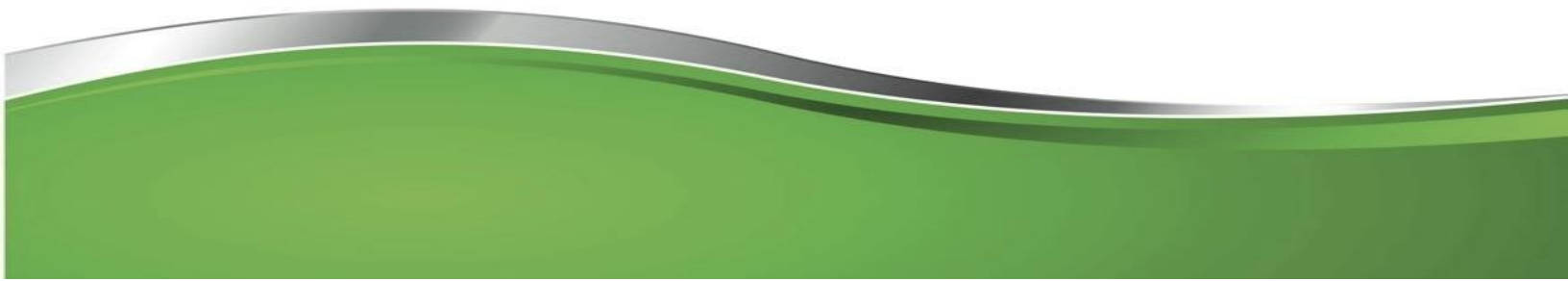


# MEASURING THE GREEN ECONOMY WATERLOO REGION



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April 1, 2013

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# EverEco

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## EXECUTIVE SUMMARY

In order to develop an effective Climate Action Plan, the Region of Waterloo seeks to define and quantify Waterloo region's green economy. The goal of this study was to calculate the size of the green economy by using economic indicators about green businesses, such as the dollar value of sales generated and employment levels. The results of this study will aid the Region in developing their Climate Action Plan, to identify potential stakeholders that should be involved in the development of this action plan and informing discussions on establishing an environment and business network. This study provides a definition and method of quantifying the green economy at a local level that can be applied by other regions and/or municipalities that are interested in measuring their own green economy. The results of this study also contributes to academic research by filling in the knowledge gap of defining and measuring a local green economy.

The objectives of this study were to:

1. Develop a replicable methodology that can measure a local green economy;
2. Quantify the green economy of Waterloo region using economic indicators; and
3. Conduct an initial exploration of green business views on the green economy.

The completion of this study found that the green economy generated \$1.04 billion in sales in 2011, and provided a total of 3043 jobs in green businesses. Case studies on two green businesses identified that incentives would help increase their market share. Several recommendations were made to the Region of Waterloo to assist in the development of the green economy including increasing the collection of information from businesses and holding open houses and information sessions about the Climate Action Plan.

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## 1.0 Introduction

Waterloo region has a population of more than 553,000 people and is located in southern Ontario, approximately 100 kilometers (km) west of Toronto (Region of Waterloo, 2010a). The region is governed by the Region of Waterloo and consists of three municipalities, Cambridge, Kitchener and Waterloo as well as four townships, North Dumfries, Wellesley, Wilmot and Woolwich (a map is provided in Appendix 1) (Region of Waterloo, 2010a; Region of Waterloo, 2010d).

The Region of Waterloo is committed to “ensuring a healthy natural environment with clean air, water and land, and protected green spaces and sensitive environmental features” (Region of Waterloo, 2010c, para. 2). In 2009, the Environmental Sustainability Strategy was established to help the Region attain this goal (Region of Waterloo, 2010c). As part of the Strategy implementation the Region formed a partnership with REEP Green Solutions and Sustainable Waterloo called the Climate Collaborative (Region of Waterloo, 2010b). The main purpose of the Climate Collaborative is to provide a foundation to develop a local action plan aimed towards reducing Waterloo region’s overall environmental impact and to set an appropriate greenhouse gas (GHG) reduction target for the community (Region of Waterloo, 2010b). The Region of Waterloo would like to engage with the general public and stakeholders to help develop a plan called the Climate Action Plan. The Climate Action Plan is meant to help Waterloo region “reduce GHG emissions as well as support future economic development and prosperity while maintaining a clean and healthy environment and enhancing quality of life” (Region of Waterloo, 2010b, para. 11).

In order to develop an effective Climate Action Plan, the Region of Waterloo would like to quantify Waterloo region’s green economy. Although there is no universal definition of a green economy, it generally refers to the transition of the current economy towards one that supports “the development and use of products and services that promote environmental protection and/or energy security” (State of Washington, 2009, p.12). The green economy has social, environmental and economic aspects and must be considered in the context of sustainable development (Webb and Esakin, 2011). Determining the size of the green economy will help provide the Region of Waterloo with an idea of, and business case for, green business incentive

programs that should be implemented as part of the Climate Action Plan. Therefore, the main purpose and goal of this study is to quantify the size of Waterloo region's green economy.

This study gauges the size of the green economy by using economic indicators from green businesses such as the dollar value of sales generated and employment levels. The results of this study aids the Region in developing their Climate Action Plan, identifying potential stakeholders that should be involved in the development of this action plan and inform discussions on establishing an environment and business network. The completion of this study will provide a definition and method of quantifying the green economy at a local level that can be applied by other regions and/or municipalities that are interested in measuring their own green economy. The results of this study will also aid other academic research by filling in the knowledge gap of defining and measuring a local green economy.

The objectives of this study are to:

1. Develop a replicable methodology that can measure a local green economy;
2. Quantify the green economy of Waterloo region using economic indicators; and
3. Conduct an initial exploration of green business views on the green economy

This report will provide an overview of the definition of a green economy, the participants involved and the various methodologies that have been used to measure the green economy in previous studies. The report will then explain the methodology developed to calculate Waterloo region's green economy and will provide an analysis and discussion of the results of the research. Lastly, the report will conduct case studies featuring two local green businesses.

## 2.0 The Green Economy – Research Context

To provide a foundation for this study, a literature review was conducted on three topics. The first, “What is a Green Economy?” reviews literature on the different definitions that have been used for the green economy and will outline the definition that was used for this study. The second, “Who is Involved?” reviews relevant literature on green economy participants and provides the scope of the research conducted. The last, “How do we measure the Green Economy?” reviews literature on the methodologies that have been used to measure the green economy in different regions and outlines the methodology that was used to quantify Waterloo region’s green economy.

### 2.1 What is a Green Economy?

The concept of a green economy has no universal definition (Harper-Anderson, 2012; UN DESA, 2011; ECO Canada, 2010), but there are common characteristics between the various definitions used by institutions and researchers. For example, the United Nations Environmental Programme (UNEP) states “a green economy results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP, 2010b, p.5). The Globe Foundation, a Canadian non-profit organization, defines the green economy as the “creation of green jobs, the promotion of real, sustainable economic growth, and the prevention of environmental pollution, global warming, resource depletion, and ecological degradation” (Globe Foundation, 2010a, p.6). The definition of a green economy also varies depending on the study, region and context that the term is being used in. For example, in Pew Charitable Trusts’ The Clean Energy Economy study, the green economy was defined as one that “generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources” (Pew Charitable Trust, 2009, p.5). On the other hand, Michigan’s Green Jobs Report defines the green economy as any industry that provides services or products in five areas: clean transportation and fuels, pollution prevention or environmental cleanup, agriculture and natural resource conservation, increased energy efficiency and renewable energy production (Michigan Department of Energy, Labour, and



Economic Growth, 2009). California’s Innovating the Green Economy in California Regions study has defined industry sectors as “green economic activity categorized into six industry sectors: energy research and services, environmental services, green building, green manufacturing, green transportation and recycling and remediation” (The Center for Community Innovation, 2010, p.vii). British Columbia’s Green Economy study also had a broad definition with the “green economy being one that is powered by green technologies and practices in every dimension of society and as such, one that generates green jobs, creates more sustainable businesses, and stimulates low-carbon investments province-wide” (Globe Foundation, 2010a, p.6). The Federation of Canadian Municipalities have established five key priority areas that consist within the green economy (Figure 1) and green businesses can be found in all five priority areas (Joseph and Thompson, 2011, p. 7).



