



ECO CANADA

Environmental Careers Organization



# Defining the Green Economy

LABOUR MARKET RESEARCH STUDY

2010

## ECO CANADA

ECO Canada develops programs that help individuals build meaningful environmental careers, provides employers with resources to find and keep the best environmental practitioners, and informs educators and governments of employment trends to ensure the ongoing prosperity of this growing sector.



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- Electricity Sector Council
- Forest Products Sector Council
- Information and Communications Technology Council (ICTC)
- Mining Industry Human Resources Council (MiHR)
- Petroleum Human Resources Council of Canada

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# 1. EXECUTIVE SUMMARY

The emergence of the green economy represents the next stage in the evolution of the environmental sector and is growing in step with increasing public awareness of environmental impact. It can be said that the green economy has experienced rapid growth, in part, as the result of changing demand, where greater emphasis is placed on the sustainability of products and services.

Greater public awareness, together with government policy, regulatory requirements and financial incentives influence organizations to embrace green technology and adopt greener practices. Companies operating in almost every sector of the economy now consider the 'greenness' of their operations in decisions that differentiate their products and services, realizing that in many cases their decisions present long-term cost saving opportunities.

There is a danger in characterizing the green economy as a unique and isolated phenomenon as it would suggest that the business opportunities it presents are entirely new and unrelated to the environmental sector or broader Canadian economy. It is also important to recognize the employment outcomes resulting from the continued growth of the green economy will be built upon the existing skill-sets of the environmental workforce and integrated into new sectors of the economy as demand for green products and services continues to grow.

ECO Canada's *Defining the Green Economy* Report represents the first critical step in solidifying the Canadian definition of "Green Economy". With this definition, business, government and the public at large will be better positioned to understand what opportunities and challenges may lay ahead for business development, government direction as well as occupational opportunities and skill needs.

This definitional report lays an important foundation for ECO Canada's subsequent research to help illuminate the real economic and business opportunities associated with this societal shift as well as the specific occupational and skills requirements necessary to fully realize the positive impacts of this economic movement.

## 1.1 WHAT IS THE GREEN ECONOMY?

In order to fully understand the breadth and importance of this emerging green economy we must first define what is meant by the term, the genuine areas of business opportunity and the implications it has on employment and skills.

Through extensive research, 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.*

In addressing the reduction of negative production, distribution and consumption patterns as well as the proactive efforts to repair and rethink our future efforts, this definition is both prescriptive and far-reaching. The inclusion of the term "primary intention" should draw a clear connection to the first-hand operations that positively affect the environment and not relate to enterprises that support these primary operations.

The green economy is a subset of the entire Canadian economy. It does not exist in parallel to the traditional economy, but it includes similar activities and processes. It produces similar goods and services as the broader economy, but also includes new products and services and green processes supporting the production of green products and services.



The green economy is the aggregate of all activity operating with the primary intention of minimizing all forms of environmental impact.





## 1.2 DEFINITIONAL CRITERIA FOR THE GREEN ECONOMY

Definitional criteria provide the foundation for understanding and categorizing green economic activity as it specifically pertains to labour market development challenges. The three main definitional criteria include an economic perspective, a technical perspective, and a development process perspective.

**Technical Perspective** - defines the green economy through the application of quantitative, analytical criteria that *measure exactly what it is about a product, process or service that is 'green,'* and to what extent.

**Economic Perspective** - relates the characteristics of an activity to *categorize its economic classification system of sectors, industries, and occupations.* Economic criteria might assess whether products or services contribute to decreased greenhouse gas emissions, or include sustainable resources in manufacturing processes.

**Development Process** - identifies *where in the development cycle a green job is situated.* The development process includes the phases of development of a product or service, from the research phase through to design, delivery, implementation, ongoing use and maintenance.

These criteria serve to inform the future development of a framework or model to outline the extent to which an activity or industry can be classified as "green". Applying each perspective helps to clarify how a product or service aligns appropriately with the green economy.

## 1.3 DEFINING GREEN JOBS

Using the same process for defining the green economy, a **green organization is defined as one that produces goods or services designed to minimize environmental impact.**

Building upon work completed by other organizations pursuing similar objectives, **ECO Canada defines a green job as one that works directly with information, technologies, or materials that minimize environmental impact, and also requires specialized skills, knowledge, training, or experience related to these areas.**

Through the research process it became evident that the viable approach to building common and universally consistent language would be to conceptualize and communicate green jobs as those that focus on aspects related to production, and more specifically, the production of goods or services that support ecological integrity and minimize environmental impact.

## 1.4 GREEN SKILLS

Green skills are the knowledge, training or experience as they relate to technologies or materials that minimize environmental impact. Despite the adaption, reallocation and to a lesser extent, creation of jobs that will structure the green workforce, no distinctly new skill sets emerge as necessities for operating in these increased environmental capacities. Rather, focus will remain more on diversification of existing skills applications relating to the green economy among existing trades and professions.

As the green economy continues to evolve, it is evident that skills gaps are emerging. Research indicated that the application of increased specialized skills will be needed to support green economic activity in:

*Wind and solar energy*

*Battery technology and power electronics*

*Sustainability management and energy efficiency*

*Environmental finance and emissions trading*

Research further elicited that these areas will require greater skill augmentation in areas of research and development, consulting and engineering capacities.

In addition to specialized green skills, knowledge and experience, other skills or knowledge areas that are deficient in a viable green economy include:

*Softer skills related to communications*

*The ability to adapt to technological change*

*A lack of knowledge of sustainable development*

*Interdisciplinary thinking that develops relationships across industries and organizations to support system integration*

These skills are not necessarily technical or employment-related, but refer to the need for specific, education-based exposure to the development issues and opportunity areas within the green economy.

## 1.5 IMPACT ON EMPLOYMENT

There is no doubt that greening of the Canadian economy will involve large scale investments in new technologies, equipment, buildings and infrastructure and therefore will be a major stimulus to employment. Based on the definition and supporting framework, the green economy has an impact on employment through **(a) the adaption and reallocation of existing jobs;** and **(b) the creation of new jobs.**

The largest influence of the green economy on employment is in terms of jobs being adapted or reallocated, with existing workers having to learn new skills and/or broaden their pre-existing skill sets. The movement towards greening the economy has resulted in a need for increased economic integration and increased demand for a more holistic economic approach.

The lesser impact of the green economy on employment concerns the creation of new jobs as businesses work to meet new consumer demand and adapt to new or anticipated environmental or energy-use regulations. The emergence of new markets for low-carbon energy technologies, renewable energy, energy efficiency and alternate forms of transportation all offer vast implications on new occupational opportunities.



Green skills are the knowledge, training or experience as they relate to technologies or materials that minimize environmental impact.



## 1.6 AREAS OF OPPORTUNITY

While no area of the traditionally-termed economy remains untouched by the green economy, the in-depth literature review, qualitative interviews and quantitative survey data determined these areas as the top areas of opportunity in Canada within the emerging green economy.

*Renewable Energy & Energy Efficiency*

*Buildings, Retro-fitting & Construction*

*Transportation & Alternative Transportation*

*Waste Recycling & Waste Management*

It should be noted that the green economy does not consist exclusively of these four selected areas of focus. The green economy encompasses all activities with a deep-seated focus or primary intention of reducing resource consumption, harmful emissions, and minimizing all forms of environmental impact. Therefore, further exploration is required to develop a comprehensive listing of all contributing sub-sectors.



The largest influence of the green economy on employment is in terms of jobs being adapted or reallocated, with existing workers having to learn new skills and/or broaden their pre-existing skill sets. The movement towards greening the economy has resulted in a need for increased economic integration and increased demand for a more holistic economic approach.



## 1.7 FUTURE DIRECTIONS & NEXT STEPS

Through the construction of a definition, a framework and the exploration of the emerging business and skill areas of the green economy, the study provided some necessary follow-up to the research in order to aid in better understanding the opportunities for the green economy.

- **Test the definition and application of the definitional criteria**

Additional focused consultation with high-level, strategic thinkers familiar with the emerging green economy in Canada is recommended to test and refine the consensus-driven definition of the green economy and green jobs.

- **Further refine the definitional criteria**

Develop a more explicit understanding of the three perspectives and use additional research to inform the inclusion of specific measures and other rule-based approaches to further identify and clarify green job activities.

- **Finalize the green economy definitional model**

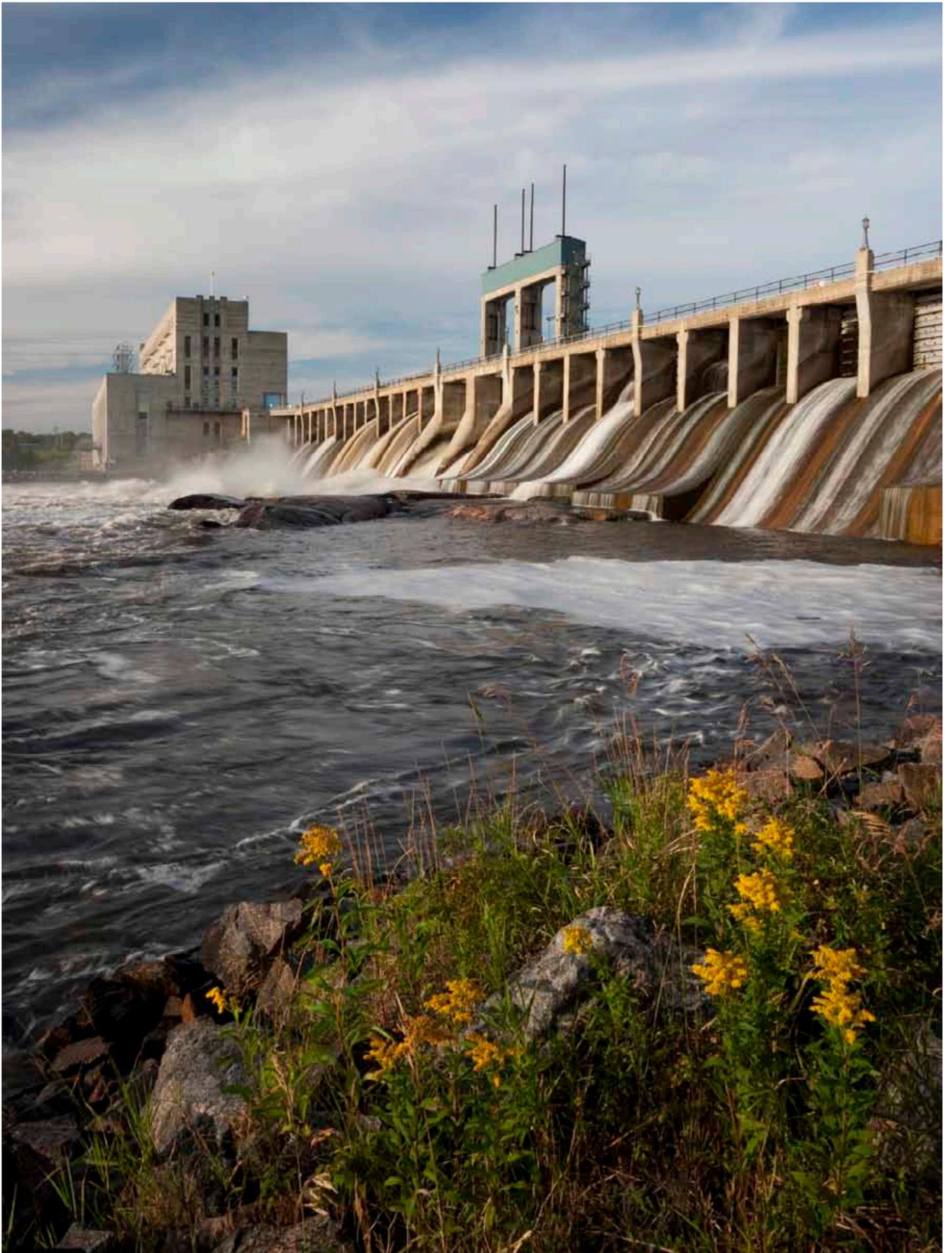
Using testing, application and refinement of the definitional criteria noted in the above points, derive a universally-adopted model with sufficient detail to categorize and classify all possible industries and occupations contributing to the green economy in Canada.

- **Calculate the actual size and composition of the green economy in Canada**

Undertake economy-wide research to develop a complete understanding of the current size and composition of the green economy in Canada, reveal distinct emerging trends, and assess the future demand for green skills and occupations.

- **Update Occupational Classifications and System to reflect green economy occupations**

Develop partnerships with appropriate government agencies to collaborate in updating Canada's National Occupation Classification (NOC) and the North American Industry Classification System (NAICS) to better reflect the emergence of green occupations and industry sectors in the evolving green economy.



## 2. INTRODUCTION

### 2.1 ABOUT ECO CANADA

ECO Canada is a not-for-profit organization that was first established in 1992 under the federal government's Sector Council initiative. Its mission is "to ensure an adequate supply of people with the demonstrated skills and knowledge required to meet the environmental human resource needs of the public and private sectors".

Over the past 18 years, ECO Canada has grown into its own as an organization focused on supporting Canada's environment industry by communicating with industry stakeholders, conducting research and creating the necessary resources required to address human resource needs in order to ensure the success of this dynamic sector.

ECO Canada is an industry-led human resources organization that:

- Develops programs that help individuals build meaningful environmental careers;
- Provides employers with resources to find and keep the best environmental professionals; and
- Informs educators and governments of employment trends to ensure the ongoing prosperity of this growing sector.

### 2.2 PROJECT CONTEXT & OBJECTIVES

The terms green economy and green jobs are highly dynamic concepts used to describe a wide range of activities and occupations with varying degrees of economic impact. Language used to describe and define the green economy varies among government agencies, industry associations, employers, and educational institutions.

As a consequence, the majority of publicly available documentation lacks consistency or has limited applicability. At present, no universal or shared framework exists to consistently define or classify green jobs or green economic activity on a national scale, in a Canadian context.

To address this issue, ECO Canada, with the support of Human Resource and Skills Development Canada, commissioned the *Defining the Green Economy* labour market research study to gain a better understanding of definitional issues and classifications approaches, and establish common language and concepts to characterize the green economy and green jobs.

Objectives of this project were to:

- Develop a definition for the emerging green economy and supporting definitional criteria;
- Identify the top opportunity areas within the Canadian green economy over the coming decade; and
- Establish common language and develop a consensus-driven definition of green jobs.

It is essential that these areas be better understood to ensure that future decisions are based on the appropriate background information and understanding of green economic activity. Findings from this report will be used to inform government policy development, human resource decisions, as well as ECO Canada's own organizational direction.

### 2.3 METHODOLOGY

Methodological components of the project included the review of a large spectrum of secondary literature and relevant data sources to provide the basis for macro-level analysis. Primary research was also conducted to gain insight into green economy and green jobs conceptual approaches, and to better understand the characteristics of green companies operating within the Canadian green economy.

- Thirty in-depth qualitative interviews were conducted with a variety of high-level stakeholders across Canada with an in-depth knowledge or familiarity with the green economy, including individuals representing the private sector, national sector councils, various foundations, associations and think tanks, and academic institutions.
- A quantitative telephone survey was also completed with senior managers or decision makers familiar with green or sustainable activities representing 501 organizations across Canada. Of the 501 organizations interviewed, 431 were considered to be green companies, meaning their organization operated within a targeted industry sector that produced goods or services designed to minimize environmental impact.



## 3. LITERATURE REVIEW

### 3.1 LITERATURE REVIEW SUMMARY

With growing consensus that environmental change is a reality, the level of impact these changes will have on the world's economic, social and ecological systems comes into question. Data from a broad range of sources indicates widespread agreement that dramatic economic changes will be required in the coming years as individual countries, blocs and the broader global structure are affected by shifting environmental influences. While the emergence of a green economy is clear, experts still continue to debate the scope and definitional approaches in describing the green economy and green jobs. The research revealed that some experts have a broad definitional approach while others advocate a narrower, more focused definition. Despite the debate regarding the composition of the green economy, the literature review indicated growing consensus concerning the areas typically identified as key economic and employment opportunities with the green economy. The leading areas of opportunity identified were:

- Renewable Energy & Energy Efficiency;
- Buildings, Retro-fitting & Construction;
- Transportation & Alternative Transportation; and
- Waste Recycling & Waste Management.

### 3.2 ENVIRONMENTAL INFLUENCES ON THE ECONOMIC LANDSCAPE

Canada and the entire global community today confront a strikingly different environmental landscape than that of the past century. As the United Nations Environment Programme (UNEP) noted in 2008, "there is growing recognition that humanity faces a severe environmental emergency. Modern economies have been built on an unsustainable foundation. Activities ranging from agriculture and mining to manufacturing, services, and transportation rely on fossil fuels, generate copious amounts of pollution and waste, and undermine critical ecosystems, eco-services, and life support."<sup>1</sup>

For the most part, a review of existing literature indicates there is growing consensus that environmental change arising from global warming and other manifestations is already a reality. The 'deniers' appear to be relatively few in number, and in Canada at least, appear to be increasingly associated with the fringes of the debate regarding climate change and the economy.



Action on climate change will also create significant business opportunities, as new markets are created in low-carbon energy technologies and other low-carbon goods and services.



Despite the evidence supporting the reality of climate change, some observers continue to dispute the imminent and pressing economic, social, and ecological issues as they deny the premise that there is either current or pending global climate change leading to negative environmental impact. The American Policy Center, for example, as recently as 2008 stated "there is no global warming. Period. You can't find a real scientist anywhere in the world who can look you in the eye and, without hesitation, without clarification, without saying, kinda, mighta, sorta, if, and, or but [...] say 'yes, global warming is with us!' There is no evidence whatsoever to support such claims. Anyone who tells you that scientific research shows warming trends - be they teachers, news casters, Congressmen, Senators, Vice Presidents or Presidents - is wrong. There is no global warming."<sup>2</sup>

Likewise, in 2008, the Science and Public Policy Institute in the United States issued a publication entitled *Proved: There is No Climate Crisis*. The article's author related that data made available by the *Physics and Society* journal provides "mathematical proof" categorically refuting the existence of a "climate crisis."<sup>3</sup>

<sup>1</sup> Nations Environment Programme. *Green Jobs: Towards decent work in a sustainable, low-carbon world*. 2008, p.33.

