



Niagara College

Carbon
Project
Annual Report

2013-2014



June 2014

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Introduction

As public and private sector organizations become more conscious of environmental risks, carbon management gains a more crucial role in performance management, as well as corporate social responsibility (CSR). By tracking their carbon footprint, or the overall impact they have on the global climate in terms of the total amount of greenhouse gases produced, organizations are also making noticeable improvements to operational performance.

Partnering with Niagara Sustainability Initiative (NSI) through the Carbon Project allows companies, institutions and municipalities to recognize opportunities for emission reductions and efficiency improvements. Many organizations do not have a focused approach to carbon management. By simply viewing carbon emission data in a unified carbon management dashboard, organizations are more likely to make strides towards lowering that impact and potential business risks as they are able to identify the largest sources of their emissions. The greatest opportunities for carbon management improvements come from money-saving energy efficiency measures, making the investment in carbon management a valuable business practice.

Through a sustainability themed academic year, Niagara College has identified and acted upon the importance of the engagement of their growing student and employee population. Consequently, the College received widespread recognition as a leader among both post secondary institutions and Niagara organizations alike. However, the impact of engagement at a post secondary institution is two-fold. Understanding and engaging in sustainable behaviour is critical for students, not just to support the College in achieving its internal goals but also to foster sustainable thinking that can be applied when these students enter the workforce.

In partnership with Niagara Sustainability Initiative (NSI), Niagara College has undertaken the process of calculating its corporate carbon footprint. The purpose of this report is to update and inform Niagara College regarding the results of the 2013 reporting year under the Carbon Project.

Voluntary Reporting: The Carbon Project

The Carbon Project is a voluntary program whereby partners commit to managing and reducing their organizational carbon emissions. Through NSI's proven approach to engaging organizations in setting and achieving reduction targets, partners are able to minimize their environmental impact while improving their financial bottom line: a two-fold accomplishment. The **Carbon Project** provides NSI partner organizations with services, tools and networks to facilitate a reduction in carbon (or GHG) emissions. In turn, participating organizations report their corporate carbon footprint, at a minimum, on an annual basis.

Scope of Inventory

Niagara College reports their corporate carbon inventory according to the institutions fiscal year, which continues from April 1, 2013 to March 31, 2014. Niagara College's baseline year is April 1, 2009 – March 31, 2010. International GHG accounting standards were followed to determine Niagara College's carbon footprint through the use of carbon accounting software developed by e3Solutions. According to these standards, emissions generating activities were classified under the following scopes:

Scope 1: All GHG emissions resulting from direct combustion.

Scope 2: Indirect GHG emissions from consumption of purchased electricity.



Scope 3: Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, outsourced activities, waste disposal, water usage and others.

As a participating organization in the Carbon Project, Niagara College has committed to measuring and reporting emissions from the following activities:

Scope 1: Fleet vehicles and stationary combustion

Scope 2: Electricity consumption

Scope 3: Business travel, waste and water

Inventory

The corporate carbon inventory totalled 6,528.67 tonnes of CO₂e (tCO₂e) and was reduced to 6178.67 tCO₂e once offsets were accounted for. The largest emission source was stationary combustion, Scope 1, totalling 3,626.38 tCO₂e, 55.55% of the total footprint (Table 1, Figure 1). The second largest emission source was electricity consumption (Scope 2) totalling 1781.79 tCO₂e (27.29% of the total footprint). Waste, scope 3, represented the third largest contributor to the corporate carbon emissions at 970.77 tCO₂e (14.87%). Lastly, business travel (3), vehicle fleet (1), and water (3) represent the remaining source activities with 126.17 tCO₂e, 17.55 tCO₂e, and 6.01 tCO₂e respectively.

Note: In 2012 the Wine Visitor and Education Centre as well as the Rankin Technology Centre at Niagara College were both deemed carbon neutral buildings within Niagara College's Niagara-on-the-Lake and Welland campuses, respectively. The building is Carbonzero certified and CSA recognized under the Clean Projects Registry. To maintain the buildings' carbon neutral designation, 350.00 tCO₂e were purchased through ISO 14064-2 Verified Emission Reductions from Walker Environmental Group in 2013. The total purchased offsets are reflected in the total carbon inventory and account for 5.36% of the total inventory (Figure 2).