*Figure 1 - Components of a Green Economy*

Each definition of a green economy considers different economic, environmental and social aspects and demonstrates the context that the term green economy is used in, and can influence how the green economy is defined and measured (Webb and Esakin, 2011). In fact, UNEP has created multiple definitions for the green economy in its publications. The first, as provided above, considers that a green economy should reduce impacts on the environment while improving social and human wellbeing (UNEP, 2010b). The second definition that was

created by UNEP considers a green economy as one “in which the vital links between economy, society, and environment are taken into account” and emphasizes the reduction of “waste, pollution, and the use of resources, materials, and energy” (UNEP, 2010a, p.1). UNEP states that a green economy should “create decent employment opportunities, promote sustainable trade, reduce poverty, and improve equity and income distribution” (2010a, p.1). This definition demonstrates that in order to define what a green economy is, many aspects have to be considered and included.

To provide context for this study, the definition of a green economy by ECO Canada will be used. ECO Canada defines the green economy as “the aggregate of all activity operating with the primary intention of reducing conventional levels of resource consumption, harmful emissions, and minimizing all forms of environmental impact. The green economy includes the inputs, activities, outputs and outcomes as they relate to the production of green products and services” (2010, p.3). ECO Canada’s definition of the green economy has been selected because it provides a narrow scope for this study and includes parameters that can be collected and measured in a short time frame. In addition, the focus on “inputs, activities, outputs and outcomes as they relate to the production of green products and services” (ECO Canada, 2010, p.3) is what the Region of Waterloo is interested in measuring for their local green economy.

In Canada, the green economy is only a subset of the entire economy (ECO Canada, 2010) and is “considered as a vehicle to deliver sustainable development” (UNEP, 2012, p.5). Sustainable development is defined as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p.43). The quantification of the green economy will provide the Region of Waterloo with baseline information for their Climate Action Plan.

## 2.2 Who is Involved?

Policy makers, businesses, non-government organizations and the public can all influence the progress towards green economies (Custance, 2002). Governments, particularly the federal government, play a crucial role in the development of green economies by implementing policies and programs that can foster green economic growth (Webb and Esakin, 2011). At the global

scale there are various international organizations focused on creating momentum for environmental issues and green economies. The UNEP, the World Bank and International Monetary Fund (IMF) all report and explore trends, future outlooks and policy options (UNEP, 2011). The UNEP has developed comprehensive reports regarding green economies and how the world is able to get there, most notably through its 'Towards a Green Economy' publication (UNEP, 2011). The World Bank has estimated comprehensive wealth through produced, natural and human/institutional assets and IMF urges the need of a low-carbon model for growth while rebuilding from the global economic crisis (UNEP, 2011). On a more national level, the Government of Canada has developed policies such as the Federal Sustainable Development Act (Government of Canada, 2008) and Canadian Environmental Protection Act (Environment Canada, 1999) that help ensure environmental protection, however there are no mandatory requirements for green economies. Webb and Esakin (2011) express that governments play a crucial role in the development of green economies, in particularly the federal government.

As a part of Ontario's Green Energy Act that was established in 2009 (Ministry of Energy and Infrastructure, 2009), a feed-in-tariff program for renewable energy was set up to attract new investment and create new green economy jobs (Yatchew & Baziliauskas, 2011). This feed-in-Tariff program run by the Ontario Power Authority has proven to play an important role in building green economies (Yatchew & Baziliauskas, 2011). Yatchew and Baziliauskas (2011) note that the Green Energy Act has "potentially wide ramifications for energy related decision making in the province and there are risks that political exigencies will lead to less than optimal conditions" (Yatchew & Baziliauskas, 2011).

Focusing on the Region of Waterloo, the Residential Energy Efficiency Project (REEP) is a non-profit organization that focuses on "building public awareness and understanding of the climate-change issue and to provide technical information and social dialogue about the link to personal energy consumption" (Parker, Scott and Rowlands 2001, p.12), argues that the success of REEP is largely based on the inclusion of multiple stakeholders that share the projects goals. Thus it was found that involving various people with the same interest yet from different viewpoints can successfully develop change within a community. A key message found in literature was that in order to create a movement and positive change towards green economies,

all stakeholders must be included (Sustainable Waterloo Region, 2012; Parker, Scott and Rowlands, 2000). Unless there is full support behind the initiative, change will not occur as there is not enough resolve behind it (Parker, Scott and Rowlands, 2000). This can help explain the players behind the green economy. Unless there is support from key members of society such as industry leaders, governmental representatives, and influential persons, a change in society will be less likely (Parker, Scott and Rowlands, 2000). The Green Economy Coalition noted that “green economies prosper from community actions and locally-owned solutions, which are supported by national leadership and international institutions” (Green Economy Coalition, 2012, p.52). This provides an indication that green economies can prosper when there is collaboration between multi-stakeholders within any community. The literature review reveals that there is a clear lack of knowledge on understanding the importance of businesses in the growth of green economies (Custance, 2002) and this research contributes to filling this gap.

For the purposes of this study, a green business is defined as businesses that directly provide a green product or service (The Center for Community Innovation, 2010). In addition, a green sector/industry is defined as “one that consists of activities undertaken by firms in measuring, preventing, limiting or correcting environmental damage, as well as that those engage in clean or resource-efficient technologies, that reduce emissions and/or minimize waste disposal problems” (Workforce Planning Board of Waterloo-Wellington-Dufferin, 2011b, p.1). The US Bureau of Labor Statistics also included agriculture and biodiversity into their definition of green goods and services (Bureau of Labor Statistics, 2010). By choosing a combination of these definitions as the base indicator, it allowed for a precise and efficient method in determining whether a business was considered to be applicable for this study. As most studies measured the green economy through green jobs (The Center for Community Innovation, 2010), a focus on green businesses allowed for a quantification of the number of people that are employed by green businesses in the region. This study does not cover private households, government agencies, non-profit organizations and educational institutions.

## 2.3 How do we Measure the Green Economy?

A number of studies that measure the green economy have been completed in the past (Eberts, 2011). Each study utilized different methodologies and adopted different definitions of what constitutes as a green economy, green industry and green job, which has yielded different estimates (Eberts, 2011; ECO Canada, 2010; Krause and Slaper, 2009).