<sup>2</sup> American Policy Center. "There is No Global Warming." Accessed at: <http://www.americanpolicy.org/un/thereisnoglobal.htm>

<sup>3</sup> Science & Public Policy Institute. "Proved: There is No Climate Crisis." 2008. Accessed at [http://scienceandpublicpolicy.org/images/stories/press\\_releases/Press-Release\\_No-Climate-Crisis.pdf](http://scienceandpublicpolicy.org/images/stories/press_releases/Press-Release_No-Climate-Crisis.pdf)

Environmental change has also been the subject of much debate in Canada. In a 2006 open letter to the Prime Minister published in the *National Post*, for example, 60 academic scientists forcefully called upon the federal government to reconsider what they considered to be faulty and incomplete evidence supporting the notion that global warming was underway.<sup>4</sup>

A combination of widely-accepted and ever-growing body of evidence, however, solidifies the reality and urgency of environmental change. The extensive analysis underlying the 2006 *Stern Review on the Economics of Climate Change* found that "the scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response. This Review has assessed a wide range of evidence on the impacts of climate change and on the economic costs, and has used a number of different techniques to assess costs and risks. From all of these perspectives, the evidence gathered by the Review leads to a simple conclusion: the benefits of strong and early action far outweigh the economic costs of not acting."

In addition, the Stern Review pointed out that "action on climate change will also create significant business opportunities, as new markets are created in low-carbon energy technologies and other low-carbon goods and services. These markets could grow to be worth hundreds of billions of dollars each year, and employment in these sectors will expand accordingly. The world does not need to choose between averting climate change and promoting growth and development. Changes in energy technologies and in the structure of economies have created opportunities to decouple growth from greenhouse gas emissions. Indeed, ignoring climate change will eventually damage economic growth."<sup>5</sup>

The acceptance speech for the 2007 Nobel Peace Prize, awarded to the Intergovernmental Panel on Climate Change (IPCC), noted that "as stated in the Fourth Assessment Report [of the IPCC], warming of the climate system is unequivocal, and most of the global average warming over the past 50 years is very likely due to anthropogenic greenhouse gases increases."<sup>6</sup>

Accordingly, the main constraints towards evolving towards a green economy within the Canadian context may be policy-based rather than grounded in doubts concerning whether or not global warming is indeed underway. There have been many critics of alleged government inactivity concerning the response to the importance or urgency of tomorrow's green economy.<sup>7</sup> On the other hand, defenders of the federal government in Canada, can point to substantive initiatives that suggest the opposite. For example, a 2008 Government of Canada publication titled *Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions* related that "rather than relying solely on the voluntary measures used in the past, for the first time, the government is introducing mandatory and enforceable actions across a broad range of sectors."<sup>8</sup>

If it is accepted that increasing environmental concerns necessitate a large-scale governmental and corporate economic response, is it realistic to expect significant forward movement when most economies, including Canada's, struggle to regain their footing after considerable economic downturn? Many observers note that the recent period of economic decline, has increased the opportunities for future growth in the emerging green economy – practical opportunities that are more feasible than would have otherwise been the case during an economic boom.

As Kevin Doyle, President of Boston's Green Economy consulting firm, has remarked, "the idea that we could simultaneously attack the climate change crisis, pump up the economy, save money on energy costs, and provide 'green collar jobs' is a tantalizing prospect."<sup>9</sup> Likewise, the Seattle Jobs Initiative think tank has argued that "new jobs of the green economy have the power to redirect our current path of environmental decline and create economic opportunity by rebuilding a strong middle class, providing pathways out of poverty, strengthening urban and rural communities alike, and providing individuals with skills and jobs that are good for them and good for the planet."<sup>10</sup>

<sup>4</sup> "Open Kyoto to Debate." *National Post*, April 6, 2006. Accessed at: <http://www.financialpost.com/scripts/story.html?id=b703a122-f20b-4cce-8a05-c773e7f878ec>

<sup>5</sup> Nicholas Herbert Stern. "The Economics of Climate Change: The Stern Review." 2006.

<sup>6</sup> Intergovernmental Panel on Climate Change. "Nobel Lecture." 2007. Accessed at: [http://nobelprize.org/nobel\\_prizes/peace/laureates/2007/ipcc-lecture\\_en.html](http://nobelprize.org/nobel_prizes/peace/laureates/2007/ipcc-lecture_en.html)

<sup>7</sup> See, for example, *The Hill Times*. "Environment Policy Briefing." April 19, 2010, pp.30-47.

<sup>8</sup> Government of Canada. "Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions." 2008, p.1.

<sup>9</sup> Kevin Doyle. "How do we define the green-job economy?" Accessed at: [http://www.experience.com/alumnus/article?channel\\_id=green&source\\_page=home&article\\_id=article\\_1208549976001](http://www.experience.com/alumnus/article?channel_id=green&source_page=home&article_id=article_1208549976001)

<sup>10</sup> Seattle Jobs Initiative. "A Growing Green Economy: Opportunities for Tomorrow." 2009, p.8.

Many Canadian observers agree with this 'turn challenge into opportunity' perspective, and indeed some go further in demanding governments to demonstrate leadership by investing tax dollars to promote the transition to the green economy. For example, the David Suzuki Foundation in 2009 remarked that the "global economy, including Canada's, is in a serious recession. Jobs, economic activity and access to credit are shrinking. A significant public investment is needed to kick start the economy, and, in particular, to create jobs. At the same time, Canada faces unprecedented environmental challenges [...] these two problems are connected. A healthy economy depends on a healthy environment. By making the right stimulus investments, we can put Canadians to work right away and start to build a greener, stronger economy."<sup>11</sup>

Literature focusing on the relationship between environmental and economic issues reveals that much has been done globally in response to the perceived threat of climate change and its impacts on the environment. While many would argue that the response of governments, corporations, individuals, and others has thus far been somewhat muted and insufficient, a literature review concerning the topic of global warming as well as its manifestations and implications, indicates a wealth of past and current action, as well as abundant future opportunities. Data from a broad range of sources indicates widespread agreement that economic focus will have to change dramatically in the coming years as individual countries, blocs, and the entire global structure are affected by shifting environmental influences.

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Economic focus will have to change dramatically in the coming years as individual countries, blocs, and the entire global structure are affected by shifting environmental influences.

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<sup>11</sup> David Suzuki Foundation. "A Green Economic Stimulus package to Secure our Current and Future Prosperity," 2009.



## 3.3 DEFINING GREEN JOBS AND THE GREEN ECONOMY

### 3.3.1 OVERVIEW

As recently as March 2010, politicians, scholars, economists and other observers of the world economy and its labour markets continued to debate the scope and definitional approaches in describing the green economy and green jobs.<sup>12</sup> While some still dispute the urgency of the climate change issue, the emergence of the green economy can hardly be debated. To corroborate this assertion, a 2008 report by the International Labour Organization (ILO) stated that the “global market for environmental products and services is projected to double by ... 2020.”<sup>13</sup> In its report, the ILO noted that in recent years 2.3 million people worldwide have found new jobs in the renewable energy sector alone, with enormous employment opportunities on the horizon for that expanding sector of the economy.

However, the frequently quoted 2008 United Nations Environment Programme report is typically broad and elusive on the definitional matter that sits at the heart of what constitutes employment in the green economy: “Green jobs are those that contribute appreciably to maintaining or restoring environmental quality and avoiding future damage to the Earth’s ecosystems.”<sup>14</sup> As the wealth of literature and debate on this topic indicates, there is not presently – and likely will never be – a unanimous or even near-unanimous consensus on what constitutes either the green economy or green jobs, nor is there consensus among green economy stakeholders on how to measure such economic concepts.

Kevin Doyle neatly sums up the definitional conundrum: “Having announced the imminent arrival of the green economy, we’re scrambling to define exactly what that means ... The slow move to sustainability – and especially the climate change challenge – is creating whole new industries, new jobs, and new types of responsibilities within existing jobs. It’s happening in fits and starts, and we’re making it up as we go along. It will take a while for things to shake out, for people to agree on common job categories.”<sup>15</sup> As a result, a myriad of industry publications have sprung up in response to the ambiguity associated with explicitly defining and gaining consensus regarding the composition of green jobs and the green economy.<sup>16</sup>

The imprecise nature of what constitutes the green economy or green jobs has not gone unnoticed in Canada. For example, a recent study remarked that “Canada’s National Occupation Classification [NOC] system does not yet recognize many of the new green careers. [Moreover,] the North American Industry Classification System [NAICS] has not yet adapted to include new emerging green sectors in established industries.”<sup>17</sup> Despite this limitation, the present research relies upon the NAICS coding system for primary research considerations, in the absence of a preferable option.



The slow move to sustainability – and especially the climate change challenge – is creating whole new industries, new jobs, and new types of responsibilities within existing jobs.



<sup>12</sup> Accessed at: <http://www.economist.com/debate/overview/167/Green%20jobs>

<sup>13</sup> International Labour Organization. “Green Jobs – Facts and Figures.” 2008.

<sup>14</sup> United Nations Environment Programme, p.35.

<sup>15</sup> Kevin Doyle.

<sup>16</sup> Washington State Department of Community, Trade and Economic Development. “The Green-Economy Jobs Initiative: Definitions.” 2009.

<sup>17</sup> Toronto Workforce Innovation Group et al. *Greening the Economy: Transitioning to New Careers*. December 2009.

### 3.3.2 NARROW OR BROAD DEFINITION?

To emphasize the complexity surrounding the development of a consensus-driven definition of the green economy, a wide range of perspectives are highlighted. As Kevin Doyle has noted, "There are some super-smart people in [these] debates, and they often disagree. That disagreement isn't going to end anytime soon."<sup>18</sup> For example, the Obama administration in the United States adopted the perspective of Van Jones, influential author and (former) member of the Obama brain trust. Jones argued that workers in declining industries must be re-trained, paid a reasonable wage in the emerging green economy, and that such people should be categorized as constituting part of that new economy, even if their job activities remain what could be described as 'traditional' in nature (e.g., a carpenter undertaking traditional tasks at a wind farm, and so on).<sup>19</sup>

In contrast to this broad definitional perspective, there are many who contend that such an expansive viewpoint of the green economy and related employment is too vast. This viewpoint insists that such a broad or inclusive working definition of the green economy would not provide sufficient detail regarding the specific areas of focus or skills required to support the green economy.

With acknowledgement to the importance of developing a definitional structure to conceptualize the emerging green economy, the Business Council of British Columbia suggests the merit of a narrower, rather than a broader perspective. With a focus on definitional precision that could permit meaningful classification and measurement, the Business Council suggests developing "conservatively categorized" definitions and job data, remarking that such an approach should call upon "rigorous metrics to determine what counts as a green economy/job."<sup>20</sup> Such metrics might include the measurement to the extent a job or activity directly contributes to more efficient use of resources or waste reduction. Other criteria might classify the characteristics of an activity into sectors, industries or occupations.

Although aimed at more traditional environmental activity, Statistics Canada has adopted and implemented a narrow definition of what constitutes 'environmental employees', namely "those involved in the production/provision of environmental goods and services."<sup>[1]</sup> Likewise, the GLOBE Foundation, based in British Columbia, appears to weigh in on the side of the merits of a narrower definition of what might constitute employment in the green economy, stating "the education of a new generation of managers and the training of the labour force on low carbon or green practices are [...] important factors in society's transition toward systemic changes that promote sustainability."<sup>22</sup> The Foundation's report focused on the jobs in key sectors that are responsible for supplying the bulk of the green products and services to all other industries and sectors to help lower greenhouse gas emissions and to reduce human-related impacts on the environment.

Why is this definitional discussion important? As noted above, after settling developing consensus-driven definitions of the green economy and green jobs, the present project was also commissioned to identify key areas of opportunity within the Canadian economy over the coming years. It is important to acknowledge that the transition to a green economy will not be without repercussions. As the International Labour Organization has noted, "Although winners are likely to far outnumber losers, some workers may be hurt in the economic restructuring toward sustainability."<sup>23</sup>

Much is at stake. For example, Sustainable Development Technology Canada (SDTC), a foundation initiated by the Government of Canada and designed to enhance the linkage between research and commercialization, commented that there will be many opportunities in the future for organizations at the research-commercialization convergence of the green economy: "Billions of dollars in subsidies and incentives are becoming available to clean technology businesses that promise employment."<sup>24</sup>

<sup>18</sup> Kevin Doyle.

<sup>19</sup> Van Jones. *The Green Collar Economy: How One Solution Can Fix Our Two Biggest Problems*. New York: Harper Collins, 2008.

<sup>20</sup> Business Council of British Columbia. "Environment & Energy Bulletin – Charting the Green Economy." Volume 1, Number 2, May 2009.

<sup>21</sup> Statistics Canada. "Environment Industry: Business Sector." 2002 (revised) and 2004.

<sup>22</sup> Globe Foundation. "British Columbia's Green Economy: Building a Strong Low-Carbon Future." January 2010, p.6.

<sup>23</sup> International Labour Organization.

<sup>24</sup> Sustainable Development Technology Canada. "The 2010 SDTC CleanTech Growth & Go-to-Market Report." 2010, p.40.

### 3.3.3 OPPORTUNITY AREAS WITHIN THE GREEN ECONOMY

Relating directly to ECO Canada's mission to ensure an adequate supply of people with the demonstrated skills and knowledge required to meet the environmental human resource needs of the public and private sectors, it is imperative that employers in this country have access to an abundant pool of skilled, highly trained employees to be competitive in an evolving global economy. An in-depth literature review of current and emerging environmental and economic conditions has argued that there will be a growing tendency in the coming years and decades for economies to transition to green principles.

Consequently, the labour force of tomorrow must meet the challenge in the areas that comprise the green economy. At present, there is a growing consensus that Canada and other countries are not adequately prepared to meet future labour force requirements. The United Nations Environment Programme notes that "several countries have reported that a skills gap already exists between available workers and the needs of green industries."<sup>25</sup>

Likewise, in the words of the Ontario Trillium Foundation, the green economic sector "is expected to experience serious labour shortages in years to come."<sup>26</sup> Similarly, Canada's Public Policy Forum has remarked that "skills and training are significant challenges" in this country, in terms of meeting the requirements of organizations operating in the green economy.<sup>27</sup>

Much has been written in recent years concerning where the employers of tomorrow turn to seek skilled employees in what is expected to be a fiercely competitive job environment where the demand for capable workers will considerably exceed the supply. Increased reliance upon immigrants<sup>28</sup> and older, retrained workers have been frequently identified as potential, if partial, solutions to this situation.

To better understand emerging economic opportunities in specific communities, provinces, and regions, some organizations already have begun to identify 'winners' in the evolving green economy, albeit sometimes at high, sector-level classifications or categorization.

Thus, from various corners of the debate come varying approaches to defining the green economy. Important aspects of the definitional debate concern the inclusion or exclusion of industries and jobs from the green economy. Is the nuclear industry part of the green economy, for instance? Use of nuclear power certainly reduces greenhouse gas emissions and improves the atmosphere. On the other hand, ongoing operation and storage of nuclear waste raises serious concerns regarding other forms of environmental impact. From an occupational perspective, are jobs in the corn-based ethanol industry considered green jobs? As an alternative fuel, ethanol helps reduce greenhouse gas emissions, but some argue that corn production has a number of inherently harmful environmental practices including fertilizer use and damage to water sources.

Some studies argue for an industrial-based approach to defining the green economy and creating green jobs, while others favor an occupational-based approach. An industry approach considers all jobs and economic output within a particular industry that meet particular 'green' standards to be green. An occupational approach, on the other hand, includes all employees at all types of firms whose work activities – or inputs – conform to the 'greening' of the economy.

In both cases, deciding on which occupations or industries are green is part of the definitional challenge. Moreover, each approach results in different green jobs statistics, depending on the structure of the economy being measured.

<sup>25</sup> United Nations Environment Programme, p.25.

<sup>26</sup> Ontario Trillium Foundation. "Green Economy." 2008, p.1.

<sup>27</sup> Public Policy Forum. "Green Jobs: Is This the New 'New Economy' Summary Report." 2009, p.6.

<sup>28</sup> See, for example, Global Advantage Consulting. "Green Jobs: A Review of Domestic Literature, International Evidence and Best Practices." 2009, pp.10-12.

In a recent publication, for example, Toronto and vicinity officials specifically identified utilities, construction, manufacturing, and retail trades as the four sectors that likely would be local winners in the coming years, from a green employment perspective. In that particular Toronto area analysis, these sectors were chosen “based on their importance to these geographic areas and in terms of employment size and growth.”<sup>29</sup> For these Toronto-area communities, the definition of what constituted an opportunity sector had to be defined based on local circumstances and prevailing economic conditions.

Van Jones suggests more broadly in his book that the green economy encompasses five main sectors: renewable energy, clean transportation, water management, waste management and land management. Each of these major sectors is further comprised of industry subsectors. Some analysts argue for the inclusion of one additional category related to green buildings, which might include energy efficiency activities, water efficiency retrofits, as well as Leadership in Energy and Environmental Design (LEED) construction. This industrial sector-driven framework has both merit and internal consistency as a basis for beginning to develop a definitional framework that examines occupational demand and supply within the green economy sectors defined.

Limiting the definition of the green economy and green jobs to businesses that produce 'green' products or services would exclude 'green jobs' at traditional business and industries. For example, energy efficiency engineers working at a pulp mill may be excluded using this approach. A recent study, *The Green Economy: What Does Green Mean?*, notes that the use of an occupational approach, while more comprehensive, is subject to the considerable ambiguity and interpretation challenges alluded to above.<sup>30</sup>

Rather than focus explicitly on this definitional challenge, it has been useful to step back and examine the fundamental questions related to the purpose of defining green jobs, along with the expected value and intended application of such a definition. As a starting point, it is important to acknowledge the reality of climate change and environmental degradation facing the global community. Considering the sense of urgency surrounding these issues, it is imperative we reduce greenhouse gas emissions, endorse activities designed to mitigate or adapt to climate change, and pursue means to minimize future environmental impact. An altered economic landscape that promotes sustainable development will contribute directly to green industry activity and occupational opportunities.

While the above discussion indicates a robust debate is underway concerning the composition of the emerging green economy, the literature review indicates there is growing consensus concerning the areas typically identified as those providing key economic and employment opportunities within the green economy.

Specifically, Figure 1 assembles the results of a cross-section of both Canadian and international sources concerning the key occupational opportunity areas within the emerging green economy. While the number of Canadian sources cited below is at present somewhat limited, it is evident, however, that there are key areas of opportunity in the Canadian context. Accordingly, the following represent the top four areas of opportunity within the green economy:

- Renewable Energy & Energy Efficiency;
- Buildings, Retro-fitting & Construction;
- Transportation & Alternative Transportation; and
- Waste Recycling & Waste Management.

<sup>29</sup> Toronto Workforce Innovation Group et al.

