

July 17, 2013

Walker Environmental Group Inc.  
P.O. Box 100  
Thorold, Ontario  
L2V 3Y8

Niagara College Canada  
135 Taylor Rd.  
Niagara-on-the-Lake, ON  
L0S 1J0

Dear Ms. Wilkinson,

**RE: Building Operations Carbon Reduction Plan**

Please find attached a copy of the *Building Operations Reduction Plan* prepared by Walker Environmental Group Inc. for the Niagara College Wine Visitor Education Centre. This report is not a binding document and has been developed to assist Niagara College in reducing their operational carbon footprint. Walker Environmental Group would like to thank you for your continued support, participation and cooperation throughout the Carbon Neutral Building Project process.

Sincerely,

**Carbon Neutral Building Service Team**

Kyle Monteith



Project Technician  
Renewable Energy

Jon Colamartini



Project Coordinator  
Construction and Renewable Energy

Crystal Vella



Research Analyst  
Renewable Energy

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# Carbon Neutral Building Services Team

A division of

**WALKER ENVIRONMENTAL GROUP INC.**

P.O. Box 100, Thorold, ON, L2V 3Y8

[www.walkerind.com](http://www.walkerind.com)

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## **BUILDING OPERATIONS CARBON REDUCTION PLAN**

**- CONFIDENTIAL -**

Prepared for:

**Niagara College Wine Visitor Education Centre  
135 Taylor Road  
Niagara-on-the-lake, Ontario  
L0S 1J0**

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**Audit Team Leader**

Kyle Monteith

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## Executive Summary

Walker Environmental Group Inc. (WEG) was retained by Niagara College to create a Building Operations Carbon Reduction Plan on the Wine Visitor Education Centre (WVEC). A Building Operations Greenhouse Gas Audit was completed in May 2013 to establish the building's operational carbon footprint; this Carbon Reduction Plan is based on the results of the GHG Audit.

The aggregated total of greenhouse gas emissions for the WVEC for Niagara College's 2012 fiscal year was equal to 40.08 tonnes of carbon dioxide equivalents (CO<sub>2</sub>e). Three contributing sources of operational greenhouse gas emissions were identified in the carbon audit:

1. Natural Gas—Used for the building's unique heating and cooling needs – source of 15.70 tonnes (39.16% of total) of CO<sub>2</sub>e emissions.
2. Electricity—main source is the buildings lighting systems – source of 24.35 tonnes (60.74% of total) of CO<sub>2</sub>e emissions.
3. Water—Used for the production of wine – source of 0.04 tonnes (0.09% of total) of CO<sub>2</sub>e emissions.

Walker Environmental Group has completed this Carbon Reduction Plan to include several initiatives that Niagara College may choose to implement to reduce the WVEC carbon footprint. The initiatives included in this reduction plan include both building retrofit projects and behavioural changes. These proposed initiatives could assist Niagara College in reaching two of their sustainability targets

- Reduce electricity consumption by 10 percent
- Reduce greenhouse gas emissions by 10 percent

This Carbon Reduction Plan was created to assist Niagara College in reducing its operational carbon footprint at the Wine Visitor Education Centre. WEG has provided a summary of reduction opportunities for Niagara College to consider. Some of these initiatives include employee education and engagement, the installation of UV film on windows and re-programming of the WVEC building automation system.

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## 1. Introduction

Walker Environmental Group (WEG) was retained by Niagara College to conduct a Building Operations Greenhouse Gas Audit and accompanying Carbon Reduction Plan for the Wine Visitor Education Centre (WVEC). The GHG Audit site visit occurred on January 25<sup>th</sup>, 2013 and assessment of the audit continued through May 27, 2013. From the information and data collected and analyzed to determine the WVEC carbon footprint, WEG has developed a Building Operations Carbon Reduction Plan.

### 1.1 Purpose of the Carbon Reduction Plan

This carbon reduction plan was created to provide Niagara College with opportunities to reduce the energy consumption, water consumption and overall carbon footprint of the WVEC. WEG has included several recommendations for Niagara College to reduce carbon emissions; these recommendations have been designed specifically for the WVEC. This report will be the first in a series of carbon reduction plans which will be prepared for the WVEC annually by WEG.

## 2. Project Background

Sustainability is an integral part of the Niagara College culture. The College has made a commitment to become a leader in sustainable development not only as an educational institution but also as a leader in the Niagara Region.<sup>1</sup> Niagara College has made several five-year sustainability targets to be achieved campus wide.

