Emerging Green Jobs in Canada:

Insights for Employment Counsellors into the Changing Labour Market and its Potential for Entry-Level Employment

FIRST 1 WORK

GREENSKILLS NETWORK

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CANADIAN EDUCATION AND RESEARCH INSTITUTE FOR COUNSELLING
INSTITUT CANADIEN D'ÉDUCATION ET DE RECHERCHE EN ORIENTATION

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Principle Author:
Justine Katz, Green Skills Network

Contributing Authors and Research Team:
Mirga Saltmiras, Evidence Consulting
Ryan Stanga, Evidence Consulting
Ron Sly, Sly Communications
Susan Kachmar, Tracks Employment
Reginald Sheffield, The Red G Company
Stefeni Higuchi, Volunteer
Eleanor (Bing Shu) Shi, Volunteer

Executive Director:
Matt Wood, First Work

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Aaron Stauch, Lutherwood Employment Services

The Green Skills Network is a department of First Work: The Ontario Association of Youth Employment Centres. It serves to close labour market gaps by connecting entry-level workers to emerging Green employment opportunities.

For more information, contact:
Justine Katz, Green Skills Network Coordinator
416-323-9557 ext 227/ jkatz@firstwork.org
www.greenskillsnetwork.ca / www.firstwork.org

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Executive Summary

As Canada transitions to a greener economy, its labour market is transforming and new employment opportunities are emerging. This report will assist employment counsellors, job developers, and job seekers in gaining a better understanding of these effects, specifically as they relate to entry-level employment in renewable energy and energy conservation.

Entry-level is defined as jobs that require less than a post-secondary degree. The focus on entry-level jobs is due to the ongoing challenges in youth employment in Canada. The youth unemployment rate is almost double that of the country's total unemployment rate and is steadily increasing.

The focus on renewable energy and energy conservation is due to these sectors providing the most opportunity for entry-level work. Renewable energy includes occupations found in the generation and distribution of wind energy, solar energy, bioenergy and hydropower. Energy conservation for the purpose of this report relates to jobs found in energy efficient building, including new building construction and retrofitting of existing buildings.

There are a number of factors that are influencing the labour market and the demand for labour in the green economy. These factors include climate change, consumer habits and demands, policy and investment, with policy and investment being particularly influential. Canada's provinces and territories have all drafted energy and/or climate change strategies and have invested in the green economy financially. Although there is currently still a heavy reliance on fossil fuels, there is strong potential for future growth in green jobs as Canada continues to shift to a greener economy.

Within the literature, there is an ongoing and inconclusive debate over defining green jobs. A number of studies provide different, but related, concepts, but there is not a single standard definition that is used. Studies do all agree, however, that green jobs are found in multiple, if not all, sectors of the economy, and include a variety of activities.

In identifying the areas of the green economy that have the most potential for employment, there are two approaches that studies take. The first approach, the green sector approach, speaks about green job opportunities as though they are taking place in new sectors such as renewable energy or energy conservation. A review of six labour market studies demonstrates that the renewable energy and energy conservation sectors are most commonly identified as having the most employment opportunities. Four other sectors also identified include clean transportation, environmental protection, waste management and recycling, and energy management.

While the green sector approach does provide insight into the direction of the green economy and the areas that are particularly being affected, the approach can misrepresent the relationship between the green economy and the traditional economy. For example, the use of terminology such as "clean transportation" and "renewable energy" denotes separation from the traditional transportation and energy sectors, which is not the case. For this reason, many studies take another approach, the traditional sector approach, when describing the green economy. The traditional sector approach speaks about green job opportunities as though they are taking place in traditional sectors such as utilities or construction. Using this approach, the sectors identified as being most effected by the green economy are the energy, manufacturing and construction sectors.

Literature suggests that the skills needed for jobs in renewable energy and energy conservation include a combination of existing and new skills or knowledge. Both generic and technical skills used in occupations outside of the green economy are often transferable, and the development of new skills can be learned through on-the-job training and specialized courses.

Occupations in renewable energy include a variety of activities and mostly mirror the occupations found in the generation of traditional forms of energy generation. Occupations are found in the manufacturing and distribution of equipment, project development, and the construction and installation and operation and maintenance of energy facilities. Bioenergy also includes growing and harvesting biomass. These activities include a mixture of high, medium, and low skilled jobs.

Energy conservation, defined as energy efficient building including new building construction and retrofitting of existing buildings, also holds enormous opportunity for entry-level work. Building certifications and rating systems such as Leadership in Energy and Environmental Design (LEED) are driving the construction sector to adapt greener techniques in every stage of construction and renovation, from picking the location of a building to onsite practices of construction crews. For some occupations, such as construction labourers and machine operators, there is little change to the responsibilities and skills required in response to these standards. At the management level, enrolment in courses to become more familiar with sustainable building practices and building certification requirements may be necessary. For speciality trade occupations such as plumbers, electricians, carpenters, and HVAC installers, more in-depth training is needed to become familiar with new green technologies and techniques.

The recommendations for employment counsellors are as follows:

1. Review the six job task analyses found in Appendix A of this report. These will provide further insight into the nature of more common entry-level green jobs.

2. Use the inventories of training programs and employers found in Appendix B and C to connect youth to the appropriate training program and/or employer. Contact the Green Skills Network if you know of a training program or an employer that is not included in the inventory.

3. Review the map of renewable energy and energy conservation projects in Canada found in Appendix D to become familiar with the types of activity occurring in your community and province. These projects provide potential leads for your clients. Contact the Green Skills Network if you know of a project that is not included in the inventory.

4. Review the case studies in Appendix E, which serve as examples of different models for green jobs training programs. Contact the Green Skills Network if you would like support in implementing a training program in your community.

5. Stay informed about Green policy and investment as it relates to your community.

6. Visit the Green Skills Network website at www.greenskillsnetwork.ca for more information on green jobs.

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Introduction

As Canada transitions to a greener economy, its labour market is transforming and new employment opportunities are emerging. The green economy extends throughout the broader economy and is affecting many, if not all, traditional industries. Environmental Careers Organization of Canada (Eco Canada), an organization that determines human resource needs in the environmental industry, describes the green economy as follows:

> *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.*[1]

The implication of this description of a green economy with respect to new employment opportunities, or "green jobs" as they have been labelled, is that many of these new jobs are very much like the jobs found in traditional sectors, demanding the same or similar skills as existing jobs, and often requiring little or no additional training. However, especially where new technologies and techniques are becoming more commonplace, the greening of our economy is having an impact on the labour market, and employment counsellors, job developers and job seekers must be aware of these changes.

This literature review will assist employment counsellors, job developers, and job seekers in gaining a better understanding of the green economy and its labour effects, specifically regarding entry-level employment in renewable energy and energy conservation.

- **Entry-level** is *defined* as jobs that require less than a post-secondary degree.

The focus on entry-level jobs is due to the ongoing challenges in youth employment in Canada. The youth unemployment rate is almost double that of the country's total unemployment rate and is steadily increasing. Youth are competing in the job market against others in their cohort as well as two generations of workers who possess more work experience. Having a better understanding of emerging entry-level occupations and the skills needed to obtain employment in these areas can help youth enter the labour force and begin developing their careers.

- **Renewable energy** includes occupations found in the generation and distribution of wind energy, solar energy, bioenergy and hydropower.

- **Energy conservation** for the purpose of this report relates to jobs found in energy efficient building, including new building construction and retrofitting of existing buildings.

The focus on renewable energy and energy conservation is due to these sectors providing the most opportunity for entry-level work. As will be demonstrated in Part 1 of this literature review, a comparison of six labour market studies demonstrates that renewable energy and conservation have been identified as the two

[1] Environmental Careers Organization Canada, "Defining the Green Economy: Labour Market Research Study". 2010. Page 3.

sectors with the most employment opportunity. The literature also suggests that renewable energy not only creates more jobs per unit of electricity produced than traditional forms of energy do[2], but also creates more jobs for those with less education. According to one study, clean energy creates 3.6 times more jobs for people with high school degrees or less than fossil fuels do.[3]

Part One of this Literature Review will address the following questions:

- What is causing the transition to a green economy and how does this affect the labour market?
- What are green jobs?
- Which sectors offer the most opportunity for green jobs?

Part Two will focus specifically on renewable energy and energy conservation and will provide information on the skills and training needed to be successful in obtaining a job in these sectors as well as the types of occupations available in wind energy, solar energy, bioenergy, hydropower, and energy conservation.

[2] ClearSky Advisors Inc., "Economic Impacts of the Solar PV Sector in Ontario 2008-2018". July 2011. Page 15.

[3] RDA Global, "Green Collar Jobs: New Workforce Development Opportunities in Alberta". 2010. Page 7

Part One:

The Green Economy

SECTION 1:

How the Labour Market is Influenced

There is little disagreement among experts regarding the factors that are influencing the shift to a greener economy and the associated labour market effects. A study by Martinez-Fernandez, Hinojosa, and Miranda entitled *Green Jobs and Skills: the Local Labour Market Implications of Addressing Climate Change*, closely examines the ways in which the labour market is being affected by climate change, including direct impact from climate change, changes in consumer habits, and regulations.[4] Canadian literature parallels this study and identifies the following as key factors that are influencing the labour market:

- Climate change and other environmental issues
- Consumer habits
- Policy and regulation
- Financial investment

Canadian literature also identifies the changes occurring in the job market as a result of the abovementioned influencing factors:

- **Job creation**, which refers both to the development of new occupations that are specific to the green economy, such as an energy auditor, and the increased demand for workers, such as construction workers needed to perform retrofits on existing buildings to increase energy efficiency.

- **Job** loss, which refers to the phasing out of occupations in response to changing regulation and consumer demands. For example, as Canada moves away from using plastic bags and packaging, jobs relating to manufacturing these products will decrease.

- **Job adaptation**, which refers to the changes in existing jobs to reflect the new demands of the green economy. As indicated in both Canadian and non-Canadian literature, job adaptation is the most significant labour market effect of the green economy.

Influencing factors and their labour market affects are outlined below in further detail.

Climate Change and other Environmental Issues

Physical changes in the environment as a result of climate change (i.e. resource depletion and increases in natural disasters such as droughts and earthquakes) as well as pollution from fossil fuels, are transforming the labour market directly and indirectly:

- **Direct effects include** the development of new skills in industries such as agriculture and fishing to adapt to changing weather patterns and resource depletion, as well as the demand for additional workers to re-stabilize communities in the aftermath of a natural disaster.[5]

- **Indirect effects** refer to changes in the priorities and practices of consumers, investors, businesses and governments to mitigate the effects of climate change through an increased awareness of its negative consequences. These indirect effects and their influence on the demand for labour

[4] OECD/Martinez-Fernandez. C, Hinojosa C, Miranda G., "Green Jobs and Skills: The Local Labour Market Implications of Addressing Climate Change". 8 February 2010. Page 7.

[5] Strietska-Ilina, Olga, Christine Hofmann, Mercedes Durán Haro & Shinyoung Jeon, "Skills for Green Jobs: A Global View. 2011.

are outlined in more detail in the following pages.

Consumer Habits and Demands

Literature projects that despite increased efforts to conserve energy, energy use will continue to increase both in Canada and globally. One estimate calculates that electricity use in Canada will increase by 1.3% annually until 2020[6]. Energy conservation efforts, however, will affect the level of energy increase. In their study *Skills and Occupational Needs in Renewable Energy*, the International Labour Office calculates that with no policy changes, global energy use will rise by approximately 84% between 2007 and 2050, but is reduced to 32% if strong energy efficiency measures are put in place[7]. The increase in social awareness about the importance of conserving energy and of the negative effects of climate change has spurred interest among consumers for environmentally friendly and energy efficient products. This is increasing the demand for labour and creating new jobs as workers are needed in all stages of production and distribution for energy efficient products and services.

Policy

The government's actions to mitigate or adapt to the effects of climate change has a strong impact on the labour market with regard to job creation and job loss. The Canadian Centre for Energy Information, a non-profit organization that provides information on the Canadian energy system, identifies that all of Canada's provinces and territories have drafted energy and/or climate change strategies that include targets for reductions in greenhouse gas emissions, as well as conservation efforts and increased renewable energy use. Furthermore, some provinces have developed additional strategies or set specific goals relating to one or more of the renewable energies such as British Columbia's Bioenergy Strategy[8]. Strategies are reflective of each province's available resources. Many green jobs studies state that policies that include stipulations on the domestic content of renewable energy projects and incentivize private investment in renewable energy will result in further job creation.

Despite the efforts to increase renewable energy use and energy conservation efforts, many studies make special mention that Canada is still heavily reliant on fossil fuels, including oil, natural gas and coal. One study states that it is not likely that renewable energies will be effective in changing this reliance on fossil fuels or nuclear generation in the near future[9].

Financial Investment

The aforementioned energy strategies are not as easily achieved without financial investment. There are a number of federal and provincial initiatives that offer incentives and other provisions towards energy projects, though literature suggests that the Canadian government has not come up to par. A study entitled *Falling Behind: Canada's Lost Green Energy Jobs,* examines the relationship between financial investment and job creation. It estimates that in 2010 the federal government invested just under $300 million in renewable energy and energy efficiency, an investment that is relatively low when compared to other parts of the world, and demonstrates how an additional 65,000 jobs would have been created had Canada matched the United States' spending for that year. In sum, an increase in investment is a possibility and could spark further growth in job creation.

[6] Calvert, John and Marjorie Griffin Cohen, "Climate Change and the Canadian Energy Sector: Implications for Labour and Trade Unions". October 2011. Page 22.

[7] International Labour Office Skills and Employability Department, "Skills and Occupational Needs in Renewable Energy". 2011. Page 13.

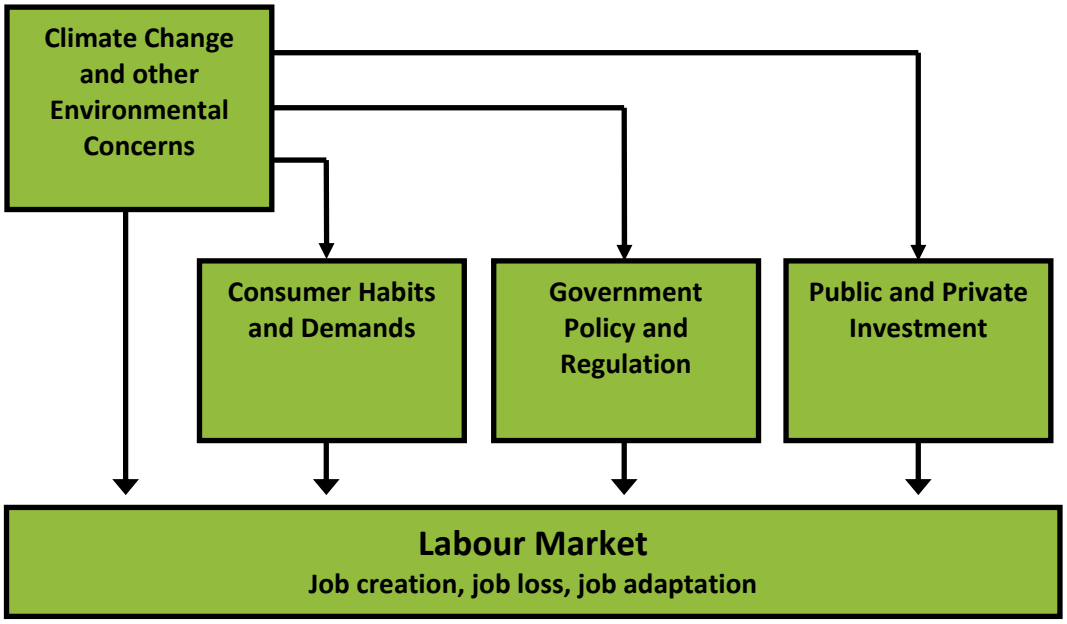
[8] Links to energy strategies can be found by visiting www.centreforenergy.com

[9] Calvert, John and Marjorie Griffin Cohen, "Climate Change and the Canadian Energy Sector: Implications for Labour and Trade Unions". October 2011. Page 14.

The labour market will be more or less affected depending on how strong and numerous the aforementioned influencing factors are. This implies that the changes that are occurring in the labour market will be felt differently across Canada.

Additionally, these changes are not static. Employment effects will fluctuate should policy or investment be strengthened or weakened over time. Figure 1 provides an overview of the factors that are influencing the demand for labour and the effects on the labour market.