<sup>30</sup> Accessed at: <http://www.ibrc.indiana.edu/ibr/2009/fall/article3.html>

# Figure 1

## Dynamic Growth Sectors of the Green Economy - A Comparative Catalogue

Sector	Source/Geographic Area (year)															
	UNEP - Green Jobs report / Global (2008) <sup>1</sup>	UNEP - Global Green New Deal / Global (2009) <sup>2</sup>	US Metro Economies / US (2008) <sup>3</sup>	Clean Edge (think tank) / US (2009) <sup>4</sup>	State of Mich. / MI state (2009) <sup>5</sup>	COE Calif. (2009) <sup>6</sup>	State of Oregon / OR state (2009) <sup>7</sup>	State of Wash. / WA state (2009) <sup>8</sup>	Seattle Jobs Initiative / Seattle (2009) <sup>9</sup>	Grist Magazine / Seattle (2008) <sup>10</sup>	UK Dept. of Business Enterprise & Regulatory Reform / UK (2006) <sup>11</sup>	Australian Conservation Fdn and Aus. Council of Trade Unions / Australia (2008) <sup>12</sup>	Sustainable Development Technology Canada / Canada (2010) <sup>13</sup>	David Suzuki Fdn. / Canada (2009) <sup>14</sup>	Ontario Trillium Fdn. / Ontario (2009) <sup>15</sup>	Globe Fdn. / BC (2010) <sup>16</sup>
Renewable energy / Energy efficiency	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Buildings / Retrofitting / Construction	X	X	X	X		X			X	X		X		X	X	X
Transportation / Alternative trans.	X	X	X	X	X	X			X				X	X	X	X
Waste recycling / mgmt.	X				X				X	X	X	X	X			X
Pollution control				X				X								X
Env. protection				X			X									X
Food and Sustainable Agriculture	X	X			X	X			X						X	
Forestry	X															
Fresh water / Wastewater treatment		X		X		X					X	X	X	X		X
Biomaterials				X		X						X	X			
Brownfield redevelopment										X	X		X	X		
Other / Supporting services	X	X	X	X		X	X				X			X		X

<sup>1</sup> United Nations Environment Programme. *Green Jobs: Towards Decent Work in a Sustainable, Low Carbon World*. 2008.

<sup>2</sup> United Nations Environment Programme. *Global Green New Deal – Policy Brief*. 2009.

<sup>3</sup> Global Insight. *US Metro Economies: Current and Potential Green Jobs in the US Economy*, 2008. Accessed at: <http://www.usmayors.org/pressreleases/uploads/GreenJobsReport.pdf>

<sup>4</sup> Clean Edge – Ron Pernick and Clint Wilder. *Clean Tech Job Trends 2009*. 2009.

<sup>5</sup> Michigan Bureau of Labor Market Information and Strategic Initiatives. *Michigan Green Jobs Report*. 2009. Accessed at: [http://www.milmi.org/admin/uploadedPublications/1604\\_GreenReport\\_E.pdf](http://www.milmi.org/admin/uploadedPublications/1604_GreenReport_E.pdf)

<sup>6</sup> Centres of Excellence. "Green Occupational Framework." June 2009. Accessed at <http://www.coeccc.net/green/index.asp>.

<sup>7</sup> Oregon Employment Department, Workforce and Economic Research Division. *The Greening of Oregon's Workforce: Jobs, Wages, and Training*. 2009. Accessed at: <http://www.qualityinfo.org/pubs/green/greening.pdf>

<sup>8</sup> Washington State Employment Security Department. *2008 Washington State Green Economy Jobs*. 2009. Accessed at: [http://www.workforceexplorer.com/admin/uploadedPublications/9463\\_Green\\_Jobs\\_Report\\_2008\\_WEXVersion.pdf](http://www.workforceexplorer.com/admin/uploadedPublications/9463_Green_Jobs_Report_2008_WEXVersion.pdf)

<sup>9</sup> Seattle Jobs Initiative. *A Growing Green Economy: Opportunities of Tomorrow*. 2009.

<sup>10</sup> Kevin Doyle. "How do we define the green-job economy?" 2008. Accessed at: <http://www.grist.org/artcle/remake-a-living-hire-definition>.

<sup>11</sup> As cited in Global Advantage Consulting Group, Inc. *Green Jobs: A Review of Domestic Literature, International Evidence, and Best Practices*. 2009.

<sup>12</sup> As cited in Global Advantage Consulting Group, Inc. *Green Jobs: A Review of Domestic Literature, International Evidence, and Best Practices*. 2009.

<sup>13</sup> Sustainable Development Technology Canada. *The 2010 SDTC CleanTech Growth & Go-To-Market Report*. 2010.

<sup>14</sup> David Suzuki Foundation. *A Green Economic Stimulus Package to Secure our Current and Future Prosperity*. 2009.

<sup>15</sup> Ontario Trillium Foundation. *Green Economy*. 2008.

<sup>16</sup> Globe Foundation. *British Columbia's Green Economy: Building a Strong Low-Carbon Future*. 2010.



## 4. STAKEHOLDER INTERVIEWS

### 4.1 SUMMARY

The qualitative research uncovered the complexity of the green economy and lack of consensus on defining the term 'green'. The results also confirmed the need for industry consensus on the definition of the green economy and green jobs. Differing views of the definition of the green economy, the industry scope of the green economy and the definition of a green job itself warrants a close look at the drivers of change impacting the nature of the green economy.

The primary drivers of change in the green economy identified (economic benefits, government policy and consumer demand) have and will continue to influence employment as organizations work to meet new consumer demand or adapt to environmental or energy use regulation. These changes will effect employment in two distinctly different ways:

- The adaptation or reallocation of existing jobs; and
- The creation of new jobs.

The largest impact on employment has been related to adaptation or re-allocation of jobs, with existing workers having to learn new skills and/or broaden their existing skill sets. As a result, both the need for economy-wide integration and demand for a more holistic economic approach have increased. The drive to become a sustainable society demands collaboration among industries that may not have worked together in the past. In essence, stakeholders indicated that sustainability is becoming an overarching way of working, regardless of industry; that a new level of expertise and broader awareness of the potential for interconnectivity across previously disparate organizations is required.

The other impact of the green economy on employment concerns the creation of new jobs. The new green economy has an impact on employment as businesses work to meet new consumer demands or adapt to new or anticipated regulations in relation to the environment and/or energy. As noted in both the secondary and qualitative research results, the emerging green economy has opened avenues or created opportunities that did not previously exist.

Despite a wide variety of perspectives, stakeholder opinions concerning the definition of a green job differed primarily in whether a green job is defined by practices or production. Using a more broadly-defined practice perspective, virtually any job could be green if it reduces its impact on the environment. Following this perspective, any job within an organization which has taken initiatives to reduce its environmental impact and focuses on sustainable practices could be considered to be green. On the other hand, following a more narrowly-defined production perspective, a job would be considered green only if it is directly involved in the production of a good or service that that directly reduces environmental impact.

Although some new jobs will be created, stakeholders generally felt that no uniquely new skill sets had emerged as a consequence of increased green activities or initiatives. Rather, it was noted that there has been more diversification of existing skill applications to support the green economy among existing trades and professions.

As the green economy continues to evolve, it is evident that skills gaps are emerging. Stakeholders mentioned the general need for specialized skill sets to support the continued emergence of the green economy. While unable to specify particular skills in demand at such an early stage of development, areas of consensus regarding the application of specialized skills to support green economic activity included:

- Wind and solar energy;
- Battery technology and power electronics;
- Sustainability management and energy efficiency; and
- Environmental finance and emissions trading.

Despite a lack of complete consensus regarding the specific application or area of expertise, stakeholders frequently mentioned a need for more research and development personnel and consulting and engineering practitioners. Although more investigation is needed to determine specific demand and application of skills these individuals would require, it should be noted that many stakeholders acknowledged the crucial role these professionals will play in the emerging green economy.

## 4.2 GREEN ECONOMY AND THE ENVIRONMENTAL SECTOR

Clear opinions were offered with respect to differences between the 'green economy' and the 'environmental sector', with many indicating that a much broader range of companies, from services to manufacturing to natural resources, could be involved in the green economy.

*"When we look at the environmental sector, we're looking at natural resources, site remediation, clean air and clean water. If you look at manufacturing, you're looking at productivity, less waste, becoming energy efficient. Lean manufacturing. Lean but also energy efficient."*

**Academic**

*"The green economy is somewhat broader than the environmental sector. The entire environmental sector is part of green industry."*

**Foundation / Association / Think Tank**

However, others disagreed, indicating that the environmental sector may be a more vague term.

*"I have a lot of problems with the 'environmental sector' because I'm not sure what it means. I think of the SIC codes for environmental services, but I'm not sure that this also represents the environmental sector. If you want to come up with a definition, you may need to change the SIC code. The lack of definition is the main problem. Companies can't call themselves 'green' if there is no one definition as to what it stands for. If an industry is reducing its energy use, but is still using coal for fuel, then is it really green? Environmental sector would probably be considered part of the green economy."*

**Foundation / Association / Think Tank**



### 4.3 CAN ENTIRE INDUSTRIES OR SECTORS BE GREEN?

High levels of consensus were evident among stakeholders regarding whether entire industries could be labeled green. These included participants involved in solar, wind, and electric battery technologies, as well as those involved in research and development and sustainable development practices, including jobs such as biological engineers, consultants and scientists. However, many stakeholders, including those working for foundations, associations & think tanks, noted that conventional industries could include green jobs.

*"There can be green jobs in [conventional] industries. For example, people in the oil sands industry who have green jobs are those who work in site reclamation."*

**Foundation / Association / Think Tank**

*"There's no question that every industry is going to try and 'green themselves,' absolutely, entire sectors will change their practices, and try to make themselves more sustainable. I don't think there are industries that can't be greened."*

**Foundation / Association / Think Tank**

Other key informants, however, were reluctant to name entire industries as green due to the lack of consensus regarding the definition of a green job, or a belief that no industry can operate without some significant impact on the environment.

*"If I were an auditor, I would expect to be able to look at an industry that looks green, and find ways in which it was not green. And I could go to the other end of the spectrum and find so-called dirty industries that are making significant movement to reducing their environmental footprint. So I'd be reluctant to define an entire industry as green."*

**Foundation / Association / Think Tank**

*"Everything we do is consuming things that aren't sustainable ... It would have to be 100% sustainable to be green, and no one is. We depend on oil to get things out of the ground, but now you use oil to make a windmill. If anyone says they are [a green industry] they're green washing."*

**Private**

*"That might be pushing it. I'd say 'no' [no industry is green]. Even installing solar panels there is quite a bit of energy consumed in producing them. No business can be perfect in terms of the environment, so nothing can be purely green. It's hard to pin it down."*

**Private**

### 4.4 DRIVERS OF CHANGE

#### 4.4.1 PRIMARY DRIVERS

Research clearly indicates there are many drivers (with varying impact) that have led employers to adopt greener practices:

- Financial incentives (i.e. benefits of reducing energy consumption);
- Regulatory necessity / Government policy;
- Consumer demand;
- Marketplace competitive advantage;
- Corporate stewardship / Corporate reputation; and
- Catastrophes / Environmental impact of operations.

One of the primary drivers identified by stakeholders was indeed the **financial incentives or economic benefits** of making changes, from reduced energy use to less waste production.

*"Top-down direction. The company decided about five years ago to embrace sustainability to be a better company, but like all profit-motivated companies, we found out that sustainability saves money. The day to day operating costs are reduced. Being a profit-motivated company, heading down the path of sustainability helps us to reduce our costs."*

**Private**

*"One of the primary motivations is driven by an environmental consciousness, but it also makes business sense [...] it's driven by self preservation."*

**Academic**

*"It takes money to manage pollution. It only makes sense to reduce energy – it improves your bottom line. It's an economic driver primarily ... plus your company's reputation to the consumer. The shift in climate change thinking. You're conspicuous if you don't."*

**Foundation / Association / Think Tank**

*"Once they understand that the bottom line can be influenced by making these changes, they are saving money. They are saving energy, raw materials and so forth."*

**Foundation / Association / Think Tank**



Two major forces – the two are government regulation and public acceptance of products and public attitudes – which may be forcing companies to adopt green practices.



**Government policy** was also identified as a key rationale for change, as stakeholders noted that change may not always occur voluntarily.

*"I'm not sure that companies are going out to do that; many companies have been legislated to do that. It's been more from an optical perspective for the consumer base. More and more companies are doing it because they are required."*

**Private**

*"Two major forces – the two are government regulation and public acceptance of products and public attitudes – which may be forcing companies to adopt green practices."*

**Academic**

*"One of the things we think about a lot is how to avoid boom and bust in these situations. There's a lot of demand and a lot of attention. But the truth is the economics of it doesn't make sense unless there is strong government support of this. When it comes to home energy retrofits ... tax credits have created a huge surge in demand for energy auditors and workers to weather-strip your home."*

**Foundation / Association / Think Tank**

**Consumer demand** for products that meet specific standards was also identified as a key driver of change for companies, though in many cases, stakeholders indicated that a mixture of drivers motivated companies to adopt greener practices.

*"There are a number of drivers. I'd probably cite three. One would be consumer demand. It's undeniable that we've had an explosion in demand from the consumer for products and services that are less environmentally destructive in how they're produced and packaged. The other part is government policy. Things around energy efficiency – there are programs incenting home retrofits and that's produced a burst of activity and employment around those activities. Those are all green jobs. The third factor is the economics around it. Energy prices are going up and people are starting to understand that that is going to continue to go up and people need to be ... minimizing the economic impact of those increases."*

**Foundation / Association / Think Tank**

A **company's reputation** and **need to stay competitive** were also cited, primarily by those in the private sector, as key driving forces. In terms of competition, some stakeholders noted that international pressure was a key driver for some industries, particularly those wanting to sell goods or services in Europe.

*"Trying to improve reputation in the market. Once your competitor starts to lower energy intensity, you don't look as good. The need to improve image. Also seeing that when reducing waste, you reduce costs. It's reputation and costs."*

**Private**

## 4.4.2 FUTURE DRIVERS

The idea of how *further change could be incited* was raised by some stakeholders, who felt that economic effects would be key, while others believe that the end consumer or customer of any organization ultimately influence change.

*"It initially should be the price mechanism. If a carbon tax comes into play and it's more expensive to purchase goods or services that are not green, then people would change. Have a smaller car or weather proof their house. People also want to reduce their costs, so if it's cheaper to switch to greener practices to save money, then companies will do that. Consumers might play a small role, but they always want the cheapest option. I don't think people act that much on moral persuasion; it really has to be a financial benefit to drive us toward that. The incentive is to save energy, because it's cheaper. Or to use promotion for their company, in terms of improving their image. Consumers might be somewhat of a driving force, as consumers do affect demand. I think price is a lot more important."*

**Foundation / Association / Think Tank**

*"I would suggest that things that incent a company to adopt change have to do with their customers. That's the bottom line. When companies perceive that they're going to serve their customers better in ways that their customers feel are providing more value. There is a little leadership that is associated with this value proposition. Companies that adopt strategic positioning with lowering impact on the environment. It's about competitive advantage."*

**Foundation / Association / Think Tank**

## 4.5 IMPACT ON EMPLOYMENT

Overall, the emergence of the green economy has influenced employment as organizations work to meet new consumer demand or adapt to environmental or energy use regulation.

There was a general perception among participants that continued development of the green economy affects employment in two distinctly different ways. For the most part, stakeholders noted that the biggest impact of the green economy on employment has been in jobs being **adapted or reallocated**, with existing workers having to learn new skills or broaden their existing skill sets. To a lesser extent, the emergence of the green economy has had an impact on employment through the **creation of new jobs**.

## 4.5.1 JOB ADAPTATION OR REALLOCATION

Across stakeholder types, participants recognized that the primary impact of the green economy on employment is the need for workers to update their skills, utilize new technologies, and meet the requirements of emerging regulations. Key experts largely indicated that the emerging green economy requires employees to adapt existing job responsibilities and adjust their skill sets accordingly. Thus, the effect is not entirely a net addition of new jobs, but a shift of workers in traditional jobs to green jobs. Some participants felt it was misleading to suggest the growing green economy has resulted in new employment when most jobs are transitioning to become greener. In addition, other participants stated that the ongoing evolution of the green economy will eventually result in all jobs having green components.

*"You can argue that new consumer demands and regulations require new thinking. I don't know if they're new jobs, but these engineers and researchers have to think in a new way. It's demand for greener products from consumers."*

**Foundation / Association / Think Tank**

*"People are moving into the green sector. It's affecting the allocation of capital, moving toward these green jobs. There isn't a net effect, because we are losing these jobs elsewhere. It's more of a re-allocation."*

**Foundation / Association / Think Tank**

*"[People] use the same skills. It just shifts the nature of their skills and broadens their skills. [...] It's more an adaptation of skills."*

**Academic**

*"My disappointment with the current discussion on this topic is that [some] put green in a whole new category, saying there are green jobs - all these new jobs. We are evolving, every job will be green; you have to improve the sectors you have. The jobs you are losing are bigger than the net new green."*

**Foundation / Association / Think Tank**



#### 4.5.2 NEW JOB CREATION

The other main impact of the green economy on employment concerns new job creation. While the number of new green jobs will not likely eclipse the number of jobs being adapted or re-allocated, stakeholders agree that the emergence of the green economy has resulted in some new job creation.

*"I see quite a number of jobs that have been generated. Like producing ethanol or new opportunities in agriculture. These are net new jobs."*

**Foundation / Association / Think Tank**

*"Lots of jobs have been created – both net new and redefined. Some engineers have learned to design, but in more green ways. There have been a bunch of new jobs based on research ideas, basically how to adopt those ideas or how to build greenness into business."*

**Foundation / Association / Think Tank**

*"It is [impacting employment] in all manufacturing and retail. The shift I've seen is that there's so much more interest and action on the manufacturing side. Sustainability managers and directors helping their manufacturing process and products, and packaging becoming greener. Jobs like manager of sustainable seafood is new, our sustainable packaging team is a completely net new team, and our sustainability directors are net new. But others are an adaptation of existing jobs."*

**Private**

## 4.6 DEFINITION OF A GREEN JOB

### 4.6.1 DIVERSITY OF GREEN JOB DEFINITIONS

There was strong endorsement from stakeholders regarding the need for a definition, and concern that the current lack of consensus and absence of universally accepted concepts was responsible for the ambiguity and subjectivity surrounding the term green.