The Pew Charitable Trust's (2009) "The Clean Energy Economy: Repowering Jobs, Businesses and Investments across America" study and the California Economic Strategy Panel's "Clean Technology and the Green Economy: Growing Products, Services, Businesses and Jobs in California's Value Network" (Collaborative Economics, 2008) study, used proprietary data from Dunn and Bradstreet (D&B) and the National Employment Time-Series database to gather information on private-sector establishments (The Center for Community Innovation, 2010, p.5). Each study then used the Standard Industrial Classification (SIC) codes to identify green businesses and establishments that contribute to the green economy in their respective region of study (The Center for Community Innovation, 2010, p.5). SIC codes are used to classify enterprises and companies by the activities that they are engaged in (Statistics Canada, 2003). SIC codes are similar to the North American Industry Classification System (NAICS) codes developed by the statistical agencies of Canada, the USA and Mexico (Statistics Canada, 2012). The difference between SIC codes and NAICS codes is that SIC codes provide more detailed industry information (The Center for Community Innovation, 2010, p.5). For example, "while an 8-digit SIC (17110403) designates Solar Energy Contractors, the corresponding 6-digit NAICS code is much broader, including all Plumbing, Heating, and Air-Conditioning Contractors. SIC code 36219909, Windmills, Electric Generating, corresponds to NAICS 335312, Motor and Generator Manufacturing" (The Center for Community Innovation, 2010, p.5). Therefore it is difficult to use the NAICS system to identify sub-industries that engage in activities that "reduce energy consumption or improve environmental quality" (The Center for Community Innovation, 2010, p.6).

Despite the broadness of the NAICS classification system, the USA Department of Commerce's (2010) "Measuring the Green Economy" study, Globe Foundation's (2010b) "British Columbia's (BC) Green Economy" study and ECO Canada's (2010) "Defining the Green Economy"

study all used NAICS codes as a way to identify green companies, businesses, products and services. Once a company, product or service was determined to be green, each study measured the green economy by calculating revenue, sales, and/or employment. A majority of studies that attempt to measure the green economy prefer to do so by calculating the number of green jobs/employment there are in the region of study (The Center for Community Innovation, 2010, p.5). Some of these studies include Michigan’s Department of Energy, Labor and Economic Growth’s (2009) “Green Reports Report” the Missouri Economic Research and Information Center’s (2012) “The Missouri Green Jobs Report” and the Workforce Planning Board of Waterloo-Wellington-Dufferin’s (2011b) “Green Jobs Profile”. For the purposes of this study the green economy in Waterloo region will be measured by using the methodologies that have been adapted by the studies aforementioned. SIC codes Canada have been replaced by NAICS codes (Statistics Canada, 2003) and since this study is based on green businesses in Waterloo region, NAICS codes will be used. Second, the sales generated and the number of people employed from green businesses will be calculated to determine the size of the green economy by dollar value and by the number of jobs that the local green economy provides.

### 3.0 Methodology

Three research methods were undertaken for this study: literature review, database analysis and case studies. A description of each method is provided below.

#### 3.1 Literature Review on Components of the Green Economy

Two literature reviews were conducted to provide a foundation for this study. The first literature review was divided into five sub-topics about the green economy. Highlights of section one, three and four were presented in part two of the report.

1. What is a green economy?
2. What are the main economic activities in Waterloo region?
3. What are the key organizations/players in a green economy?
4. What are the indicators that can be used to measure the green economy?
5. What policy instruments can be used to promote growth of a green economy?

Two types of literature were reviewed and synthesized - academic journals and non-academic literature (grey literature). Academic articles were retrieved from various online journal databases such as Sciverse, Scopus and the University of Waterloo's library website whereas grey literature was retrieved from organizations such as the United Nations, the Government of Canada and ECO Canada. All of the grey literature reviewed consisted of government and non-profit organization research reports. The overall aim of the first literature review was to provide a better understanding of what a green economy is and ideas on how to approach this study. The second literature review, was focused on providing the scope and boundary of this study. The three topics that were reviewed are:

1. The definition of a green economy that should be used;
2. The participants that should be included; and
3. The methodology that should be undertaken.

Literature that was used for the second literature review consisted of academic journals, also retrieved from online journal databases, and research studies from different countries. All of the research studies reviewed measured the green economy in their respective region. These regions include places such as the state of California, Washington and Michigan from the USA and the provinces of BC and Ontario from Canada.

### 3.2 Database Analysis

A comprehensive database containing information on all operating businesses within Waterloo region has been retrieved from Dun and Bradstreet (D&B). The database included statistics such as annual sales, number of employees, NAICS code, line of business and main office addresses. The company that provided the database, D&B, is a Canadian company with a global commercial database that has over 215 million business records (Dun and Bradstreet, 2012). D&B has their own proprietary methods of collecting and maintaining data, which includes telephone interviews, self-reporting from businesses, public data and purchase of data from other sources (Vinodrai, personal communication, January 25, 2012).

Since the database contained information on all operating businesses, the following steps were taken to determine the green businesses that exist in Waterloo region:

1. The Bureau of Labour Statistics from the USA established a list of industries, as identified by NAICS code, which are considered to have the potential of providing green goods or services (Bureau of Labour Statistics, 2010). Industries that are classified as not having the potential of providing a green product or service were eliminated from our database.
2. Remaining NAICS codes were classified as a green industry through a voting system and based on the green industry definition. NAICS codes that had more than three out of five votes from team members were classified as a green industry and were kept in the database. NAICS codes that had 3 votes went through the research review process provided in step 5 and codes that had 1-2 votes were eliminated from our database. Steps one and two combined removed 19177 business entries from the database.
3. Next, all businesses that were identified as “unclassified” under the NAICS code 999990 or as the line of business was eliminated. A total of 1150 businesses were listed as unclassified and there was no feasible way of retrieving this information.
4. Duplicate entries that contained identical statistics were eliminated from the database, therefore removing 134 businesses
5. All businesses that were left on the database were researched, using various websites such as the business’s main site, to determine whether the main line of business was green. Businesses that were not considered to be a green business were eliminated from the database. There are three criteria, listed below, used to determine whether a business was considered to be green and at least two must be met. This step eliminated 704 businesses from the database.
  - ✓ Website must exist
  - ✓ On the website, an environmental policy or vision should be clearly stated
  - ✓ On the website, the green product or service must be clearly identified or indicated

### 3.3 Case Studies

As an additional piece of exploratory work, case studies were completed. Over a two-week period, fifteen local green businesses were contacted to participate, and two businesses



expressed interest in participating. Case studies were done with Vertex Environmental and Martin's Family Fruit Farm. Interviews were conducted in a semi-structured interview style to provide participants with the flexibility to expand or elaborate on their responses. Semi-structured interviews were conducted with each business that lasted approximately thirty minutes and was held to understand the level of influence the Region of Waterloo has had in supporting and facilitating the growth of a local green economy. The interview questions are provided in appendix three. Questions were asked to determine how these businesses felt about the Region of Waterloo's role in environmental initiatives, Climate Action Plan and what actions can be taken to encourage/motivate local businesses to adopt sustainable practices.

The interviews were recorded and transcribed. Results are summarized and presented in section 4.

### 3.4 Limitations of Study

There are several limitations to the methodology and study conducted. The first limitation is the definitions that have been used for the green economy, green business, green products/services and green sector/industry. All of these terms are subjective and can change depending on the context, study and region that it is being used in. For example, section 2.1 shows that there are multiple definitions for the green economy. With each definition, there were different economic, environmental and social aspects considered (Webb and Esakin, 2011), entailing different parameters used to measure the green economy. The results of this study may not correlate to other green economy studies because of the variation in the definitions that have been used and a globally recognized definition does not exist.

The second limitation is the use of NAICS codes to categorize green businesses and industries. NAICS codes are broad and have not been designed to take into account the wide range of the activities that are undertaken by large multi-establishment companies (Statistic Canada, 2012) or identify industries that are specifically engaged in activities that improve environmental quality or reduce energy (The Center for Community Innovation, 2010). Theoretically all NAICS codes have the potential of containing green businesses, even if it is one company. This means that the elimination of several NAICS codes from the database could have

resulted in some green businesses being removed from the study. Also, there is no central government agency or organization that is responsible for assigning, monitoring or approving NAICS codes (United States Census Bureau, 2013). These codes are assigned by various agencies depending on their purpose (United States Census Bureau, 2013) and therefore there may be inconsistency and inaccuracy in the NAICS codes that have been assigned to businesses in the D&B database retrieved for the study.