Figure 1: Influencing the Demand for Labour



SECTION 2:
Defining Green Jobs

Defining green jobs is an ongoing and inconclusive debate in both Canadian and global literature. Canadian examples of definitions for green jobs are as follows:

> *"…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."*[10]

> *"These are occupations that facilitate the reduction of waste and pollution, improve the environment, and pay a livable wage with benefits that can support a family and offer potential for upward mobility."*[11]

> *"When an occupation produces an output or lowers the price of a product that offers positive environmental externalities, this may be considered in whole or in part as a green job."*[12]

> *"In a nutshell, green jobs are high-quality jobs that are saved or created by policies that will shift our* economy *toward greater sustainability."*[13]

Though there are a number of definitions available, definitions can be grouped together based on the emphasis that they put on certain features of green jobs. Eco Canada[14] and The Georgetown University Center on Education and the Workforce[15] have identified common approaches to defining green jobs based on these highlighted features, which are outlined in Figure 2.

Figure 2: Approaches to Defining Green Jobs

Industrial-Based Approach	Emphasizes the economic outputs of a particular job.
Occupational-Based Approach	Emphasizes the activities and inputs of a particular job.
Worker-Centred Approach	Emphasizes the quality of a job first (i.e. Adequate wages and opportunity for career advancement) and environmental consciousness second.
Energy-Centred Approach	Includes only jobs found within energy generation and conservation.
All-Encompassing Environmental Approach	Includes all jobs that improve or protect the environment in some way.

[10] Environmental Careers Organization Canada, "Defining the Green Economy: Labour Market Research Study". 2010. Page 4.

[11] Peel Halton Workforce Development Group, Toronto Workforce Innovation Group and Workforce Planning Board York Region, "Greening the Economy: Transitioning to New Careers". December 2009. Page 3.

[12] Globe Foundation, "Careers for a Sustainable Future: A Reference Guide to Green Jobs in British Columbia". September 2010. Page 9.

[13] Thompson, David, "Green Jobs: It's Time to Build Alberta's Future". Page 2.

[14] Environmental Careers Organization Canada, "Defining the Green Economy: Labour Market Research Study". 2010.

[15] Georgetown University Center on Education and Workforce, "State of Green: The Definition and Measurement of Green Jobs".

For some, the lack of a standard definition or approach to defining green jobs is unacceptable and is a roadblock to investment in the green economy. For example, Morris, Bogart, Dorchak and Meiners' *7 Myths about Green Jobs* states that "committing hundreds of billions of dollars to promoting a policy goal that lacks a transparent definition cannot be justified."[16] Without a clear definition, they propose that there can be no measure of green jobs and no comparison between green jobs studies, which can lead to uninformed policy debate and the creation of counterproductive environmental policies.

A perspective that provides some level of definitional consistency but that also allows for some flexibility comes from Martinez-Fernandez, Hinojosa, and Miranda, who provide several indicators of green jobs as opposed to one rigid definition. This study stipulates that in order for a job to be labelled green it needs to conform to several of the indicators, which are as follows:

1. The sector that a job is found within and whether it is considered to be a "green sector", such as renewable energy and recycling.
2. The **product or service's** impact or output on the environment provided by the company in which the job is found.
3. The **production method**, including techniques and practices, used by the company to provide its product or service.
4. The **green awareness** and commitment to the environmental cause displayed by the company.
5. The **position in the value chain** of the product or service.
6. The nature of the **occupational profile** and whether it contributes to improving the environment in some way.
7. The **specialized** green **skills and abilities** required for the job.
8. The level of **job decency** and whether it provides adequate wages, job security, safe working conditions, etc.
9. The **green workload** of the job that is dedicated to performing green tasks versus work in traditional areas. [17]

So while there is some sort of standardization, there is also flexibility for governments and communities to choose a definition that best reflects local conditions and abilities.

Although the debate in defining green jobs is inconclusive, studies are consistent in stating that green jobs span across multiple, if not all, industries of the economy, and include a variety of activities. This is why it is extremely difficult to find a standard definition that will incorporate all the different features of green jobs.

Part two of this literature review will focus specifically on green jobs in the renewable energy and energy conservation sectors, but it is important to understand that green jobs can be found throughout the economy and that they encompass a variety of occupations and activities. Industries that are being most affected by the transition to a green economy are discussed in the next section.

[16] Morriss, Andrew P, William T. Bogart, Andrew Dorchak, & Roger E. Meiners, "7 Myths about Green Jobs". 2009. Page 2.

[17] OECD/Martinez-Fernandez. C, Hinojosa C, Miranda G., "Green Jobs and Skills: The Local Labour Market Implications of Addressing Climate Change". 8 February 2010. Pages 22-23.

SECTION 3:
Areas of Opportunity

A close review of the literature reveals two approaches to identifying the sectors most affected by the transition to a green economy and creating the most green job opportunities:

- The **green sector approach,** which speaks about green job opportunities as though they are taking place in new sectors such as renewable energy or energy conservation.

- The **traditional sector approach,** which speaks about green job opportunities as though they are taking place in traditional sectors such as utilities or construction.

These two distinct ways of thinking found in the literature are likely due to the transitional phase of the green economy. Although in theory the green economy is not separate from the mainstream economy, there is currently a divide between industries that are shifting their activities and those that are not. This has led to the development of new "green" terminology to distinguish between green and non-green activities, and many studies on green jobs have incorporated this terminology into their writing. On the other hand, once the economy completes its transition and all industries and sectors of the economy are incorporating more environmentally friendly practices and standards, the terms "green" and "green economy" may become unnecessary. Therefore, some studies have refrained from using any new "green" terminology in their reporting. These two approaches are outlined below in more detail.

Green Sector Approach

For the studies that follow the green sector approach, there is a lack of consistency in categorizing the green sectors and sub-sectors. One can see the differences by reviewing three labour market studies, (one that is Canada-wide and two that are province specific to Alberta and British Columbia) which are outlined in Figure 3. In one example, the Canada-wide study lists transportation as a sector, whereas the BC study includes it as a sub-sector of energy management and efficiency.

Figure 3: Comparing Three Labour Market Studies Using the Green Sector Approach

Defining the Green Economy – Labour Market Research Study	A Reference Guide to Green Jobs in British Columbia	New Workforce Development Opportunities in Alberta
• Renewable energy and energy efficiency • Buildings, retrofitting and construction • Transportation and alternative transportation • Waste recycling and waste management	• Clean and Alternative Energy • Energy Management and Efficiency • Green Building • Environmental Efficiency • Carbon Finance and Investment • Green Knowledge and Support	• Green construction • Renewable Energy • Environmental Remediation • Green Manufacturing • Recycling • Sustainable Landscaping and Gardening

The inconsistency of green sector names makes it challenging to identify opportunities for labour market growth. However, a close review of six studies[18] using the green sector approach reveals that there are similarities between the sectors, making it possible to generate a list of green sectors most commonly identified as having the most employment opportunities. These sectors are as follows:

- **Renewable Energy (RE):** The generation and distribution of wind, solar, hydropower, and bioenergy.

- **Energy Efficient Building (EEB):** The construction of new buildings or retrofitting of existing buildings using new energy efficient techniques.

- **Clean Transportation (CT):** The development of new vehicles and technologies to reduce the amount of carbon emissions generated by the transportation sector.

- **Environmental Protection (EP):** The protection of and prevention of further damage to the environment's resources including water, air, and soil.

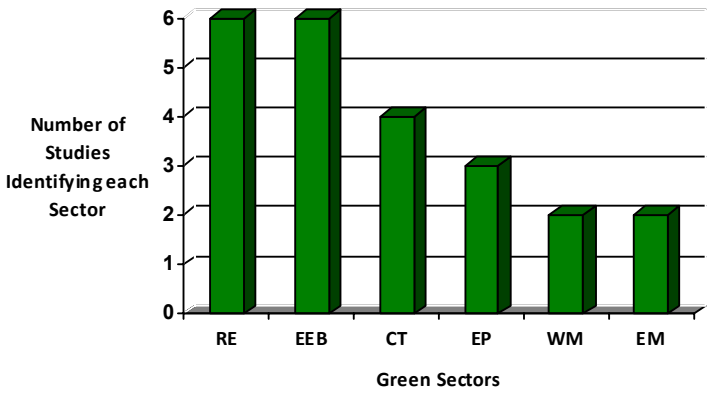
- **Waste Management and Recycling (WM):** the efforts made to collect, process and monitor waste to reduce negative environmental impacts of wasteful materials.

- **Energy Management (EM):** The storage and transmission of energy, such as a smart grid, in accordance with efficient and sustainable practices.

Figure 4 demonstrates the number of studies that identify each of the sectors and shows that the renewable energy and energy efficient building (a sub-sector of energy conservation) sectors are the two sectors most frequently identified. . For this reason, Part 2 of this report will focus specifically on renewable energy and energy conservation.

While the green sector approach does provide insight into the direction of the green economy and the areas that are particularly being affected, the approach can misrepresent the relationship between the green economy and the traditional economy. For example, the use of terminology such as "clean transportation" and "renewable energy" denotes separation from the traditional transportation and energy sectors, which is not the case.

Figure 4: Green Sectors Identified as Having Potential for Employment



[18] The six studies are as follows:

1. Environmental Careers Organization Canada, "Defining the Green Economy: Labour Market Research Study". 2010.
2. Globe Foundation, "Careers for a Sustainable Future: A Reference Guide to Green Jobs in British Columbia". 2010.
3. Newfoundland and Labrador Federation of Labour, "Good Jobs, Green Jobs: Exploring Opportunities for Newfoundland and Labrador". May 2009.
4. RDA Global, "Green Collar Jobs: New Workforce Development Opportunities in Alberta". 2010.
5. Strietska-Ilina, Olga, Christine Hofmann, Mercedes Durán Haro & Shinyoung Jeon, "Skills for Green Jobs: A Global View. 2011.
6. Thompson, David, "Green Jobs: It's Time to Build Alberta's Future.

Traditional Sector Approach

As previously mentioned, the green economy is not separate from the traditional economy; rather, it is an economy where traditional sectors are taking new approaches to producing goods and services that will result in a reduced negative impact. Therefore, it is worthwhile to identify the traditional sectors that are being most affected by the green economy. There are a number of studies that take this traditional approach, for example:

- A study conducted in the Greater Toronto Region identifies utilities, construction, manufacturing and retail trade as four sectors that are being greatly affected by the transition to the green economy. [19]

- A study and survey of employers conducted in California demonstrates the impact of the green economy on 20 traditional industries. The five most effected sectors include manufacturing, construction, professional, scientific, and technical services, wholesale trade, and agriculture, forestry, fishing and hunting.[20]

A review of Canadian literature reveals that the energy, manufacturing and construction sectors are the primary sectors that are being most affected by the green economy. This is due to the influencing factors discussed in section one of this report. It is important to note that these *sectors are very much intertwined.* For example, Pollin and Garrett-Peltier's study, *Building the Green Economy: Employment Effects of Green Energy Investments for Ontario*, demonstrates that manufacturing and construction jobs take up at least 50% of the jobs found in generating renewable energy.[21]

Other Labour Market Issues

It should be noted that the transition to a green economy is just one trend affecting labour markets. Some of the traditional sectors identified above are also projected to face a labour shortage in the coming years in Canada due to retirement of workers. Specifically:

- The construction sector will need to replace over 150,000 workers by 2017.[22]

- The manufacturing sector will require 400,000 new workers by 2019. [23]

- The electricity industry will see a decrease in its labour force by 5% per year.[24]

[19] Peel Halton Workforce Development Group, Toronto Workforce Innovation Group and Workforce Planning Board York Region, "Greening the Economy: Transitioning to New Careers". December 2009.

[20] State of California Employment Development Department Labor Market Information Division, "California's Green Economy: Summary of Survey Results". October 2010.

[21] Polin, Robert, and Heidi Garrett-Peltier, "Building the Green Economy: Employment Effects of Green Energy Investments for Ontario". Page 29.

[22] Skills Compétences Canada, "Media Fact Sheet: Skilled Trades Power Canada's Key Economic Sectors". 2009.. Page 1.

[23] Ibid

[24] Calvert, John and Marjorie Griffin Cohen, "Climate Change and the Canadian Energy Sector: Implications for Labour and Trade Unions". October 2011. Page 30

Part Two:

Occupations in Renewable Energy and Energy Conservation

SECTION 4:

Skills and Training for Jobs in Transition

Part one of this literature review identified renewable energy and energy conservation as the two green sectors that will experience the greatest labour market changes due to consumer habits and demands, policy, and investment. The following sections will discuss the skills required and occupational trends found in these sectors. The occupations available in these sectors range from lowly to highly skilled jobs, including but not limited to, general labourers, trades people, managers and engineers. The focus for this review is on the available entry level occupations. Job task analyses for six entry-level occupations can be found in Appendix A.

Literature suggests that the jobs in renewable energy and energy conservation require a combination of existing skills and new green skills or knowledge. Specifically, the skills needed for these jobs can be categorized as follows:

- Transferability of **existing skills** including:

  Generic skills – basic and routine skills needed for any place of employment, such as good communication

  Technical skills – more knowledge intensive skills that are usually developed through trades schools and apprenticeship programs

- Development of **new green skills and knowledge** through on-the-job training and specialized courses

The transferability of existing skills carries the most weight with respect to most green jobs. Some studies, such as *Greening the Economy: Transitioning to Green Careers*[25] and *Green Opportunities: Occupations in the Wind Industry*[26], will refer to the National Occupation Classification (NOC) system or the North American Industry Classification System (NAICS) and identify the skills that can be transferred over to related green occupations.

Eco Canada identifies four areas of skills and knowledge that are currently lacking in the green economy, which include both transferable and new skills and knowledge:

- Communication skills
- Adaptation to technological change
- Knowledge of sustainable development
- Interdisciplinary thinking[27]

The skills and knowledge areas identified by Eco Canada are prevalent in most literature on green jobs, especially with regard to knowledge of sustainable development and interdisciplinary thinking.

With regard to training to develop new green skills and knowledge, there are currently no standard certifications that have been developed for jobs in the renewable energy sector, but there are discussions to do so in some provinces. There are a number of programs available that develop the skills necessary for occupations in renewable energy and energy conservation. These programs vary in length and intensity. Additionally, certifications and

[25] D. Parsons & Associates, "Greening the Economy: Transitioning to New Careers". December 2009.
[26] Niagara Workforce Planning Board, "Green Opportunities: Occupations in the Wind Industry". March 2010.
[27] Environmental Careers Organization Canada, "Defining the Green Economy: Labour Market Research Study". 2010. Page 5.

standards in traditional sectors are evolving and beginning to integrate green training into their curriculum. An inventory of training and educational programs across the province can be found in Appendix B, and an in-depth look into five green jobs trainings programs can be found in Appendix E.

Since many of the occupations within renewable energy and energy conservation are still emerging, there is currently no consensus among employers with regard to qualifications for new hires. A numbers of surveys conducted by various organizations suggest that while some employers identify work experience as being necessary, others are willing to take on new graduates of trades programs. Most companies will offer additional on-the-job training for new hires that display an enthusiasm for the green economy and the ability to learn new skills. An inventory of employers who provide services in renewable energy or energy conservation can be found in Appendix C.

The next two sections will provide a more in-depth look at the trends and occupations available in each of the renewable energies as well as in energy conservation.

SECTION 5

Occupations in Renewable Energy

Occupations in renewable energy include those found in the generation and distribution of wind energy, solar energy, hydropower, and bioenergy[28]:

- **Wind energy** generates electricity through the use of wind turbines. Small scale wind turbines can generate power for a single house or farm, whereas wind farms can generate electricity for thousands of homes.

- **Solar energy** generates electricity from the sun's rays through the use of photovoltaic (PV) cells, which can be mounted on the ground or on rooftops. Solar PV cells are generally used in residential and commercial buildings, but a number of solar farms are emerging as well.

- **Bioenergy** generates electricity through the burning of wood waste and other organic matters, known as biomass.

- **Hydropower** generates electricity through the energy of flowing water. This can take several forms. The use of a dam and reservoir to retain water from a river is the most common.