*"To my knowledge, there's no national code or anything. It's still subjective in the way people interpret it."*

**Academic**

*"It's such a broad section, and as yet, we don't even know descriptions of many of these jobs ... It's a major task to define those jobs."*

**Private**

*"Overall, there needs to be a standard definition of these terms."*

**Foundation / Association / Think Tank**

*"I don't think any job is green or sustainable. I don't think any product can be green or sustainable. But I think they can be both greener and more sustainable. The words green and sustainable get thrown around too much. Green products are a misnomer because there's an impact on the environment with everything. But you can operate any job with a green mindset."*

**Private**

Key informants, including those from private industry, national sector councils, foundations, associations, think tanks, and post-secondary institutions offered a wide variety of perspectives regarding the definition of a green job. Overall, there was a great deal of debate in the absence of a universal and consistent definition. Many stakeholders grappled with the definition and indicated the industry is feeling its way at present.

*"What are green jobs? It's pretty controversial because you don't know what should be contained and there is no standard definition."*

**Foundation / Association / Think Tank**

*"There are no metrics right now. It's so broad that it's hard to define."*

**Foundation / Association / Think Tank**

Further discussion, however, revealed two key positions that differ primarily in whether a green job is defined by practices or by production. The two perspectives are as follows:

- a) **Practices:** Virtually any job could be green if it reduces its impact on the environment. Following this approach, any job within an organization that has reduced its environmental impact and focuses on sustainable practices could be considered to be green, including (but not limited to) jobs related to energy efficiency, renewable energy, research and development, finance and policy.
- b) **Production:** A job is green only if it is directly involved in the production of a good or service that supports ecological integrity and is involved in improvements of the environment.

### 4.6.2 WHAT DOES A GREEN JOB INVOLVE?

Many stakeholders are wary of 'green washing' and were reluctant to re-label conventional or traditional jobs as green. These participants felt that in a rush to gain a competitive advantage, receive funding, or present a favorable public image, too many jobs were being labeled as green, and as a result, the term has lost meaning.

*"It's easy to define any new job as green. But it's not, its adaptation. From a policy standpoint, it's whether it is involved in environmental performance policy and R&D."*

**Private**

*"[A job] would have to have a pretty direct impact on the environment [to be considered green]. It has to have a positive impact on the environment. Otherwise it becomes a green wash or a green sell."*

**Private**

*"A job that reduces the impact on the environment would be a green job. Many jobs can have a positive effect on the environment - so many jobs can be considered green. So much so that it's not a useful term. Can fuels be green? If you have a process that greatly reduces the consumption of fossil fuels, yet you're still using fossil fuels, is that green?"*

**Foundation / Association / Think Tank**

In terms of the specific characteristics required to be considered a 'green' job, some stakeholders clearly believe that technical jobs directly involved in specific processes providing energy efficiency that should be considered green.

*"It's more technically oriented jobs, engineering for example."*

**Foundation / Association / Think Tank**

*"As far as being a green job you'd have to have technical expertise. Not just selling someone else's product that is green. You actually have to have the knowledge base."*

**Private**

*"Traditional green jobs are renewable energy sectors. While now we're trying to change processes so that any job could be a green job, ideally."*

**Academic**

Other key experts indicated that green jobs could be related to services such as consulting, law and finance.

*"Service sector jobs can be green. All those products that have to be installed, there is a lot of project management, design and maintenance. All those would be green. Financing too. Most banks now have an area or specialist dealing with renewable projects. Lawyers might work on eco areas, but I'm not sure their jobs would be green."*

**Private**

In addition, other stakeholders felt there may be even a broader range of skills that could be considered part of a green skills set, involving a holistic view of skills from communications to marketing and innovation.

*"When you look at the term green job, from our perspective, it's very broad. We've done our own analysis, and we see a world that wants to become green. We don't want pollution. We want to preserve our natural resources. But we also want a progressive world. You'll never have clean and green without damaging prosperity. How do you bring those two together? You need literacy, poverty eradication. There are more jobs on the marketing, policy, education side, and also about innovation on the business side. Also hugely about communication to let people know what's going to happen."*

**Academic**

Participants provided diverse examples of green jobs, varying in area of focus, skill-set and knowledge requirements, and degree of environmental impact. Examples are summarized in the table below:

**Figure 2**  
Examples of Green Jobs

Sustainability consultant	Solar panel consultant
Mechanical engineer	Biologist
Sustainability manager	Environmental scientist
Sustainable packaging teams	Engineers in site remediation
Manager of sustainable seafood	Facilities planner
Energy manager	Economist
Forester	Technician (e.g. wind, solar, environmental)

## 4.7 GREEN SKILL GAPS

### 4.7.1 CURRENT NEEDS

When asked what skills gaps currently exist, stakeholders consistently stated that businesses are currently adapting to meet changing needs. Three consistent skills gaps were identified, including the ability to adapt to the quick pace of **technological change**, increased knowledge of **sustainable development** and of a new breed of **interdisciplinary thinkers**.

#### Technological Change

Stakeholders acknowledged that with rapidly changing technology it is difficult to adapt to new methods or apply them to existing practices. Many participants noted that the skill-set required to adapt to new technologies is often non-existent or extremely difficult to find. Similarly, a broader understanding of the relevance of certain technologies is sometimes lacking.

*"Solar technology is not a new technology, but learning how to install in buildings is how we're learning. Understanding why we're designing the way we're designing. If you have to track your carbon as a company, that will be a whole new skill set people will have to learn. Constant adaptations to the new technology. The biggest gap is how quick technology is changing. It's unbelievable."*

**Private**

*"We see an emerging area, integration of new technologies into existing buildings. A lot of work [is needed] in this area."*

**Academic**

#### Knowledge of Sustainable Development

Another key skills gap was evident with limited or lack of knowledge relating to sustainable development and green practices in general. This lack of knowledge was apparent across business processes, practices, policies and regulations. Of particular note were skills related to carbon trading and environmental finance.

*"I think there is still a huge deficiency in environmental finance and emissions trading. The hard technology stuff we have a lot of people coming through now. But the finance and economic policies relating to the environment, I see far fewer opportunities in terms of university training. There aren't changes afoot to address that gap to my knowledge. I don't get an impression that it's happening."*

**Academic**

*"I think there are definitely gaps around some of these pieces - recycling and greenhouse gases. How do you take that green thinking and embed it into existing processes? Adding carbon accounting into existing accounting practices. People doing those jobs they don't have background in those areas."*

**Private**

#### Interdisciplinary Thinkers

Participants also consistently identified that professionals and employees lack a thorough understanding of the green issues and their relevance across disciplines or departments.

*"The challenge is that it is interdisciplinary. [Some universities are beginning to set up programs] between public administration and engineering. You need an [emphasize] environmental / bio thinking into engineering and vice versus into public policy. We're at the early stages."*

**Foundation / Association / Think Tank**

It is important to note, however, that some stakeholders questioned if post-secondary institutions were well equipped to support the demand for an interdisciplinary approach.

*"Far too many people in the business faculties have no business experience, and classic theory on sustainability may be very different than what happens in reality. For example, the theory of sustainable development assumes a sufficient quantity of capital to put those measures in place. The practical issue is that you have to cut for everything you add... when in fact you may not be able to do that at all unless you are very creative with what you can do."*

**Academic**

In addition to the general skills required in the areas mentioned above, areas of consensus regarding the application of specialized skills to support the continued growth of the green economy included:

- Wind and solar energy;
- Battery technology and power electronics;
- Sustainability management and energy efficiency; and
- Environmental finance and emissions trading.

Despite complete consensus regarding the specific skills required to support green activity, stakeholders frequently mentioned a need for more research and development personnel and consulting and engineering practitioners. Although more investigation is needed to determine the specific demand and application of skills these individuals would require, it should be noted that many participants acknowledged the crucial role these professionals would play in the emerging green economy.

In addition to the specialized skills required moving forward, softer skills related to communication were mentioned by respondents as areas of demand in the future. Stakeholders felt that communication will become increasingly important as organizations adapt to technological change and began to explore interdisciplinary relationships across organizations in response to the demand for system integration.



As the green economy continues to evolve, greater pressures will be placed on interdisciplinary cooperation, including a greater level of understanding of and the relationships between business areas interacting with each other.



#### 4.7.2 SKILL-SET EVOLUTION

When asked how the green or environmental influence has changed the types of skills required in the workforce today, stakeholders offered a variety of consistent responses.

Participants repeatedly agreed that the emerging green economy has increased the demand for system integration and a more holistic approach to understanding the relationship between economic activity and environmental impact. As the green economy continues to evolve, greater pressures will be placed on interdisciplinary cooperation, including a greater level of understanding of and the relationships between business areas interacting with each other. Understanding these relationships is critical to gain insight into the types of training required to support further growth and development.

One key area of adaptation of existing jobs includes the **integration of systems**, where everything from engineering, policy and trades needs to work together and understand how systems interact. The drive towards becoming more sustainable as a society has resulted in the need for industries that may not have worked together in the past, to collaborate moving forward. In essence, stakeholders indicated that sustainability is becoming an overarching way of working, regardless of industry.

*"We deal with integrating systems. It's everything from professional engineers, policy makers, trades, construction – the whole spectrum. There needs to be an understanding of how systems interact with each other. Now it's important to understand how what you do impacts other areas. It's doing things differently – and people need to be trained in that."*

**Foundation / Association / Think Tank**

*"If you are an engineer, in 1990, you worried about cost, maintenance and energy use were all factors. In 2010, you worry about water use, air quality, use of products emissions. There is a more holistic view requiring interdisciplinary skills. This generates new challenges that mean you can't cookie cutter the buildings. It takes a more holistic understanding."*

**Foundation / Association / Think Tank**



The new world is all about understanding the interrelationships and the impact you have on other spheres. You have to work collaboratively. That takes a different kind of understanding.



*"My institute for sustainable environment and the economy is interdisciplinary. We're trying to develop the new breed of masters and PhD's who know enough economics and engineering and management theory that they can integrate it properly on the job. The most innovative stuff is taking place in interdisciplinary areas. Integrated sustainability."*

**Academic**

*"We're working with manufacturers to become greener. Working with manufacturers to develop new programs. Energy auditing. We're looking at integrating technologies. Wind energy. The new world is all about understanding the interrelationships and the impact you have on other spheres. You have to work collaboratively. That takes a different kind of understanding. And that's what we're teaching. We're providing more integrated training to get a clearer understanding of how their work affects others."*

**Academic**

The demand for increased integration and interdisciplinary action requires a new level of expertise and a **broader awareness and understanding** of the issues across topics, coupled with an increased level of cooperation across industries.

*"There has to be a broader awareness of issues. You need to be literate in general issues. I'm seeing lots of diversity in the types of traditional jobs, and there is a blurring. All departments need to be engaged. You can't stay in your little department anymore."*

**Private**

*"There is a new level of expertise that is required to understand how green works and how to measure things like compliance with LEED standards. A whole army has been created by government to regulate this and within the private sector, they need to understand regulations, adapt to them and fight them, where appropriate."*

**Foundation / Association / Think Tank**

*"We are taking industrial engineers and changing them to be business savvy and know capital planning. It's adapting engineering skills to overall business strategy."*

**Private**

Most stakeholders agreed that the greening economy has increased expectations and requirements in relation to technology, as businesses adapt or evolve. Stakeholders noted that skill-sets are changing both in relation to professional competencies and environmental technology issues. In addition, the emergence of the green economy has affected training standards across industry.

*"The skill mix is changing, but the fundamentals are the same. The orientation stays the same, but the outcome has changed. There is now more thinking of the consequences, development of a process that doesn't [harm the environment]. There is a different thinking process."*

**Academic**

*"As training standards are being updated, we're trying to deal with a graduate or journey person coming back. Employers pay or the worker pays themselves. Also contractors are looking to upgrade their skill set. They see opportunity."*

**Academic**

In addition, stakeholders suggest there has been an **attitudinal shift** in the workforce. The green influence has encouraged a heightened awareness of how things are done, what impact a business is having on the environment (i.e., its footprint) and an overall increase in environmental sensitivity. Although this shift can attract or engage employees to 'green' industries, others industries (i.e. businesses in the oil and gas sector) stated that difficulties emerged in attracting new candidates and in engaging the Aboriginal community because of environmental issues and negative publicity.



### 4.7.3 EMERGENCE OF NEW SKILLS

When asked if the emerging green economy has resulted in the development of trades with unique or new skill sets, stakeholders generally felt that it had not. It was noted, however, that there has been more of a diversification of existing skills relating to the green economy among existing trades and professions. The expectation is that this evolution would be more informal, including on-the-job training and non-standardized training.

*"Current trades will continue to evolve. You will just have the evolution of what currently exists."*

**Foundation / Association / Think Tank**

*"A lot of the new technologies are very integrated. There is a significant cross over in the range of occupations. New trades with distinct skill sets haven't emerged yet."*

**Academic**

*"We'll see variations on a theme. Instead of chemical engineer, you are an environmental engineer. They are classical engineers, with a variation on the old."*

**Sector Council**

### 4.8 TRAINING PROVIDERS AND GREEN SKILLS

When considering skills development, stakeholders consistently reported that they primarily address these needs through in-house training. There was recognition, however, that training programs are adapting to meet the new skills needs of industry at both colleges and universities. Stakeholders also recognized the need for additional programs and training initiatives across disciplines.

*"[Post-secondary institutions] are responding well. They are getting an understanding, working with their manufacturing counterparts and identifying where retraining has to occur."*

**Foundation / Association / Think Tank**

*"We have a working group which involves all six post secondary institutions in the city, all are developing sustainability initiatives and are trying to understand their sweet spot and what their differentiation will be, how they will meet needs."*

**Foundation / Association / Think Tank**

*"We work together with industry groups, understanding what the needs and trends are, how to develop courses and programs. There is a lot of work going on."*

**Academic**

Stakeholders readily identified partnerships that currently exist to address skills gaps evident as a result of the greening of the economy. Most often, partnerships between post secondary institutions and industry were cited, including both universities and colleges. It is interesting to note there was a consistent perception that colleges have out-performed universities in their ability to more adapt to the changing needs of industry. There was general consensus across stakeholder groups that partnerships are becoming increasingly important as needs become apparent in the emergence of the green economy.

*"[An] interesting [partnership] I'm aware of is a mentoring program. They're constantly asked to sponsor research. They are being proactive with institutions to get research done. Funding research, but research that is needed by them. This links the student with industry."*

**Foundation / Association / Think Tank**

*"Those partnerships are starting to appear. Starting to see expanded models around industry partnerships with specific training, industry/college/university."*

**Foundation / Association / Think Tank**

*"There are lots of them - between large companies and universities, but for the purposes of creating niches. Foundations get involved."*

**Sector Council**

Despite the growing number of partnerships, however, some stakeholders mentioned the need to increase efforts and incorporate green content and perspectives in areas beyond specialized programs.

*"People graduating in environmental areas don't know about [green] jobs. So in business schools, they need to add green courses. Logistics management needs to include how to build a green supply chain, how to audit a carbon accounting system. I don't think it's happening now. Some of the MBA programs have sustainability programs and courses, but they're separate courses and not everyone is taking them. When we're talking about green jobs, we should be talking about equipping the people we're training to think green. That will have a much more long lasting and sustainable, transformational impact."*

**Private**

#### 4.9 GREEN INITIATIVES IN PROGRESS

When asked to describe green initiatives either in progress or on the horizon, participants provided examples of a variety of projects (Figure 3). Although the examples mentioned were provided by a cross-section of participants representing industry, government, academic institutions, foundations, associations, and think tanks, initiatives focused mainly on increasing efficiency, reducing environmental footprint, and internal skills development programs.

*"Each company looks at its own [workforce]. There are proprietary technologies. We're looking not just of skills of current workers, but shifting to deal with identifying the skills sets needed 10 years from now."*

**Foundation / Association / Think Tank**

**Figure 3**  
Examples of Green Initiatives

Site remediation	Energy efficiency
Air quality assessment	Light weighting initiatives (automotive)
Internal training / education courses	Energy auditing / energy efficient buildings
Sustainable packaging	Alternate fuel / bio fuels research and development
Reducing energy consumption	Integrated training / interdisciplinary
Water Usage Reduction	Fuel usage reduction
Emission reduction	



## 5. INDUSTRY RESEARCH RESULTS

### 5.1 SUMMARY

The quantitative research revealed a broad profile of green companies currently operating within the Canadian green economy. These organizations were more likely to provide services, as opposed to products, primarily focused in professional, scientific and technical services. Small organizations employing 5 employees or less comprised half of all participating green companies. The majority expected to hire in the next five years and recognized that specialized environmental knowledge and training will be critical in current employee performance and future recruitment.

- Respondents most frequently mentioned their organization was a green company because they provide services, or work with technology or materials that reduce environmental impact.
- Participants were most likely to indicate their primary industry or line of business was related to professional, scientific and technical services (NAICS 541).
- Half (50%) of all green companies operating in Canada employ 5 employees or less.
- Two-thirds (66%) of green companies reported that 51% or more of their company's full-time employees work in green jobs some or all of the time (green jobs work directly with information, technologies or materials that minimize environmental impact, and also requires specialized skills, knowledge, training or experience in these areas).
- In response to either current or anticipated demand, two-thirds (64%) of green companies expected to hire additional full-time green employees over the next five years.
- Green companies identified specialized knowledge and training as being critical to maximize performance in green jobs. These same competencies, in addition to keeping up to date with emerging green trends were also most frequently mentioned as being essential over the next five years.

While all 501 organizations interviewed stated they were a green company as per the terms of the working definition, analysis of other information collected in the survey indicated that 70 of the 501 organizations interviewed operated outside the parameters of a green company as defined for this research study. The two primary reasons for these exclusions were:

- The organization did not operate within a North American Industry Classification System (NAICS) six digit code associated with the green economy; and
- Analysis of the verbatim survey responses identified that several organizations did not produce either goods or services designed to minimize environmental impact, as per survey screening requirements (even though respondents may have initially stated that their organization does indeed produce such goods and services).

As a result, the decision was made to focus exclusively on the responses of the 431 green companies operating as part of the Canadian green economy. The remaining 70 organizations were determined to be non-green companies and are not included in this report.



Research revealed a broad profile of green companies currently operating within the Canadian green economy.