The third limitation is the amount of data that was available. The only data that was applicable from the D&B database was sales, the number of employees and NAICS codes for each business. If more information was available, such as the types of or the imports/exports of products and services, would have contributed to the study by making it easier to identify green businesses or calculate the number of goods and sales that stay within the region. With limited time and resources, it was not feasible to review all of the businesses within the database to determine whether they were green, hence why NAICS codes were categorized into green industries and the Green Business Framework (Figure 2) was developed to streamline the process.

The fourth limitation was a number of businesses were removed from the study because there was no company website or feasible options available to retrieve information on the business and their activities from. Furthermore, only two green businesses were willing to participate in the interview process, impacting the interview results. Lastly, there were limited studies on the green economy in Ontario to compare the results of this study with.

## 4.0 Results

*Objective 1: Develop a replicable methodology that can measure a local green economy*

The studies reviewed in section 2.3 were used to develop a working framework that measures the local green economy. This framework was then modified as the study was conducted to increase effectiveness and feasibility. As a result, a final framework that can be used to measure the local green economy is provided in Figure 2 called the Green Business Framework. The purpose of developing this framework was to provide a streamlined process to help other regions, municipalities and researchers measure their respective local green economy.

This framework provides the steps that taken to identify the green businesses in Waterloo region and was the first step taken to measure the region’s green economy.

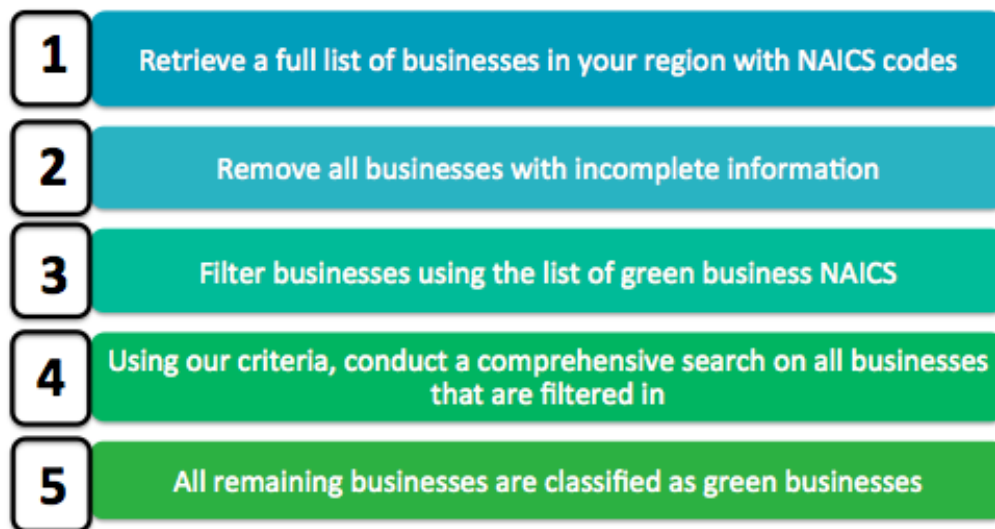


Figure 2 - Green Business Framework

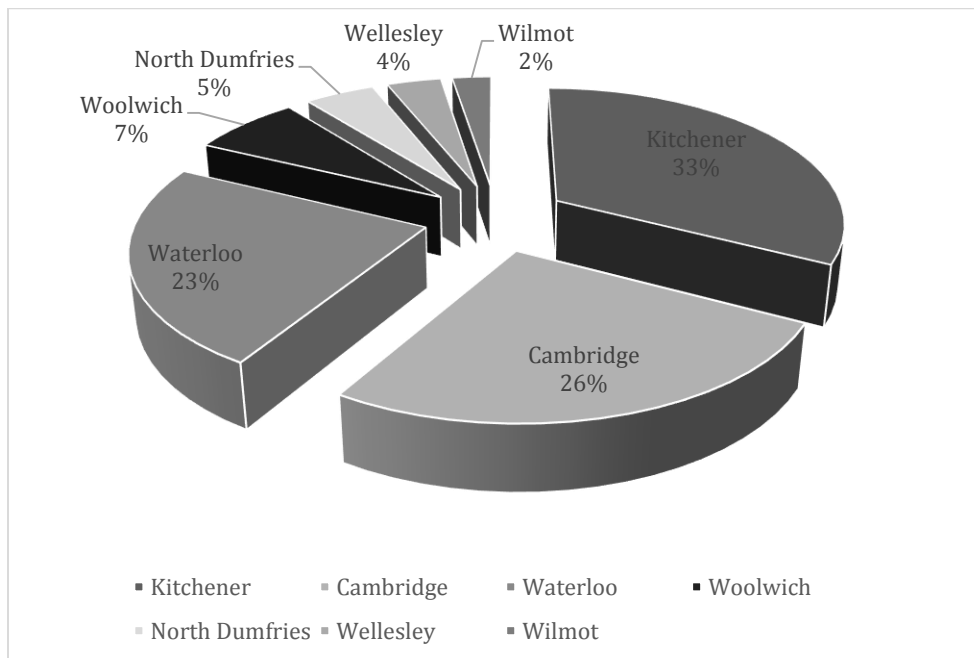
The five steps in the Green Business Framework are further described below:

1. This information can be retrieved from the city or region’s economic development offices, various business directories and private databases. In either Microsoft Excel or Access format.
2. This includes removing all businesses that do not have a NAICS code or has an unclassified business NAICS code (code number 999990). Any duplicate or generally unusable entries should also be removed.
3. Businesses should be filtered with the green business NAICS codes listed in Appendix 2.
4. All businesses that were filtered in using the green business NAICS codes should be further screened using the criteria below. If a business meets at least two out of three of the criteria, it should be included into the list of green businesses.
  - ✓ Website must exist
  - ✓ On the website, an environmental policy or vision should be clearly stated
  - ✓ On the website, the green product or service must be clearly identified or indicated

- Data on these businesses can be calculated to provide the size of the local green economy. Examples of data include the aggregate dollar value of sales generated and the number of employees from the green businesses identified.

*Objective 2: Quantify the green economy of Waterloo region using economic indicators, such as sales and number of employees, from green businesses*

The D&B database obtained identified a total of 22,984 businesses in Waterloo region. Using the methodology discussed in section 3.3, 196 businesses were classified as green businesses. This means that 0.0085% of the businesses in Waterloo region are businesses that provide a green product and/or service as their core business activity.



*Figure 3 - Green Businesses by Location*

In 2011, the 196 green businesses generated approximately \$1.04 billion in sales. On the other hand, all other businesses generated \$54 billion in sales. The value of green businesses, in terms of sales by dollar value, is approximately 2%. The total number of employees employed by green businesses is 3,043 people whereas the total number of employment by the businesses identified is 231,663 people; 1.31% of total employment. The three regions with the largest number of green businesses are Kitchener, Cambridge and Waterloo, as shown in Figure 3. There

are 12 different sectors in Waterloo region’s economy and, as shown by Figure 4, the top three sectors with the highest number of green businesses are ‘Environmental and other Scientific and Technical Consulting Services’, ‘Administrative and Support, Waste Management and Remediation Services’ and ‘Agriculture’. These sectors were categorized by the NAICS codes first two digits.