Employment opportunities are increasing in all of the abovementioned renewable energies; however, there appears to be more Canadian literature available on occupations in wind and solar energy. Eco Canada's labour market research study specifically identifies specialized skills in wind and solar as an emerging skills gap in the green economy.[29]

Literature suggests that renewable energy not only creates more jobs per unit of electricity produced than traditional forms of energy do[30], but also creates more jobs for those with less education. According to one study, clean energy creates 3.6 times more jobs for people with high school degrees or less than fossil fuels do.[31]

For a map of renewable energy projects across Canada that serves to provide employment counsellors and job developers with potential leads for clients, please refer to Appendix D.

Occupations in renewable energy include a variety of activities and mostly mirror the occupations found in the generation of traditional forms of energy generation. For all the renewable energies, occupations are found in the following areas:

- Manufacturing and distribution of equipment
- Project development
- Construction and installation of energy facilities
- Operation and maintenance of energy facilities

Bioenergy includes one additional area:

- Growing and harvesting biomass

[28] The marine energy sector is also gaining momentum in Canada; however the current employment opportunities available are in Research and Development and are not entry level in nature. Therefore marine energy will not be discussed in further detail in this report, but it is important to note that this sector is moving forward and more opportunities will become available in the coming years.

[29] Environmental Careers Organization Canada, "Defining the Green Economy: Labour Market Research Study". 2010. Page 5.

[30] ClearSky Advisors Inc., "Economic Impacts of the Solar PV Sector in Ontario 2008-2018". July 2011. Page 15.

[31] RDA Global, "Green Collar Jobs: New Workforce Development Opportunities in Alberta". 2010. Page 7

The International Labour Office's *Skills and Occupational Needs in Renewable Energy* provides a table that lists the occupations found in each of these areas, and indicates whether the occupations are highly skilled (H), medium skilled (M) or low skilled (L).[32] A summarized version of this table is found in Figure 5.

Changing Profiles of Workers

The electricity industry workforce is primarily made up of white males; however, literature suggests that as many of the current workers begin to retire, the workforce will be undergoing changes to include more females, younger workers, immigrants and Aboriginal peoples.

The renewable energy and energy conservation sectors offer enormous opportunity for Aboriginal communities to be particularly influential for a number of reasons:

- The environmental sustainability principles of the green economy are already an integral part of Aboriginal culture.
- By law, companies must consult with Aboriginal communities before any project development on treaty or traditional land.[33]
- Companies are being offered financial incentives to partner with Aboriginal communities including First Nations, Métis and Inuit people. [34]

Wind Energy

The occupations in the wind industry sector are primarily found in operations and maintenance, manufacturing, construction and sales. The European Wind Energy Association identifies manufacturing as having the most opportunity.[35]

The recommended training for jobs in wind energy is enrolment in courses that provide general exposure and familiarity of wind issues and technologies. Most companies will offer on-the-job training for new employees. Examples of such training include:

- Training to become familiar with the different types of turbines. This type of training is offered regardless of experience.
- Software training for monitoring facility operation

Most literature on the wind industry identify wind turbine maintenance technician as an emerging new job. Although there is no standard certification for this type of job, there are a number of courses and programs available to develop the new skills associated with this position.

Representative jobs in wind power include electrical tradesperson, construction worker, general construction labourer, heavy equipment operator, operations manager, technical sales person, electricity sales person, marketing specialist, manufacturing plant worker, and turbine maintenance worker.

Solar Energy

Solar PV creates the most job opportunities per unit of electricity produced when compared to the other renewable energies.[36]

[32] International Labour Office Skills and Employability Department, "Skills and Occupational Needs in Renewable Energy". 2011. Page xxii-xxii

[33] Aboriginal Human Resource Council and the Ontario Sustainable Energy Association, "Green Energy Outlook: Generating Opportunities for Aboriginal Communities". 2010. Page 2.

[34] Ibid

[35] Niagara Workforce Planning Board, "Green Opportunities: Occupations in the Wind Industry". March 2010. Niagara Workforce Planning Board. Page 6.

[36] ClearSky Advisors Inc., "Economic Impacts of the Solar PV Sector in Ontario 2008-2018". July 2011. Page 15.

The occupations in the solar energy sector can be found in operations and maintenance, construction labour, warehousing and distribution, manufacturing, installation and sales.

An occupation that is receiving noticeable attention is a solar PV panel installer, and industry informants identify that there is a shortage of skilled solar PV installers. There is currently no standardized certification program for a solar panel installer, but specialized training is needed. Some companies will hire graduates of electrical or technical trades programs and then offer on-the-job or external training to develop the specialized PV skills.

Representative jobs in solar energy include manufacturer, assembler, electrical tradesperson for system installation and integration, technical salesperson, marketing specialist, business and finance specialist, and plant and operations manager.

Bioenergy

Like wind and solar, bioenergy creates opportunities in construction, manufacturing, and operation and maintenance. Additional jobs include farmers and foresters to produce and harvest the biomass resources, as well as truckers to transport the biomass to bioenergy plants. A common finding in the literature is that of all the renewable energies, bioenergy will create the most opportunity in rural areas.

The consensus in the literature is that the skills developed in trades and technical certificates are sufficient for jobs in the bioenergy sector. If additional specialized training is needed, employers will either offer on-the-job training or will provide outside training courses.

Representative jobs in bioenergy include plant operator, construction trades person, plumbing and pipefitting trades person, power systems trades person, maintenance engineering technician, component manufacturer, and technical salesperson.

Hydropower

Like the other renewable energies, occupations in hydro are primarily found in construction, manufacturing, and operation and maintenance. The average level of education suggested by the literature is engineering or trades programs. Most training is provided on the job.

The hydropower sector is more established than any of the other renewable energies. The major concern with this sector is in recruiting new workers due to the ageing workforce.

Representative jobs in hydropower include plant construction contractor and labourer, plant operator, maintenance engineering technician, and component manufacturer.

Figure 5: Summary of Job Skill Level

Area of Activity	Wind	Solar	Bioenergy	Hydro
Manufacturing and Distribution	H, M, L	H, M, L	H, M, L	Predominantly H and M
Project Development	H	H	H	H
Construction and Installation	H, M, L	H, M	H, M, L	H, M, L
Operation and Maintenance	M	Predominantly M, some H and L	H, M, L	H, M
Biomass Production	N/A	N/A	H, M, L	N/A

SECTION 6:

Occupations in Energy Conservation

Energy conservation for the purpose of this report includes those in energy efficient building, including new building construction and retrofitting of existing buildings. Building certifications and rating systems such as Leadership in Energy and Environmental Design (LEED) are driving the construction sector to adapt greener techniques in every stage of construction and renovation, from picking the location of a building, to installing new technologies such as ENERGY STAR products, to onsite practices of construction crews.

Drew Liming's *Careers in Green Construction*[37] demonstrates how the occupational profiles of those working in the construction sector are adapting in response to rating systems such as LEED. For some occupations, such as constructional labourers and machine operators, there is little change to the responsibilities and skills required in response to these standards. At the management level, enrolment in courses to become more familiar with sustainable building practices and building certification requirements may be necessary. For speciality trade occupations such as plumbers, electricians, carpenters, HVAC installers, more in-depth training is needed to become familiar with new green technologies and techniques. There are many courses and programs available, offered through community colleges, trade associations, and private companies. These courses and programs vary in length and intensity.

An important skill that is in demand for all construction workers is interdisciplinary or holistic thinking. A collaborative report by The Clean Air Partnership, the Canadian Urban Institute, and the Toronto Training Board found that energy efficient construction requires workers to be familiar with how buildings work as a system and how the work of each trade involved interconnects with each other.[38] An easy to scan chart that lists the technologies and practices that may require new knowledge and training can be found starting on page ten of the abovementioned report.

New Occupations

Roofers are experiencing tremendous opportunity in the area of solar panel installation, as the skills needed for both occupations are quite similar. This is especially true for roofers who are also trained as electricians. Many courses are available for roofers to learn the new skills related to solar panel installation.

With regard to retrofitting existing residential and commercial buildings, energy auditing is a new occupation emerging in this field. Energy audits are required both before and after renovations are done in order to measure improvements. Energy auditing is not an entry-level job in that it requires experience in construction and home inspection as well as completion of a training course; however, this occupation is believed to be a great opportunity for career advancement. As demand for renovations increases, the demand for energy auditors will increase as well.

Representative jobs in energy conservation include construction manager, construction labourer, construction equipment operator, carpenter, electrician, HVAC installer, plumber, insulation installer, painter, glazier, and roofer.

[37] Liming, Drew, "Careers in Green Construction". June 2011.

[38] Penney, Jennifer, Ireen Wieditz, Brent Gilmour, Jeff Evenson and Karen Lior, "Skills for Energy Efficient Construction: A Report on Trades Training for Energy Efficient Buildings in the Greater Toronto Area". March 2007.

SECTION 7:

Conclusions and Recommendations for Employment Counsellors and Job Developers

The green economy offers great potential for youth to enter the labour market and obtain entry level positions. This potential is driven by a number of different factors including climate change, consumer habits and demands and, most significantly, government policy and investment. Although there are definitional challenges regarding green jobs, the consensus is that green jobs affect many, if not all, industries of the economy, although some are more affected than others.

The area of the green economy that offers the highest level of opportunity for youth is in the energy sector, specifically the generation of renewable energy and in energy conservation. In addition to the energy sector, the construction and manufacturing sectors are also being greatly affected by the transition to a green economy. The opportunities in these three sectors are increasing even further due to many of the current workers reaching the age of retirement.

The skills required for occupations in renewable energy and energy conservation include both generic and technical skills, some of which are new and need to be developed and others which are easily transferable from other non-green occupations. The training and employment requirements for the occupations are not uniform, but there are a number of training programs that can support youth in developing at least the basic skills, and employers are generally able to offer additional on the job training. Knowledge of sustainability and interdisciplinary thinking are highly encouraged.

The recommendations for employment counsellors are as follows:

1. Review the six job task analyses found in Appendix A of this report. These will provide further insight into the nature of more common entry-level green jobs.

2. Use the inventories of training programs and employers found in Appendix B and C to connect youth to the appropriate training program and/or employer. Contact the Green Skills Network if you know of a training program or an employer that is not included in the inventory.

3. Review the map of renewable energy and energy conservation projects in Canada found in Appendix D to become familiar with the types of activity occurring in your community and province. These projects provide potential leads for your clients. Contact the Green Skills Network if you know of a project that is not included in the inventory.

4. Review the case studies in Appendix E, which serve as examples of different models for green jobs training programs. Contact the Green Skills Network if you would like support in implementing a training program in your community.

5. Stay informed about Green policy and investment as it relates to your community.

6. Visit the Green Skills Network website at www.greenskillsnetwork.ca for more information on green jobs.

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Websites

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APPENDIX A:

Job Task Analyses

The following six job task analyses were developed by an experienced job developer by comparing job descriptions, from knowledge acquired through reviewing green energy corporations and with consideration from support documents identified in the literature review. These descriptions are designed to give applicants, from varies backgrounds, a great opportunity to prove their fit based on experience, education and general interest.

Home Energy Auditor

Job Description

A Home Energy Auditor inspects and evaluates energy efficiency levels in a home or place of business and uses these findings to suggest cost saving improvements.

Responsibilities

- Identify major energy consumption devices
- Identify areas that drain energy
- Use of diagnostic tools and equipment
- Estimate cost of retrofits or changes
- Make recommendations for energy conservation
- Continuous learning and training
- Complete reports and detailed paperwork
- Stay up to date with trends, concepts and technology that effect green energy initiatives

Essential Skills or Experience

- Basic electrical, plumbing, or Heating and ventilation experience
- Consultative selling/partnership development
- Troubleshoot
- Tangible and proven experience in related field
- Understand energy usage, flow, concepts
- Courteous, great people skills
- Problem solving
- Positive attitude
- Attention to detail
- Good mathematical aptitude and accuracy
- Effective communication skills

Qualifications

- Interest in sustainable living concepts
- Grade 12 or an equivalent combination of education, skills development and experience
- Formal training in related trades
- Willing to travel
- Skills from a background in estimating, sales, consulting or home building are highly transferrable

Home Energy Retrofitter

Job Description

The Home Energy Retrofitter performs the cost saving changes recommended by the Home Energy Auditor to improve the efficiency of a home or place of business.

Responsibilities

- Change light bulbs and fixtures
- Change faucets and shower heads/aerators
- Replace caulking and weather stripping
- Building insulation
- Install green energy power – solar/wind
- Weatherization or weatherproofing activities
- Continuous learning and training
- Complete reports and detailed paperwork
- Stay up to date with trends, concepts and technology that effect green energy initiatives

Essential Skills or Experience

- Use of tools
- Troubleshoot
- Understand energy usage, flow, concepts
- Courteous, great people skills
- Problem solving
- Positive attitude
- Attention to detail
- Good mathematical aptitude and accuracy
- Effective communication skills

Qualifications

- Interest in sustainable living concepts
- Grade 12 or an equivalent combination of education, skills development and experience
- Basic electrical, plumbing, or heating and ventilation experience
- Willing to travel
- Skills from a background in electrical, carpentry, HVAC or plumbing are highly transferrable

Solar Panel Installer

Job Description

Solar Panel Installers assemble, install and activate solar panels on small and large scale projects.

Responsibilities

- Assemble and install solar panels in diverse applications
- Materials management
- Troubleshoot
- Site clean up
- Continuous learning and training
- Complete reports or paperwork
- General equipment maintenance
- Work at heights
- Work with wood, steel and aluminum
- Stay up to date with trends, concepts and technology that effect green energy initiatives

Essential Skills or Experience

- Use of tools
- Fabrication or machining
- Basic electrical, plumbing, welding or construction experience
- Troubleshoot
- Layout/blue print interpretation
- Attention to detail
- Positive attitude
- Time management
- Ability to perform duties safely
- Work both as part of a team and independently
- Good mathematical aptitude and accuracy
- Ability to multi task
- Effective communication skills

Qualifications

- Interest in sustainable living concepts
- Interest in hands on employment
- Grade 12 or an equivalent combination of education, skills development and experience
- Fall arrest
- Willing to travel for extended periods
- Willing to work long hours
- Physically fit
- Skills from a background in roofing, electrical, plumbing, automotive or HVAC are highly transferrable

Bioenergy Plant Operator

Job Description

The Bioenergy Plant Operator will assist with the processes that convert biomass into useable energy.

Responsibilities

- Handle raw materials
- Work in a fast paced manufacturing environment
- Alter the properties of raw materials
- Continuous learning and training
- Complete reports or paperwork
- Monitor characteristic changes in products, as per specifications
- Work both as part of a team and independently
- Stay up to date with trends, concepts and technology that effect green energy initiatives

Essential Skills or Experience

- Use of basic tools
- Work under pressure
- Troubleshoot
- Attention to detail
- Significant use of memory
- Job tasks planning and organizing
- Ability to manage comprehensive tasks
- Finding information
- Basic computer skills
- Ability to multi task
- Effective communication skills

Qualifications

- Ability to perform duties safely
- Interest in sustainable living concepts
- Interest in hands on employment
- Grade 12 or an equivalent combination of education, skills development and experience
- Workplace Hazardous Materials Information System (WHMIS)
- Physically fit
- Skills from a background in food processing, fermentation or biology are highly transferrable

Wind Turbine Maintenance Technician

Job Description

Wind Turbine Maintenance Technicians assist with the installation and maintenance of wind turbines for both large and small applications.

Responsibilities

- Assemble and install wind turbines in diverse applications
- Materials management
- Troubleshoot
- Continuous learning and training
- Complete reports or paperwork
- Service and preventative maintenance
- Work at heights
- Stay up to date with trends, concepts and technology that effect green energy initiatives
- Work both as part of a team and independently
- Site clean up

Essential Skills or Experience

- Ability to perform duties safely
- Basic computer skills
- Ability to multi task
- Effective communication skills
- Good mathematical aptitude and accuracy
- Comfortable working from heights

Qualifications

- Interest in sustainable living concepts
- Interest in hands on employment
- Grade 12 or an equivalent combination of education, skills development and experience
- Fall arrest certification
- Willing to travel regularly for extended periods
- Willing to work long hours
- Physically fit (must be able to lift up to 75lbs, walk, climb, reach, balance, kneel)
- Skills from a background in electrical, HVAC, maintenance or automotive or wiring are highly transferable

Wind Turbine Manufacturing Technician

Job Description

Wind Turbines capture wind energy which is converted into mechanical energy. As part of a manufacturing team, Wind Turbine Manufacturing Technicians assist with the production of wind turbines that are destined for both large and small applications.