## 5.2 DETAILED ANALYSIS

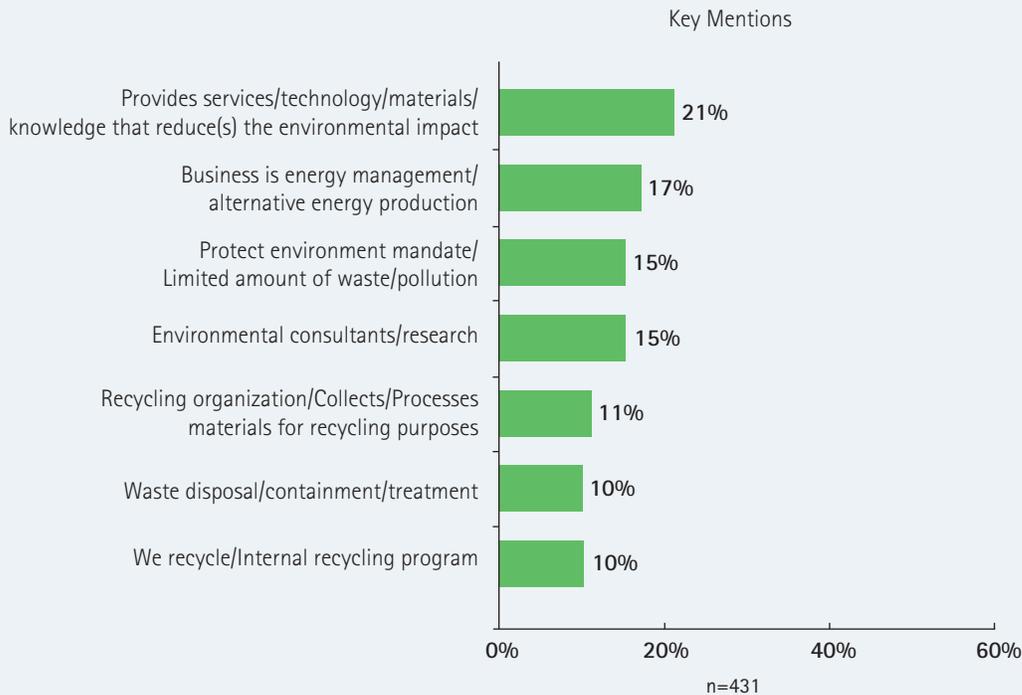
### 5.2.1 WHY ORGANIZATIONS SELF-IDENTIFY AS BEING GREEN COMPANIES

The study population consisted of companies operating within targeted industry codes. Organizations that self-identified as 'green companies' responded 'yes' to the following screening question at the beginning of the quantitative survey: "A green company could be defined as a company that produces goods or services that are designed to minimize environmental impact. By this definition, is your organization a green company because it produces goods or services that are designed to minimize environmental impact?"

Organizations which self-identified in this fashion as being a green company indicated they are a green company for a number of reasons. The most frequently mentioned responses included:

- The service, technology, materials, or knowledge they provide reduces environmental impact (21%);
- Their business is involved in energy management or alternative energy production (17%); and
- They have a mandate to protect the environment, they are environmental consultants, or they are a recycling organization (i.e., an organization that processes materials for recycling purposes) (15%).

**Figure 4**  
Why Organizations Self-Identify as being Green Companies



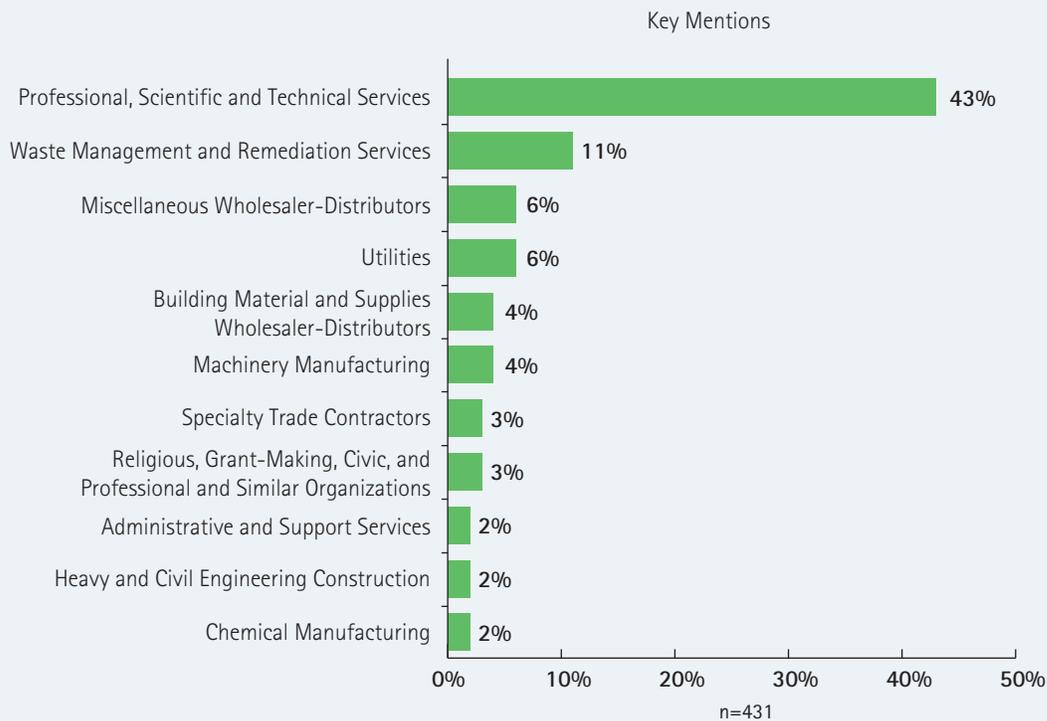
**Question 3:** Why specifically do you say your company is a green company?

## 5.2.2 PRIMARY BUSINESS OR INDUSTRY OF GREEN COMPANIES

The 431 companies deemed to be green as per the operational definition<sup>31</sup> were asked to identify their primary industry or line of business. Forty-three percent (43%) of green companies reported being primarily involved in professional, scientific and technical services (NAICS 541), while 11% were primarily involved in waste management and remediation services (NAICS 562).

This information, together with data collected elsewhere in the survey, was utilized to assign a primary six digit NAICS code to each respondent organization. For current purposes of analysis, as a data reduction tool this six digit NAICS information was collapsed back to three digit NAICS assignments, resulting in the following figure.

**Figure 5**  
Three Digit NAICS Representation – Green Companies



NOTE: 37 other NAICS codes each accounted for 1% or fewer respondent companies.

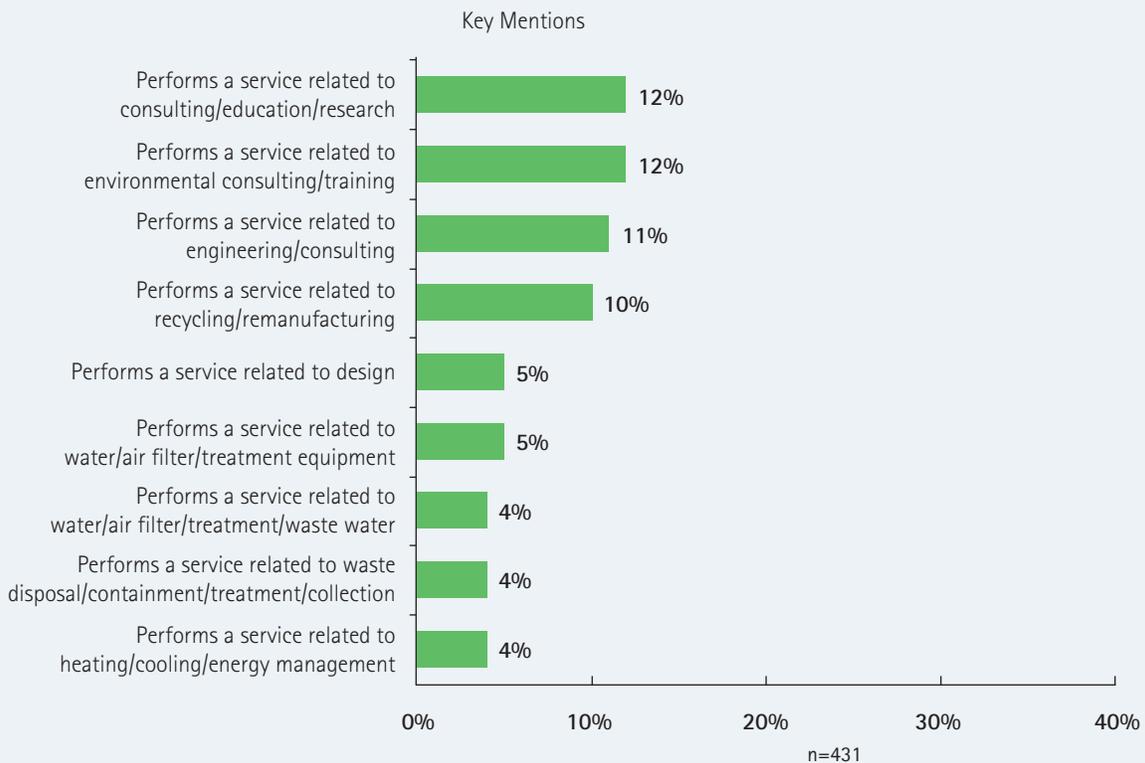
**Question 4:** What type of business or industry your organization is primarily engaged in at the present time?

<sup>31</sup> The quantitative survey working definition for a green company was: 'a company that produces goods or services that are designed to minimize environmental impact.'

### 5.2.3 GOODS AND SERVICES PRODUCED

The green companies surveyed were more likely to perform services than produce products. Green companies most frequently reported performing services related to consulting, education, or research (12%), environmental consulting or training (12%) engineering or consulting (11%), and recycling or re-manufacturing (10%).

**Figure 6**  
Goods or Services Currently Produced

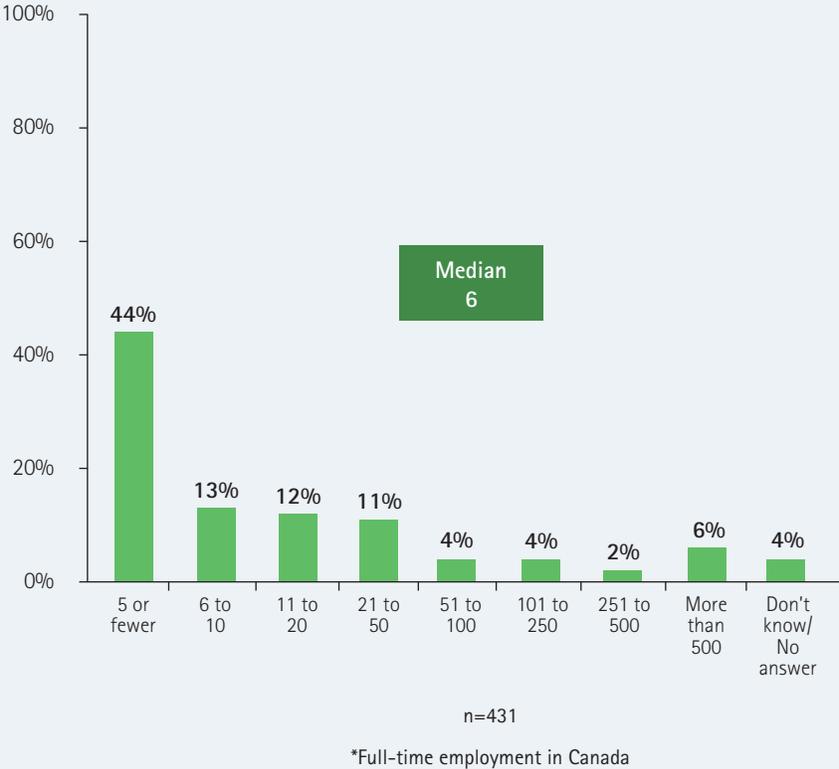


**Question 5:** Please tell me the specific goods or services your organization produces at the present time?

### 5.2.4 FULL-TIME EMPLOYEES

Forty-four percent (44%) of green companies surveyed had five or fewer full-time employees at their operations within Canada. The median number of full-time employees was six.

**Figure 7**  
Number of Current Full-Time Employees in Canada

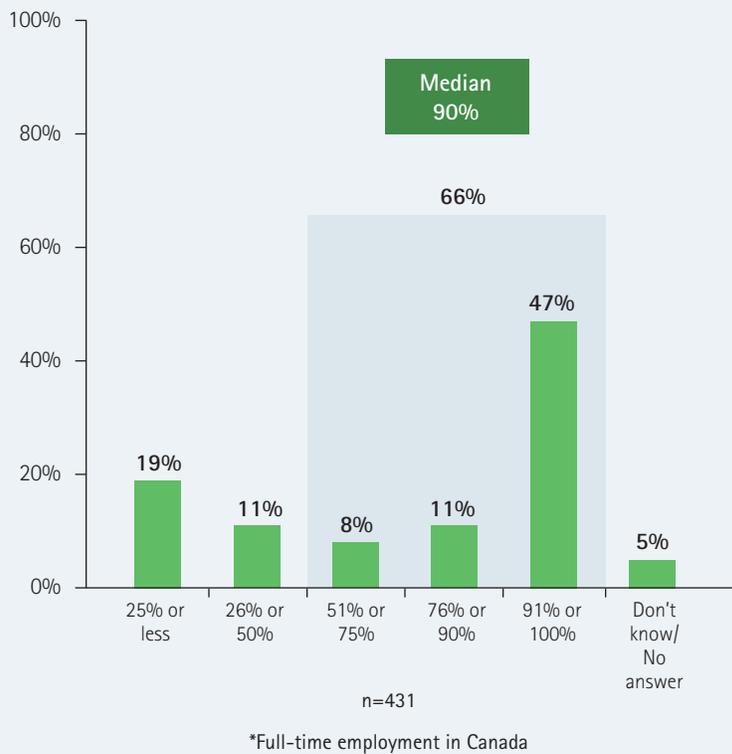


**Question 6:** How many full-time employees, including yourself, are currently working at your company's operations within Canada?

### 5.2.5 FULL-TIME EMPLOYEES IN GREEN JOBS

Two-thirds (66%) of green companies reported that 51% or more of their company's full time employees currently worked in green jobs some or all of the time. The median percentage of employees working in green jobs was 90%.

**Figure 8**  
Percentage of Employees Working in Green Jobs Some or All of the Time



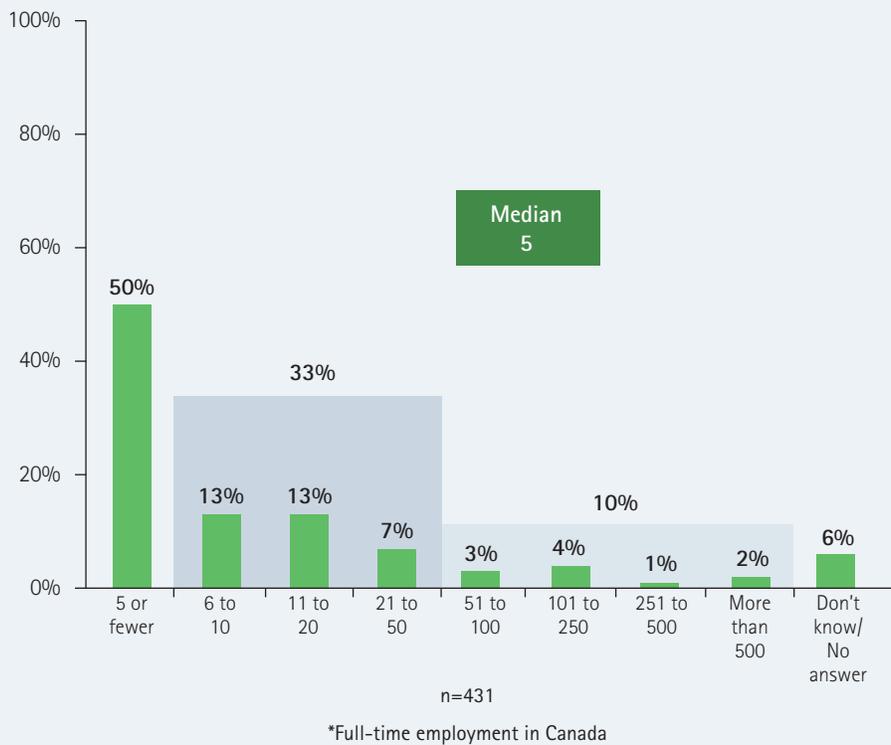
**Question 7:** A green job is one that directly works with information, technologies, or materials that minimize environmental impact, and also requires specialized skills, knowledge, training, or experience for activities that minimize environmental impact.

Knowing this, what percentage of your company's full-time employees in Canada, including yourself, work in green jobs some or all of the time?

## 5.2.6 FULL-TIME GREEN JOB EMPLOYEES PER COMPANY

The number of full-time green employees per company was determined by combining and analyzing the information collected in Questions 6 and 7. Given the information presented above for Question 6, it follows that most green companies are small in terms of the number of green job employees. Half (50%) of the companies employed 5 or fewer green employees, while the median number of green employees working in green companies was five.

**Figure 9**  
Full-Time Green Job Employees per Company



**Question 6:** How many full-time employees, including yourself, are currently working at your company's operations within Canada?

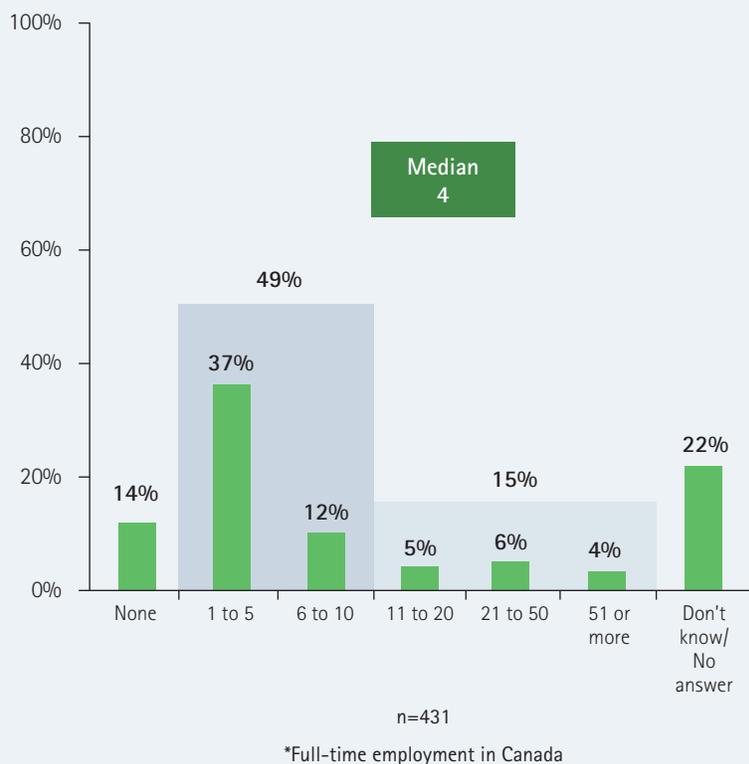
**Question 7:** A green job is one that directly works with information, technologies, or materials that minimize environmental impact, and also requires specialized skills, knowledge, training, or experience for activities that minimize environmental impact.