Table 1. Corporate Carbon Footprint by Scope

Scope 1		Scope 2		Scope 3		Carbon Offsets	
Fleet Vehicles (tCO ₂ e)	17.55	Electricity Consumption (tCO ₂ e)	1781.79	Employee Commuting (tCO ₂ e)	--	Purchased Carbon Offsets	350.00
Stationary Combustion (tCO ₂ e)	3626.38			Business Travel (tCO ₂ e)	126.17		
Refrigerants (tCO ₂ e)	--			Waste (tCO ₂ e)	970.77		
		Water (tCO ₂ e)	6.01				
Total (tCO₂e)	3643.93	Total (tCO₂e)	1781.79	Total (tCO₂e)	1102.95	Total (tCO₂e)	350.00



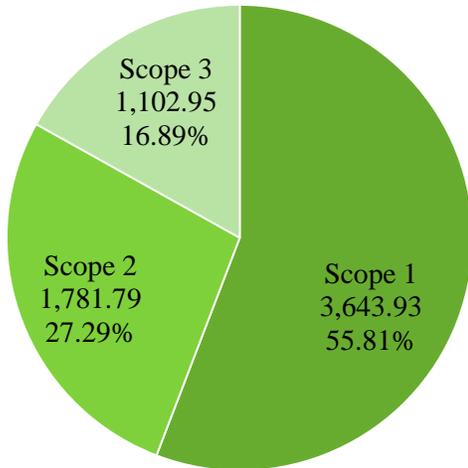


Figure 1. Niagara College's 2013-2014 corporate carbon inventory by scope (tCO₂e), including percentage.

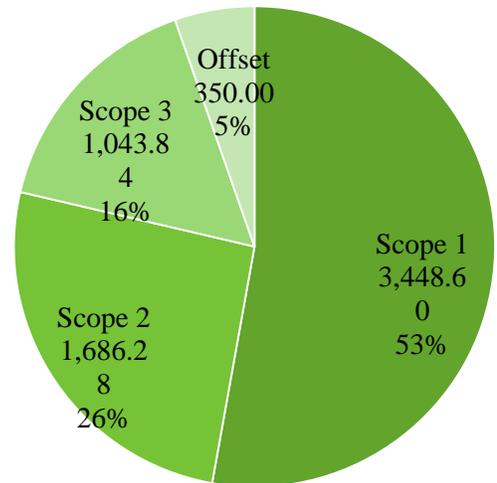


Figure 2. Niagara College's 2013-2014 Carbon Inventory with Purchased Offsets (tCO₂e) by scope including percentage.

In the 2013/2014 reporting year, almost all of Niagara College's scope 1 emissions were as a result of stationary combustion (3626.38 tCO₂e), the remaining 17.55 tCO₂e were as a result of vehicle fleet related emissions (Figure 3). Waste related emissions comprised 88% of scope 3 emissions, while emissions from business travel and water were responsible for the remaining 11 and 1% respectively (Figure 4).

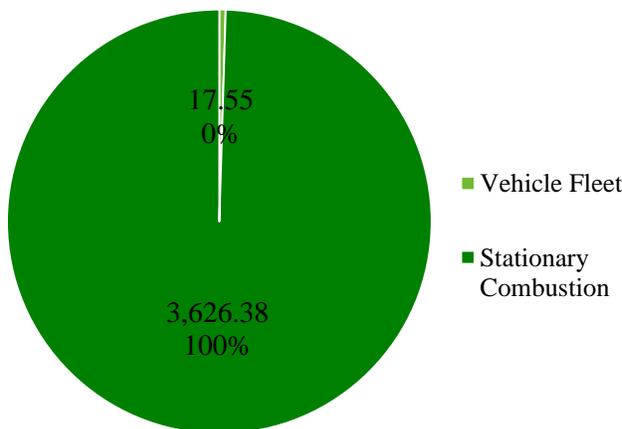


Figure 3. Niagara College's 2013-2014 Scope 1 Emissions (tCO₂e), by source activity, including percentage.