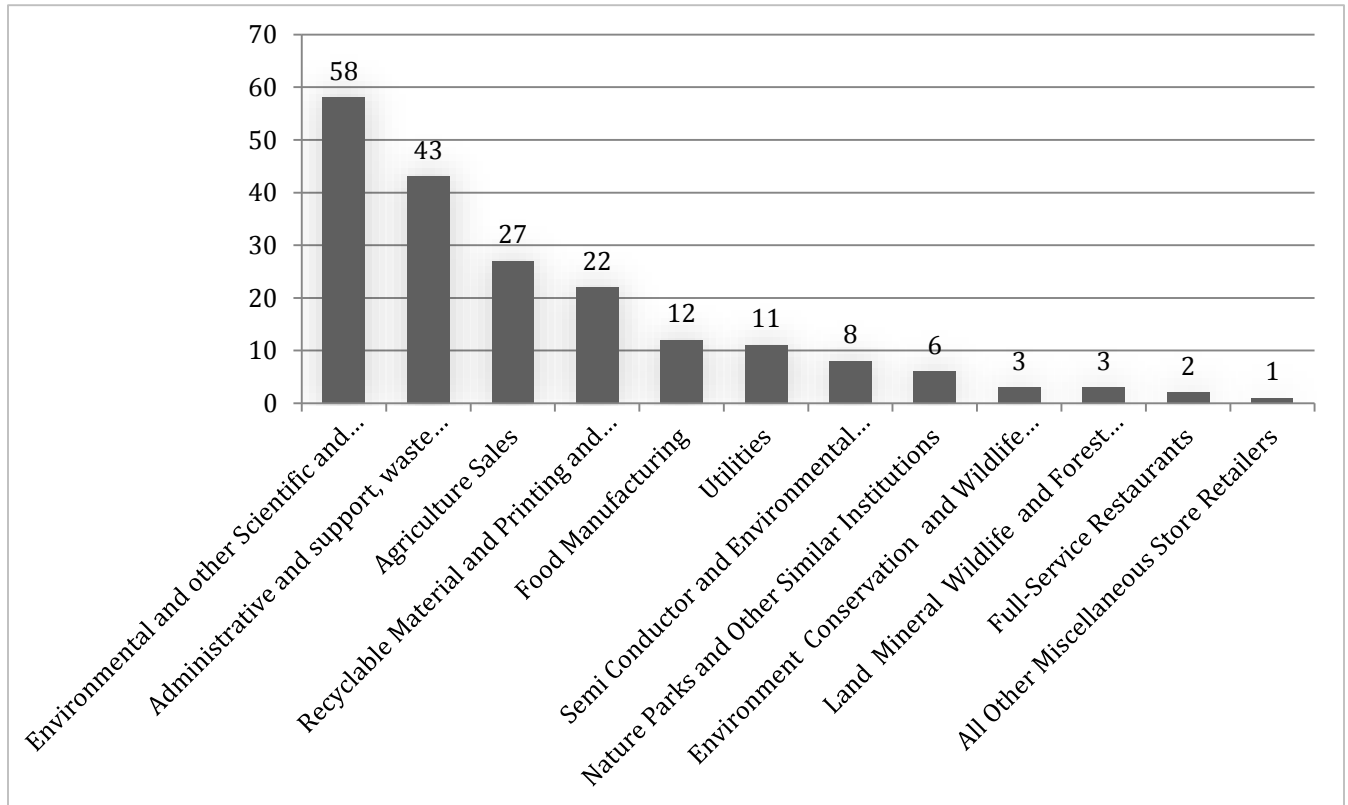


Figure 4 - Green Economy by Industry

Table 1 outlines sales by dollar value that is generated by each sector. The sectors that generated the most sales are Administrative and support, waste management and remediation services, Utilities and Environmental and other Scientific and Technical Consulting Services. In total these three sectors alone generated approximately \$926 million dollars. The sectors that generated the lowest dollar value of sales were All Other Miscellaneous Store Retailers and Full-Service Restaurants at \$470 thousand dollars. Employment is highest in the Administrative sector, and lowest in full-service restaurants.

Table 1 - Sales and Number of Employees by Sector

NAICS Code	Sector	Sales	Employees
56	Administrative and support, waste management and remediation services	\$607,880,000	1088
22	Utilities	\$237,760,000	326
54	Environmental and other Scientific and Technical Consulting Services	\$79,889,000	613
42	Recyclable Material and Printing and Writing Wholesale Trade	\$33,860,000	147
33	Semi-Conductor and Environmental Control Manufacturing	\$27,240,000	256
71	Nature Parks and Other Similar Institutions	\$21,614,000	290
11	Agriculture	\$18,091,970	186
81	Environment Conservation and Wildlife Organizations	\$6,700,000	65
92	Land Mineral Wildlife and Forest Conservation	\$2,908,000	27
31	Food Manufacturing	\$2,700,000	41
45	All Other Miscellaneous Store Retailers	\$420,000	3
72	Full-Service Restaurants	\$50,000	1
	<b>Total</b>	<b>\$1,039,112,970</b>	<b>3,047</b>

As shown in Figure 5, the Administrative and Support, Waste Management and Remediation Services accounts for 58.5% of the sales generated, followed by the Utilities sector at 22.9% and the Environmental and other Scientific and Technical Consulting Services at 7.7%. The sectors with the lowest sales by dollar value generated are Full-Service Restaurants at 0.0048%, followed by All Other Miscellaneous Store Retailers at 0.0404% and Food Manufacturing at 0.64%. On the other hand, the top three sectors that employed the most people are Administrative and Support, Waste Management and Remediation Services with 1088 employees, Environmental and other Scientific and Technical Consulting Services with 613 employees and Utilities with 326 employees. In total, these sectors employ 3,047 people in Waterloo region.

*Objective 3: Conduct an initial exploration on green business views on the green economy*

Invitations were sent to 15 local green businesses, as per the database results. Two businesses expressed interest in participating. These businesses were Vertex Environmental Inc. and Martin’s Family Fruit Farm.