Knowing this, what percentage of your company's full-time employees in Canada, including yourself, work in green jobs some or all of the time?

### 5.2.7 ADDITIONAL GREEN EMPLOYEES TO BE HIRED PER COMPANY

In response to either current or anticipated demand, two-thirds (64%) of all green companies surveyed expected to hire additional full-time green employees over the next five years. Half (49%) of green companies reported that they expected to hire between one and ten net additional full-time green employees while 15% reported that they were likely to hire 11 or more employees to work in green jobs.

**Figure 10**  
Additional Green Employees to be Hired in the Next Five Years



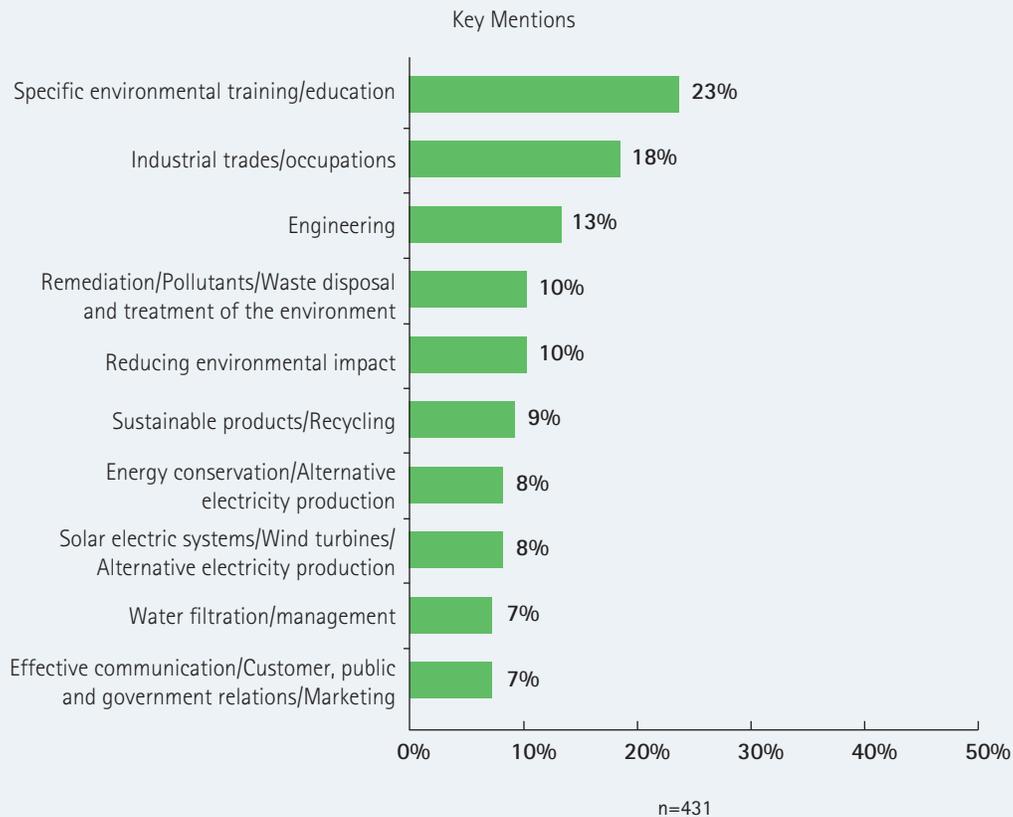
**Question 8:** How many additional new full-time employees, over and above those who currently work with your company, do you expect your company will hire in the next five years to work within green jobs, some or all of the time, at your company's operations within Canada?

### 5.2.8 CURRENT GREEN JOB SKILLS, KNOWLEDGE, TRAINING OR EXPERIENCE

Green company representatives identified a number of critically important specialized skills, knowledge, training or experience currently possessed by their staff members working in green jobs. Over 20% of green companies named skills associated with specific environmental training or education such as LEED certification, agriculture, or biological, as critical. Eighteen percent (18%) reported experience related to industrial trades or occupations.

Ten percent (10%) mentioned areas related to engineering, skills associated with remediation, pollutants, or treatment of the environment, while another 10% mentioned skills specifically related to reducing environmental impact.

**Figure 11**  
Critical Green Jobs Skills, Knowledge, Training or Experience Possessed by Staff Members

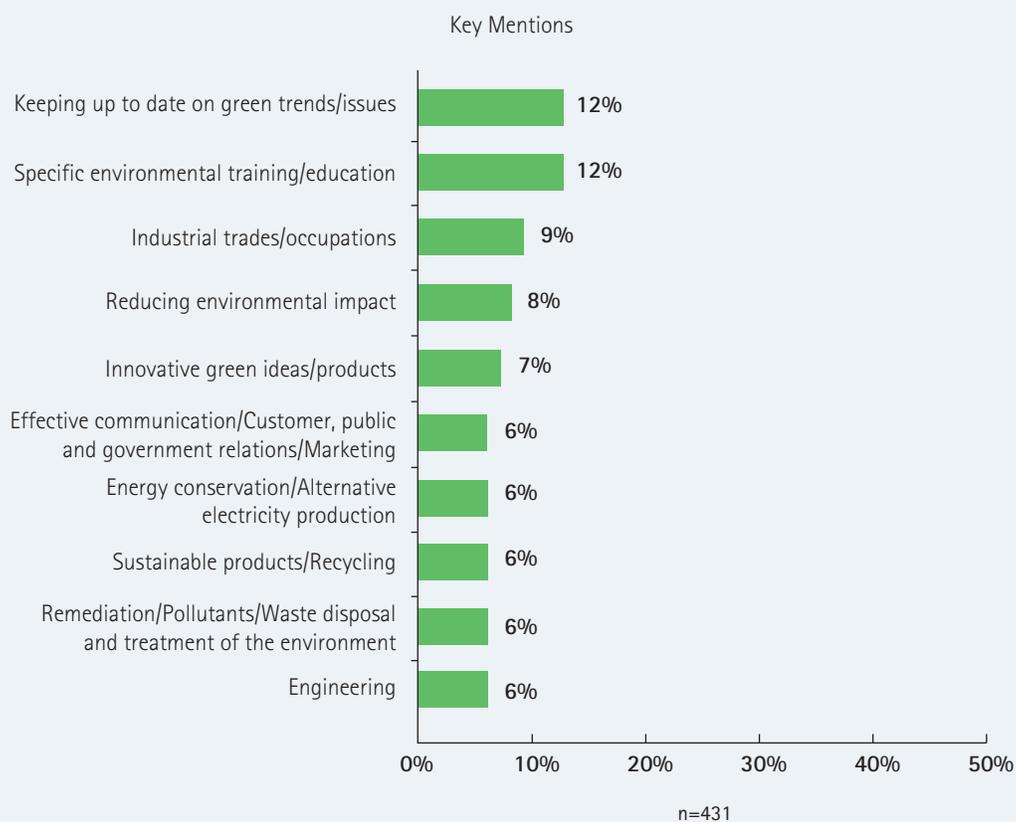


**Question 9:** At the present time, what are the most critical specialized green job skills, knowledge, training, or experience possessed by your staff members who work in green jobs?

### 5.2.9 GREEN JOB SKILLS, KNOWLEDGE, TRAINING OR EXPERIENCE NEEDED IN THE NEXT FIVE YEARS

Similar to the critical skills currently possessed by staff members who work in green jobs, it followed that many green companies reported that these same skills will be most critical over the next five years. It is important to note that twenty percent (20%) of organizations could not identify which skills would be most critical to maximize green job performance.

**Figure 12**  
Critical Green Job Skills, Knowledge, Training or Experience Needed in the Next Five Years



**Question 10:** And over the next five years, what do you think will be the most critical specialized green job skills, knowledge, training, or experience that will be needed by your staff members to maximize their performance in their green jobs?



## 6. DEFINITIONAL CRITERIA

### 6.1 DEVELOPING DEFINITIONAL CRITERIA

It became apparent over the course of the study that the development of a set of definitional criteria would be crucial to support the development of a consensus-driven definition of the green economy. Given the wide range of perceptions encountered throughout the project, it was essential to develop criteria that would provide sufficient structure for understanding the perspectives adopted to establish common language and consensus-driven approach. Therefore, these criteria are presented as a foundation for categorizing green economic activity.

The green economy is a subset of the entire economy. It does not exist in parallel to the entire economy or the 'traditional' economy, but rather it includes similar activities and processes. It produces similar goods and services as the broader, traditional economy, but also includes new green products, services and green processes supporting the production of green products and services.

The fundamental assumption underlying this study's interest in the green economy is that it will require new or re-allocated skills, create employment, and result in products, processes, and services that are more efficient and require fewer resources than conventional activity. Defining the green economy also provides the opportunity to identify jobs that are no longer in demand due to their reliance on production processes and services that are harmful to the environment.



The green economy is a subset of the entire economy. It does not exist in parallel to the entire economy or the 'traditional' economy, but rather it includes similar activities and processes.



Although the literature examined in the preparation of this report positions the green economy within the broader, multi-faceted economy, it is important that the definitional criteria presented here are also understood within the particular context of ECO Canada's mandate: the environmental labour market and the Canadian economy. Consequently, while broader aspects of the green economy relating to general societal changes are important, these perspectives need to be considered through an economic and environmental lens in order to sharpen the focus of this study's research efforts. For example, while efforts to change consumer behaviours towards the purchase of products and services that have a decreased negative environmental impact—such as the use of 'green' detergents, the decreased use of plastic shopping bags, or the increased use of energy-efficient products—are intrinsic elements in the campaign to reduce our carbon footprint and would undoubtedly be considered green by many, these kinds of events are associated with behavioural change and/or the final demand for products and services. These activities fall outside the scope of this study.

For example, increased use of public transit is a green 'activity': it is a more efficient transportation mode and reduces carbon emissions. But a behavioural shift towards increased use of public transit, per se, is not generally within the "green" context of this particular study. However, as the discussion below indicates, elements of public transit are green when the occupations and skills related to the design and development of a transportation system are considered.

To put the definitional criteria in perspective, the stages in the relationship among elements of the green economy are outlined in Figure 13. Using logic model terminology, 'inputs' include the resources, skilled workforce and capital required for the green economy, while 'activities' involve the application of inputs, resulting in 'outputs', or the goods and services produced in the green economy. Outcomes are the immediate (direct), intermediate (2-5 years), and longer-term impacts or results arising from green outputs.

**Figure 13**  
Green Economy Inputs, Activities, Outputs and Outcomes



“

The fundamental assumption underlying this study's interest in the green economy is that it will require new or re-allocated skills, create employment, and result in products, processes, and services that are more efficient and require fewer resources than conventional activity.

”

Literature review findings clearly indicate that the quest for conceptual or definitional criteria for the green economy has been problematic. A great deal of the difficulty related to understanding the green economy and its attendant labour market dimensions arises from a lack of clarity or focus concerning what it is that a green economy actually and measurably produces (or can produce)—its outputs and the kinds of results or changes that arise from the outputs.

The complexity of the green economy contributes to the challenge of developing definitional criteria. For example, 'green' connotes economic activities that minimize or are at least less than the environmental effects of 'traditional', more resource-intensive activities, but the extent of 'less' is unknown since economic metrics (i.e., productivity, efficiency, use of resources) have not been developed. The inter-disciplinary nature of the green economy — its economic, sociological, cultural, and political dimensions — adds to the complexity. Other dimensions of the green economy encompass local versus global perspectives, low-tech versus high-tech, labour intensive versus capital intensive activities.

The definitional criteria presented in this study represent the first step toward developing metrics to measure which activities constitute the green economy. This new conceptual approach is a result of the analysis of both the secondary and primary research on the green economy, green jobs, and environmental impact. In particular, the idea presented here is the inter-relationship of the three core definitional criteria of the green economy.

The criteria support the process to explicitly identify the characteristics of the green economy. The three main components are an economic perspective, a technical perspective, and a development process perspective, as defined in the following sections. The intent is to identify the various conditions or attributes to determine whether or not the activities related to the development of products, services and their related processes are green. These three criteria also aid in the identification of key areas of opportunity.

## 6.2 TECHNICAL PERSPECTIVE

The technical perspective characterizes the green economy through the application of quantitative, analytical criteria that indicate exactly how and to what extent a product, process, or service is 'green'. For example, how does a job or activity directly contribute to various green economy outcomes such as improved energy efficiency or waste reduction? Does it do this by increasing the efficiency of a manufacturing process, by introducing an entirely new process, or eliminating parts of conventional processes that are wasteful and/or harmful to the environment? Does a product or service replace an existing product or service that is more harmful to the environment? Is it possible to directly quantify the extent of these contributions, either in percentage terms or a general sense of the scope of the impact (low, medium, high)?

The research conducted for this study provided support for the technical perspective as a way of understanding the green economy. Specifically, a technical perspective is how many qualitative interviewees understand and define 'green'. In addition, there was consistency in their interpretation of the technical perspective: *"A green job includes an engineer that is tasked with light weighting an automobile. Or somebody who is an emissions engineer who is developing advanced vehicle dynamics for fuel economies because they help reduce greenhouse gasses."*

A number of the insights offered into the definition of a green job support the technical perspective that requires some explicit identification or measurement of the green component of a job. For example, as a private organization indicated in the qualitative research process: *"If a machine puts out a certain amount of energy and you redesign that to be more efficient, that would be green."*

Interestingly, the qualitative analysis points to a number of the challenges relating to the technical aspects of a green job and the green economy, particularly the challenges relating to measuring and monitoring the impacts of green activities: *"Much of the green we're going to see is around consumption monitoring and consumption control."*



The quantitative survey was designed to obtain insights concerning technical aspects of green company operations based on responses regarding an organizations green operations and skills, knowledge, and training requirements of their current and future workforce:

- Responses clearly indicated that the kinds of attributes stated by companies defining themselves as a green company, such as "providing services, technology, materials, or knowledge that reduce(s) environmental impacts" and/or whose business is directly involved in designing products and services that positively influence the environment, conform to the technical perspective of the definitional criteria.
- The responses concerning specialized green job skills indicated that more than half of the green organizations had or expected to require the kinds of skills that relate to the technical aspects of the green economy.

Conceptually, examples of applying this technical, production-function perspective include:

- **Public transportation:** Hybrid buses used for public transit have additional environmental benefits as compared to traditional diesel buses. From the technical perspective of this study, the main green impacts of hybrid buses occur in the changes in the technical processes to develop and manufacture the hybrid engines. Drivers of hybrid buses and passengers do not require specific 'green' skills.

- **Decrease in vehicle emissions:** changes in engine specifications and consumer/driver behaviour both contribute to decreased greenhouse gas emissions. The former change requires research and development expertise as well as engineering skills that intrinsically may or may not be 'green'. Changes in consumer behaviour, such as decreased use of private vehicles or decreased engine idling, while important to reducing emissions, require public relations campaigns, price changes, and other methods to motivate change. 'Green' skills and occupations are generally not required to change driving behaviour, so the contribution to decreased emissions due to changes in consumer behaviour would not be considered 'green'.

Overall, insights regarding the technical perspective gained through both the qualitative and quantitative analyses support the validity and applicability of this approach to understanding the green economy and green jobs. Research examining the technical perspective using specific, individualized inquiry will help further define and enhance the practicality of the technical perspective.

## 6.3 ECONOMIC PERSPECTIVE

The **economic perspective** is concerned with distilling or relating the characteristics of an activity into a classification system of sectors, industries, and occupations. Economies are broadly classified into two main sectors:

- **The goods-producing sector** (i.e., primary resources, manufacturing, and construction); and
- **The service sector** (i.e., education, government, wholesale and retail trade, finance, services).

While each of these broad sectors may have industries or sub-industries with green activities contributing towards the outcomes identified in Figure 13, the goods-producing sector may be the area where the greatest changes in processes are required to produce green impacts from the vantage point of this study. This sector should be considered the area of highest priority, based on the notion that changes in the processes and products of industries in these sectors offer the greatest potential to contribute to the green economy, thereby reducing environmental impact.

Within the goods producing sector, the 'economic perspective' research question concerns the identification of the industries and occupations within industries that contribute to the desired outcomes in Figure 13. Skills should be considered part of the economic perspective as well. Specifically, the economic perspective links green skills to green jobs by considering the specialized knowledge, skills, training and/or expertise that persons require to work in a green job.

This perspective identifies where in the economy a green activity —one that contributes to the desired outcomes — occurs (or is required). It should be noted that this economic perspective focuses on the industrial structure and composition of the economy. Various analytical methodologies to estimate impacts and social benefits, such as cost-benefit analysis and economic impact analysis are not meant to be part of the definitional criteria. Rather, the economic perspective attempts to classify green jobs by industry sector, occupation and skills by relating these to the outcomes in Figure 13. Do a company's products or services directly contribute to decreased greenhouse gas emissions, for example? Does it utilize sustainable resources in its manufacturing processes? Do the specialized skills of employees enable a company to provide services that improve the efficiency of a product, industrial process or service?

Examples of applying this economic perspective to a range of processes include:

- **Fishing industry:** improving harvesting practices and methods in this primary resource sector may increase the sustainability of the fishery and thereby increase resources, but it may not require new skills or occupations.
- **Windmill production:** is a manufacturing activity that may not require new skills or occupations to install and operate, but the product (windmills) does contribute to reduced carbon emissions relative to other sources of electricity generation. See the development process perspective section below for additional comments on this product.
- **Public transportation:** can be viewed as a green activity. From the economic perspective, the green component is the manufacturing of buses and other public transit vehicles, rather than the use of public transportation by individuals.

The findings from the qualitative and quantitative research broadly support the economic perspective of the definitional criteria — identifying the industries and occupations that are part of the green economy.

The primary research identified two important insights that affect the economic perspective. First and most importantly, the results of the quantitative analysis identified the important contribution of the professional, scientific, and technical services industry. The responses to Question 4 indicated that 43% of companies were in this sector, with another 11% involved in waste management and remediation services. The sample was designed to capture service sector firms that provide professional, scientific, and technical services (among others) and so this finding is not unexpected. The finding does support the decision to include this industry sector in future analysis concerning green jobs and definitional framework considerations.

The second finding concerns the view expressed by several interviewees participating in the qualitative research that all sectors and jobs need to consider themselves as green, or at least move in this direction. This is certainly an essential requirement to bring about change, but from the definitional criteria perspective, the need to focus on specific outcomes (see Figure 13) is paramount. In particular, from the definitional criteria perspective, the green economy focuses on organizations that operate with the intention of reducing resource consumption, harmful emissions, and minimizing all forms of environmental impact.