Responsibilities

- Assemble and dismantle wind turbines in whole or in part
- Work in a fast paced manufacturing environment
- Perform quality inspections on parts and finished products
- Materials management
- Continuous learning and training
- Complete reports or paperwork
- Preventative maintenance
- Work as part of a team and independently
- Stay up to date with trends, concepts and technology that effect green energy initiatives

Essential Skills or Experience

- Use of tools
- Fabrication or machining
- Basic electrical, plumbing, welding or construction experience
- Troubleshoot
- Basic computer skills
- Ability to multi task
- Effective communication skills
- Ability to perform duties safely
- Layout/blue print interpretation
- Tangible and proven experience in related field

Qualifications

- Interest in sustainable living concepts
- Interest in hands on employment
- Grade 12 or an equivalent combination of education, skills development and experience
- Workplace Hazardous Materials Information System (WHMIS)
- Physically fit (must be able to lift up to 75lbs, climb, reach, balance, kneel)
- Skills from a background in electrical, HVAC, maintenance, automotive or wiring are highly transferable

APPENDIX B

Inventory of Training Programs

The Green Skills Network has compiled an inventory of Canadian programs which provide training and courses in renewable energy and energy conservation. This inventory is provided to Employment Counsellors and Job Developers to allow them to identify training resources in support of their clients' pursuit of work in these sectors.

While this inventory is thorough it is not exhaustive. The Network did not come across any programs in Newfoundland, Nunavut and Saskatchewan that were specific to renewable energy and energy conservation. It is important to note that there are many programs available that are not included in this inventory that provide training for green jobs outside of these two areas of the green economy.

If your organization knows of any programs which should be added to the inventory, please contact the Network at info@greenskillsnetwork.ca.

ALBERTA

Edmonton

Northern Alberta Institute of Technology
Course: Alternative Energy Technology

Duration: 1 to 2 years
Cost: $6929.34

Requirements:
• Grade 12 English
• Math 30 Pure
• Chemistry 20
• Physics 20

Phone: 780-471-6248
E-mail: AskNAIT@nait.ca
Website: www.nait.ca

Northern Alberta Institute of Technology
Course: Biological Sciences Technology - Renewable Resources

Duration: 1 to 2 years
Cost: $5828.34

Requirements:
• Grade 12 English
• Math 30 (Pure or Applied)
• Chemistry 30
• Biology 30 (with 65% overall average)
• Successful completion of the NAIT PreTech Program (Stream 3) is considered equivalent to the listed entrance requirements.

Phone: 780-491-3914
E-mail: trevora@nait.ca
Website: www.nait.ca

Lethbridge

Lethbridge College
Course: Wind Turbine Technician Training Program

Duration: 6 months to 1 year

Requirements:
Alberta High School Diploma or equivalent with a minimum grade of 50% in
• Math 20P (Pure) or Math 20A (Applied)
• English Language Arts (ELA) 30-1 or 30-2
plus a minimum of 10 high school science credits or equivalents.

Phone: 403-320-3319
E-mail: windturbine@iwea.ca
Website: www.lethbridgecollege.ca

BRITISH COLUMBIA

Burnaby

British Columbia Institute of Technology
Course: Sustainable Energy Manager Associate Certificate

Phone: 604-432-8857
E-mail: steve_finn@bcit.ca
Website: www.bcit.ca

Castlegar

Selkirk College
Course: Integrated Environmental Planning

Duration: 1 to 2 years
Cost: $8077.05

Requirements:
• Principles of Math 11 with minimum C+ OR Applications of Math 11 with minimum B.

Phone: 250-365-1425
Website: www.selkirk.ca

Dawson Creek

Northern Lights College
Course: Wind Turbine Maintenance Technician

Duration: 6 months to 1 year

Requirements:
Grade 10 level completion including:
• Grade 10 English, or Career and College Preparation (CCP) English 030 Intermediate English with minimum C+ and
•Grade 10 Math or CCP Math 030 Intermediate Mathematics, with C+ OR
•Completion of Wind Turbine Maintenance Assessment with a 70% grade or higher.

Phone: 250-784-7505
E-mail: hmayer@nlc.bc.ca
Website: www.nlc.bc.ca

New Westminster

Douglas College
Course: Building Energy and Resource Management Certificate Program

Cost: $6000

Requirements:
• Math 11 and Physics 11 OR equivalent
• International education OR equivalent work experience

Phone: 604-527-5001
E-mail: chapellb@douglas.bc.ca
Website: www.douglas.bc.ca

Victoria

Camosun College (Interuban Campus)
Course: Environmental Technology: Diploma in Environmental Technology

Duration: 1 to 2 years

Requirements:
• C+ in English 12
• C+ in Principles of Math 12
• C+ in Biology 12
• C+ in Chemistry 12 and Physics 11

Phone: 250-370-3459
Website: www.camosun.ca

MANITOBA

Brandon

Assiniboine Community College
Course: Environmental Technologies

Duration: 1 to 2 years
Cost: Approximately $6,895

Requirements:
• A complete Manitoba Grade 12 English 40G/40S or equivalent
• Pre-calculus or Applied Mathematics 40S or equivalent

Phone: 204-725-8718
E-mail: technology@assiniboine.net
Website: www.public.assiniboine.net

Winnipeg

BOMA e-Energy Training
Course: The BOMA e-Energy Training program

Phone: 204-777-2662
E-mail: info@bomamanitoba.ca
Website: www.bomamanitoba.ca

NEW BRUNSWICK

Moncton

New Brunswick Community College
Course: Electrical Engineering Technology: Alternate Energy Systems

Duration: 1 to 2 years

Requirements:
• High School Diploma or Adult High School Diploma or GED Diploma of High School Equivalency
• Geometry and Applications in Mathematics 112 and Functions and Relations 112
• One (1) additional science from the following: Biology 112 or 122,Chemistry 112 or 122, Physics 112 or 122 (Recommended)

Phone: 506-856-2220
E-mail: student.services@nbcc.ca
Website: www.nbcc.ca

NORTHWEST TERRITORIES

Fort Smith

Aurora College (Thebacha Campus)
Course: Environment and Natural Resources Technology Program

Duration: 1 to 2 years

Requirements:
Determined on the basis of the student's abilities in English, Mathematics and Science. The applicant should possess a grade 12 diploma and must have earned credits (minimum 65%) in:
• English 30-2 or Aurora College ABE English 150
• Applied Mathematics 30 or Aurora College ABE Math 150
• Grade 12 Biology, Chemistry or Physics or Aurora College ABE Science 140/150.

• Applicants are required to possess or be eligible to obtain a valid Firearms Acquisition and Possession License to successfully complete field camp requirements.
• Students must be motivated to work in the field of environment and natural resources and demonstrate their motivation in a letter of intent.
• Applicants may be asked to participate in a personal or telephone interview with the Program Head or a designate.
• Mature students and students with academic equivalences will be considered on a case-by-case basis.

Phone: 867-872-7500
Website: www.auroracollege.nt.ca

Inuvik

Aurora College (Aurora Campus)
Course: Environment and Natural Resources Technology Program

Duration: 1 to 2 years

Requirements:
Determined on the basis of the student's abilities in English, Mathematics and Science. The applicant should possess a grade 12 diploma and must have earned credits (minimum 65%) in:
• English 30-2 or Aurora College ABE English 150
• Applied Mathematics 30 or Aurora College ABE Math 150
• Grade 12 Biology, Chemistry or Physics or Aurora College ABE Science 140/150.

• Applicants are required to possess or be eligible to obtain a valid Firearms Acquisition and Possession License to successfully complete field camp requirements.
• Students must be motivated to work in the field of environment and natural resources and demonstrate their motivation in a letter of intent.
• Applicants may be asked to participate in a personal or telephone interview with the Program Head or a designate.
• Mature students and students with academic equivalences will be considered on a case-by-case basis.

Phone: 867-777-7800
Website: www.auroracollege.nt.ca

NOVA SCOTIA

Chester Basin

Solar Nova Scotia
Course: Solar Shelter Workshop

Duration: Less than 2 weeks
Cost: $90

Requirements: None

Phone: 902-852-4758
E-mail: info@solarns.ca
Website: www.solarns.ca

Dartmouth

Nova Scotia Community College
Course: Building Environmental Systems (BES) Certificate

Phone: (902) 491-1166
E-mail: Brenda.Silver@nscc.ca
Website: www.nscc.ca

Nova Scotia Community College
Course: Environmental Engineering Technology - Water Resources

Duration: 1 to 2 years

Requirements:
High School Diploma or equivalent, including Academic Grade 12 English, Math and Chemistry

Phone: 902-491-1100
E-mail: waterfront.info@nscc.ca
Website: www.nscc.ca

Halifax

Solar Nova Scotia
Course: Solar Shelter Workshop

Duration: Less than 2 weeks
Cost: $90

Requirements: None

Phone: 902-852-4758
E-mail: info@solarns.ca
Website: www.solarns.ca

Lawrencetown

Nova Scotia Community College
Course: Energy Sustainability Engineering Technology

Duration: 1 to 2 years

Requirements:
High School Graduation Diploma including:
• Academic Grade 12 Math and English, and Physics or Chemistry OR
• A certificate, diploma, or degree in a trade, physical science, engineering, or architecture program OR
• Equivalent industry experience.

Phone: 902-825-3491
E-mail: avc.info@nscc.ca
Website: www.nscc.ca

Windsor

Solar Nova Scotia
Course: Solar Shelter Workshop

Duration: Less than 2 weeks
Cost: $90

Requirements: None

Phone: 902-852-4758
E-mail: info@solarns.ca
Website: www.solarns.ca

ONTARIO

Aurora

REpower Ontario
Course: Green Economy 101

Duration: Less than 2 weeks
Cost: $535

Requirements:
• 16 years and older
• Competency in spoken and written English

Phone: 905-727-0491 ext 114
E-mail: jslykhuis@windfallcentre.ca
Website: www.windfallcentre.ca

Haileybury

Northern College of Applied Arts and Technology
Course: Natural Resource Technician

Duration: 1 to 2 years
Cost: $2318.24

Requirements:
• Ontario Secondary School Diploma (OSSD)
• Grade 12 English and Math (MCT4C preferred; MAP4C is accepted with a minimum GPA of 60%)
• 11 Biology and 12 Chemistry recommended

Phone: 705-567-9291 ext 3705
E-mail: kallior@northern.on.ca
Website: www.northernc.on.ca

Haliburton

Fleming College
Course: Sustainable Building Design and Construction

Duration: 1 to 6 months
Cost: $3855.25 per semester

Requirements:
OSSD with the majority of credits at the College (C) and Open (O) level, including:
• 2 College English courses (Grade 11 or 12) OR
• A current Certificate of Qualification as a Carpenter - General

Phone: 705-749-5514
E-mail: pmarcott@flemingc.on.ca
Website: www.flemingcollege.com

Kingston

St. Lawrence College
Course: Energy Systems Engineering Technician

Duration: 1 to 2 years
Cost: $3480.49

Requirements:
• Ontario Secondary School Diploma or equivalent with Grade 12 Math at the C or U level (or MCR3U) and MCT4C Recommended
• The majority of Grade 11 and 12 courses must be college or university preparation level.
• Students are encouraged to include Physics (SPH4C) in their high school program.

Phone: 613-544-5400 ext.1245
E-mail: dathersych@sl.on.ca
Website: www.stlawrencecollege.ca

St. Lawrence College
Course: Wind Turbine Technician

Duration: 1 to 2 years
Cost: $3480.49

Requirements:
Ontario Secondary School Diploma or equivalent with Grade 12 Math at the C or U level (or MCR3U or MCF3M) and MCT4C Recommended.

Phone: 613-544-5400 ext 1463
E-mail: Rbaur@sl.on.ca
Website: www.stlawrencecollege.ca

Kitchener

Academy for Clean Energy
Course: 5-Day Entry-level Course for Solar PV Design and Installation

Duration: Less than 2 weeks
Cost: $1,999 + HST

Phone: 519-870-0468
E-mail: info@academyforcleanenergy.ca
Website: www.academyforcleanenergy.ca

Academy for Clean Energy
Course: Ontario Wind School

Phone: 519-870-0467
E-mail: info@academyforcleanenergy.ca
Website: www.academyforcleanenergy.ca

Academy for Clean Energy
Course: Ontario Biogas School

Phone: 519-870-0466
E-mail: info@academyforcleanenergy.ca
Website: www.academyforcleanenergy.ca

Conestoga College (Doon Campus)
Course: Renewable Energy Techniques

Duration: 6 months
Cost: $3622.44

Requirements:
- Ontario Secondary School Diploma (OSSD) or equivalent or 19 years of age or older with mature student status
- Grade 12 compulsory English, C or U, or equivalent, OR Conestoga College Preparatory Communications (COMM1270).
- Grade 11 Mathematics, C, M (U/C) or U, or equivalent, OR Conestoga College Preparatory Mathematics for Trades (MATH1420).
- English and/or mathematics testing may be required.
- Grade11 and/or 12 Sciences, Physics, Biology, Chemistry, C or U, or equivalent is recommended.

Phone: 519-748-5220 ext. 3656
Website: www.conestogac.on.ca

London

Academy for Clean Energy
Course Name: 5-Day Entry-level Course for Solar PV Design and Installation

Duration: Less than 2 weeks
Cost: $1,999 + HST

Phone: 519-870-0467
E-mail: info@academyforcleanenergy.ca
Website: www.academyforcleanenergy.ca

Academy for Clean Energy
Course: Ontario Wind School
Phone: 519-870-0466
E-mail: info@academyforcleanenergy.ca
Website: www.academyforcleanenergy.ca

Academy for Clean Energy
Course: Ontario Biogas School

Phone: 519-870-0467
E-mail: info@academyforcleanenergy.ca
Website: www.academyforcleanenergy.ca

Mississauga

Infinite Solar Renewable Energy Professional Training
Course: 5-Day Entry Level Solar PV Design and Installation Course

Duration: Less than 2 weeks

Requirements:
Basic computer skills, familiarity with equations, fractions and algebra, ability to safely lift 50 lbs.

Phone: 289-801-1880
E-mail: info@infinite-solar.com
Website: www.infinite-solar.com

Infinite Solar Renewable Energy Professional Training
Course: 2-Day Solar PV Hands-on Workshop

Duration: Less than 2 weeks

Requirements: None

Phone: 289-801-1881
E-mail: info@infinite-solar.com
Website: www.infinite-solar.com

Infinite Solar Renewable Energy Professional Training
Course: 1-Day Solar Sales Course

Duration: Less than 2 weeks

Requirements:
Completion of the Infinite Solar PV Installation and Design Course or a similar IREC Accredited Solar PV Course

Phone: 289-801-1882
E-mail: info@infinite-solar.com
Website: www.infinite-solar.com

Ontario Solar Academy
Course: 5 Day Solar PV Design & Installation

Duration: Less than 2 weeks
Cost: $2295

Requirements:
Basic computer skills, familiarity with equations, fractions and algebra, ability to safely lift 50 lbs.

Phone: 416-900-7191
Website: www.solaracademy.com

Schuco Solar Training
Course: Photovoltaic Training

Duration: Less than 2 weeks
Cost: $350

Requirements: None

Phone: 860-616-0213
E-mail: carolevancedarfield@schueco-usa.com
Website: www.schueco.com

Newcastle

College of Renewable Energy
Course: 6 Month Solar Renewable Energy Technologist

Duration: 6 months to 1 year
Cost: $8995

Requirements:
Preferred Credentials:
• High School Graduate
• 3-10 years work experience, preferably in a hand-skills environment.
• Willing and anxious to learn for a new career.

Phone: 905-987-5475
Website: www.collegeofrenewableenergy.com

College of Renewable Energy
Course: 5 Day NABCEP Course

Duration: Less than 2 weeks
Cost: $2495

Phone:905-987-5475
Website: www.collegeofrenewableenergy.com

Oshawa

Durham College
Course: Energy Audit Techniques

Duration: 1 to 2 years
Cost: $2954

Requirements:
Ontario Secondary School Diploma, General Education Development, Academic and Career Entrance – College Prep or Mature Student Status plus senior level (Grade 11 or higher) subject credits in:
• Grade 12 English;
• Grade 12 Math (College TechnologyMCT4C)*;
• Computer Literacy Skills (recommended);
• Construction Technology (TCJ4C) and/or Manufacturing Technology (TMJ4E) and/or Technological Design (TDJ4M) (recommended);
• Physics (recommended).