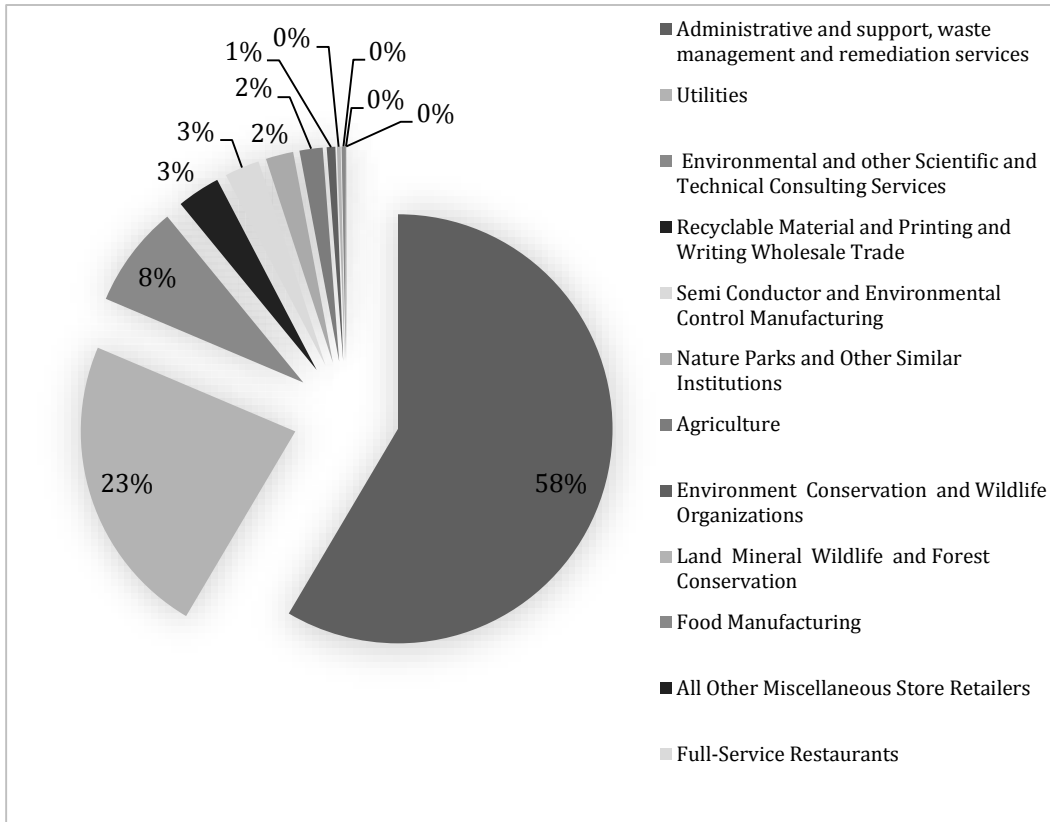


Figure 5 - Green Economy Breakdown by Sales

### Case Study 1: Vertex Environmental Inc.

Vertex Environmental Inc. is a Canadian owned in-situ remediation firm. (Vertex Environmental Inc., personal communication, March 7, 2013). With over 50 years of combined experience, Vertex Environmental works on projects both nationally and internationally (Vertex Environmental Inc., personal communication, March 7, 2013). Remediation services are provided for natural resources such as soil and groundwater (Vertex Environmental Inc., personal communication, March 7, 2013). Vertex has been operating in Waterloo region for approximately 10 years and has 20 employees (Vertex Environmental Inc., personal communication, March 7, 2013).

Bruce Tunnicliffe, a Project Manager at Vertex, was asked a series of questions, as provided in Appendix 3. The answers to these questions are summarized in Table 2.

Table 2 - Vertex Environmental Inc. Interview Responses

Question	Answer
<b>What percentage of your revenue stays within Waterloo region?</b>	<ul style="list-style-type: none"> <li>• 100% of the revenue generated by Vertex Environmental Inc. stays within the region</li> <li>• The head office is located in Cambridge but most of the operations are outside of the Waterloo Region</li> </ul>
<b>What percentage of your business is conducted within Waterloo region?</b>	<ul style="list-style-type: none"> <li>• Less than 10% of the operations occur within the region because of the nature of the work that is undertaken by Vertex</li> </ul>
<b>Why did your business choose to provide a green service? (At what point in your business did this happen?)</b>	<ul style="list-style-type: none"> <li>• There was a trend towards using in-situ remediation and the founder (Bruce) had expertise in the area and so Vertex started offering this service and the business grew as a result of the trend</li> </ul>
<b>Would government incentives promote green business development? If yes/no please explain why. Did you use any particular incentives or programs that the government provided?</b>	<ul style="list-style-type: none"> <li>• Yes government incentives would have helped Vertex Environmental Inc.</li> <li>• Vertex Environmental Inc. did not use any incentives for the first five years of operations until there was a federal government SR&amp;DE research program for scientific research and development</li> </ul>
<b>Would you find benefits in the creation of an Environment and Business Network? If yes/no please explain why.</b>	<ul style="list-style-type: none"> <li>• Vertex Environmental Inc. would be interested in the Environment and Business Network but does not know if the network will benefit their business</li> </ul>
<b>What kind of activities would you want the Environment and Business network to implement?</b>	<ul style="list-style-type: none"> <li>• Newsletters and updates on the green industry or environment</li> <li>• Events with speakers</li> </ul>
<b>How could the regional government improve/better the playing field for green businesses?</b>	<ul style="list-style-type: none"> <li>• Keep government offers and incentives running over a long time period, instead of having a program that lasts for just one year</li> <li>• Have better policies suited to green businesses</li> </ul>
<b>What are some of the greatest challenges you face as a green business? (I.e. marketing services, finding the consumer etc.)</b>	<ul style="list-style-type: none"> <li>• It is hard to find customers, there must be a market for the product/service being provided</li> <li>• Cash flow for businesses that run on contracts</li> </ul>

(Vertex Environmental Inc., personal communication, March 7, 2013)



## Case Study 2: Martin's Family Fruit Farm

Martin's Family Fruit Farm is a family owned and operated business that started in 1971 (Martin's Family Fruit Farm, personal communication, March 11, 2013). They employ, on average, 70 people for their 700 acres of land (Martin's Family Fruit Farm, personal communication, March 11, 2013). They produce apples and are a wholesaler as well as retailer of apples and apple related products (Martin's Family Fruit Farm, personal communication, March 11, 2013). Steve Martin of Martin's Family Fruit Farm was asked several questions regarding his experiences as a green business. Results are summarized in table 3.

Table 3 - Martin's Family Fruit Farm Interview Responses

Question	Answer
<b>What percentage of your revenue stays within Waterloo region?</b>	<ul style="list-style-type: none"> <li>• About 60% of the revenue stays in the region</li> <li>• 95% within Ontario</li> </ul>
<b>What percentage of your business is conducted within Waterloo region?</b>	<ul style="list-style-type: none"> <li>• 40% of business is conducted within the region</li> <li>• Varies from year to year</li> </ul>
<b>Why did your business choose to provide a green service? (At what point in your business did this happen?)</b>	<ul style="list-style-type: none"> <li>• Adapted because of the market demand</li> </ul>
<b>Would government incentives promote green business development? If yes/no please explain why. Did you use any particular incentives or programs that the government provided?</b>	<ul style="list-style-type: none"> <li>• Yes it would since there has been encouragement by the government to buy local</li> </ul>
<b>Would you find benefits in the creation of an Environment and Business Network? If yes/no please explain why.</b>	<ul style="list-style-type: none"> <li>• Yes if businesses could come together as a network and share best practices</li> </ul>
<b>What kind of activities would you want the Environment and Business network to implement?</b>	<ul style="list-style-type: none"> <li>• By having public forums or conferences to share best practices</li> </ul>
<b>How could the regional government improve/better the playing field for green businesses?</b>	<ul style="list-style-type: none"> <li>• Help local businesses stay competitive against other businesses in areas where wages are lower</li> </ul>

**What are some of the greatest challenges you face as a green business? (I.e. marketing services, finding the consumer etc.)**

- Wages since competitors are from areas in which wages are lower than Ontario's thus it is harder for Martin's Family Fruit Farm to compete

(Martin's Family Fruit Farm, personal communication, March 11, 2013)

Overall, each green business is based in Waterloo region but conducts a majority of their activities and businesses outside of the region. Vertex Environmental Inc. and Martin's Family Fruit Farm are both small to medium sized enterprises and have chosen to provide a green product/service because of the growing market demand for more sustainable practices and products. Each company have expressed challenges that they have faced as a green business, including cash flows, competitors with lower costs and marketing/creating awareness about their products and services. Vertex believes that government programs and grants should have a long-term vision and that future policies should be better suited towards helping green businesses. Martin's family fruit farm shares the same view and expresses that the government should implement programs/policies that can help local businesses stay competitive against larger firms that have lower operational costs.

#### 4.1 Analysis and Discussion

The objectives of the research were met; a framework has been developed and a dollar value of the green economy has been calculated for Waterloo region. In addition, two case studies were completed to give initial insight on local green businesses views on the green economy. Using the results of the database analysis, Waterloo region's green economy was quantified. The total number of green businesses in the region, how much sales by dollar value was generated and number of employees was also determined.