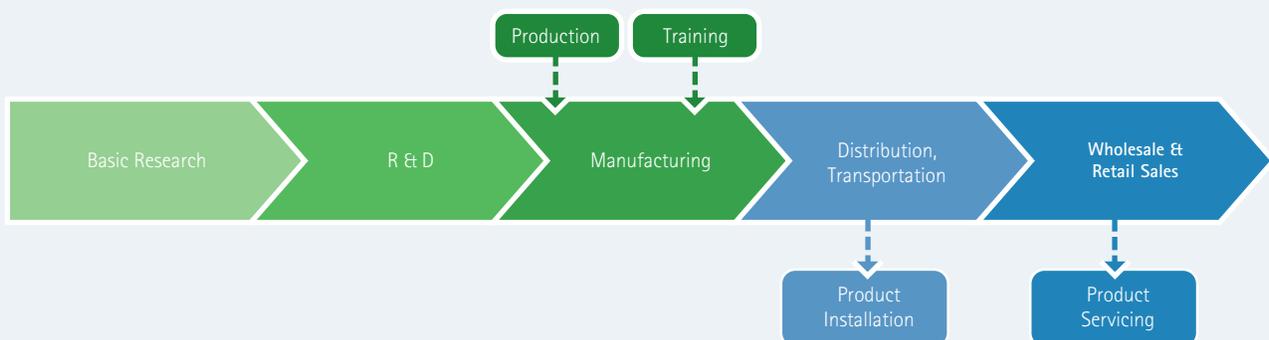
## 6.4 DEVELOPMENT PROCESS PERSPECTIVE

This perspective is concerned with identifying where in the development process a green job is situated. The development process would include the phases of development of a product or service, from the research phase through to design, (on-going) delivery, implementation and ongoing use and maintenance. Such jobs may not be in green industries, but support green activities through product design. Technical service jobs to maintain and support the ongoing operation of green equipment and green systems should be considered when enhancements and refinements to the definitional criteria are considered in future research. Green jobs throughout the manufacturing process, for example in R&D and servicing manufactured products, can contribute to the green economy by reducing energy requirements and/or increasing process efficiency. Green skills and jobs are also required to support the ongoing operation of green systems. Figure 14 provides a broad depiction of this development process approach.

Some examples of applying the development process perspective to the above examples include:

- **Public transportation:** While using public transportation may be a green activity, from an outcomes perspective, the design and manufacturing of buses and other public transit vehicles generate the greatest impacts on green occupations and skill requirements.
- **Windmill production:** The main green activity here is the design of the windmills themselves—the research, engineering design and some manufacturing elements of the windmill generators/motors and blades. These aspects of production may require new electrical engineering skills, for example. The manufacturing and installation of windmills results in energy savings, but these end results or final demand elements are likely not within the scope of this study. Maintaining windmill operations would likely include incremental green job skills.

**Figure 14**  
Development Process Elements



The qualitative and quantitative research lends further insights and enhancements into the development process perspective proposed above that concentrates on the manufacturing stage of the development process. The findings from the primary research for this study clearly demonstrate the importance of including jobs and activities related to product research and development, as well as the skills required to commercialize and/or implement new green products and services, or to modify existing products and services to increase their green value.

The findings related to the hiring of additional green employees (Question 8 of the quantitative survey) as well as the current and anticipated critical green skills (Questions 9 and 10), clearly demonstrate the considerable role and importance of professional, scientific, and technical services (and engineering construction) in the development of green organizations.

Close to one-quarter of green companies surveyed noted that their organization currently relies on skills associated with specific environmental training or education, and 12 percent regard these skills as critically important in the future of their organization. Industrial trades and occupations were noted by nine percent of organizations.



## 6.5 DEFINITIONAL CRITERIA

The three criteria for categorizing green activity are meant to support the conceptual process of explicitly identifying the characteristics of the green economy. Specifically, the criteria provide a foundation for identifying the various conditions and attributes relating to the development of green products and services. Although the exact relationship between the three criteria requires further exploration, the function of the perspectives shown in Figure 15 is indicative of the dependencies and interrelationships among the components. The categorization of green activity requires an examination of how the activity is viewed within each of these three criteria.

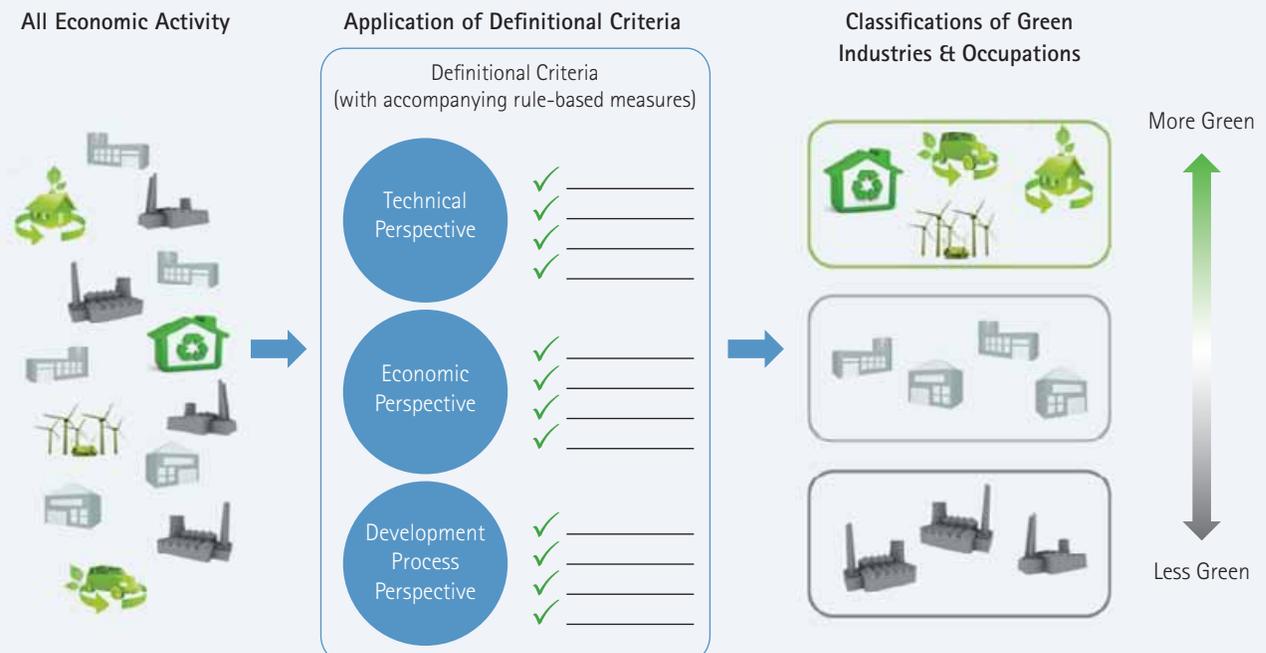
The important value in defining the green economy using the three perspectives is that it focuses on categorizing specific activities and processes within specific sectors rather than attempting to use a broad, economy-wide approach. For instance, attempting to categorize renewable energy as green can be problematic without the subsequent analysis to identify the economic, technical and development process attributes of a range of specific renewable energy activities such as the manufacturing of renewable energy products, transportation or installation of the products. Similarly, the immediate use of renewable energy products, such as energy efficient lighting by consumers, would be considered outside the green economy according to the definitional perspective developed by this study.

These three perspectives also provide the foundation for the development of a definitional model, integrating the three perspectives with the green inputs, activities, outputs and outcomes shown in Figure 15. These criteria also provide an opportunity to develop a robust model in the context of the 'new' definition of green jobs. Appendix F provides additional questions designed to support the development of the framework.

Research findings confirmed the value of the perspectives offered by the definitional criteria. Applying each of these perspectives helps to clarify how a product or service aligns with the green economy. In particular, the primary research pointed out the important role of professional, scientific, and technical jobs in the early stages of the development process for new and refined green products and services. The research also indicates that the technical perspective would benefit from additional research that focuses on how to apply this perspective more directly to organizations.

To recap, the definitional criteria represents a set of rules or definitions in each of the **economic, technical, and development process** components that define the extent to which the activities associated with a product or service are deemed to be green. The green economy is an economic system operating with the primary intention of reducing resource consumption, harmful emissions, and minimizing all forms of environmental impact.

**Figure 15**  
Green Economy Definitional Criteria





## 7. FUTURE DIRECTIONS & NEXT STEPS

As the study progressed, several areas were identified that would benefit from additional investigation. The following points outline areas of additional consideration and examination for ECO Canada:

- In anticipation of the challenges associated with distilling a consensus-driven definition of the green economy and green jobs across a large spectrum of perspectives, the development of the definitional criteria presented in this report were largely achieved after analyzing the findings of the secondary literature review, qualitative and quantitative research phases. As such, additional focused consultation with high-level, strategic thinkers familiar with the emerging green economy in Canada are recommended to test the overall concept and application of the definitional criteria.
- Continue to refine the definitional criteria by developing a more explicit understanding of the three perspectives. Additional research is required to inform the inclusion of specific measures and other rule-based approaches to further identify and clarify green job activities within the green economy. This additional research would include targeted inquiry to define and enhance the applicability, validity, and practicality of the three definitional perspectives.
- Utilize and distil results of the potential areas of future inquiry noted above to develop a complete and robust definitional model for the green economy. Such a model would include sufficient detail to categorize and classify both industries and occupations contributing (at varying levels) to the green economy in Canada.
- Upon completion of the previous recommendations, undertake economy-wide quantitative research of a representative sample of Canadian organizations with high likelihood of being involved in the Canadian green economy. A larger investigation of green companies and organizations employing those with green skills would enable a better and more complete understanding of the current size and composition of the green economy in Canada, reveal emerging trends, and assess the future demand for green skills.
- Develop partnerships with appropriate government agencies to address the demonstrated need to update Canada's National Occupation Classification (NOC) and the North American Industry Classification System (NAICS) to reflect the emergence of green careers and industry sectors.

## APPENDICES

# APPENDIX A: DETAILED RESEARCH METHODOLOGY

## RESEARCH OBJECTIVES

The terms 'green economy' and 'green jobs' are highly dynamic concepts used to describe a wide range of activities and occupations with varying degrees of economic impact. Language used to describe the green economy varies among government agencies, industry associations, employers, and educational institutions.

As a consequence, the majority of publicly available documentation lacks consistency or has limited applicability. At present, no universal or shared framework exists to consistently define or classify green jobs or green economic activity on a national scale, in a Canadian context.

To address this issue, ECO Canada, with the support of Human Resource and Skills Development Canada, commissioned the *Defining the Green Economy* labour market research study to gain a better understanding of definitional issues and classifications approaches, and establish common language and concepts to characterize the green economy and green jobs.

The specific objectives of this project were to:

- Develop a definition for the emerging green economy and supporting definitional criteria;
- Identify the top opportunity areas within the Canadian green economy over the coming decade; and
- Establish common language and develop a consensus-driven definition of green jobs.

## METHODOLOGY OVERVIEW

Project Methodology included a review of secondary literature and relevant data sources to provide the basis for macro-level analysis. Primary research was also conducted to gain insight into green economy and green jobs conceptual approaches, and to better understand the characteristics of organizations operating as green companies within Canada.

- Thirty in-depth qualitative interviews were conducted with a variety of high-level stakeholders across Canada, including individuals representing the private sector, national sector councils, various foundations, associations and think tanks, and academic institutions.
- A quantitative telephone survey was also completed with senior managers or decision makers familiar with green or sustainable activities representing 501 organizations across Canada. Of the 501 organizations interviewed, 431 were considered to be 'green companies', meaning their organization operated within a targeted industry sector that produced goods or services designed to minimize environmental impact.

## SECONDARY LITERATURE REVIEW

A literature review was conducted to inform the development of definitional criteria for the green economy and a definition for green jobs. Relevant data sources were assembled to assess the degree of consensus pertaining to green economy concepts and ideologies among Canadian, North American and international information sources.

The majority of the secondary research took place prior to commencing the primary qualitative and quantitative research strategies to facilitate a proper and full understanding of the latest thoughts and approaches to the topic of skills required or envisioned in an evolving and expanding green economy. It should be noted, however, that new information sources identified via the quantitative and qualitative components were analyzed, and if applicable, included in the report findings.

## Sources Included in the Secondary Literature Review

- Apollo Alliance, [Green Collar Jobs in America's Cities](#), 2008.
- Apollo Alliance, [Green Jobs Handbook](#), Employment Year 2008/2009.
- Bezdek, Roger, [Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century](#), 2007.
- Blue Green Alliance, [How to Revitalize America's Middle Class with the Clean Energy Economy](#), June, 2009.
- Business Council of British Columbia, [Environment & Energy Bulletin – Charting the Green Economy](#), 2009.
- California Centers of Excellence, [Green Occupational Framework](#), 2009.
- California Centers of Excellence, [Green Industry Framework](#), 2009.
- California Centers of Excellence, [Green Program Crosswalk](#), 2009.
- California Centers of Excellence, [Understanding Green Jobs](#), 2009.
- California Centers of Excellence, [Understanding the Green Economy: A Community College Perspective](#), 2009
- Clean Edge, [Five Emerging U.S. Public Finance Models: Power Clean – Tech Economic Growth and Job Creation](#), October 2009.
- Doyle, Kevin, [How do we define the green-job economy?](#) 2008.
- Entegry, [2009 Update of ECO Canada's National Occupational Standards for Environmental Employment](#), February 2010.
- FTSE, [Environmental Markets Classification System](#).
- Globe Foundation, [British Columbia's Green Economy: Building a Strong Low-Carbon Future](#), January 2010.
- Globe Foundation, [The Endless Energy Project – A Blueprint for Complete Energy Self-Sufficiency in British Columbia](#), January 2007.
- Globe Foundation, [Report on the Environmental Technology Sector in Western Canada](#), November 2003.
- Globe Net, [Are There Too Many Shades of Green?](#) April, 30, 2008.
- Government of Canada, [Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions](#), 2008.
- Intergovernmental Panel on Climate Change. [Nobel Lecture](#), 2007.
- ISC's, [Green Economy Study – Research Methodology](#).
- Jones, Van, [The Green Collar Economy: How One Solution Can Fix Our Two Biggest Problems](#), 2008.
- Mattera, Philip, [High Road or Low Road](#), February, 2009.
- Pernick, Rob, Clint Wilder, [Clean Tech Job Trends 2009](#), October 2009.
- Pinderhughes, Raquel, [Green Collar Jobs](#), 2007.
- Pollin, Robert, Jeannette Wicks-Lim & Heidi Garrett Peltier, [Green Prosperity: How Clean Energy Policies Can Fight Poverty and Raise Living Standards in the United States](#), June 2009.
- Pricewaterhouse Coopers, [Going Green: Sustainable Growth Strategies](#), February 2008.
- Public Policy Forum. [Green Jobs: Is This the New 'New Economy' Summary Report](#), 2009
- Renner, Michael, Sean Sweeney, Jill Kubit, [Employment in a Low-Carbon World](#), 2009.
- Scarpa, Juliet P., [A Growing Green Economy: Opportunities of Tomorrow](#), March 2009.
- Seattle Jobs Initiative, [A Growing Green Economy: Opportunities for Tomorrow](#), 2009.
- State of Pennsylvania, [Climate Change Action Plan](#), October 2009.
- Statistics Canada, [Environment Industry: Business Sector](#), 2004
- Statistics Canada, [Measuring Employment in the Environmental Industry](#), 1998-2000.
- Sterizinger, George, Matt Svrcek, [Solar PV Development: Location of Economic Activity](#), January 2005.
- Sterizinger, George, Matt Svrcek, [Wind Turbine Development: Location of Manufacturing Activity](#), September 2004.
- Stern, Nicholas Herbert, [The Economics of Climate Change: The Stern Review](#), 2006.
- Sustainable Development Technology Canada, [The 2010 SDTC CleanTech Growth & Go-to-Market Report](#), 2010.
- Suzuki Foundation, [A Green Economy Makes Cents](#), January 2009.
- Suzuki Foundation & Pembina Institute, [Preliminary Economic Modeling](#), December 2008.
- The Delphi Group, [Situational Analysis of the Canadian Renewable Energy Sector with a Focus on Human Resource Issues](#), January 30, 2007.
- The Hill Times, [Environmental Policy Briefing](#), April 2010.
- The Global Advantage Consulting Group, [Green Jobs: A Review of Domestic Literature, International Evidence and Best Practices](#), February 2009.
- The Ontario Trillium Foundation, [Green Economy](#), 2008.
- Toronto Workforce Innovation Group et al., [Greening the Economy: Transitioning to New Careers](#), 2009.
- Umweltwirtschaftsbericht (Germany), [Report on the Environmental Economy](#), 2009.
- UNEP, [Rethinking the Economic Recover: A Global Green New Deal](#), April 2009.
- UNEP, [Global Green New Deal – An Update for G20 Pittsburgh Summit](#), September 2009.
- UNEP, [Global Green New Deal – Policy Brief](#), March 2009.
- UNEP, [Trade and Climate Change](#), 2009.
- UNEP, [Green Jobs: Toward Decent Work in a Sustainable, Low-Carbon World](#), September 2008.
- UNEP, [Green Economy Initiative](#), September 2009.
- Washington State Department of Community, Trade and Economic Development, [The Green Economy Jobs Initiative: Definitions](#), 2009.
- World of Work, [Green Jobs – Climate Change in the World of Work](#), August 2002.

## KEY INFORMANT INTERVIEWS

Key expert interviews were conducted to capture and distil the vast array of conceptual approaches to defining green jobs. In addition, stakeholders were consulted to assess drivers of change and the impact of the green economy on employment. Information was also gathered regarding skills gaps, training requirements and labour force needs associated with the continued emergence of the green economy.

All interviews were conducted via telephone between May 25 and July 2, 2010. The Interview Protocol is found in Appendix B.

### Respondent Profile and Screening Criteria

Thirty key experts participated in the study. In addition to the contact amassed by CRA and CMC, ECO Canada provided a list of other national sector council contacts and other high-level visionaries familiar with green definitional and conceptual ideologies. The list of experts was subject to a highly selective screening process, whereby participants were selected based on their level of familiarity and in-depth knowledge of the sector.

In addition to the original list, participants were asked to refer additional contacts with a similar knowledge or experience with green issues, challenges and approaches. A relatively consistent degree of overlap across referred contacts was observed, resulting in a solid core of participants positioned to contribute strategically relevant, actionable information.