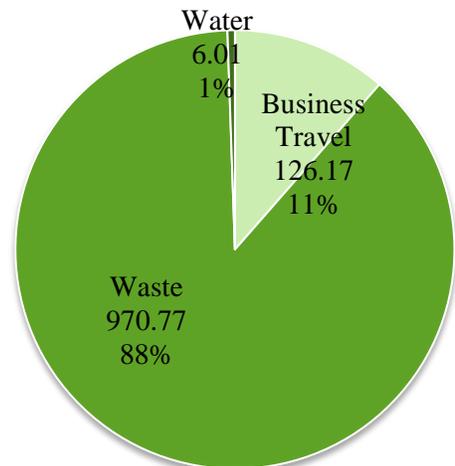


Figure 4. Niagara College's 2013-2014 Scope 3 emissions (tCO₂e) by source activity, including percentage.



Niagara College experienced peaks in their 2013 emissions during the months of December 2013 and January- March 2014 with the highest emissions recorded in December (Figure 5). These peaks in emissions are associated with the heating of facilities. Emissions associated with electricity consumption remained generally consistent throughout the reporting year. A lower student population and consequent energy consumption during the summer months at the college may offset electricity peaks observed during this period in other organizations. Based on the nature of waste emission reporting, no monthly trends were observed, although comparison with Niagara College’s waste audit report may help with identifying trends to support future waste related projects. Business travel, vehicle fleet use and water consumption did not contribute significantly to monthly trends in the institution’s carbon emissions.

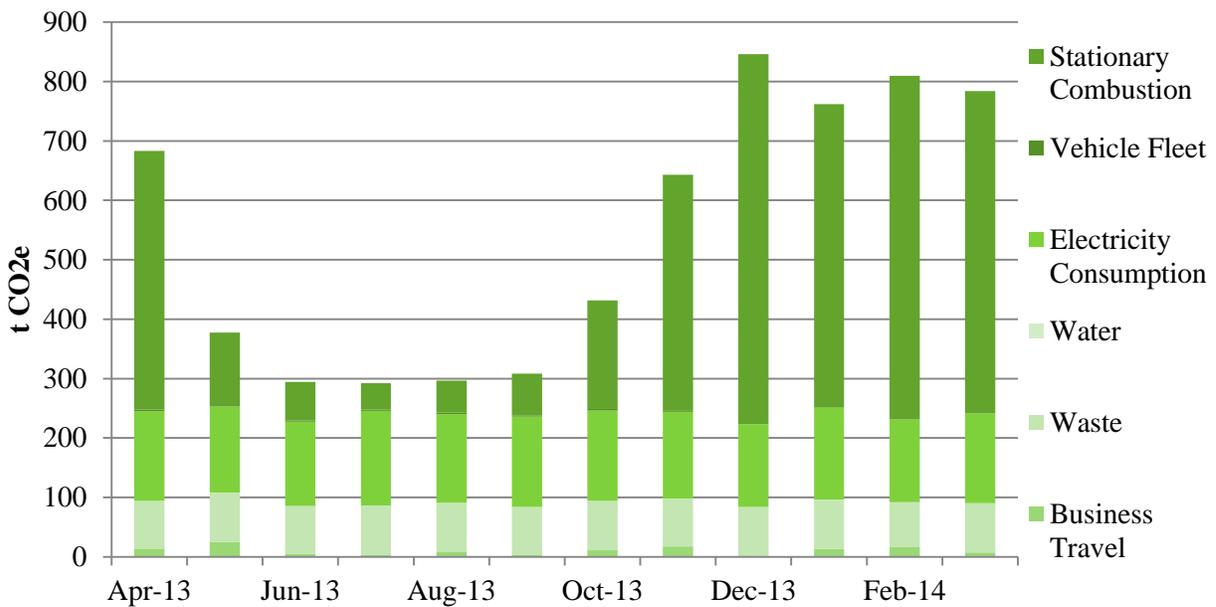


Figure 5. Niagara College’s 2013 corporate carbon emissions (tCO₂e) monthly, by source activity.

