with GHG emissions for 2016 approximately 23% lower than the 2007 baseline (see Table 1).

Between 2015 and 2016, SFU's university physical space decreased by approximately 2%. Overall, the university's physical space has increased by about 10% since the 2007 baseline.²

Fugitive emissions from cooling are estimated to comprise less than 1% of Simon Fraser University's total emissions and the fugitive emissions data are onerous to collect; therefore these emissions are considered out of scope, as per section 8.3 of the 2016/17 BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions.

1.2 OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2016

In 2016, as reported in the BC Provincial Government's SMARTTool, SFU purchased 14,793 tonnes of carbon offsets at the price of \$25 per tonne, this amounted to \$369,825 of offsets plus GST.

¹ Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit of measurement in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.

² From SFU's Annual Space Reports

SOURCE*	2007 (tCO ₂ e) BASELINE YEAR**	2014 (tCO ₂ e)	2015(tCO ₂ e)	2016 (tCO ₂ e) CURRENT YEAR
Buildings – Stationary Fuel Combustion and Purchased Energy	17,995	15,159	13,932	14,307
Fleet – Mobile Fuel Combustion	940	290	251	277
Paper – Office Supplies	357	248	100	219
Total Emissions Calendar Year	19,292	15,696	14,284	14,803
Carbon Neutral or Offset Exempt	N/A	-10	-8	-9
Total Emissions Requiring Offset Payments	N/A	15,686	14,275	14,793
Offset carry-over from Previous Year	N/A	13	0	0
Total Emissions Offsets Purchased	N/A	15,699	14,275	14,793

TABLE 1

Simon Fraser University Greenhouse Gas Emissions by Source per Year

Nine tonnes CO₂ equivalent emissions from the combustion of biomass fuels were reported as part of our total greenhouse gas emissions profile in 2016. As stated in the 2016/17 BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions, the carbon dioxide emissions resulting from the combustion of biogenic fuel sources must be reported but do not require offsets.

1.3 CHANGES TO GREENHOUSE GAS EMISSIONS & OFFSETS REPORTING FROM PREVIOUS YEARS

At this time, there are no changes to Simon Fraser University's 2016 greenhouse gas emissions from previous years.

* Emissions data (2014, 2015, 2016) are values are reported in SMARTTool. For simplicity, values with decimals have been rounded off.

** 2007 baseline set from Willis Energy: SFU GHG Inventory

2.0 ACTIONS TAKEN TO REDUCE GREENHOUSE GAS EMISSIONS IN 2016

2.1 BUILDING EMISSIONS

Building emissions continue to represent the largest portion of SFU's greenhouse gas emission footprint at 96.6% in 2016. Energy efficiency and conservation projects and behavioural-change campaigns are the primary tools employed by SFU to reduce its greenhouse gas emissions.

2.1.1 PLANNING FOR REDUCTIONS

With SFU's 2013/14 – 2015/16 Strategic Energy Management Plan (SEMP) in its last year of implementation, SFU began developing its 2015/16 – 2020/2021 SEMP, to set a roadmap to further minimize the institution's energy consumption and reduce its GHG emissions.

Propelled by SFU's University Energy Utilization Policy (GP 43) and as a signatory to the Paris Pledge for Action, supporting "the adoption of a new, universal climate agreement at COP 21 in Paris", SFU has set ambitious targets for the next five years. Namely, SFU has committed to reducing the energy consumption of the Burnaby Campus by 16% from 2012/13 and displacing 80% of the fossil-based energy to renewables by 2020/21. Achieving these targets will enable the university to surpass the provincial target of 33% GHG reduction by 2020 and set the path to reach the 80% reduction target by 2050.

2.1.2 NEW BUILDINGS & MAJOR RENEWAL OF EXISTING BUILDINGS

SFU began construction on a new 15,000-square-metre Sustainable Energy and Environmental Engineering Program (SE3P) Building on its Surrey Campus, targeted for occupancy at the end of 2018. The building will house teaching and research in SFU's Mechatronic Systems Engineering (MSE) and host a new innovative program in sustainable energy and engineering. To minimize the carbon footprint of this new space, the building is designed and being constructed to meet high green building standards and targeted for LEED Gold Certification.