Participant characteristics were tracked to ensure a divergent mix of opinions and perspectives across participant backgrounds, industry representation and regional distribution. Participants represented the following organizational groupings:

- Private sector (providing perspectives from 'the trenches' of the green economy);
- National sector councils (providing perspectives from across the Canadian economic landscape);
- Academics (providing perspectives from knowledge leaders studying the topic and providing training to the workforce); and
- Foundations, associations and think tanks (providing perspectives from various points along the continuum of thought regarding the emerging green economy).

## QUANTITATIVE SURVEY

The survey was designed by Corporate Research Associates (CRA), Collins Management Consulting & Research (CMC), and ECO Canada, to support the study objectives. The survey targeted senior managers, decision-makers, or persons most familiar with green or sustainable activities within green companies operating as part of the Canadian green economy. This component of the research sought to:

- Determine the specific types of business and industries believed to be operating within the green economy;
- Determine the specific goods and/or services produced by organizations operating in the green economy;
- Identify the percentage of employees within green companies currently involved in green jobs;
- Assess the growth of the number of green jobs within green companies expected in the coming years; and
- Better understand current as well as future employment skills needs of Canadian organizations operating in the green economy.

Data collection was conducted by telephone from July 7 to July 30, 2010 with 501 businesses. Each interview lasted an average of 10 minutes. The quantitative questionnaire is found in Appendix C.

### Sampling Plan

The study population was comprised of companies categorized as operating within targeted industry codes. Samples were drawn from an InfoCanada database, based on a wide assortment of search terms regarded as likely to be associated with organizations operating within one or more of the four occupational opportunity areas cited in the literature review component of the project. This list of search terms was derived by representatives from CRA, CMC, and ECO Canada (Refer to Appendix G for a complete list of search terms).

InfoCanada provided a list of all organizations within its national database categorized via Standard Industry Codes (SIC) containing one or more of the targeted keywords. This approach led to 18,192 unique sample records being made available to CRA for telephone survey purposes.

While it is more common to categorize organizations operating within the green economy utilizing North American Industry Classification System (NAICS), InfoCanada provided SIC coded sample records for sampling purposes. InfoCanada is one of the country's leading providers of national business sample records, and it supplies this information using SIC rather than NAICS.

## Pre-Test

A pre-test was conducted in the first week of July, 2010, to identify issues or difficulties respondents might have understanding or providing responses to survey questions. Pre-test activities included:

- A field test completed with 100 respondents;
- Changes to the questionnaire to ensure collection of strategically relevant and actionable data;
- Changes to the questionnaire based on difficulties experienced by participants; and
- Review and finalization of the telephone survey.

## Participant Screening

To qualify, respondents were required to self identify as being a 'green company'. The quantitative survey working definition for a green company was: 'a company that produces goods or services that are designed to minimize environmental impact'.

## Coding & Processing

While all 501 organizations interviewed stated they were a green company as per the terms of the working definition for the quantitative survey, analysis of other information collected in the survey indicated that 70 of the 501 organizations interviewed operated outside the parameters of a green company as defined for this research study. The two primary reasons for these exclusions were:

- The organization did not operate within a North American Industry Classification System (NAICS) six digit code associated with the green economy, based on CRA's coding of the survey verbatim data that was collected. While all companies included in the initial study sample were categorized within an SIC code associated with the green economy, upon completing the 501 interviews, some organizations interviewed were found to operate within sectors that could not be classified within the green economy, as operationally defined for this study. Given that the study population should have included only organizations that could be coded via SIC title keyword as having a six digit SIC associated with the green economy, organizations regarded as having a non-green industry code were excluded from the final 'green organization' dataset of 431 corporate entities.
- Analysis of the verbatim survey responses identified that several organizations did not produce either goods or services designed to minimize environmental impact. That is, they do not produce an output which minimizes environmental impact, as per the required terms of the screener question in the survey (even though respondents may have initially stated that their organization does indeed produce such goods and services).

As a result, the decision was made to compare and contrast the responses of the 431 green companies to those of the 70 organizations interviewed that were deemed to operate outside the green economy. Accordingly, commentary on these differences is provided throughout the report.

## Response Rate

Among all eligible respondents contacted, the response rate was 16%. Response rate is calculated as the number of cooperative contacts (769) divided by the total number of eligible telephone numbers called (4,778).

See Appendix D for a detailed disposition of all telephone numbers called, provided in Marketing Research and Intelligence Association's (MRIA) Standard Record of Contact Format.

## Margin of Error

A sample of 431 respondents would be expected to provide results accurate to within  $\pm 4.7$ , 19 times out of 20 (or the 95% confidence level). A sample of 70 respondents would be expected to provide results accurate to within  $\pm 11.7\%$ , 19 times out of 20 (or the 95% confidence level). See Appendix E for additional sample tolerance breakdowns.

## LIMITATIONS OF THE RESEARCH

**Industry and Occupational Classification:** The imprecise nature of what constitutes the green economy or green jobs have not gone unnoticed in Canada. For example, a recent study remarked that "Canada's National Occupation Classification [NOC] system does not yet recognize many of the new green careers. [Moreover,] the North American Industry Classification System [NAICS] has not yet adapted to include new emerging green sectors in established industries."<sup>32</sup> Despite this limitation, the present research relies upon the NAICS coding system for primary research considerations, in the absence of a preferable option.

**Coverage:** The survey frame includes organizations willing to participate in the telephone survey drawn from a random sample within pre-selected industry sub-segments. In total, 501 organizations qualified for the survey, including 431 that were classified as being green companies after an extensive analysis of survey responses. It is important to note that the intent of the quantitative survey was to provide a high level understanding of the characteristics of organizations operating within the Canadian green economy, not to provide an extensive profile of green employment. As such, the findings would be interpreted in this context, as a snapshot of green companies producing goods or services designed to minimize environmental impact. Data contained in this report cannot be used to extrapolate current or future employment figures.

**Comparability with other data sources:** No other current sources of information regarding the characteristics of green companies operating within the Canadian green economy exist in Canada at a national level.

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<sup>32</sup> Toronto Workforce Innovation Group et al. [Greening the Economy: Transitioning to New Careers](#). December 2009.

# APPENDIX B: QUALITATIVE INTERVIEW PROTOCOL

## INTRODUCTION

*I would like to begin by thanking you for taking the time to help us with our study. Our discussion should take about 25 minutes. The objective of our discussion today is to gather your perceptions and those of other opinion leaders, of occupational opportunities in the emerging green economy. Your inputs are very valuable to ECO Canada and your time is greatly appreciated.*

*With your permission, I'd like to record our conversation so I don't have to write a lot of notes. The recording will only be used for reporting purposes. Everything you say today is anonymous and confidential. Your comments will be combined with those from other people that I interview, as part of a detailed study report. Any questions before we begin?*

## GREEN JOBS AND ECONOMY - DEFINITION

**Moderator:** I'd like to start by sharing some information with you. Environmental and climate change issues have seen growing prominence on the public and political agendas. The transition to a low carbon economy will require adjustments in what is produced and consumed in Canada and how. While these adjustments will have economic costs, there will also be significant wealth producing and job creating opportunities. Concern for environmental issues and the development of clean technologies will have an impact on how the labour market will transform itself in years to come.

First I'd like to understand your views of green jobs....

- What would the *definition* of a green job be?
- What specific processes, products or services would a job have to do or not do to be considered a green job?
- How would you define or measure if a job is green?
  - Can industries as a whole be green? What would be an example of a green industry?
    - Are green jobs more associated with goods-producing sectors (i.e. forestry, manufacturing, construction), or can these be service sector green jobs?
- Are there examples of green jobs within your industry/sector? How does the environmental sector and the green economy compare?
- What, if anything, distinguishes the two?

## GREEN DRIVERS

- What are the *driving factors* that have led companies (if appropriate: within your sector) to adopt greener practices and produce green products?
- To address the issues requiring the greening of the economy, where are companies focusing the majority of their investments and why? Probe (if necessary):
  - Reducing fossil fuels
  - Reducing pollution/greenhouse gases
  - Increasing energy efficiency
  - Recycling materials
  - Adaptation
  - Investments in research & development and/or developing renewable sources of energy
- Is green certification for products, processes or services an issue or an opportunity that helps define green products, processes or services?

## DEMAND

- In your view, how, if at all, is the greening of the economy impacting employment (within your sector)? Probe:
  - How is it changing the types of skills required?
  - How is it changing recruitment and/or retention practices?
  - How is it changing training and human resource development practices/requirements?
- What, if any, types of *green skills gaps* exist (within your sector)? Are these concentrated in particular occupational areas and/or skill levels (i.e. low, medium, high)?
- How, if at all, has the work force changed due to green/environmental influence?
- Have new trades, with distinct skill sets, emerged?
  - If yes, which ones?
  - If yes, will your industry be seeking designation of the new trades as apprenticeable trades?
- What challenges exist in trying to address these skills gaps?

## SKILLS DEVELOPMENT

- How is industry (your sector) identifying the specific skill requirements associated with the greening of the economy?
- How are sectors / your sector working to supply the skill requirements associated with the greening of the economy?
- In your experience, how are post-secondary institutions and other training providers responding to the needs of the green economy? Probe:
  - Differences in response to professional vs. skilled trades (i.e. low, medium, high)
- What types of partnerships exist with post-secondary and other training institutions to meet the skills requirements?

## SECTOR RESPONSIVENESS

- What types of projects, if any, are you undertaking or planning to undertake related to the greening of the economy? (That could include research as well as practical, developmental projects)
- Any final comments?

## OTHER PARTICIPANTS

- Based on the content we've covered today, and your knowledge of the topic, can you recommend anyone else you think we should be talking to about the emerging green economy in Canada?

On behalf of ECO Canada, thank you for your time and input.

# APPENDIX C: QUANTITATIVE SURVEY QUESTIONNAIRE

Hello, my name is \_\_\_\_\_ and I work with Corporate Research Associates, a survey research company. Today we are conducting a research study among companies that operate as part of Canada's 'green economy'. May I please speak with a senior manager, decision-maker, or person familiar with "green" or "sustainable" activities at your company?

We are conducting the survey today on behalf of ECO Canada, Canada's national sector council responsible for supporting the environmental sector. This survey should only take 5 to 10 minutes, and all information you provide will be kept strictly anonymous. If you wish, we could provide you with a summary of the survey results. Please be assured that we are not trying to sell you anything. This survey is registered with the national survey registration system.

Your company is one of several hundred businesses across Canada selected at random for participation in this survey, from within targeted sectors of interest to ECO Canada.

## Section A: Introduction and Screening

1. A *green company* could be defined as a company that *produces goods or services* that are designed to minimize environmental impact. By this definition, is your organization a green company because it *produces goods or services* that are designed to minimize environmental impact? **CODE ONE ONLY – IF RESPONDENT SAYS THEIR GOODS OR SERVICES REDUCE GREENHOUSE GAS EMISSIONS OR CONTRIBUTE TO ENERGY EFFICIENCY, RECORD AS 'YES'**  
  
1 Yes      **CONTINUE**  
2 No      **THANK, TERMINATE, & RECORD**
2. In which official language would you prefer to be interviewed? **CODE ONE ONLY**  
  
1 English  
2 French

## Section B: Sector, Activities, Hiring, and Skills

3. Next, why specifically do you say your company is a green company? **PROBE: Any other reasons? RECORD VERBATIM – INTERVIEWER INSTRUCTION: IT IS VERY IMPORTANT TO OBTAIN PRECISE DETAILS CONCERNING THIS QUESTION**  

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4. Please tell me what type of business or industry your organization is primarily engaged in at the present time? **PROBE: And what other areas is your organization engaged in at the present time? RECORD VERBATIM – INTERVIEWER INSTRUCTION: IT IS VERY IMPORTANT TO OBTAIN PRECISE DETAILS CONCERNING THIS QUESTION**  

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5. And please tell me the specific goods or services your organization produces at the present time? PROBE: Anything else? **RECORD VERBATIM – INTERVIEWER INSTRUCTION: IT IS VERY IMPORTANT TO OBTAIN PRECISE DETAILS CONCERNING THIS QUESTION**

\_\_\_\_\_

6. How many full-time employees, including yourself, are currently working at your company's operations within Canada? **RECORD NUMBER – PROBE TO AVOID ACCEPTING A RANGE – IF ASKED, SAY THAT "FULL-TIME" IS AT LEAST 30 HOURS PER WEEK**

**RECORD NUMBER:** \_\_\_\_\_

7. A 'green job' is one that directly works with information, technologies, or materials that minimize environmental impact, and also requires specialized skills, knowledge, training, or experience for activities that minimize environmental impact. Knowing this, what percentage of your company's full-time employees in Canada, including yourself, work in green jobs some or all of the time? **RECORD PERCENTAGE – PROBE TO AVOID ACCEPTING A RANGE – IF ASKED, SAY THAT "FULL-TIME" IS AT LEAST 30 HOURS PER WEEK**

**RECORD PERCENTAGE:** \_\_\_\_\_

8. And how many additional new full-time employees, over and above those who currently work with your company, do you expect your company will hire in the next five years to work within green jobs, some or all of the time, at your company's operations within Canada? **RECORD NUMBER – PROBE TO AVOID ACCEPTING A RANGE – IF ASKED, SAY THAT "FULL-TIME" IS AT LEAST 30 HOURS PER WEEK**

**RECORD NUMBER:** \_\_\_\_\_

9. At the present time, what are the most critical specialized green job skills, knowledge, training, or experience possessed by your staff members who work in green jobs? **PROBE:** Any others? **RECORD VERBATIM, UP TO THREE SPECIALIZED AREAS – INTERVIEWER INSTRUCTION: IT IS VERY IMPORTANT TO OBTAIN PRECISE DETAILS CONCERNING THIS QUESTION. IF HELPFUL REPEAT THE DEFINITION OF A 'GREEN JOB' AS BEING ONE THAT "directly works with information, technologies, or materials that minimize the impact on the environment, and also requires specialized skills, knowledge, training, or experience related to activities that minimize the impact on the environment."**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

10. And over the next five years, what do you think will be the most critical specialized green job skills, knowledge, training, or experience that will be needed by your staff members to maximize their performance in their green jobs? **PROBE:** Any others? **RECORD VERBATIM, UP TO THREE SPECIALIZED AREAS – INTERVIEWER INSTRUCTION: IT IS VERY IMPORTANT TO OBTAIN PRECISE DETAILS CONCERNING THIS QUESTION. IF HELPFUL REPEAT THE DEFINITION OF A 'GREEN JOB' AS BEING ONE THAT "directly works with information, technologies, or materials that minimize the impact on the environment, and also requires specialized skills, knowledge, training, or experience related to activities that minimize the impact on the environment."**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

### Section C: Demographics and Classification Questions

In closing, I would like to ask you some questions about yourself that will help us analyze the survey results. Once again, please be assured that all information you provide is strictly confidential, and will only be used to classify the survey results.

11. To ensure that we are interviewing a wide distribution of businesses, could you tell me the postal code of the office at which I have reached you today?

**RECORD, EVEN IF THE RESPONDENT CAN ONLY GIVE PARTIAL POSTAL CODE.**

**RECORD POSTAL CODE:** \_\_\_\_\_

12. This completes the interview. Thank you for your assistance. We can provide you with an executive summary of the survey results via email after the full report has been prepared. Are you interested in obtaining a summary of the survey findings?

01 Yes, am interested in the report [RECORD EMAIL ADDRESS: \_\_\_\_\_]

02 No, am not interested in the report

**THANK YOU FOR YOUR ASSISTANCE AND COOPERATION**

## APPENDIX D: QUANTITATIVE SURVEY COMPLETION RESULTS

Among all eligible residents contacted, the response rate was 16 percent. Response rate is calculated as the number of cooperative contacts (769) divided by the total number of eligible telephone numbers called (4,778).

The final disposition of all telephone numbers called is shown below in a form derived from the *Marketing Research and Intelligence Association's (MRIA) Standard Record of Contact Format*.

COMPLETION RESULTS	
<b>A. Total Numbers Attempted</b>	<b>5,745</b>
Discontinued Number/Not in Service	411
Fax/Modem	57
Cell Phone/Pager	10
Non Business Number	17
Wrong Number/Blocked Number	115
Duplicate	55
Corporate Level Decision	261
Business Closed/Out of Business	41
<b>B. Eligible Numbers</b>	<b>4,778</b>
Busy Signal	31
Answering Machine	1,213
No Answer	310
Scheduled Call Back	1,180
Mid Call Back	4
Illness, Incapable	2
Language Problem	12
Qualified Not Available	98
<b>C. Total Asked</b>	<b>1,928</b>
Gatekeeper Refusal	468
Mid Terminate	19
Respondent Refusal	455
Never Call List	27
Hang Up	190
<b>D. Co-operative Contacts</b>	<b>769</b>
Did Not Qualify (self-reported as 'non-green')	268
Completed Interviews	501

## APPENDIX E: SAMPLING TOLERANCES

A sample of 431 respondents would be expected to provide results accurate to within  $\pm 4.7\%$  19 times out of 20 (or the 95% confidence level). A sample of 70 respondents would be expected to provide results accurate to within  $\pm 11.7\%$  19 times out of 20 (or the 95% confidence level).

As margins of error for various sub-samples will vary based on sample size and proportion of the obtained result, a selection of sampling tolerances is presented in the following table:

SAMPLE TOLERANCES FOR PERCENTAGE RESULTS BY SAMPLE SIZE					
Size of Sample	10 or 90%	20 or 80%	30 or 70%	40 or 60%	50%
431 Interviews	2.8%	3.8%	4.3%	4.6%	4.7%
400 Interviews	2.9%	3.9%	4.5%	4.8%	4.9%
200 Interviews	4.2%	5.5%	6.3%	6.8%	6.9%
100 Interviews	5.9%	7.8%	9.0%	9.6%	9.8%
70 Interviews	7.0%	9.4%	10.7%	11.5%	11.7%

## APPENDIX F: DEFINITIONAL CRITERIA QUESTIONS

### TECHNICAL PERSPECTIVE

1. Is this green job in direct support of an activity/process, product or service that results in improved environmental impacts? What are these?
2. How does the job contribute to the green economy outcomes?
3. What green outcomes does it affect specifically?

### ECONOMIC PERSPECTIVE

1. What is the industrial structure where this job occurs?
2. What is the occupation: to which green outcomes does it contribute?
3. What skills are required which directly contribute to the green economy: to which outcomes do these skills contribute?

### DEVELOPMENT PROCESS PERSPECTIVE

1. At what stage in the product/service development process does this green job contribute to green outcomes? How?



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