Niagara College’s total carbon emissions have grown by 28.8% (1,380tCO₂e) since the 2009-2010 baseline year, mainly as a result of growth in population and new buildings to accommodate for said growth (Figure 5). Although overall emissions have grown, there are areas that have seen vast improvement from the last year of reporting, 2012-2013, as well as from baseline records. For example, emissions from vehicle fleet use have been reduced by 22.66 tCO₂e, or 56%, from 2009-2010 levels as a result of mitigation efforts (Figure 6). Further, based on energy management initiatives that the College has pursued over the last year, electricity related emissions have been reduced by 34% since last year’s report (920.74 tCO₂e). Additionally, business travel related emissions have been reduced by 37% since last year’s footprint and 7.74% since the baseline year. In contrast, the largest contributor to the organization’s corporate footprint growth is natural gas consumption, which has grown by 34.5% since 2012-2013 (929.85tCO₂e) and by 37% since the baseline year (980.97tCO₂e).

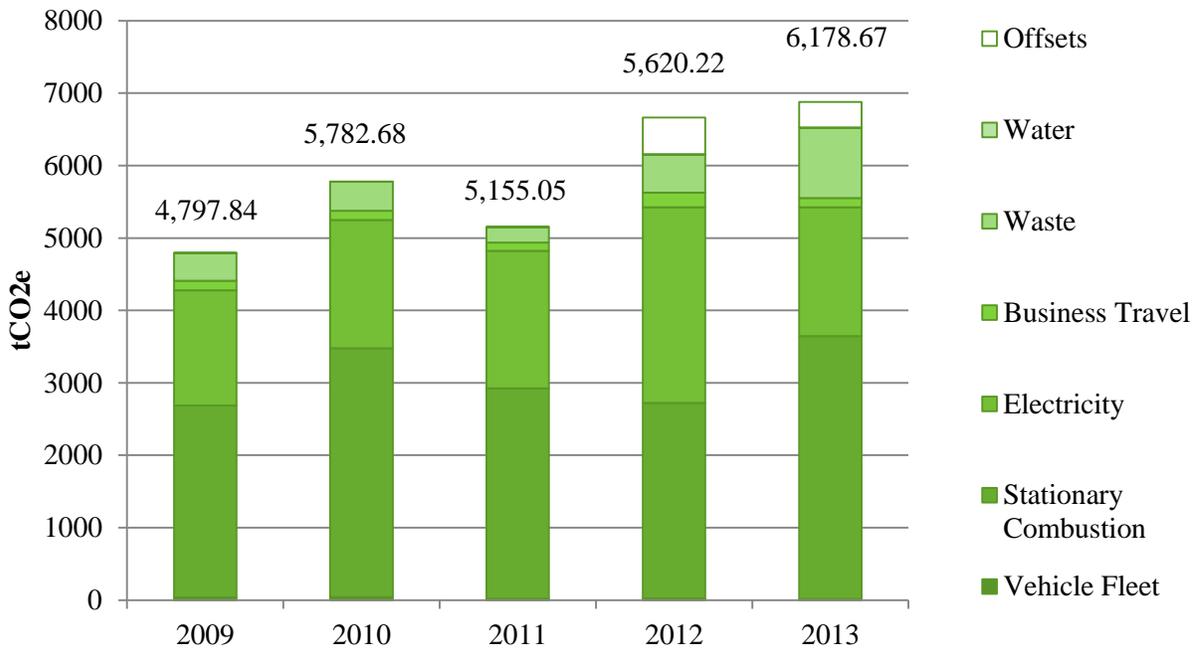


Figure 5. Niagara College's Corporate Carbon Footprint (tCO₂e) from 2009-2010 to 2013-2014 reporting years, by source activity.