An integrated design planning approach to major renewal projects has also brought the focus onto improving energy efficiency in the renewal and repurposing of the existing older buildings on the Burnaby Campus.

Major renewal projects that are currently under final design focus on building envelope improvements such as roof and wall insulation, as well as new windows and entrances. This integrated planning will ensure building energy performance is enhanced as part of the capital renewal program.

2.1.3 ENERGY EFFICIENCY & CONSERVATION PROJECTS

In 2016, SFU implemented the following measures throughout its campuses to achieve energy efficiency and GHG emissions reductions:

Animal Care Facility Heating System and DDC Upgrade

- Replaced the aging boiler with two high-efficiency condensing boilers
- Integrated the building control to the campus control system
- Replaced the pneumatic control valves of the air handling units

Demand Controlled Ventilation in Academic Quadrangle and East Theatre Annex

- Installed CO₂ sensors and occupancy sensors in the HVAC system of the lecture theaters to optimize the energy usage of the area
- Monitored CO₂ content continuously to optimize ventilation

Variable Speed Drives Installation in Shrum Science Centre

- Installed 15 Variable Speed Drives (VSDs) with a total horsepower of 230 fans in the Shrum Science Centre to optimize the energy usage of the HVAC system
- The electricity reduction from this reduction is equivalent to powering 25 households in BC.

Heating Valve Replacements in South Science Building Heating

- Replaced 133 pneumatic heating valves in South Science Building to avoid hot water leak

Airflow Fine Tuning in Shrum Science Centre

- Re-commissioned face velocities of fume hoods to current standard
- Reduced the amount of infiltration

Lighting Efficiency Projects

West Mall Centre Lighting Upgrade

- Replaced 1,250 2-lamp 2x4 T8 fixtures with 1,214 LED fixtures with estimated electricity saving of 300,000 kWh

Maggie Benston Centre Lighting Upgrades

- Replaced 850 3-lamp 2x4 T8 fixtures with 817 2x2 LED fixtures with estimated electricity saving of 200,000 kWh

Other Projects

Residences Water and Energy Efficiency Improvements

- Installed over 360 water efficient showerheads and faucet aerators in student residences to reduce water and energy consumption through the FortisBC Rental Apartment Efficiency Program
- Estimated GHG emissions reduction of 90 tonnes CO₂e, which is roughly equivalent to the annual emissions produced by 19 passenger vehicles

- Estimated water consumption reduction of 8,000 m³, which is enough water to fill up SFU's swimming pool 12 times.³

2.1.4 BEHAVIOUR CHANGE

Developed in partnership with BC Hydro's Workplace Conservation Awareness (WCA) program, SFU's Green Labs and Green Office Certification Programs saw vast success within the University as many offices and labs across SFU's three campuses participated in the certification process. At the height of the program, 56 green offices and labs were registered, of which 32 completed the certification program directly, contributing to demand-side energy management.

In March 2016, SFU held a Green Offices and Green Labs Challenge where 16 offices and labs across SFU participated by submitting photos of their conservation efforts. The Challenge also encouraged participants to engage others within their departments, and to sign up other offices and labs. The results were impressive with 11 new offices and labs signing up for the certification program.

Starting in the summer of 2016 SFU began reviewing the existing Green Office and Labs program to identify opportunities for expansion. Given the growing demand and interest on behalf of the SFU community to participate in the certification of various spaces on campus, SFU developed the 'Sustainable Spaces Program', for launch in early 2017. This expansion aligns with BC Hydro's new Energy Wise Network program that replaced the WCA program and aims to increase energy conservation awareness at the workplace and inspire action and leadership among SFU communities to contribute to demand-side energy use management. For more information on the new Sustainable Spaces program, see section 3.1.2.

³ To read more about this project, visit: <https://www.sfu.ca/sfunews/stories/2016/water-conservation-makes-splash-across-campus.html>

2.2 FLEET EMISSIONS

In 2016, SFU replaced several decade old 6-Cylinder engine model fleet vehicles with new, efficient, 4-Cylinder engine model vehicles. SFU staff continue to utilize the informal but well-practiced “buddying up” system, minimizing single occupancy in campus fleet vehicles. Overall, SFU’s vehicle fleet size increased by three vehicles.