The City of Kitchener's "Our Region's Environmental Leadership: 2012 Corporate Consultation" study concluded that there was over 2,400 green/environmental businesses in Ontario (City of Kitchener, 2012). Waterloo region has a population of 553,000 people (Region of Waterloo, 2010a); this suggests that a total of 196 green businesses in Waterloo is an appropriate estimate as compared to the size of the city. A total of 889,621 businesses are registered in Ontario, if there are approximately 2,400 green businesses in Ontario (Industry Canada, 2012)

this indicates that green businesses account for 0.26% of total businesses. This percentage corresponds to the number of green businesses and total businesses in Waterloo region; where 0.85% of the businesses in Waterloo region was considered to be green. Studies that measure the green economy in other regions have provided similar conclusions. For example, Washington State, US Department of Commerce, British Columbia and California's studies on the size of the green economy all indicate that the percentage of green businesses, products and services is relatively small in their respective regions, account for less than 2% depending on the economic indicator used and are expected to grow because of environmental awareness increasing (State of Washington, 2009; USA Department of Commerce, 2010; Globe Foundation, 2010a; The Center for Community Innovation, 2010).

The results of this study indicate that the total sales generated from businesses in Waterloo region is \$54.5 billion. Of these sales, green businesses generated \$1.04 billion, accounting for 1.9% of the total sales generated. This provides a dollar value of the green economy in Waterloo region. Although \$1.04 billion dollars seems like a large number, the global market for green products and services is estimated to worth US\$5.2 trillion dollars (Globe Foundation, 2010a). This shows that the sales generated from Waterloo region is quite small in comparison to the net worth of the global green products and services market. Although there exist no studies that use the same methodology as this one, some comparisons may be made despite the varying metrics.

According to the Workforce Planning Board of Waterloo-Wellington-Dufferin Green Economy in Ontario study, there are 1,958,615 people employed by green industries in Ontario. Green businesses in Waterloo region employ 3,043 people, meaning that Waterloo region's green labour force accounts for approximately 0.15% of Ontario's total green labour force. Other regions that have used green jobs as a measure of the size of the green economy are generally much larger than Waterloo region. For example, some of these regions include Michigan and Missouri. Michigan estimated 109,067 green jobs in their region while Missouri states that there are 131,103 green jobs in their state (Michigan Department of Energy, Labour and Economic Growth, 2009; Missouri Economic Research and Information Center, 2012). Although using different metrics than this study, the results can give insight on what has been typical in the past.

If Waterloo region was to be compared to Ontario, the number of people employed in green jobs seems small. On the other hand, if Waterloo region was compared to Michigan or Missouri, the number of people employed in green jobs seems more sizable.

Results from the case studies conducted with Vertex Environmental Inc. and Martin's Family Fruit Farm reveal that there are many challenges they face as green businesses and small-medium sized enterprises. The biggest challenge was competition. These businesses find it hard to compete with other firms that have more publicity and lower operational costs. Since a majority of the businesses that were identified as green were SMEs, the results suggest that incentive programs and/or grants that are provided by the government may be helpful in increasing their competitiveness and ability to sustain their operations. The results also suggest that if an Environment and Business network is established, activities such as seminars and conferences that encourage businesses to share best practices are preferable. Seminars and conferences can create awareness for green businesses and can help with their operational and marketing strategies. Two interviews are not sufficient to make high level generalizations about green businesses in Waterloo region, however. These results can be further explored to determine the types of activities, programs and stakeholders that the Region of Waterloo would like to include in their Climate Action Plan.

There are several reasons why the results may have turned out this way. The first reason is the methodology and framework that was used to quantify the green economy. Limited studies on measuring the green economy are available. The studies that were the most applicable to this research were conducted in British Columbia (BC) and several states in the US such as Michigan and Washington. As well, a majority of these studies are focused on measuring the number of green jobs in the economy as opposed to measuring the green economy by sales, revenue or profit made by green businesses. Therefore the methodology used may not be the most effective way to measure the green economy. For example, the most feasible way of identifying sector and industry type is by using NAICS codes. NAICS codes are broad and do not identify green industries, despite this, NAICS codes were still used due to a lack of alternatives (ECO Canada, 2010). Since these codes were used, the size of the green economy may be under or over estimated. Results were also influenced by limited resources and feasible options to collect a sufficient amount of

data on green businesses. The results may have turned out differently if limited time was not an issue. For example, with more time the study could have reviewed all the businesses on the database and contacted any business that did not have a company website to determine whether they were green or not. These would have reduced the number of limitations that this study had.

## 5.0 Conclusion

Waterloo Region has a total of 196 green businesses with a dollar value of \$1.04 billion dollars for the local green economy. When comparing this to other regions such as Michigan or Missouri, the green economy of Waterloo region seems sizable. On the other hand, when this dollar value is compared to the global net worth of green products and services, Waterloo region's local green economy only accounts for a small portion. This measurement is one of the few attempts made to measure the size of Waterloo region's green economy. The Green Business Framework was developed to help aid other regions, municipalities and researchers measure the size of a local green economy. Although the methodology has limitations, it provides a benchmark and foundation for others to build upon. The results of this study can be used to provide a baseline and ideas for the development of the Climate Action Plan. It will also allow the Region of Waterloo to benchmark their local green economy to other regions, as well as assess the types of green business-oriented programs and policies that should be implemented. There are three research gaps that were identified from this study. The first is that many green economy studies focus on green jobs instead of green businesses. Second, there are limited studies on the green economy in Ontario. The last research gap is that NAICS codes used were too broad and the need for codes that identify green sectors/industries is essential.

## 5.1 Recommendations

The results of this study show that there is a lack of information on green businesses and the use of green businesses to measure the local green economy of Waterloo region. In order to address this gap it is recommended that the Region of Waterloo collect more information from the businesses that operate within the region. The Region of Waterloo can collect more information by adjusting the yearly Workplace Count questionnaire to collect information

specifically for the establishment of a green businesses count (Region of Waterloo, 2010e). Currently the Workplace Count is a questionnaire that asks general questions such as business name, location, description and number of employees (Region of Waterloo, 2010e). More specific questions in regards to industry, types of products or services provided, and sales, would assist in the formation of a green business database and a measure of the green economy on a yearly basis.

The Region of Waterloo is also recommended to implement informational sessions or open houses when developing the Climate Action Plan. This will allow the Region to collect public and business opinion on the types of activities, policies and programs that should be implemented to encourage better environmental performance and sustainable development in the region.