*Alternate mathematics entrance opportunity - If you apply to this program with either Grade 11 mathematics university/college preparation (3M), university preparation (3U); or Grade 12 College and Apprenticeship Mathematics (MAP4C), completed or in progress, you will be considered for admission. However, you must successfully complete an upgrading math program at the college. There is no additional fee for this math upgrading.

Phone: 905-721-3000
E-mail: admissions@durhamcollege.ca
Website: www.durhamcollege.ca

Durham College
Course: Renewable Energy Technician

Duration: 1 to 2 years
Cost: $2954

Requirements:
Ontario Secondary School Diploma, General Education Development, Academic and Career Entrance – College Prep or Mature Student Status plus senior level (Grade 11 or higher) subject credits in:
• Grade 12 English;
• Grade 12 Math (College TechnologyMCT4C)*;
• Computer Literacy Skills (recommended);
• Construction Technology (TCJ4C) and/or Manufacturing Technology (TMJ4E) and/or Technological Design (TDJ4M) (recommended);
• Physics (recommended).

*Alternate mathematics entrance opportunity - If you apply to this program with either Grade 11 mathematics university/college preparation (3M), university preparation (3U); or Grade 12 College and Apprenticeship Mathematics (MAP4C), completed or in progress, you will be considered for admission. However, you must successfully complete an upgrading math program at the college. There is no additional fee for this math upgrading.

Phone: 905-721-3000
E-mail: admissions@durhamcollege.ca
Website: www.durhamcollege.ca

Perth

Algonquin College
Course: Construction Carpentry - Advanced Housing

Duration: 1 to 2 years
Cost: $1,110 per term in Levels 1 and 2 and $1,102.40 per term in Levels 3 and 4.

Requirements:
• Ontario Secondary School Diploma or equivalent. Applicants with an OSSD showing senior English and/or Math courses at the Basic Level or with Workplace or Open courses, will be tested to determine their eligibility; OR
• Academic and Career Entrance (ACE) certificate; OR
• General Educational Development (GED) certificate; OR
• Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee of $40 (subject to change) will be charged.

Phone: 613-267-2859
E-mail: AskAlgonquin@algonquincollege.com
Website: www.algonquincollege.com

Peterborough

Fleming College
Course: Sustainable Building Design and Construction

Duration: 1 to 6 months
Cost: $3,875 per semester

Requirements:
• OSSD with the majority of credits at the College (C) and Open (O) level, including 2 College English courses (Grade 11 or Grade 12) OR
• A current Certificate of Qualification as a Carpenter - General.

Phone: 705-749-5530
E-mail: admissions@flemingc.on.ca
Website: www.flemingcollege.com

Sarnia

Lambton College
Course: Alternative Energy Engineering Technology

Duration: More than 2 years
Cost: $10,618.17

Requirements:
OSSD or equivalent with:
• Grade 12 English (C or U)
• Grade 12 Mathematics (C or U)
• Recommended, but not required: Grade 11 or 12 Physics (C or U) and Grade 11 or 12 Chemistry

Phone: 519-542-7751 ext 2436
E-mail: techschool@lambton.on.ca
Website: www.lambton.on.ca

Sault Ste. Marie

Sault College of Applied Arts and Technology
Course: Renewable Energy and Green Construction Techniques

Duration: 1 to 2 years
Cost: $3,217.39

Requirements:
Ontario Secondary School Diploma with Grade 12 English (C) ENG4C or mature student status.

Phone: 705-759-2554 ext 2525
E-mail: robert.mctaggart@saultcollege.ca
Website: www.saultcollege.ca

St. Catherine

Niagara College, on the Lake Campus
Course: Environmental Technician-Field and Laboratory (Co-op)

Duration: 1 to 2 years
Cost: $4,035.40 per year

Requirements:
Ontario Secondary School Diploma (OSSD), or equivalent, including the following:
• English - any Grade 12 (C) or (U), or equivalent.
• Math - any Grade 12 (C) or (U), or equivalent.
• Chemistry - Grade 11 (U) or Grade 12 (C) or (U)

Phone: 905-735-2211ext 7619
E-mail: admissions@niagaracollege.ca
Website: www.niagaracollege.ca/content

Sudbury

Cambrian College
Course: Energy Systems Technology (ESTY)

Duration: More than 2 years
Cost: $3,336.58 per year

Requirements:
Ontario Secondary School Diploma or equivalent or mature student status, including:
• Grade 12 English (C), (U), or (M)
• Grade 12 Math (C), (U), or (M) (MCT4C is highly recommended)
• Grade 12 physics (C), (U), or (M) and any technology subjects (construction, manufacturing design, transportation) is recommended.

Phone: 705-566-8101 ext. 7578
E-mail: kameal.mina@cambriancollege.ca
Website: www.cambriancollege.ca

Toronto

Centennial College
Course: Energy Systems Engineering Technician

Duration: 1 to 2 years
Cost: $3478.16

Requirements:
• Ontario Secondary School Diploma (OSSD) or equivalent or be 19 years of age or older.
• Compulsory English 12C or U or skills assessment, or equivalent
• Math 11M or U, or 12C or U, or skills assessment, or equivalent

Phone: 416-289-5000 ext. 2356
E-mail: energy@centennialcollege.ca
Website: www.centennialcollege.ca

Centennial College
Course: Introduction to Alternative Energy Technologies

Duration: Less than 2 weeks
Cost: $591.25

Phone: 416-289-5000 ext. 8172
E-mail: energy@centennialcollege.ca
Website: www.centennialcollege.ca

Centennial College
Course: Hands on Solar Energy Workshop

Duration: 2 to 4 weeks
Cost: $695

Phone: 416-289-5300
E-mail: cei@centennialcollege.ca
Website: www.centennialcollege.ca

Humber College
Course: Sustainable Energy and Building Technology-Co-op

Duration: More than 2 years
Cost: $3587.08

Requirements:
• Ontario Secondary School Diploma or equivalent, or mature student status including:
• Grade 12 English
• Grade 12 Math
• Two Grade 11 or Grade 12 C, U or M courses in addition to those listed above
• Applicants who do not possess the required courses may complete admission testing to determine equivalencies.

Phone: 416-675-6622 ext. 4536
E-mail: robert.hellier@humber.ca
Website: www.humber.ca

Seneca College
Course: Photovoltaic (Solar) Clerk

Requirements:
• Ontario Secondary School Diploma or Mature Student Status
• Basic keyboarding skills
• Ability to use Microsoft Office Word

Phone: 416-491-5050 x22499
E-mail: Vince.Bennici@senecacollege.ca
Website: www.senecacollege.ca

Seneca College
Course: Photovoltaic (Solar) Design Assistant

Requirements:
• Ontario Secondary School Diploma or mature student status
• Ability to use Microsoft Office required.
• Mathematics for College Technology and Business and Technological Communications at the Grade 12 level an asset.

Phone: 416-491-5050 x22499
E-mail: Vince.Bennici@senecacollege.ca
Website: www.senecacollege.ca

Seneca College
Course: Photovoltaic (Solar) Installation Assistant

Requirements:
• Ontario Secondary School Diploma (OSSD) or mature student status.
• Mathematics for College Technology at the Grade 12 level an asset.

Phone: 416-491-5050 x22499
E-mail: Vince.Bennici@senecacollege.ca
Website: www.senecacollege.ca

Seneca College
Course: Photovoltaic Systems

Requirements:
A basic level of electrical background is recommended for students entering this program: electricians, electrical engineers, electrical technologists and technicians and electronic technologists and technicians; contractors or persons with no educational credentials but who have work experience in the solar energy industry.

Phone: 416-491-5050 x 22499
E-mail: Vince.Bennici@senecacollege.ca
Website: www.senecacollege.ca

Welland

Niagara College, Welland Campus
Course: Renewable Energy Technician

Duration: 1 to 2 years
Cost: $3,617.90 per year

Requirements:
Ontario Secondary School Diploma or equivalent, including:
• Grade 12 English
• Grade 12 Math

Phone: 905-735-2211 ext 7619
E-mail: admissions@niagaracollege.ca
Website: www.niagaracollege.ca

Whitby

Durham College
Course: Energy Management and Sustainable Building Technology

Duration: More than 2 years
Cost: $2,424

Requirements:
Ontario Secondary School Diploma, General Education Development, Academic and Career Entrance – College Prep or Mature Student Status plus senior level (Grade 11 or higher) subject credits in:
• Grade 12 English;
• Grade 12 Math (College TechnologyMCT4C)*;
• Computer Literacy Skills (recommended);
• Construction Technology (TCJ4C) and/or Manufacturing Technology (TMJ4E) and/or Technological Design (TDJ4M) (recommended);
• Physics (recommended).

*Alternate mathematics entrance opportunity - If you apply to this program with either Grade 11 mathematics university/college preparation (3M), university preparation (3U); or Grade 12 College and Apprenticeship Mathematics (MAP4C), completed or in progress, you will be considered for admission. However, you must successfully complete an upgrading math program at the college. There is no additional fee for this math upgrading.

Phone: 905-721-2000
E-mail: admissions@durhamcollege.ca
Website: www.durhamcollege.ca

Windsor

St. Clair College
Course: Energy Systems Design Technology

Duration: More than 2 years
Cost: $3,172.69 for Year 1

Requirements:
OSSD with the majority of courses at the College (C), University (U), University/College (M) or Open (O) level plus:
• Grade 12 Math (C) or (U)
• Senior Level Physics (C) or (U)

Phone: 519-972-2727 ext 4435
E-mail: bsedlacek@stclaircollege.ca
Website: www.stclaircollege.ca

Woodbridge

Kortright Centre
Course: Eco-Home Renovations

Duration: Less than 2 weeks
Cost: $125

Phone: 416-667-6281
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Photovoltaic Generation (PVG)

Duration: Less than 2 weeks
Cost: $125

Phone: 416-667-6282
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Utility Connected Photovoltaic Installation (UPVI)

Duration: Less than 2 weeks
Cost: Course: $195 (Exam: add $250)

Requirements:
• Prerequisite: Photovoltaic Generation
• Recommended: Green Energy Introduction
• The majority of the course will be spent outdoors; participants should dress accordingly.

Phone: 416-667-6283
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Wind Energy (WND)

Duration: Less than 2 weeks
Cost: $125

Requirements:
Portions of the day will be spent outdoors; participants should dress accordingly.

Phone: 416-667-6284
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Off-Grid Systems Installation (OGSI)

Duration: Less than 2 weeks
Cost: $195

Requirements:
• Prerequisite: Green Energy Introduction, Photovoltaic Generation, Remote Power Systems for Cottages and Developing Countries
• The entire workshop will be conducted outdoors; participants should dress accordingly.

Phone: 416-667-6285
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Remote Power Systems for Cottages and Developing Countries (OGS)

Duration: Less than 2 weeks
Cost: $125
Requirements:
• Recommended: Green Energy Introduction
• Prerequisite: Photovolatic Generation
• Portions of the day will be spent outdoors; participants should dress accordingly.

Phone: 416-667-6286
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Solar Professional Training Course (PTC)

Duration: Less than 2 weeks
Cost: $1600

Phone: 416-667-6287
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

Kortright Centre
Course: Sustainable Energy Options (Green Energy Introduction)

Duration: Less than 2 weeks
Cost: $125

Phone: 416-667-6288
E-mail: TheCampus@trca.on.ca
Website: www.thelivingcitycampus.com

PRINCE EDWARD ISLAND

Summerside

Holland College
Course: Wind Turbine Technician
Duration: 6 months to 1 year
Cost: $4,500

Requirements:
• High School Diploma or equivalent
• Grade 11 or 12 Physics
• Class 5 Drivers Licence
• Medical exam

Phone: 902-888-6433
E-mail: amdibling@hollandcollege.com
Website: www.hollandcollege.com

QUEBEC

Gaspé

Centre de Gaspe
Course: Mechanical and Industrial Electronics - Maintenance of Wind Turbines

Duration: Between 1 and 2 years
Cost: Estimated total cost is $820

Requirements:
• Hold a High School diploma or hold an education considered sufficient by the College
• Mathematics 416.
• Physical Science 416.
• Demonstrate independence in carrying out their duties.
• Be able to work as a team.
• Can plan and organize their work efficiently.
• Be able to adapt to various work environments (snow, sleet, ice, wind, etc..).
• Be able to work at heights and confined spaces.
• Have good physical shape;
• Knowledge of English is an asset.

Phone: 418-368-2201 ext 1608
E-mail: abachand@cegepgim.ca
Website: www.collegia.qc.ca

Montreal

Université du Québec à Montréal
Course: Bachelor of Environmental Design
Duration: More than 2 years

Requirements:
• Knowledge of French
• Hold a college diploma or equivalent
• Have a documented work experience, combined with a demonstrated interest in design. Submit a portfolio outlining his experience in design and / or a letter.

Phone: 514-987-3000 ext 7691
E-mail: prog.bacc.designenvironnement@uqam.ca
Website: www.programmes.uqam.ca

Cégep Limoilou
Course: Technology Building Systems

Requirements:
Meet the requirements for admission to college and the following prerequisites:
•Technical and Scientific Mathematics (064,406) of the 4th secondary OR Natural sciences (065,406) of the 4th secondary
•Science and Environmental Technology (058404) of the 4th OR Secondary Science and Environment (058402) of the 4th secondary
or
•Math 436 - 068-436 / 4101-2, 4102-1, 4103-1, 4104-2, 4105-1, 4106-1, 4107-1, 4108-1, 4109-1, 4110-1, 4111-2 or equivalent
•Physical Science 436 - 056-486 and 056-430 or 056-416 and 056-430 / 4010-2, 4011-2, 4012-2

Phone: 418-647-6600
E-mail: infolimoilou@climoilou.qc.ca
Website: www.climoilou.qc.ca

YUKON

Whitehorse

Yukon College
Course: Environmental and Conservation Sciences

Duration: More than 2 years
Cost: $108/one-credit course, $324/three-credit course

Requirements:
• Students may complete two years (60 credits) in either the Renewable Resource Management or Northern Science diploma program at Yukon College before transferring into the University of Alberta B.Sc. ENCS Program for years three and four; other routes of entry are also available.
• Applicants apply to the University of Alberta, after consulting with an ENCS Advisor in the Division of Applied Science and Management at Yukon College.

Phone: 867-668-8898
E-mail: kaitken@yukoncollege.yk.ca
Website: www.yukoncollege.yk.ca

ONLINE

Grande Prairie Regional College
Course: Traditional Building Workshops

Duration: 2 to 4 weeks

Requirements:
High School Diploma

Phone: 780-835-6617
E-mail: ypeterson@gprc.ab.ca
Website: www.gprc.ab.ca

Ontility Store
Course: Solar Electric Training

Cost: $995

Requirements:
• Basic math skills
• Use of the Internet
• Problem solving skills
• Use of a calculator.
• Use of basic hand tools is for lab participation

Phone: +1 (877) 858-7479 Toll Free
E-mail: info@ontility.com
Website: www.ontility.com

Ontility Store
Course: PV Technical Sales

Cost: $795

Requirements:
It is highly recommended that students complete Ontility Y Entry Level Solar Electric Training or an equivalent course before registering for PV Technical Sales.

Phone: +1 (877) 858-7479 Toll Free
E-mail: info@ontility.com
Website: www.ontility.com

APPENDIX C:

Inventory of Employers

The Green Skills Network has compiled an inventory of Canadian companies that provde services in renewable energy and energy conservation. This inventory is provided to Employment Counsellors and Job Developers to allow them to identify employment resources in support of their clients' pursuit of work in the green economy.

It is important to note that there are many companies not included in this inventory that provide services in other areas of the green economy.

While this inventory is thorough it is not exhaustive. If your organization knows of any businesses which should be added to the inventory, please contact the Network at info@greenskillsnetwork.ca.