2.3 PAPER EMISSIONS

Paper consumption in 2016 continued to go down so that, compared to 2007, emissions from paper have been reduced by nearly 39%. This can be attributed to a general shift towards increased use of online communications and digital workflows, as well as an increase in individual efforts across the University to print less and to set printing to double-sided as a default. The popularity of multi-function devices (MFDs) that will scan and email directly from the MFD has also reduced the need for photocopying.

Central Stores in Facilities Services, Burnaby campus is the main supplier of office paper to departments across the University. The standard stock is 30% recycled content (RC) paper, with only limited distribution of virgin paper for specialized needs.

SFU Document Solutions provides centralized printing and digital services to the University and purchases paper as a sustainable choice to meet their printing needs. This is significant as Document Solutions handles printing for 95% of all course and exam packages.

3.0 PLANS TO CONTINUE REDUCING GREENHOUSE GAS EMISSIONS

Despite the increase in overall greenhouse gas emissions compared to 2015, SFU has achieved the interim goal of an 18% reduction below 2007 emission levels by 2016 with a reduction of greenhouse gas emissions of almost 23% compared to 2007 baseline emissions.

Building operations (heating, cooling and powering buildings) account for nearly 97% of campus emissions in 2016. In order to achieve the university’s goal of a 33% reduction by 2020 (compared to 2007 baseline) SFU will need to explore renewable energy options, as well as focus efforts to engage its community in continued behavioral change programs and campaigns. At the same time, efforts to scale up energy efficiency projects to prioritize energy performance as part of a holistic approach to building upgrades throughout SFU’s campus buildings.

Recognizing that new space will continue to be added to accommodate growth to support SFU’s academic and research needs, new space will be required to meet high performance standards to minimize their carbon footprint.

SFU has taken a bold stance on climate action and in November 2016, SFU voluntarily committed itself to decrease the carbon footprint of its investment portfolio by at least 30 percent by 2030 – in line with Canada’s national climate commitment.⁴ This commitment follows a series of other climate-related initiatives and achievements including the creation of a Responsible Investment Committee and Policy; nearly doubling the share of SFU’s endowment committed to socially responsible investment; and the development of a University Energy Utilization Policy. This is being operationalized through the Strategic Energy Management Plan (SEMP).

⁴ From SFU News: “SFU moves to decrease carbon footprint of its investment portfolio” s

Furthermore, in 2016, SFU embarked on an ambitious engagement process to envision what a “sustainable SFU” would look like in 20 years. The result of the engagement process was a single University vision for sustainability and twenty 20-year goals. Throughout the engagement process the SFU community expressed the importance of the institution taking the lead on lowering its GHG emissions and shifting towards renewable energy, with one of the final 20-year goals being that “100% of SFU’s energy is sourced from renewable sources.” To meet this ambitious target and set the stage for SFU to meet the target of 80% GHG reduction by 2050 (using a 2007 baseline) it is imperative that its short-term institutional plans and targets provide a concrete direction. SFU is scheduled to release its 5-Year Sustainability Strategic plan in Fall 2017; the 20-Year Sustainability Vision and Goals document as well as the Greenhouse Gas Reduction Targets Act will influence the trajectory of that 5-year plan.

In 2016 SFU announced the construction of a Central Energy Plant on Burnaby Mountain with Corix Multi-Utility Services (Inc.) to provide the institution and UniverCity with green, thermal energy.⁵ This plant will provide sustainable energy to over 40,000 people on Burnaby mountain. At build out, the Central Energy Plant would reduce GHG emissions at the campus from heating by 85% and the entire SFU GHG emissions from all sources by 69%.⁶

3.1 BUILDING EMISSIONS

SFU will continue to invest in retrofit projects and optimize its building performance and energy efficiency through the Sustainable Utilities Revolving Fund (SURF), the Carbon Neutral Capital Program, and through other external funding support including BC Hydro and Fortis BC. The newly introduced Sustainable Spaces Program has great potential in furthering demand-side energy management.