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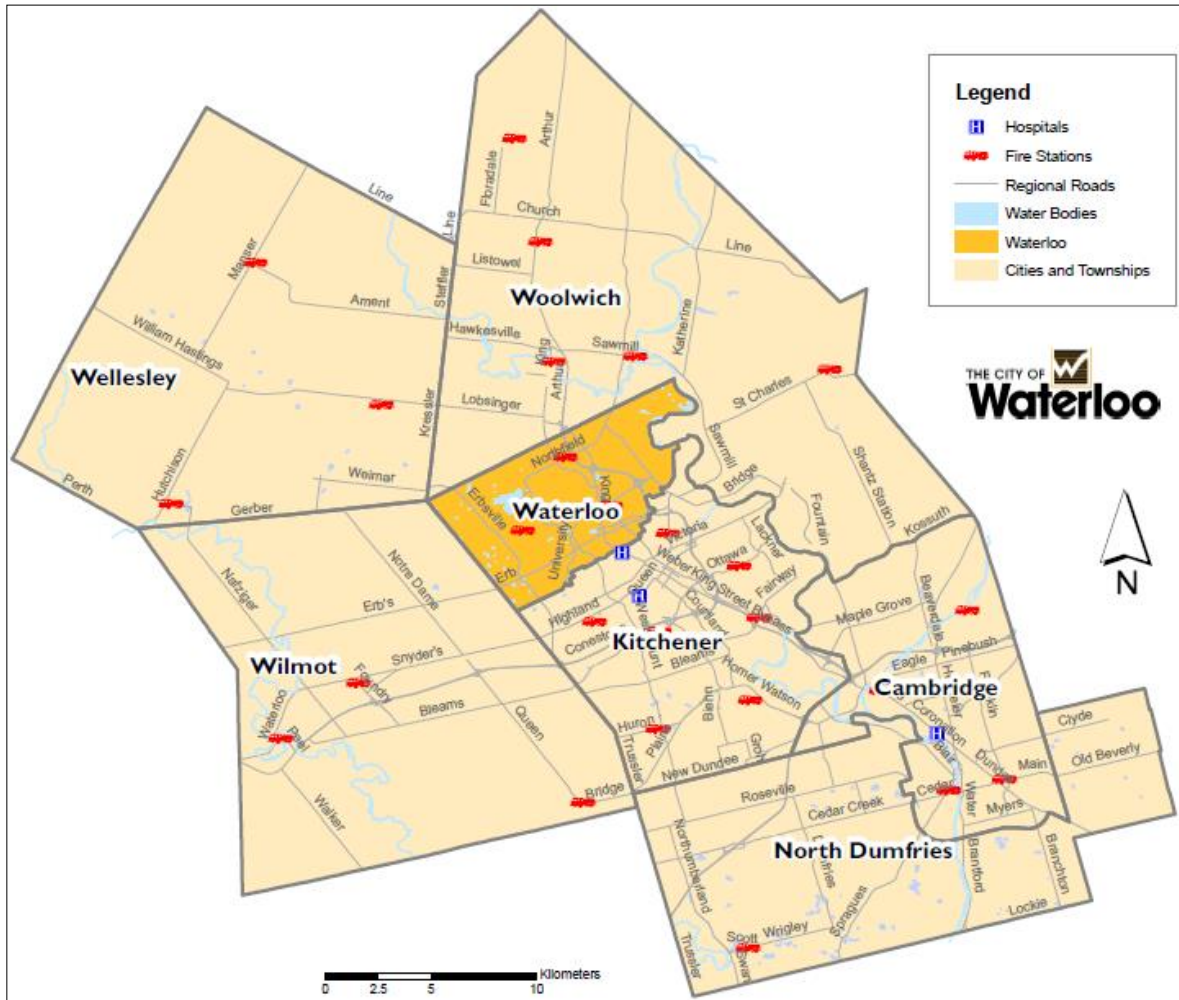
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Appendix 1 – Waterloo Region Map



(City of Waterloo, 2012)

Appendix 2 – Green Business NAICS Codes

<b>NAICS Code</b>	<b>NAICS Name</b>
111150	Corn Farming
111199	All Other Grain Farming
111211	Potato Farming
111219	Other Vegetable (except Potato) and Melon Farming
111331	Apple Orchards
111333	Strawberry Farming
111421	Nursery and Tree Production
111422	Floriculture Production
111998	All Other Miscellaneous Crop Farming
221119	Other Electric Power Generation
221330	Steam and Air-Conditioning Supply
312120	Breweries
312130	Wineries
334413	Semiconductor and Related Device Manufacturing
334512	Automatic Environmental Control Manufacturing for Regulating Residential Commercial and Appliance Use
423930	Recyclable Material Merchant Wholesalers
424110	Printing and Writing Paper Merchant Wholesalers
541620	Environmental Consulting Services
541690	Other Scientific and Technical Consulting Services
562211	Hazardous Waste Treatment and Disposal
562212	Solid Waste Landfills
562910	Remediation Services
562920	Materials Recovery Facilities
562998	All Other Miscellaneous Waste Management Services
712190	Nature Parks and Other Similar Institutions
813312	Environment Conservation and Wildlife Organizations
924120	Land Mineral Wildlife and Forest Conservation

### Appendix 3- Interview Questions

1. What percentage of your revenue stays within Waterloo region?
2. What percentage of your business is conducted within Waterloo region?
3. Why did your business choose to provide a green service? (At what point in your business did this happen?)
4. Would government incentives promote green business development? If yes/no please explain why. Did you use any particular incentives or programs that the government provided?
5. Would you find benefits in the creation of an Environment and Business Network? If yes/no please explain why.
6. What kind of activities would you want the Environment and Business network to implement?
7. How could the regional government improve/better the playing field for green businesses?
8. What are some of the greatest challenges you face as a green business? (I.e. marketing services, finding the consumer etc.)

## Appendix 4 – Sample of Bureau of Labour Statistics Green Goods and Services Industries by NAICS Code

For full list, see [http://www.bls.gov/green/industry\\_by\\_naics.pdf](http://www.bls.gov/green/industry_by_naics.pdf)

**BUREAU OF LABOR STATISTICS**  
Green Goods and Services Industries by NAICS Code  
For Public Comment (Federal Register Notice): 3/15/2010

NAICS 2007	Title	Included	Category of green economic activity (1-7)	Definition elements (1-4)	Example of green good or service
111110	Soybean farming	Y	6	2	USDA certified organic produce, soybeans for biodiesel
111120	Oilseed, except soybean, farming	Y	6	2	USDA certified organic produce
111130	Dry pea and bean farming	Y	6	2	USDA certified organic produce
111140	Wheat farming	Y	6	2	USDA certified organic produce
111150	Corn farming	Y	6	2	USDA certified organic produce, growing corn for ethanol
111160	Rice farming	Y	6	2	USDA certified organic produce
111191	Oilseed and grain combination farming	Y	6	2	USDA certified organic produce
111199	All other grain farming	Y	6	2	USDA certified organic produce, growing sorghum for ethanol
111211	Potato farming	Y	6	2	USDA certified organic produce
111219	Other vegetable and melon farming	Y	6	2	USDA certified organic produce
111310	Orange groves	Y	6	2	USDA certified organic produce
111320	Citrus, except orange, groves	Y	6	2	USDA certified organic produce
111331	Apple orchards	Y	6	2	USDA certified organic produce
111332	Grape vineyards	Y	6	2	USDA certified organic produce
111333	Strawberry farming	Y	6	2	USDA certified organic produce
111334	Berry, except strawberry, farming	Y	6	2	USDA certified organic produce
111335	Tree nut farming	Y	6	2	USDA certified organic produce
111336	Fruit and tree nut combination farming	Y	6	2	USDA certified organic produce
111339	Other non-citrus fruit farming	Y	6	2	USDA certified organic produce
111411	Mushroom production	Y	6	2	USDA certified organic produce
111419	Other food crops grown under cover	Y	6	2	USDA certified organic produce
111421	Nursery and tree production	Y	6	2	USDA certified organic products
111422	Floriculture production	Y	6	2	USDA certified organic products
111910	Tobacco farming	Y	6	2	USDA certified organic tobacco
111920	Cotton farming	Y	6	2	USDA certified organic cotton
111930	Sugarcane farming	Y	6	2	USDA certified organic produce, sugarcane for ethanol

**LEGEND:**  
Y: Included  
N: Excluded

**Categories of green economic activity:**  
1. Renewable energy  
2. Energy efficiency  
3. Greenhouse gas reduction  
4. Pollution reduction and cleanup

5. Recycling and waste reduction  
6. Agricultural and natural resources conservation  
7. Education, compliance, public awareness, and training

**Definition Elements:**  
1. Direct green good or service  
2. Indirect green good or service  
3. Specialized input to elements 1 or 2  
4. Distribution of green goods