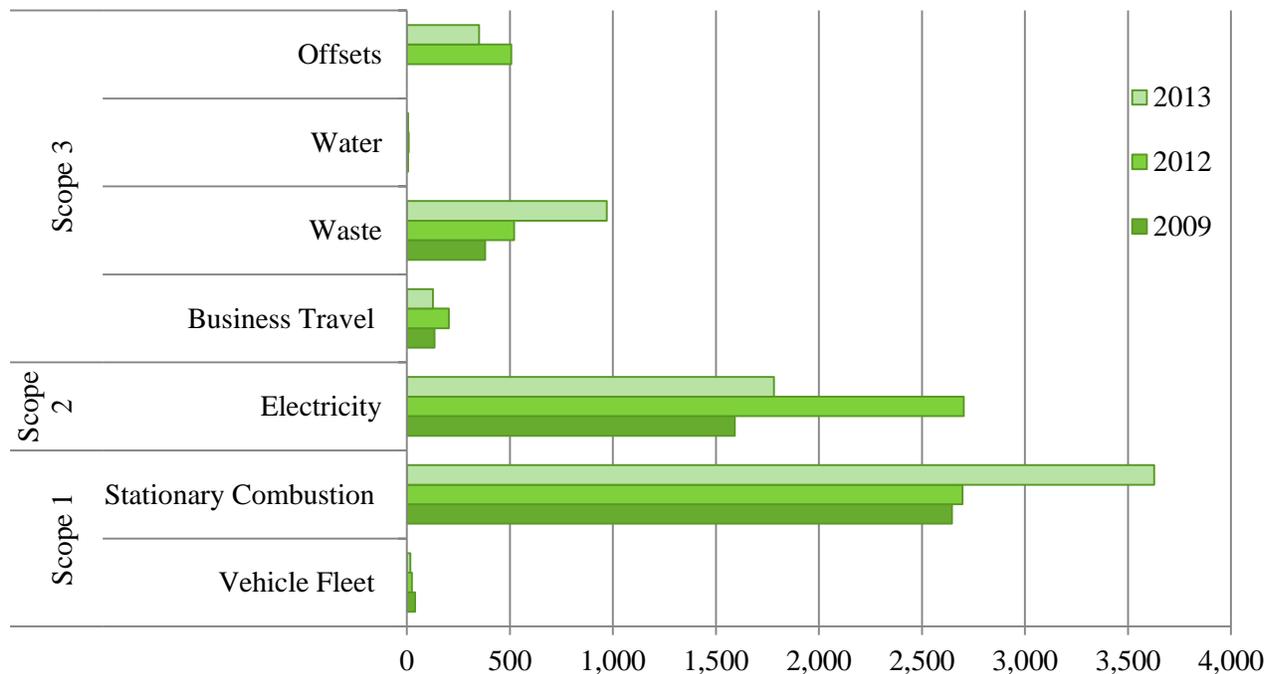


Figure 6. Comparison of Niagara College's corporate carbon emissions (tCO₂e) compared to last and baseline years, by source activity.



The weather can have a substantial influence in the natural gas and electricity consumption. In order to incorporate weather into the analysis, heating degree days and cooling degree days were taken into consideration. Heating degree day is a measure that reflects the demand of energy to heat a building in the winter months, based on outdoor temperature and how many degrees it would take to heat a facility to human comfort levels. As Niagara College's campuses are located in Niagara-on-the-Lake and Welland, a comparison of temperature among years must reflect trends observed at both locations if the College is to account for associated trends in institutional heating and cooling. Figure 7 compares the number of heating degree days between the College's 2012-2013 and 2013-2014 reporting years, using the set point of 16.5°C at both the Welland Weather Station and St. Catharines Airport. On average among the two locations, the number of heating degree days increased from the previous year by 20.3%, accounting for a proportion of the observed increase in natural gas consumption.

Similarly, cooling degree day (CDD) is a measure that reflects the demand of energy to cool a building in the summer months; based on outdoor temperature and how many degrees it would take to cool the facility to human comfort levels. Again, the number of cooling degree days between the last two reporting years can be observed in Figure 7, both at Welland Weather Station and St. Catharines Airport. Between the 12/13 and 13/14 reporting years, the average number of cooling degree days fell by 17.5% from the 16.5°C set point. This decreased demand for cooling in the summer months may have contributed to Niagara College's electricity consumption decrease. It is difficult to isolate the proportion of electricity consumption that results from building cooling as there are many additional contributing factors, whereas natural gas consumption is a direct reflection of building heating. Understanding the impact that weather has on consumption trends among years will create a clearer understanding of actual trends in natural gas and electricity consumption, as well as associated emissions.