3.1.1 ENERGY EFFICIENCY & CONSERVATION PROJECTS

The following projects are planned for upcoming years, and will contribute to decreased building GHG emissions:

- Discovery 1 – Continuous Optimization Program
- Shrum Science – DDC Radiation Zone Upgrade
- Childcare Centre – boiler upgrade
- Diamond Alumni Centre – boiler upgrade
- Water Tower Building – heating system optimization
- Demand controlled ventilation system installed for 28 lecture theaters
- Continuous replacement of existing fixtures throughout campus with LEDs

3.1.2 BEHAVIOUR CHANGE

Launch of the Sustainable Spaces Program

SFU launched the Sustainable Spaces program in early 2017 to recognize and celebrate sustainability efforts initiated at SFU. The existing Green Offices and Labs program formed the foundation of the Sustainable Spaces program, and was modified in order to incorporate SFU’s holistic definition of sustainability into programming, which includes not just ecological, but economic and social perspectives, and to expand the scope of the program to include dining and food vendors, and events.

There are four certification programs (Sustainable Offices, Sustainable Labs, Sustainable Dining and Sustainable Events) and three certification levels (Gold, Silver, and Bronze) available under the Sustainable Spaces Program.

⁵ “Corix and SFU Sign Agreement on Central Energy Plant”

⁶ “SFU signs energy deal that will see 85% reduction in greenhouse gas emissions at Burnaby Campus”



The Sustainable Spaces program encourages offices, labs, food vendors and event organizers to reduce GHG emissions through a number of physical and behavioural changes, including unplugging appliances at the end of the day, seeking naturally-lit meeting rooms and closing fume hoods in laboratory.

Expansion of the Sustainable Spaces Program

In partnership with SFU Residence and Housing, the SFU Sustainability Office is working to expand the Sustainable Spaces Program to student residences.

There are currently six student residences at SFU and the institution has announced plans on expanding student residential spaces in the coming years.⁷ There are major opportunities for emissions reductions in student residences that can be achieved through investments such as: installing efficient lighting in residence rooms and lounges, as well as investing in energy-efficient refrigerators and appliances. Student engagement and demand-side energy management through education will be the primary focus of the Sustainable Spaces expansion into residences.

Expansion of the Sustainable Labs Program

The Sustainability Office is working closely with Facilities Services to identify opportunities to expand the adoption of the Sustainable Labs program by labs that are energy intensive. The focus is to work with such labs to identify opportunities for efficiencies that ensure continued research excellence while reducing GHG emissions.

3.2 FLEET EMISSIONS

At SFU, individual departments with fleet capacities are responsible for taking actions to reduce emissions. In coming years, departments will continue to replace vehicles with newer, more efficient vehicles. Fleet managers will re-consider hybrid or electric vehicle replacements if available options meet technical requirements.