The Carbonzero Certification of the WVEC is just one way that Niagara College is working towards achieving their targets.<sup>2</sup> This carbon reduction report will address the following two college wide targets within the WVEC:

- Reduce electricity consumption by 10 percent
- Reduce greenhouse gas emissions by 10 percent

Although Niagara College does have a goal to reduce water consumption by 5 percent, WEG will not be making recommendations to reduce their water consumption; water consumption at the WVEC accounted for only 0.1 percent of the operational carbon footprint and is therefore not considered significant.

WEG has worked with Niagara College to determine the WVEC operational carbon footprint through an energy and carbon audit. Based on the audit results and carbon report produced, WEG was able to make several recommendations to assist the Niagara College WVEC to decrease their energy consumption and carbon footprint. These recommendations are both a mixture of

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<sup>1</sup> Niagara College. 2013. Sustainability Home. Retrieved from <http://www.niagaracollege.ca/content/Sustainability/SustainabilityHome.aspx>

<sup>2</sup> Niagara College. 2013. Carbon Neutral Building Project. Retrieved from <http://www.niagaracollege.ca/content/Sustainability/CarbonNeutralBuildingProject.aspx>

behavioural and retrofit projects. This carbon reduction plan outlines the steps that the WVEC could take to achieve energy and carbon reductions based on the recommendations made by WEG.

### **3. Wine Visitor and Educational Centre Operational Footprint**

#### **3.1 Scope and Operational Boundary of the Carbon Reduction Plan**

The operational boundaries that relate to the fiscal 2012 carbon audit are separated into direct greenhouse gas emissions (Scope 1), energy indirect greenhouse gas emissions (Scope 2) and other greenhouse gas emissions (Scope 3).

For the purpose of this carbon reduction plan, all recommendations and initiatives will target Scope 1 and 2 of the facility's operational footprint. Scope 1 direct emission reductions will pertain to natural gas combustion that takes place on site. Scope 2 indirect emissions reductions will focus on the electricity purchased by the WVEC from Niagara-on-the-Lake Hydro. At the WVEC, there are several daily activities performed by the staff and students at the facility that contribute to the carbon footprint.

#### **3.2 Confirmation**

Carbonzero conducted a review of the Building Operations Greenhouse Gas Report and provided external confirmation that the carbon audit was accurate. The results of their audit have been provided to Niagara College.

#### **3.3 Offsets**

The offsets purchased by Niagara College are from the Landfill Gas to Energy Project. Landfill gas is collected, captured and recovered from the East Quarry Landfill and is processed into a useable fuel source. The fuel is transferred to the nearby paper mill where it is combusted along with natural gas in the paper mill's steam plant. This carbon offset program is listed on the CSA CleanProjects Registry and has been 3<sup>rd</sup> party verified by ICF International under ISO-14064-2<sup>3</sup>.

## **4. Carbon Reduction Projects**

Niagara College has implemented several initiatives across both of its campuses to reduce their carbon footprint; the Carbon Neutral Building Program is the latest project at the Niagara-on-the-Lake campus and is specifically aimed at the WVEC. The WVEC is the first post-secondary education facility to be Carbonzero Certified<sup>4</sup>.

### **4.1 Targets and Objectives**

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<sup>3</sup> Carbonzero. 2013. Niagara, ON – Landfill Gas to Energy Project. Retrieved from <http://www.carbonzero.ca/projects/niagara-landfill-gas-energy-project>

<sup>4</sup> Niagara College. 2013. Wine Visitor + Education Centre's Carbonzero Certified status a first for colleges in Canada. Retrieved from <http://niagaracollegenews.niagaracollege.ca/2013/01/07/wine-visitor-education-centres-carbonzero-certified-status-a-first-for-colleges-in-canada/>

Niagara College is committed to achieving their sustainability goals. At the WVEC the following targets and objectives have been recommended to help achieve these goals:

- Reduce overall electricity consumption
- Reduce overall natural gas consumption

## 4.2 Recommendations

WEG has developed a series of initiatives to assist the WVEC to reduce their carbon footprint. A breakdown of each of these initiatives is summarized below.

### 4.2.1 Utilize Building Automation System

During construction in 2009 a Lutron Inc. building automation system (BAS) was installed at the WVEC; however, it was revealed during the site visit that the system is not effectively utilized. With proper training and programming, the technology can be used to automate lighting and heating and cooling programs. If used properly these programs can minimize the use of unnecessary lighting as well as further maintain and control the heating and cooling system at the WVEC.