ALBERTA

Beaverlodge

Solarwyse Ltd
Phone: 888-402-4376
E-mail: sales@solarwyse.ca
Website: www.solarwyse.ca

Calgary

Alberta Wind Energy Corporation
Phone: 403-262-9299
E-mail: amydj@shaw.ca
Website: www.albertawindenergy.net

ASH-Autonomous & Sustainable Housing Inc.
Phone: 403-239-1882
E-mail: jdo@ecobuildings.net
Website: www.ecobuildings.net

Bow Art Energy Ltd.
Phone: 403-264-2259
E-mail: contactus@bowark.com
Website: www.bowark.com

DC Power Corp
Phone: 403-720-3850
E-mail: info@dcpowercorp.com
Website: www.dcpowercorp.com

Enbridge
Phone: 403-231-3900
E-mail: webmaster-corp@enbridge.com
Website: www.enbridge.com

Enmax Corp.
Phone: 403-514-6100
E-mail: careers@enmax.com
Website: www.enmax.com

Genalta Power Inc.
Phone: 403-237-9740
E-mail: info@genaltapower.com
Website: www.genaltapower.com

Green Calgary
Phone: 403-230-1443
E-mail: info@greencalgary.org
Website: www.greencalgary.org

Greengate Power Corporation
Phone: 403-514-0556
E-mail: info@greengatepower.com
Website: www.greengatepower.com

Naturener Renewable Energy
Phone: 403-699-9724
Website: www.naturener.net

Oak Environment Inc
Phone: 403-250-9810
E-mail: info@oakenviro.com
Website: www.oakenviro.com

Qsolar
Phone: 403-775-1266
Website: www.qsolar.net

Sedmek Inc.
Phone: 403-398-0881
E-mail: sales@sedmek.com
Website: www.sedmek.com

SkyFire Energy Inc.
Phone: 403-251-0668
E-mail: info@skyfireenergy.com
Website: www.skyfireenergy.com

Suncor Energy Inc
Phone: 403-296-8000
E-mail: info@suncormail.com
Website: www.suncor.com

Sustainable Energy Technologies
Phone: 403-508-7177
Website: www.sustainableenergy.com

TransAlta
Phone: 403-267-7110
E-mail: info@transalta.ca
Website: www.transalta.com

Didsbury

Boyd Solar Corp.
Phone: 403-335-3330
Website: www.boydsolar.com

Duffield

Solar Panel
Phone: 1-866-892-0132
E-mail: solarpanel@primus.ca
Website: www.solarpanel.ca

Edmonton

Ameresco Canada
Phone: 780-425-2200
E-mail: canadajobs@ameresco.com
Website: www.ameresco.ca

Earth's General Store
Phone: 780-439-8725
E-mail: egs@shawbiz.ca
Website: www.earthsgeneralstore.ca

Energreen Technologies
Phone: 780-433-7508
E-mail: hr@evergreentechnologies.com
Website: www.evergreentechnologies.com

Home Pure Water & Solar
Phone: 780-470-3197
E-mail: homepure@telusplanet.net
Website: www.homepuresolar.com

K-1 Hybrids
Phone: 1-877-486-8650
E-mail: info@k1hybrids.com
Website: www.k1hybrids.com

Millenium Power Ltd.
Phone: 780-450-6186
E-mail: guy@millenniumpower.ca
Website: www.millenniumpower.ca

Off the Grid – Renewable Energy Power Systems
Phone: 780-641-9450
E-mail: sales@getoffthegrid.ca
Website: www.getoffthegrid.ca

Trimline Design Centre Inc.
Phone: 780-387-5857
E-mail: info@trimlinedesigncentre.com
Website: www.trimlinedesigncentre.com

ATCO Energy Sense
Phone: 403-245-7868
E-mail: energysense@atco.com
Website: www.atcoenergysense.com

Provident Solar Ltd
Phone: 1-780-983-8483
E-mail: info@providentsolar.com
Website: www.providentsolar.com

Edson

Living Systems Designs
Phone: 780-723-3533
Website: www.sunandstraw.com

Nisku

Lancaster Wind Systems Inc.
Phone: 780-979-9965
E-mail: mccwind@telus.net
Website: www.lancasterwindsystems.ca

Olds

CAP Solar Pumps Ltd
Phone: 403-556-8779
E-mail: info@capsolar.com
Website: www.capsolar.com

Pincher Creek

Wind Power Inc
Phone: 403-627-2923
E-mail: wpi@windpower.ca
Website: www.windpower.ca

Sherwood Park

Climate Change and Emission Management Corporation
Phone: 780-417-1920
E-mail: info@ccemc.ca
Website: www.ccemc.ca

St. Albert

Threshold Energy Corporation
Phone: 780-459-9433
E-mail: mail@gothreshold.com
Website: www.gothreshold.com

BRITISH COLUMBIA

Burnaby

Day4 Energy
Phone: 604-297-0444
Website: www.day4energy.com

Diacarbon Energy Inc.
Phone: 604-291-0001
E-mail: info@diacarbon.com
Website: www.diacarbon.com

Castlegar

Columbia Power Corporation
Phone: 250-304-6060
E-mail: cpc.info@columbiapower.org
Website: www.columbiapower.org

Courtenay

Terratek Energy Solutions
Phone: 1-250-897-3877
E-mail: sales@terratek.ca
Website: www.terratek.ca

Delta

Canadian Solar Technologies
Phone: 604-721-6565
E-mail: info@canadiansolartechnologies.ca
Website: www.canadiansolartechnologies.ca

Run of River Power Inc.
Phone: 604-946-9232
E-mail: info@runofriverpower.com
Website: www.runofriverpower.com

Kelowna

IPS Integrated Power Systems
Phone: 250-769-2843
Website: www.ipwr.net

Nainamo

Anderson Greenplan Ltd.
Phone: 250-722-3456
E-mail: info@greenplan.ca
Website: www.greenplan.ca

Barkley Project Group Ltd.
Phone: 250-390-2627
E-mail: nfo@barkley.ca
Website: www.barkley.ca

Nelson

Selkirk Power Company Ltd.
Phone: 250-352-5573
E-mail: info@selkirkpower.com
Website: www.selkirkpower.com

Prince George

All-Wood Fibre
Phone: 250-563-1770
E-mail: info@all-woodfibre.com
Website: www.all-woodfibre.com

Alterna Biocarbon
Phone: 250-649-2460
E-mail: info@alternaenergy.ca
Website: www.alternabiocarbon.com

Bluekey Energy Inc.
Phone: 250-562-0300
E-mail: Erin.forsberg@bluekeyenergy.com
Website: www.bluekeyenergy.ca

Brink Forest Products
Phone: 250-564-0412
E-mail: johnbrink@brink.bc.ca
Website: www.brink.bc.ca

Carrier Lumber Ltd.
Phone: 250-563-9271
E-mail: tkuzma@carrierlumber.bc.ca
Website: www.carrierlumber.bc.ca

Deltech
Phone: 250-564-3585
Website: www.deltech.ca

Dunkley Lumber Ltd
Phone: 250-998-4421
Website: www.dunkleylumber.com

Environmental Dynamics Inc.
Phone: 250-562-5412
E-mail: employment@edynamics.com
Website: www.edynamics.com

Pacific BioEnergy Corporation
Phone: 250-562-7220
E-mail: info@pacificbioenergy.ca
Website: www.pacificbioenergy.ca

Pinnacle Pellet Inc.
Phone: 250-562-5562
E-mail: info@pinnaclepellet.com
Website: www.pinnaclepellet.com

Ruskin Construction Ltd.
Phone: 250-563-2800
E-mail: careers@ruskinconstruction.com
Website: www.ruskinconstruction.com

Sinclar Group Forest Products Ltd.
Phone: 250-563-3423
Website: www.sinclar.com

Western Biomass Power Corp
Phone: 250-564-2911

Western Industrial Contractors (WIC)
Phone: 250-962-6011
E-mail: joanhood@wicltd.com
Website: www.wicltd.com

Richmond

Cascadia Ecohomes Ltd.
Phone: 604-241-1337
E-mail: info@cascadiaecohomes.com
Website: www.cascadiaecohomes.com

S.U.N. Solar Energy Co.
Phone: 778-297 5070
Website: www.sunsolarenergy.ca

Sidney

Aeolis Wind Power Corporation
Phone: 250-655-0330
E-mail: info@aeoliswindpower.com
Website: www.aeoliswind.ca

Surrey

Endurance Wind Power
Phone: 1-888-440-4451
E-mail: info@endurancewindpower.com
Website: www.endurancewindpower.com

P2 Solar Inc.
Phone: 1-888-945-4440
E-mail: info@p2solar.com
Website: www.p2solar.com

Vancouver

Alterra Power Corp.
Phone: 604-669-4999
E-mail: info@alterrapower.ca
Website: www.alterrapower.ca

Ameresco Canada
Phone: 604-684-4984
E-mail: canadajobs@ameresco.com
Website: www.ameresco.ca

Canfor Corporation
Phone: 604-661-5241
E-mail: careers@canfor.com
Website: www.canfor.com

Castle Mountain Hydr Ltd.
Phone: 250-442-7002
E-mail: info@castlemountainhydro.ca
Website: http://www3.telus.net/cmhl/index.htm

CO2 Impact
Phone: 778-384-0733
E-mail: info@co2impact.com
Website: www.co2impact.com

Elemental Energy
Phone: 604-648-6630
E-mail: info@elementalenergy.ca
Website: www.elementalenergy.ca

Finavera Wind Energy
Phone: 604-288-9051
E-mail: info@finavera.com
Website: www.finavera.com

Innergex Renewable Energy Inc
Phone: 604-633-9990
E-mail: info@innergex.com
Website: www.innergex.com

Nexterra Energy Corp
Phone: 604-637-2501
E-mail: careers@nexterra.ca
Website: www.nexterra.ca

Sea Breeze Power Corporation
Phone: 604-689-2991
E-mail: info@seabreezepower.com
Website: www.seabreezepower.com

Swift Power Corp
Phone: 604-637-6393
E-mail: alexi@swiftpower.ca
Website: www.swiftpower.ca

Synex Energy Resources Ltd
Phone: 604-688-8271
E-mail: gsunell@synex.com
Website: www.synex.com

Syntaris Power Corp.
Phone: 1-778-329-9629
E-mail: info@syntaris.com
Website: www.syntarispower.com

Vanderhoof

Avison Management Services Ltd.
Phone: 250-567-2111
E-mail: mailus@avison.ca
Website: www.avison.bc.ca

BID Construction Ltd.
Phone: 250-567-9255
Website: www.bidconst.com

Premium Pellet Ltd.
Phone: 250-567-4701
E-mail: premium@nechako.com
Website: www.premiumpellet.com

Victoria

Carmanah Technologies
Phone: 1-877-722-8877
E-mail: info@carmanah.com
Website: www.carmanah.com

Clean Air Landscaping
Phone: 250-220-1872
E-mail: info@cleanairlandscaping.ca
Website: www.cleanairlandscaping.ca

Energy Alternatives Ltd.
Phone: 250-727-0522
E-mail: sales@energyalternatives.ca
Website: www.energyalternatives.ca

Williams Lake

EarthRight Solar — Solareagle
Phone: 250-392-7119
E-mail: info@solareagle.com
Website: www.solareagle.com

MANITOBA

Steinbach

Evolve Green
Phone: 1-866-538-6583
E-mail: support@evolvegreen.ca
Website: www.evolvegreen.ca

Winnipeg

Cengea
Phone: 204-957-7566
E-mail: contact-me@cengea.com
Website: www.cengea.com

Stantec
Phone: 204-942-2505
E-mail: hr@stantec.com
Website: www.stantec.com

Manitoba Eco-Network
Phone: 204-947-6511
E-mail: info@mbeconetwork.org
Website: www.mbeconetwork.org

Manitoba Hydro
Phone: 204-360-7282
E-mail: employment@hydro.mb.ca
Website: www.hydro.mb.ca

Solar Solutions Inc
E-mail: solar@solarsolutions.ca
Website: www.solarsolutions.ca

NEW BRUNSWICK

Fredericton

New Brunswick Power
Phone: 506-458-4444
E-mail: customerservices@nbpower.com
Website: www.nbpower.com

Kars

Renewable Energy New Brunswick Ltd.
Phone: 506-485-2249
E-mail: support@renewcanada.com
Website: www.renewcanada.com

Knowlesville

Falls Brook Centre
Phone: 506-375-8143
E-mail: ja@fallsbrookcentre.ca
Website: www.fallsbrookcentre.ca

Saint John

Efficiency New Brunswick
Phone: 506-643-2860
E-mail: tracey.somers@gnb.ca
Website: www.efficiencynb.ca

Clear Power Solutions
Phone: 506-653-9021
E-mail: jason.roach@nb.aibn.com
Website: www.clearpowersolutions.com

NEWFOUNDLAND AND LABRADOR

Colliers

Cansolair Inc.
Phone: 709-788-3010
E-mail: jim@cansolair.com
Website: www.cansolair.com

Mount Pearl

Emberley
Phone: 709-368-1093
Website: www.emberley.com

St. John's

Nalcor Energy
Phone: 709-737-1440
E-mail: info@nalcorenergy.com
Website: www.nalcorenergy.com

St. Phillips

Newfound Energies
Phone: 709-895-6626
E-mail: Gerry@nfenergies.com
Website: www.labradorcoastal.com

Torbay

Ptarmigan Energy Inc.
Phone: 819-797-4545
E-mail: leopower@ptarmiganenergy.com
Website: www.ptarmiganenergy.com

NORTHWEST TERRITORIES

Fort Simpson

Arctic Energy Alliance
Phone: 867-695-2355
E-mail: dean.green@aea.nt.ca
Website: www.aea.nt.ca

Inuvik

Arctic Energy Alliance
Phone: 867-777-2068
E-mail: inuvik@aea.nt.ca
Website: www.aea.nt.ca

Norman Wells

Arctic Energy Alliance
Phone: 867-587-3520
E-mail: leanne.robinson@aea.nt.ca
Website: www.aea.nt.ca

Whati

Arctic Energy Alliance
Phone: 867-573-3030
E-mail: sonny_zoe@yahoo.com
Website: www.aea.nt.ca

Yellowknife

Arctic Energy Alliance
Phone: 867-920-3333
E-mail: info@aea.nt.ca
Website: www.aea.nt.ca

NOVA SCOTIA

Bedford

Atlantic Wind Power Corporation
Phone: 902-835-3352
E-mail: info@awpc.com
Website: www.awpc.com

Shear Wind Inc
Phone: 902-444-7420
E-mail: info@shearwind.com
Website: www.shearwind.com

Bridgewater

The Nodding Group (TNG)
Phone: 902-543-7994
E-mail: info@thenoddinggroup.ca
Website: www.thenoddinggroup.ca

Cleveland

Sun Ross Energy Systems Limited
Phone: 902-625-1539
E-mail: info@sunrossenergy.ca
Website: www.sunrossenergy.ca

Dartmouth

Eon WindElectric
Phone: 902-482-8687
E-mail: info@ecoelectric.com
Website: www.eonwind.com

Natural Forces Technologies Inc
Phone: 902-423-6094
E-mail: rapold@naturalforces.ca
Website: www.naturalforces.ca

Scotian Wind Fields Inc.
Phone: 1-877-798-5085
Website: www.scotianwindfields.ca

Seaforth Energy
Phone: 902-406-4400
E-mail: info@seaforthenergy.com
Website: www.seaforthenergy.com

Watts Wind Energy Inc.
Phone: 902-448-1416
E-mail: dregan@seaforthenergy.com
Website: www.wattswindproject.com

Halifax

Atlantic Solar Systems
Phone: 902-576-5678
Website: www.atlanticsolarsystems.ca

Aztek Solar Ltd.
Phone: 902-407-7778
E-mail: azteksolar@eastlink.ca
Website: www.azteksolar.ca

Creative Solar
Phone: 902-446-8161
E-mail: info@creativesolar.ca
Website: www.creativesolar.ca

Wind Prospect Inc.
Phone: 902-422-9663
E-mail: info@windprospect.ca
Website: www.windprospect.com

LaHave

Green Lizard
Phone: 902-523-0417
E-mail: info@green-lizard.ca
Website: www.green-lizard.ca

Lower Sackville

Renewable Energy Services Limited
Phone: 902-442-8200
E-mail: lpl@resl.ca
Website: www.resl.ca

Mabou

Black River Wind Limited
Phone: 902-258-3354
E-mail: info@blackriver.ns.ca
Website: www.blackriver.ns.ca

Pictou

Nova Sun Power
Phone: 902-485-6147
E-mail: nsp@novasunpower.com
Website: www.novasunpower.com

Salt Springs

RMSenergy
Phone: 902-925-9463
E-mail: info@rmsenergy.ca
Website: www.rmsenergy.ca

Sydney

Cape Breton Explorations Ltd. (CBEX)
Phone: 902-539-0147
E-mail: luciano@capebretonexplorations.com
Website: www.capebretonexplorations.com