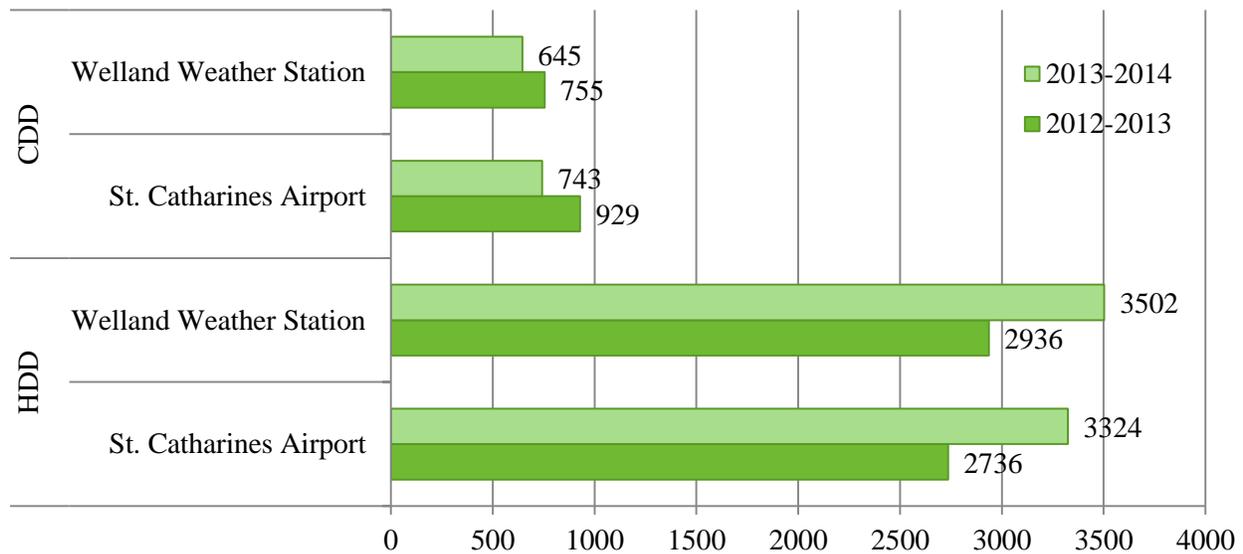


Figure 7. Comparison of the number of Cooling Degree Days (CDD) and Heating Degree Days (HDD) recorded from Welland Weather Station and St. Catharines Airport during Niagara College's 2012-2013 and 2013-2014 reporting years, with a set point of 16.5°C.

Moving Forward

The 2013-2014 reporting season represents the fifth year that Niagara College has reported on its carbon footprint. As an organization that has taken an aggressive approach to setting environmental goals and quickly delivering initiatives, Niagara College has found opportunities for reduction in all areas of its carbon footprint. Moving toward the College's 20% absolute reduction goal, NSI has provided recommendations to improve the measurement, management and mitigation of GHG emissions.

Measure

As this is the fifth year that Niagara College is reporting on its carbon footprint, the College is already very seasoned in the measurement of its carbon footprint. The following are suggested areas that may improve the thoroughness of measured emissions values that may in turn, identify opportunities for reduction:

- **Installation of Utility Sub-Meters:** It is recommended that these include expanded energy data tracking efforts and increased sub-metering, as well as enhanced network metering to enable more precise data tracing and analysis. Results of this enhanced analysis can be used by the College, in conjunction with personnel at NSI, to develop infrastructure recommendations in order to meet longer-term goals, and to ensure continued Scope 2 reductions are realized throughout subsequent reporting periods.
- **Vehicle Fleet Tracking.** Niagara College should consider increasing the frequency that they report on vehicle fleet use to better track progress of driving reduction initiatives and to better understand driving trends by month to best target informational campaigns. GPS tracking also allows Niagara College to establish realistic targets based on their fleet's current mileage. Alternatively, smart phone applications such as [Fleetmatics](#) would allow Niagara College to not only better track total mileage but also route efficiency.