According to Lutron Inc., the brand of the automation system at the WVEC, on average lighting accounts for 39 percent of an office's electricity consumption<sup>5</sup>. At the WVEC this average was lowered to an estimate of 25 percent; there are several pieces of intensive equipment used in the winemaking process that could impact Lutron's general estimate. When the Lutron system is used, electricity consumption from lighting can be reduced by 60 percent. The proper use of the automation system could help to reduce electricity demand by as much as 15 percent. This 15 percent decrease translates to a savings of 55332.12 kWh and a reduction of 4.98 tonnes of CO<sub>2</sub>e based on the 2012 GHG footprint data. The table below provides an explanation of how WEG arrived at this estimation.

**Table 1: Estimated Electricity and Carbon Reduction from Lutron Programming**

Estimated Savings from Lutron Programming	
WVEC Annual Electricity Consumption (kWh)	221,328.48
Average Lighting Use	0.25
Estimated Electricity Use for Lighting	55,332.12
Energy savings using Lutron	0.60
<b>Estimated Electricity Savings</b>	<b>33,199.27</b>
<b>Estimated Carbon Reduction</b>	<b>4.98</b>

WEG has arranged a meeting with Synchro Engineering, a local building automation system specialist to assist with programming the automation system as well as train the staff to use the device.

### 4.2.2 Install Weather Stripping on Entrances

<sup>5</sup> Lutron Electronics Co. 2013. Energy Savings. Retrieved from <http://www.lutron.com/en-US/Residential-Commercial-Solutions/Pages/Commercial-Solutions/CommercialEnergySavings.aspx>

At both the front and back entrances to the main area of the WVEC, the weather stripping has been damaged causing a notable draft. It is recommended that weather stripping be replaced on these doors; weather stripping is relatively inexpensive and will prevent heat loss during winter months and cool air loss in summer months. In addition to the new weather stripping, the doors need to be adjusted to ensure they are parallel. Parallel doors help reduce gaps and will provide a tight seal when the stripping is installed to further eliminate drafts and any heating/cooling from leaving the building. These changes could help to improve the building envelope; a sealed envelope ensures that heat is not lost in winter months and cool air is not lost in the summer.

#### **4.2.3 Install UV Blocking Film on Windows**

The majority of the WVEC's south wall is made up of 786 ft<sup>2</sup> of windows; UV rays are therefore penetrating through these windows and heat up the building during the summer and lose heat during the winter. Not only does this increased heat increase energy demand, but also the UV rays damage the wine that is stored near the windows. WEG recommends that the college consider having UV film installed on these windows to help maintain wine quality and reduce energy consumption. The local window film company that presented to WEG and Niagara College on April 19, 2013 has provided specific pricing details and energy savings based on their presentation; the information has been forwarded to Niagara College.

#### **4.2.4 Install a Curtain on Bay Door**

In the lower level of the WVEC, there is a large bay door that is opened for extended periods of time. During the site interview it was revealed that there is not enough space indoors to perform the work needed to produce wine, therefore the door needs to remain open to allow employees to work efficiently. When the bay door is open for extended periods of time there is heating and cooling loss (and increased energy costs) experienced. It is recommended that an adjustable curtain be installed to reduce the heating/cooling losses. An adjustable model with a hinge could be considered because it will not hinder employees from moving in and out of the facilities, deliveries and forklift traffic.

#### **4.2.5 Separate Billing or Automatic Download for Natural Gas Consumption**

In order to improve data collection and quality WEG would recommend either having separate billing for natural gas consumption on a monthly basis at the WVEC or have the monthly consumption automatically downloaded into a spreadsheet or software. This will ensure that monthly data is accurate and will help eliminate human error when manual readings are taken.

#### **4.2.6 Employee Education and Engagement**

During the site visit and interview, information regarding employee routines and behaviour was provided by available personnel. At the WVEC, influencing employee behaviour will come at no additional costs and can help to reduce electricity consumption at the facility. Moving forward, individuals at the WVEC could ensure that the proper training and education is given to both existing and new employees regarding energy conservation. For example, this programming could include objectives and education about turning off lighting when not in use or when natural sunlight is available. Although the building automation system will more effectively and efficiently manage the lighting in the WVEC, employees can go above and beyond the automation system by using their judgement to turn off lights if they feel it is unneeded at that time.