Tatamagouche

Colchester-Cumberland Wind Field Inc. (CCWF)
Phone: 902-657-1064
E-mail: david.r.stevenson@ns.sympatico.ca
Website: www.ccwf.ca

Windsor

SAGE Energy Inc
Phone: 902-799-1047
E-mail: admin@sage-energy.ca
Website: www.sageenergysolutions.ca

NUNAVUT

Iqaluit

Qulliq Energy Corporation
E-mail: webmaster@npc.nu.ca
Website: www.nunavutpower.com

ONTARIO

Aurora

Solar Power Network
Phone: 416-479-0333
E-mail: info@solarpowernetwork.ca
Website: www.solarpowernetwork.ca

Aylmer

IGPC Ethanol Inc.
Phone: 519-765-2575
E-mail: info@igpc.ca
Website: www.igpc.ca

Bancroft

Bancroft Wind & Solar Corporation
Phone: 613-332-2533
E-mail: info@bancroftwindsolar.com
Website: www.bancroftwindsolar.com

Barrie

Dommelvalley Green Power
Phone: 705-331-4199
E-mail: info@dommelvalley.ca
Website: www.dommelvalley.ca

RePower Canada Inc.
Phone: 705-797-8477
E-mail: solutions@repowercanada.com
Website: www.repowercanada.com

The Barrie Wind Catchers
Phone: 705-737-1512
E-mail: info@barriewindcatchers.com
Website: www.barriewindcatchers.ca

Bracebridge

Alternative Power Energizing
Phone: 705-644-0964
E-mail: info@alternative-power.ca
Website: www.alternative-power.ca

Brampton

Honeybee Solar inc.
Phone: 1-888-245-2819
E-mail: info@honeybeesolar.com
Website: www.honeybeesolar.com

Brantford

Natural Power Products
Phone: 519-752-6939
E-mail: info@npp.ca
Website: www.npp.ca

Breslau

Enerliv
Phone: 1-877-501-3626
E-mail: info@enerliv.ca
Website: www.enerliv.ca

Buckhorn

Flanagan & Sun
Phone: 705-875-3132
E-mail: sean.flanagan@flanaganandsun.com
Website: www.flanaganandsun.com

Burlington

Excess Energy
Phone: 416-809-8658
E-mail: vernsherwood@rogers.com
Website: www.excessenergy.net

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

Caledon

Sashaan Inc.
Phone: 416-986-8507
E-mail: gdenhaan@sashaan.com
Website: www.sashaan.com

Cambridge

Photowatt Ontario Inc.
Phone: 519-650-6535
E-mail: info@photowattontario.com
Website: www.photowattontario.com

Chatham

Eco Insulation
Phone: 519-352-2586
E-mail: info@ecoinsulation.ca
Website: www.ecoinsulation.ca

Collingwood

Amaizeingly Green Products, L.P.
Phone: 705-445-1140
Website: www.amaizeinglygreen.com

Concord

Icarus Power Generation Inc.
Phone: 905-836-0108
E-mail: info@icaruspower.ca
Website: www.icaruspower.ca

Elk Lake

Temiskaming Independent Energy
Phone: 1-877-367-6035
E-mail: sales@tempower.com
Website: www.tempower.com

Etobicoke

Fogo Retrofit Inc
Phone: 416-252-8444

Tepsmart Technology Ltd.
Phone: 647-892-5537
E-mail: info@tepsmarttech.com
Website: www.tepsmarttech.com

The Energy Store
Phone: 416-231-8800
E-mail: info@theenergystore.ca
Website: www.theenergystore.ca

Georgetown

Egmond Associates
Phone: 416-782-7227
E-mail: info@egmondassociates.com
Website: www.egmondassociates.com

Grimsby

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

Guelph

Canadian Solar Technologies
Phone: 519-763-7957
E-mail: info@GreenAndCleanDirect.com
Website: www.canadiansolartechnologies.ca

Hamilton

Eco Insulation
Phone: 905-381-4244
E-mail: hamilton@ecoinsulation.ca
Website: www.ecoinsulation.ca

Green Monsters Home Energy
Phone: 905-536-3988
E-mail: N/A
Website: www.greenmonsters.ca

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

Havelock

Kawartha Ethanol
Phone: 705-778-1916
E-mail: info@kawarthaethanol.com
Website: www.kawarthaethanol.ca

Hawkesbury

Dyco Solar Inc
Phone: 613-656-3791
E-mail: jobs@dyco.ca
Website: www.dyco.ca

Huntsville

Advenergy
Phone: 705-644-4605
E-mail: info@advenergy.ca
Website: www.advenergy.ca

Ingersoll

Rosco Electric
Phone: 519-425-4224
E-mail: roscoelectric@rogers.com
Website: www.roscoelectric.ca

Innisfil

Solar Connections
Phone: 705-300-2144
E-mail: service@solarconnections.info
Website: www.solarconnections.info

Solar Wind Electric
Phone: 866-283-6933
E-mail: info@solarwindelectric.ca
Website: www.solarwindelectric.ca

Iroquois

ReDriven Power Inc.
Phone: 1-866-330-0007 ext 501
E-mail: jobs@redriven.ca
Website: www.redriven.ca

Killaloe

Living Sol Building and Design
Phone: 613-756-3884
E-mail: info@livingsol.com
Website: www.livingsol.com

King City

Robert B. Somerville co. ltd.
Phone: 905-833-3100
Website: www.rbsomerville.com

Kingston

Axio Power
Phone: 613-545-0215
Website: www.axiopower.ca

Centennial Global Technology Inc.
Phone: 613-536-0333
E-mail: obs@centennialgt.com
Website: www.centennialglobaltechnology.com

Fusetek
Phone: 1-800-479-3875
E-mail: info@fusetek.com
Website: www.fusetek.com

Quantum Renewable Energy Inc.
Phone: 613-546-2326
E-mail: info@quantumenergy.ca
Website: www.quantumenergy.ca

Renewable Energy of Plum Hollow Inc.
Phone: 613-544-5575
E-mail: info@plumhollow.ca
Website: www.renewableenergy.on.ca

Rockwell Building Services ltd.
Phone: 613-542-6429

RW Electric
Phone: 613-634-2341
E-mail: bob@rwelectric.com
Website: www.rwelectric.com

Lindsay

Evergreen Power ltd.
Phone: 705-328-9431
E-mail: info@evergreenpowerltd.ca
Website: www.evergreenpowerltd.ca

Lion's Head

Sky Generation
Phone: 519-793-6212
E-mail: Glen@SkyGeneration.ca
Website: www.skygeneration.ca

London

Eco Insulation
Phone: 519-352-2586
E-mail: info@ecoinsulation.ca
Website: www.ecoinsulation.ca

German Solar Corporation
Phone: 519-457-7373
E-mail: info@germansolarcorp.com
Website: www.germansolarcorp.com

Long Sault

Seaway Valley Solar
Phone: 613-534-2688
E-mail: info@seawayvalleysolar.ca
Website: www.seawayvalleysolar.ca

Markham

Astenik Solar Inc.
Phone: 1-877-278-3645
E-mail: info@asteniksolar.com
Website: www.asteniksolar.com

Eco Insulation
Phone: 905-305-7497
E-mail: york@ecoinsulation.ca
Website: www.ecoinsulation.ca

EFAN Green inc.
Phone: 1-877-471-3326
Website: www.efan.ca

Enviro-Energy Technologies Inc.
Phone: 416-927-7690
E-mail: info@enviro-energytech.com
Website: www.enviro-energytech.com

G&T Solar International Inc.
Phone: 905-233-2209
E-mail: info@gtsolar.ca
Website: www.GTsolar.ca

Generation PV Inc.
Phone: 905-294-8600
E-mail: info@generationpv.com
Website: www.generationpv.com

International Power Canada, Inc
Phone: 416-502-0993
E-mail: info@iprcanada.com
Website: www.iprcanada.com

Pure Energies
Phone: 416-913-0787
E-mail: info@pure-energies.com
Website: www.pure-energies.com

Mississauga

AAA EcoEnergy
E-mail: info@aaaecoenergy.com
Website: www.aaaecoenergy.com

Achieve Energy
Phone: 519-800-4743
E-mail: info@achieve-energy.com
Website: www.achieve-energy.com

Almar Energy Group
Phone: 905-890-2644
E-mail: almarenergy@acn.net
Website: www.almarenergygroup.com

Apollo Solar
Phone: 905-696-8088
E-mail: info@apollosolar.ca
Website: www.apollosolar.ca

Axia Solar
Phone: 905-569-3391
E-mail: info@axiasolar.com
Website: www.axiasolar.com

Blue Green Systems
Phone: 647-977-9010
E-mail: info@bluegreensystems.com
Website: www.bluegreensystems.com

Glenbarra Energy
Phone: 905-624-8669
E-mail: info@glenbarraenergy.ca
Website: www.glenbarraenergy.ca

GreenerEnergy.ca
Phone: 647-894-7336
E-mail: contactus@greenerenergy.ca
Website: www.greenerenergy.ca

Infinite kWh
Phone: 1-877-459-4669
E-mail: info@infinitekwh.com
Website: www.infinitekwh.com

Methes Energies Canada Inc.
Phone: 905-828-2700
E-mail: info@methes.com
Website: www.methes.com

Oneworld Energy Inc.
Phone: 416-559-8164
E-mail: info@oneworldenergy.com
Website: www.oneworldenergy.com

RESCo
Phone: 416-361-0752
E-mail: info@rescoenergy.com
Website: www.rescoenergy.com

Rumble Energy
Phone: 1-877-214-2040
E-mail: info@rumble-energy.com
Website: www.rumble-energy.com

Solar and Alternative Technology
Phone: 905-694-9595
E-mail: info@alternativetechnology.ca
Website: www.alternativetechnology.ca

Sourcetec Energy
Phone: 905-678-7376
E-mail: sales@sourcetecenergy.com
Website: www.sourcetecenergy.com

Mitchell

Van Moorsel H Insulation
Phone: 519-348-9376
E-mail: info@hvmi.ca
Website: www.hvmi.ca

Napanee

Strathcona Solar Initiative
Phone: 613-354-6333
E-mail: admin@strathconasolar.com
Website: www.strathconasolar.com

Neebing

Frank's Alternate Energy
Phone: 807-964-2050
E-mail: sunwind@tbaytel.net
Website: www.sunwindwater.com

Nepean

Retrofit Solutions
Phone: 613-825-2170

Newmarket

Renewable Watts
Phone: 800-664-9909
E-mail: info@renewablewatts.ca
Website: www.renewablewatts.ca

Niagara

Canadian Lifestyle Solutions
Phone: 905-945-6298
E-mail: sales@yourclimatecontrol.com
Website: www.yourclimatecontrol.com

Hot Wired Electrical Solar
Phone: 905-357-0851
E-mail: hotwiredsolar@live.ca
Website: www.hotwiredsolar.ca

Niagara Wind Power Inc.
Phone: 905-892-2276
E-mail: info@niagarawindpower.com
Website: www.niagarawindpower.com

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

North Bay

Earl Wilson Electric
Phone: 705-497-8818
E-mail: wilsonelect@cogeco.ca
Website: www.earlwilsonelectric.com

GoOffTheGrid
Phone: 705-476-6416
E-mail: info@GoOffTheGrid.ca
Website: www.gooffthegrid.ca

Ontario Electrical Construction Company Ltd.
Phone: 705-474-3040
Website: www.onelec.com

North York

Ameresco Canada
Phone: 416-512-7700
E-mail: canadajobs@ameresco.com
Website: www.ameresco.ca

Oakville

BIOX Corporation
Phone: 905-337-4970
E-mail: info@bioxcorp.com
Website: www.bioxcorp.com

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

Oldcastle

Essex Energy Corporation
Phone: 519-946-2000
E-mail: info@essexenergy.ca
Website: www.essexenergy.ca

Orangeville

All-Tech Services
Phone: 519-942-9478
E-mail: sales@alltechservices.ca
Website: www.alltechservices.ca

Orillia

Advenergy
Phone: 800-325-3103
E-mail: info@advenergy.ca
Website: www.advenergy.ca

Oshawa

Rob's Solaricity Inc
Phone: 416-938-8183
E-mail: nfo@solaricity.ca
Website: www.solaricity.ca

Ottawa

3G Energy Corp.
Phone: 613 -769-1300
E-mail: gfindlay@3g-energy.com
Website: www.3g-energy.com

Ameresco Canada
Phone: 613-224-7500
E-mail: canadajobs@ameresco.com
Website: www.ameresco.ca

Blue Spruce Enterprises
Phone: 613-835-2257
E-mail: yurts@blue-spruce.ca
Website: www.blue-spruce.ca

Capital Solar Power
Phone: 613-746-8004
E-mail: info@capitalsolarpower.com
Website: www.capitalsolarpower.com

Clearly Solar
Phone: 613-820-2701
E-mail: info@clearlysolar.ca
Website: www.clearlysolar.ca

Eco-Energy Reserves Inc.
Phone: 613-851-6749
E-mail: chrish@ecoenergyreserves.ca
Website: www.ecoenergyreserves.ca

EcoGen Energy Inc.
Phone: 613-288-8751
E-mail: info@ecogenenergy.ca
Website: www.ecogenenergy.ca

Genuine Energy
Phone: 1-877-601-1878
E-mail: info@genuineenergy.ca
Website: www.genuineenergy.ca

GPEKS
Phone: 613-686-4474
E-mail: info@gpeks.com
Website: www.gpeks.com

Greenpower Farms Ltd.
Phone: 1-800-419-0875
Website: www.greenpowerfarms.com

Iogen Corporation
Phone: 613-733-9830
E-mail: info@logen.ca
Website: www.iogen.ca

Isolara Solar Power
Phone: 613-738-2646
E-mail: info@isolara.com
Website: www.isolara.com

MindCanada Technologies Inc.
Phone: 613-822-1118
E-mail: info@mindcanada.com
Website: www.mindcanada.com

Ottawa Solar Power
Phone: 613-728-2412
E-mail: sales@ottawasolarpower.com
Website: www.ottawasolarpower.com

Quallium Corporation
Phone: 613-741-3713
E-mail: info@quallium.com
Website: www.quallium.com

SMS Solar Harvesting Systems Inc.
Phone: 613-835-1767
E-mail: info@smssolar.com
Website: www.smssolar.com

Sol Powered Energy Corp.
Phone: 613-454-4444
E-mail: info@solpowered.com
Website: www.solpowered.com

Solacity
Phone: 613-686-4618
E-mail: Info@Solacity.com
Website: www.solacity.com

The Quallium Energy Services Team (QUEST)
Phone: 613-741-3713
E-mail: info@quallium.com
Website: www.quallium.com

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

Parry Sound

2KM North America Inc
Phone: 705-746-1162
E-mail: 2kmna.info@2kmna.com
Website: www.2kmna.com

Pembroke

Ottawa Valley Eco Services
Phone: 613-638-2155
E-mail: gwryan@nrtco.net
Website: www.ottawavalleyecoservices.net

Peterborough

Eco Alternative Energy
Phone: 705-742-9997
E-mail: peterborough@ecoaltenergy.com
Website: www.ecoaltenergy.com

Generation Solar Renewable Energy Systems Inc.
Phone: 705-741-1700
E-mail: info@generationsolar.com
Website: www.generationsolar.com

Pickering

Solera Sustainable Energies Company
Phone: 905-421-0430
E-mail: gogreen@soleraenergies.com
Website: www.soleraenergies.com

Pincton

Cleave Energy Inc.
Phone: 613-476-9260
E-mail: sales@cleave-energy.com
Website: www.cleave-energy.com

Port Credit

AMP Solar Group Inc.
Phone: 1-877-411-2671
E-mail: drogers@ampsolargroup.com
Website: www.ampsolargroup.com

Richmond Hill

Skyline Solar Energy
Phone: 905-597-6225
E-mail: info@skylinesolarenergy.com
Website: www.skylinesolarenergy.com

Sarnia

Eco Insulation
Phone: 519-352-2586
E-mail: info@ecoinsulation.ca
Website: www.ecoinsulation.ca

Sault Ste Marie

Clarida Green Energy Solutions
Phone: 705-575-4624
E-mail: krclarida@clarida.ca
Website: www.clarida.ca

Scarborough

Interect Inc.
Phone: 1-866-818-1980
E-mail: info@interect.ca
Website: www.interect.ca