3.3 PAPER EMISSIONS

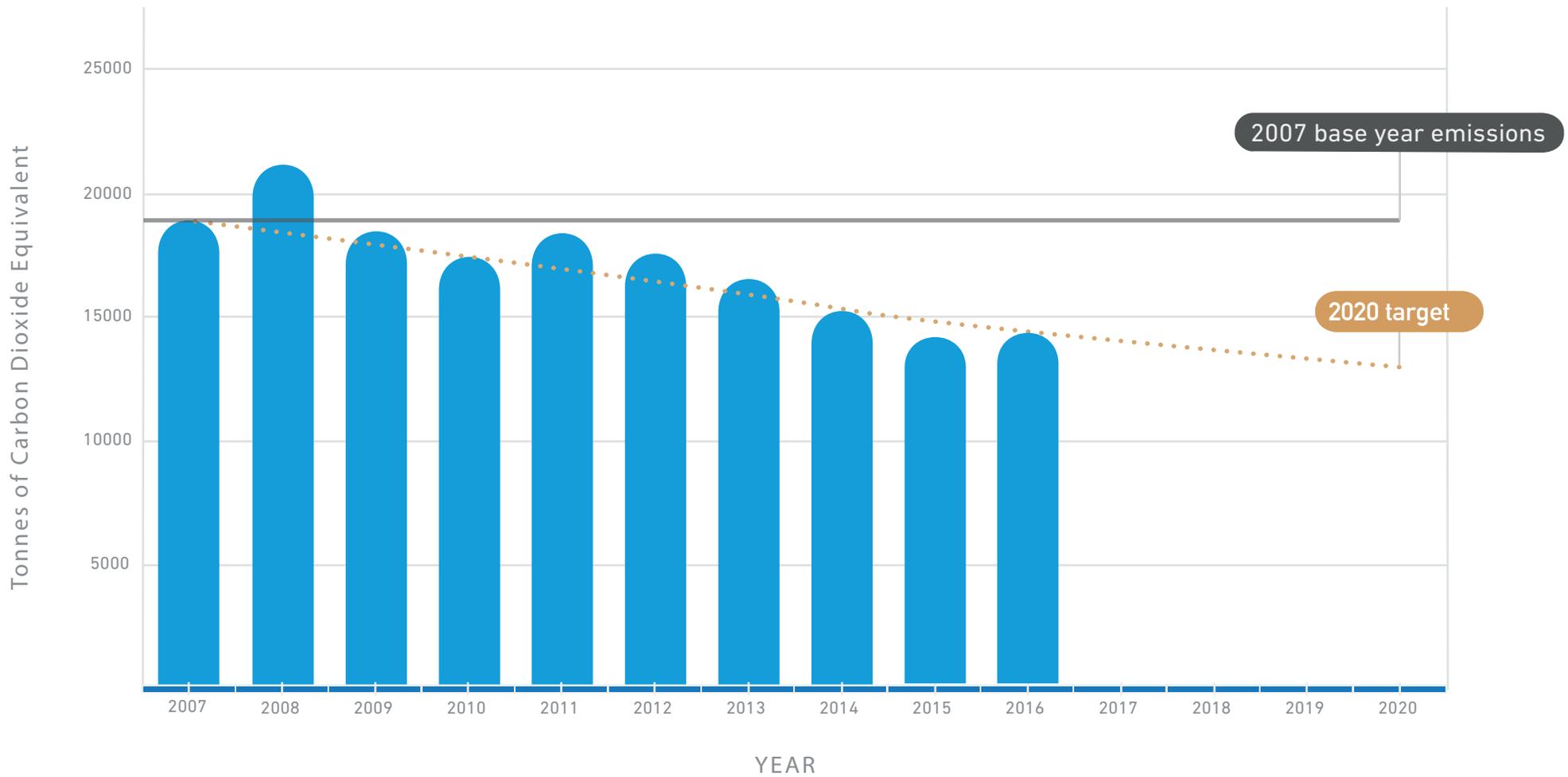
Through formalized initiatives such as the Sustainable Spaces Program launching in 2017, SFU will continue to educate and encourage its community to purchase sustainable and alternative paper source and to minimizing overall paper use wherever possible.