Manage

Following measurement and quantification, the next step is carbon management of GHG emissions. The following recommendations identify new and continuous improvement opportunities that may contribute to Niagara College's existing emission reduction strategies:

Scope 1 Recommendations

Stationary combustion within Scope 1 emissions is the greatest contributor to Niagara College's GHG emissions and has shown continued increases since the baseline year. In an effort to stay on track with reduction goals priority should be placed on identifying opportunities to reduce stationary combustion:

- Niagara College can consider alternative technologies and/or fuel options. This could include exploring the feasibility of solid constructing solid waste gasification facilities for the production of alternative turbine fuels for use in the central heating and cooling plant.
- Reductions might also be achieved through mitigation by closer monitoring of natural gas consumption trends, and/or insulation retrofits.
- It is also recommended that contact information for facilities management is widely publicised, such that the campus community is capable of contacting these departments when their work spaces are being overheated/cooled allowing instant problem resolution.
- For departmental office areas that have control over their heating and cooling,



the installation of smart thermostat systems may offer potential Scope 1 and 2 reductions and utility savings by reducing instances of unnecessary heating and cooling.

- Improving the building envelope would reduce the heating and cooling consumption, costs and emissions. Some ways to maximize building efficiency are:
 - Installation of draft proof windows
 - Installing additional insulation as needed in older buildings
 - Upgrade weather stripping on external doorframes
- Programmable water heating systems can help to reduce unnecessary water heating during times when buildings are unoccupied including the holiday season and overnight.

Scope 2 Recommendations

Though marked reductions are recognized since the last reporting year, electricity consumption within Scope 2 remains the second largest contributor to Niagara College's overall emissions profile:

- Taking advantage of daytime natural lighting in hallways/alleyways, and encouraging staff to do the same in room spaces, where appropriate, could limit lighting electricity consumption
- Investigating additional electrical retrofitting projects through the SaveONEnergy program will also result in electricity savings
- Adding caulking around the electric plugs can add insulation
- Smart power strips could be utilized in various areas of the college. For example, in the computer labs, the constant 'plug-in' and connection to the outlets may be drawing phantom power while the devices are not in use. A smart power strip could decrease the consumption of phantom power by cutting off the electricity feed to all computer-dependent electronics.

Scope 3 Reductions

Niagara College is to be commended on their substantial reduction in business travel emissions under Scope 3 for the 2013 reporting year. Conversely, the proportion of the College's total carbon footprint attributable to waste production has grown in each successive reporting period since baseline year, constituting 88% of Scope 3 emissions in 2013.

- It is recommended that the College continue to explore waste diversion strategies that target key areas identified in its 2013 waste audit report.
- Similar to the water bottle ban currently instated at the College, a program surrounding coffee cups can be explored. Alternatively, increased communication and subsidizing of coffee refill discounts at vendors would potentially reduce the number coffee cups being disposed of.
- Offering reusable plates and cutlery at campus eateries will assist in waste production, although it will also require more electricity and water to clean. A comparison in cost and emission savings associated with each alternative should be explored further.

Mitigate

Niagara College can explore the possibility of seeking carbon-neutral status for additional auxiliary buildings at both Welland and Niagara-on-the-Lake campuses through the purchase of carbon offsets. Further, improving communication about the carbon neutral building program at Niagara College among staff and students will improve the college's reputation for sustainability success.



Summary

Niagara College continues to demonstrate ambitious efforts to manage and mitigate their carbon emissions. As the College celebrated a sustainability themed academic year and utilized the Embedded Energy Manager incentive program, it was able to make considerable strides in electricity reduction and staff and student engagement. Niagara College is continuing to grow in the size of their campuses as well as student population and must therefore continue to seek reduction strategies in order to achieve their 20% absolute reduction target. Within this report, several opportunities for improving the measurement, management, and mitigation of carbon emissions have been highlighted. The NSI team is always available to discuss carbon reduction strategies and looks forward to discussing the options available to Niagara College.