4.0 APPENDICES

Progress Towards Greenhouse Gas Emissions Reduction Targets

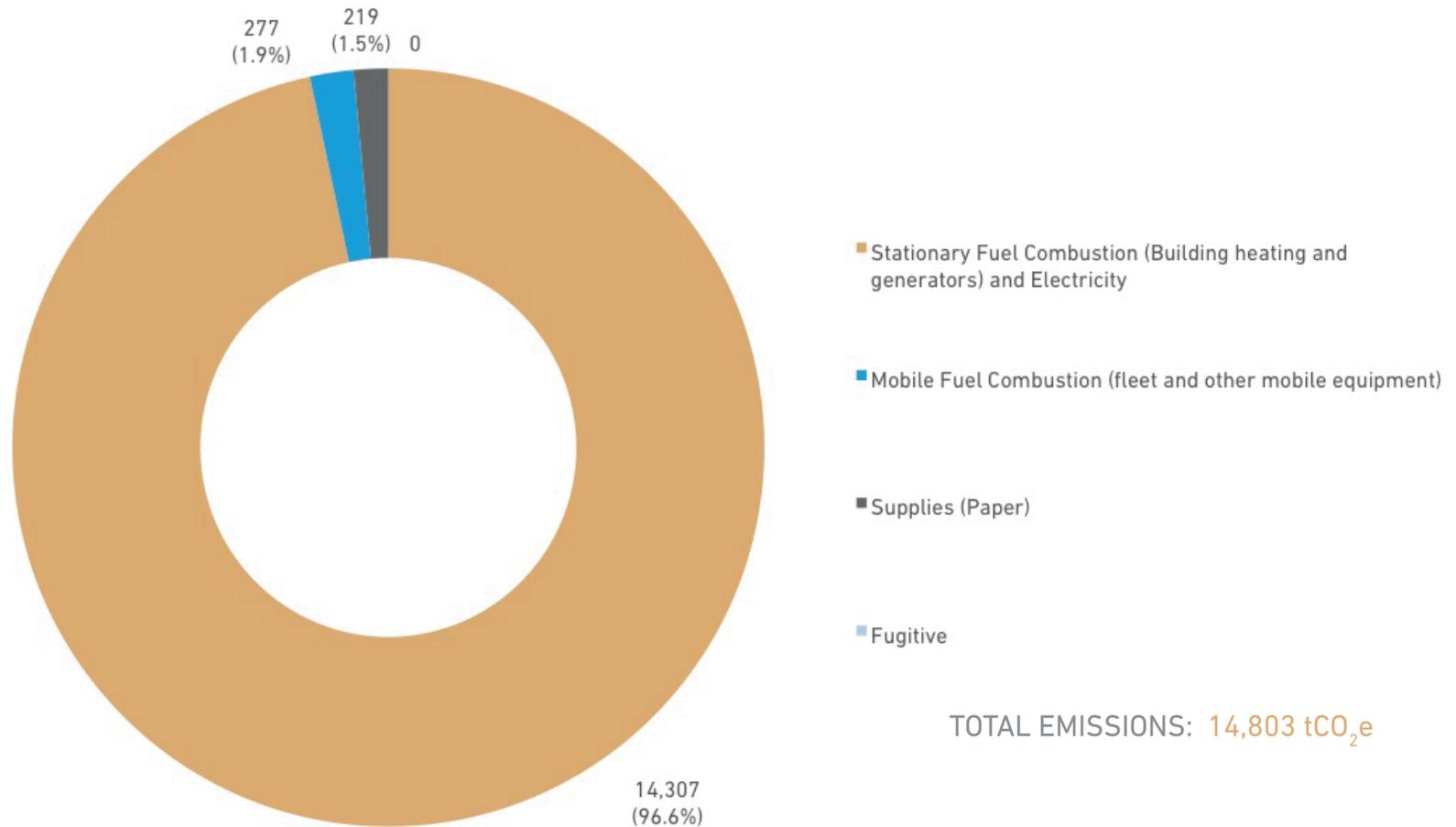
SFU Greenhouse Gas Emissions by Source

Progress Towards Greenhouse Gas Emissions Reduction Targets



● Annual Emissions (tCO₂e) ●●●● Trajectory to reach 2020 Target — Emission level from 2007 base year

Greenhouse Gas Emissions by Source (tCO₂e)



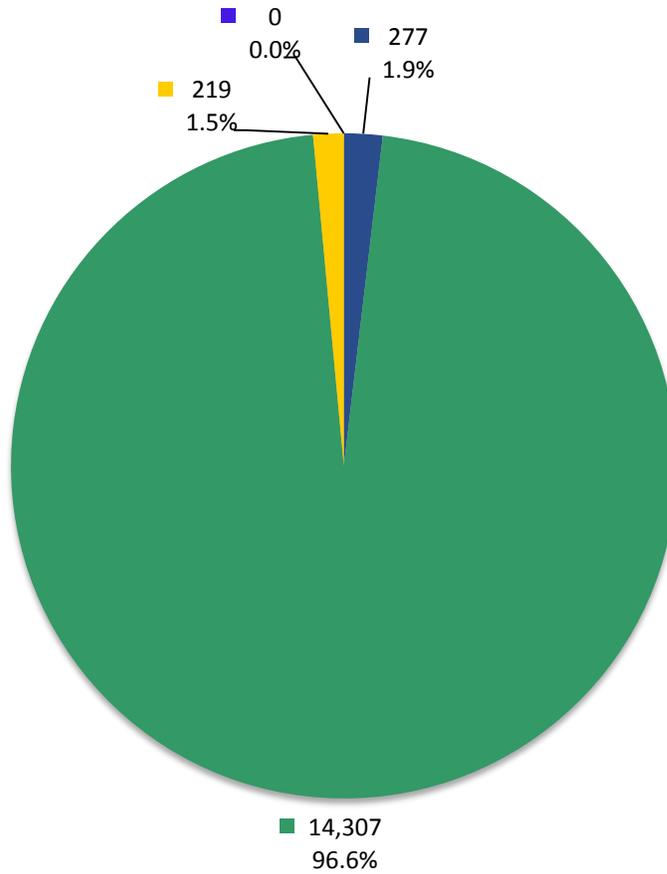
Offsets applied to become Carbon Neutral in 2016

Total offsets required: 14,793

Total offset investment: \$369,825, plus GST

Emissions which do not require offsets: 9*

Simon Fraser University Greenhouse Gas Emissions by Source for the 2016 Calendar Year (tCO₂e*)



Total Emissions: 14,803

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

Offsets Applied to Become Carbon Neutral in 2016 (Generated May 15, 2017 4:21 PM)

Total offsets required: **14,793**. Total offset investment: **\$369,825**. Emissions which do not require offsets: **9** **

*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.

2016 Carbon Neutral Action Report Survey

Part One (external)

Contact Name(s):

Wendy Lee & Erica Lay

Organization Name:

Simon Fraser University

Please select your sector:

- Post-Secondary Institution

1) Stationary Sources (Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

During 2016, did your organization take any of the following actions to support emissions reductions from buildings?

Select all that apply

- Conducted an energy audit/study of building(s) in the organization's portfolio
- Performed energy retrofits of the organization's buildings.: Boiler replacements, VFD installations, Demand controlled ventilation, DDC integration, Lighting upgrades, Building envelope upgrades, glazing replacement
- Built, or are building new LEED Gold or other "Green" buildings.: Sustainable Energy and Environmental Engineering Program (SE3P) Building
- Other actions? Please describe briefly.: Strategic Energy Management Plan

Briefly describe your organization's plans to continue reducing emissions from its stationary sources in future years.

Pursuing renewable energy with fuel switching to biomass in new heating plant, Continue 2% energy reduction each year. Exploring low-carbon electrification of the system.

During 2016, did your organization participate in utility-sponsored energy demand management program(s) (e.g. BC Hydro's Energy Management (Manager))?

Yes

If yes, please describe briefly:

BC Hydro Energy Manager and Energy Wise Programs, and Fortis BC Energy Specialist program

2) Mobile Sources (Vehicles, Off-road/Portable Equipment): Fuel Combustion.

During 2016, did your organization take any of the following actions to support emission reductions from its mobile sources?

Select all that apply

-
- Replaced existing vehicles with more fuel efficient vehicles (gas/diesel).: Replacing 6-cylinder vehicles with newer 4-cylinder vehicles.
-

Briefly describe your organization's plans to continue reducing emissions from its mobile sources in future years.

*Continue to replace aging vehicles with newer/more efficient vehicles.
Continue to reduce number of trips through "buddying up" system.*

3) Supplies (Paper):

During 2016, did your organization take any of the following actions to support emissions reductions from paper supplies?

Select all that apply

-
- Other actions? Please describe briefly.: 30% recycled content now standard, increasing replacement of printers with multi-function devices that allow for scanning/emailing to reduce need for printing
-

Briefly describe your organization's plans to continue reducing emissions associated with its office paper use in future years.

Continue to promote paper reduction and recycled-content paper use through the Sustainable Spaces program for offices and labs.

4) Other Sustainability Actions:

Business Travel:

During 2016, did your organization take any of the following actions to support emissions reductions from business travel?

Select all that apply

(No response)

Education Awareness:

During 2016, did your organization have any of the following programs or initiatives to support sustainability education and awareness?

Select all that apply

- Green, Sustainability or Climate Action Team
- Support for professional development on sustainability (e.g. workshops, conferences, training)
- Supported or provided education to staff about the science of climate change, conservation of water, energy and/or raw materials

Other Sustainability Actions:

During 2016, did your organization have any of the following programs or initiatives to support sustainability?

Select all that apply

- A water conservation strategy which may include a plan or policy for replacing water fixtures with efficient models
- An operations policy or program to facilitate the reduction and diversion of building occupant waste (e.g., composting, collection of plastics, batteries) from landfills or incineration facilities
- Green procurement standards for goods (e.g., office furniture, etc.)
- Other, please describe briefly: Lifecycle Assessment Tool for Procurement Department