MaxCon Custom Manufacturing Inc
Phone: 416-875-7905

Prowess Solar Power
Phone: 416-335-8832
E-mail: Info@prowesssolar.com
Website: www.prowesssolar.com

SIS Solar Ventures ltd.
Phone: 1-866-994-9965
E-mail: info@sissolarventures.com
Website: www.sissolarventures.com

Sharbot Lake

Eco Alternative Energy
Phone: 613-279-1076
E-mail: sharbotlake@ecoaltenergy.com
Website: www.ecoaltenergy.com

Stirling

TRG Energy Inc.
Phone: 416-528-4222
E-mail: sales@trgenergy.com
Website: www.trgenergy.com

Stoney Creek

Wooly Insulation Inc
Phone: 905-643-0811
E-mail: info@woolyinsulation.com
Website: www.woolyinsulation.com

Stouffville

Dynamic Solar Tech Inc.
Phone: 1-800-552-5042
E-mail: info@dynamicsolartech.com
Website: www.dynamicsolartech.com

Sudbury

3e Solutions
Phone: 705-662-3137
Website: www.3esolutions.ca

Enairgy SolarTech
Phone: 705-522-1393
E-mail: info@enairgy.com

Ontario Electrical Construction Company Ltd.
Phone: 705-524-2744
Website: www.onelec.com

Pro-Sol Energy Systems
Phone: 705-560-3387
E-mail: andy.g@persona.ca
Website: www.prosolenergy.ca

Soleil Power Canada
Phone: 705-869-6026
E-mail: mario@soleilpowercanada.com
Website: www.soleilpowercanada.com

Thorndale

Hybrid EcoWatts
Phone: 519-461-1315
Website: www.hybridecowatts.net

Thorold

Global Energies
Phone: 905-324-5683
E-mail: sales@globalenergies.net
Website: www.globalenergies.net

Tiverton

Huron Wind
Phone: 519-361-7777
E-mail: enquiries@huronwind.com
Website: www.huronwind.com

Toronto

ArcStar Energy
Phone: 416-300-6670
E-mail: pfitzgerald@arcstarenergy.com
Website: www.arcstarenergy.com

Aurora Borealis Solar Inc.
Phone: 416-273-3185
E-mail: info@ABSolarInc.com
Website: www.absolarinc.com

Avacos Solar
Phone: 905-264-5660
E-mail: gosolar@avacos.ca
Website: www.avacos.ca

Bioversel Sarnia
Phone: 416-969-9191
E-mail: contact@bioversel.com
Website: www.bioversel.com

Blackstone Solar
Phone: 1-866-628-9915
E-mail: humanresources@blackstoneenergy.com
Website: www.blackstonesolar.com

Boss Solar
Phone: 416-705-2336
E-mail: mike@BossSolar.com
Website: www.bosssolar.com

Carbon Free Technology
Phone: 416-975-8800
E-mail: info@carbonfreetechnology.com
Website: www.carbonfreetechnology.com

Brookfield Renewable Energy Partners L.P.
Phone: 1-888-327-2722
E-mail: enquiries@brookfield.com
Website: www.brookfieldpower.com

Canada Solar Consortium
Phone: 416-915-3105
E-mail: info@can-solar.com
Website: www.can-solar.com

Carmanah Technologies Corporation
Phone: 1-877-722-8877
E-mail: gridtie@carmanah.com
Website: www.solarforbuildings.com

CC Solar Inc.
Phone: 647-988-5886
E-mail: info@ccsolar.ca
Website: www.ccsolar.ca

Circa Solar Energy Inc.
Phone: 416-462-9993
Website: www.circasolarenergy.com

Dixon Wind and Solar
Phone: 416-261-3773
E-mail: helpdesk@dixonsystems.com
Website: www.dixonwindandsolar.ca

Down-to-Earth Solar Power
Phone: 416-607-6430
E-mail: info@dtesolar.ca
Website: www.dtesolar.ca

Eco Alternative Energy
Phone: 416-907-5848
E-mail: gta@ecoaltenergy.com
Website: www.ecoaltenergy.com

Eco Generation Services
Phone: 416-847-3973
E-mail: info@ecogeneration.ca
Website: www.ecogeneration.ca

Endura Energy
Phone: 416-789-4655
E-mail: info@enduraenergy.ca
Website: www.enduraenergy.ca

Future Energy Systems Ltd.
Phone: 705-657-7694
E-mail: info@futureenergysystems.ca
Website: www.futureenergysystems.ca

Green Saver
Phone: 416-203-3106
E-mail: info@greensaver.org
Website: www.greensaver.org

Greta Energy
Phone: 416-590-0197
E-mail: info@gretaenergy.com
Website: www.gretaenergy.com

Helios Energy
Phone: 416-900-3260
E-mail: info@heliosenergy.ca
Website: www.heliosenergy.ca

K&M Green Power Inc.
Phone: 416-546-8520
E-mail: office@green-powerinc.ca
Website: www.green-powerinc.ca

KB Racking Inc.
Phone: 1-888-661-3204
E-mail: info@kbracking.com
Website: www.kbracking.com

Mann Engineering
Phone: 416-201-9109
E-mail: info@mannengineering.com
Website: www.mannengineering.com

Northland Power
Phone: 416-962-6262
Website: www.northlandpower.ca

Ontario Electrical Construction Company Ltd.
Phone: 416-363-5741
Website: www.onelec.com

Ontario Power Generation
Phone: 416-592-2555
E-mail: mypowercareer@opg.com
Website: www.opg.com

Ontario Solar Network
Phone: 416-900-7191
E-mail: contact@solarnetwork.org
Website: www.ontariosolarnetwork.org

Ontario Solar Provider Inc.
Phone: 1-888-989-4677
E-mail: info@ontariosp.ca
Website: www.ontariosp.ca

Ontario Sustainable Energy Association
Phone: 416-977-4441
E-mail: info@ontario-sea.org
Website: www.ontario-sea.org

Orange Solar
Phone: 416-300-8005
Website: www.orange-solar.com

Ozz Solar
Phone: 416-444-5525
E-mail: info@ozzsolar.com
Website: www.ozzsolar.com

Pattern Wind Energy
Phone: 416-263-8026
E-mail: employment@patternenergy.com
Website: www.patternenergy.com

Potentia Solar Inc.
Phone: 416-703-1911
E-mail: info@potentiasolar.com
Website: www.potentiasolar.com

PV Technical Services Inc.
Phone: 416-646-2194
E-mail: info@pvtechservices.com
Website: www.pvtechservices.com

SkyPower
Phone: 416-979-4625
E-mail: info@skypower.com
Website: www.skypower.com

Solar Stream Green Energy Group Inc.
Phone: 416-900-3800
E-mail: website@solarstreamenergy.ca
Website: www.solarstreamenergy.ca

Solargy
Phone: 416-333-9977
E-mail: info@solargy.ca
Website: www.solargy.ca

Solray Energy Corporation
Phone: 416-910-6580
E-mail: info@solray.ca
Website: www.solray.ca

Solsmart
Phone: 416-229-2200
E-mail: info@smolsmart.com
Website: www.solsmart.com

Sphere Business Solutions Inc.
Phone: 416-425-8159
E-mail: info@spherebusiness.com
Website: www.solargrid.ca

Sun Bee
Phone: 1-888-786-2335
E-mail: info@sunbee.ca
Website: www.sunbee.ca

Sun2 Soalr
Phone: 416-840-3324
E-mail: sales@powerofthesun2solar.com
Website: www.powerofthesun2solar.com

Sunrise Solar
Phone: 647-260-0936
Website: www.sunrisesolar.ca

Sustainable Energy Technologies
Phone: 647-258-0343
Website: www.sustainableenergy.com

Tangoray Solar
Phone: 647-308-2738
E-mail: info@tangoraysolar.com
Website: www.tangoraysolar.com

TEKCEL Solar
Phone: 416-616-1824
E-mail: tekcel@gmail.com
Website: www.tekcelsolar.com

Tioga Energy
Phone: 416-516-8611
Website: www.tiogaenergy.ca

Toronto Renewable Energy Co-operative
Phone: 416-977-5093
E-mail: info@trec.on.ca
Website: www.trec.on.ca

Windshare
Phone: 416-977-5093
E-mail: info@windshare.ca
Website: www.windshare.ca

Moosepower
Phone: 647-478-5438
E-mail: info@moosepower.ca
Website: www.moosepower.com

Vaughan

DC Solar Power Corp.
Phone: 905-532-3869
E-mail: contact@dcsolar.com
Website: www.dcsolar.com

Logitest Solar
Phone: 1-888-382-4779
E-mail: info@logitestsolar.ca
Website: www.logitestsolar.ca

Maple Solar Solutions
Phone: 905-738-4222
E-mail: info@maplesolarinc.com
Website: www.maplesolarinc.com

North Grid Solar
Phone: 905-265-7699
E-mail: info@northgridsolar.com
Website: www.northgridsolar.com

Vineland

Informed Energy Solutions
Phone: 905-562-1426
E-mail: Sales@iesinc.ca
Website: www.informedenergysolutions.com

Wasaga Beach

Nottawasaga Mechanical
Phone: 705-429-3512
E-mail: jacob@nottawasagamechanical.com
Website: www.nottawasagamechanical.com

Waterloo

Arise Technologies Corporation
Phone: 519-725-2244
E-mail: info@arisetech.com
Website: www.arisetech.com

Green Grid Solutions
Phone: 519-885-9021
E-mail: info@greengrid.ca
Website: www.greengridsolutions.com

Whitby

NeoGen Energy Solutions Inc.
Phone: 1-888-728-6742
E-mail: info@neogensolutions.com
Website: www.neogensolutions.com

Seaforth Energy
Phone: 905-556-0604
E-mail: tramsey@seaforthenergy.com
Website: www.seaforthenergy.com

Windsor

Eco Insulation
Phone: 519-352-2586
E-mail: info@ecoinsulation.ca
Website: www.ecoinsulation.ca

OYA Solar Inc.
Phone: 519-258-8325
E-mail: info@oyasolar.ca
Website: www.oyasolar.ca

Woodbridge

Sentinel Solar
Phone: 905-850-6601
E-mail: info@sentinelsolar.com
Website: www.sentinelsolar.com

Woodstock

Proterra Solar
Phone: 888-553-5505
E-mail: info@proterrasolar.com
Website: www.proterrasolar.com

Renewable Watts
Phone: 800-664-9909
E-mail: info@renewablewatts.ca
Website: www.renewablewatts.ca

Solar Flare Systems Inc.
Phone: 519-290-5000
E-mail: info@solarflaresystems.ca
Website: www.solarflaresystems.ca

Sun and Wind Solutions
Phone: 519-535-2079
E-mail: info@sunandwindsolutions.ca
Website: www.sunandwindsolutions.com

Sundial Solar Trax
Phone: 519-777-0608
E-mail: reidaldridge@ody.ca
Website: www.sundialsolartrax.com

Zolarayz
Phone: 519-536-0259
E-mail: info@zolarayz.com
Website: www.zolarayz.com

PRINCE EDWARD ISLAND

Charlottetown

Prince Edward Island Energy Corporation
Phone: 902-368-5000
E-mail: jasherry@gov.pe.ca
Website: http://www.gov.pe.ca/eef/pecinfo/dg.inc.php3

Hunters River

Dba Solar Electric Inc
Phone: 902-964-3006

QUEBEC

Brossard

Cis Solar
Phone: 450-659-1053
E-mail: info@cissolar.com
Website: www.cissolar.com

Éolectric Inc.
Phone: 450-928-2222
E-mail: info@eolectric.com
Website: www.eolectric.com

Gatineau

GPEKS
Phone: 819-775-2760
E-mail: info@gpeks.com
Website: www.gpeks.com

Granby

Pioneer Wind Energy Systems
Phone: 201-252-4444
E-mail: info@pioneerwindenergy.com
Website: www.pioneerwindenergy.com

Kingsey Falls

Boralex Inc.
Phone: 514-985-1353
E-mail: info@boralex.com
Website: www.boralex.com

Lac-à-la-Tortue

Vision Solaire Inc
Phone: 1-819-729-0450
E-mail: info@vision-solaire.com
Website: www.vision-solaire.com

Laval

Litepro
Phone: 450-978-3084
E-mail: info@litepro.ca
Website: www.litepro.ca

Solar Energy Dc Inc.
Phone: 450-629-5009
E-mail: info@solarenergydc.com
Website: www.solarenergydc.com

Longueuil

Cartier Wind Energy Inc.
Phone: 450-928-0426
E-mail: reception@cartierenergie.com
Website: www.cartierenergie.com

Innergex Renewable Energy Inc
Phone: 450-928-2550
E-mail: info@innergex.com
Website: www.innergex.com

Montreal

Ameresco Canada
Phone: 514-490-1295
E-mail: canadajobs@ameresco.com
Website: www.ameresco.ca

Boralex
Phone: 514-985-1353
E-mail: info@boralex.com
Website: www.boralex.com

Eco City Group
Phone: 514-798-2444
E-mail: info@ecocity-group.com
Website: www.ecocity-group.com

Gaz Metro
Phone: 514-598-3444
E-mail: info@gazmetro.com
Website: www.corporatif.gazmetro.com

Kruger Energy
Phone: 514-737-1131
E-mail: jean.majeau@kruger.com
Website: www.krugerenergy.com

St-Laurent Énergies
Phone: 514-397-9997
E-mail: info@stle.ca
Website: www.stle.ca

Sunforce Products
Phone: 514-989-2100
E-mail: info@sunforceproducts.com
Website: www.sunforceproducts.com

Pointe-Claire

Matrix Energy Inc.
Phone: 514-630-5630
E-mail: info@matrixenergy.ca
Website: www.matrixenergy.ca

Reonac Energy Systems
Phone: 1-800-561-2876
E-mail: energy.systems@reonac.com
Website: www.reonac.com

Systeme Energie Reonac
Phone: 1-800-561-2876
E-mail: energy.systems@reonac.com
Website: www.reonac.com

Richmond

Biocardel Quebec Inc.
Phone: 450-691-4895
E-mail: deltri@videotron.ca
Website: www.biocardel.ca

Saint Laurent

Centennial Solar Inc
Phone: 514-461-9822
E-mail: info@centennialsolar.com
Website: www.centennialsolar.com

Rematek Energie
Phone: 514-333-6414
E-mail: info@rematek-energie.com
Website: www.rematek-energie.com

Sainte-Foy

Electrovent
Phone: 418-654-1759
E-mail: belisleb@webnet.qc.ca
Website: www.electrovent.com

Saint-Louis-de-Gonzague

Ecoinnovation
Phone: 1-888-881-7693
E-mail: info@ecoinnovation.ca
Website: www.ecoinnovation.ca

Shawinigan-Sud

ECHO Systeme
Phone: 819-537-0560
E-mail: service@echosysteme.com
Website: www.echosysteme.qc.ca

Sherbrooke

Distribution Jean-Pierre Paquette (Dispaq)
Phone: 819-564-3018
E-mail: info@dispaq.com
Website: www.dispaq.com

Enerstore
Phone: 819-562-7303
E-mail: customerservice@enerstore.ca
Website: www.enerstore.ca

St-Bruno

3Ci Inc
Phone: 450-441-9365
E-mail: info@3cienergie.com
Website: www.3cienergie.com

Ste-Thérèse

Energie Ressource Technologies
Phone: 450-437-8700
E-mail: ert@ert.qc.ca
Website: www.ert.qc.ca

St-Janvier

Energy Resource Development Inc.
Phone: 450-437-1515
E-mail: erd@erd.qc.ca
Website: www.erd.qc.ca

St-Nicephore

Canadian Solar Technologies
Phone: 819-472-1858
E-mail: harriappel@hotmail.com
Website: www.canadiansolartechnologies.ca

Canadian Solar Technologies
Phone: 819-472-1858
E-mail: harriappel@hotmail.com
Website: www.canadiansolartechnologies.ca

SASKATCHEWAN

James St Lumsden

Kelln Solar
Phone: 306-731-2224
E-mail: info@kellnsolar.com
Website: www.kellnsolar.com

Kronau

Sound Solar Systems
Phone: 306-586-2308
E-mail: info@soundsolar.ca
Website: www.soundsolar.ca

Regina

Evergreen Energy Solutions
Phone: 306-585-2288
E-mail: dale@evergreencanada.ca
Website: www.evergreencanada.ca

Regina Geothermal Solar Inc.
Phone: 306-522-5326
E-mail: info@reginageo.com
Website: www.reginageo.com

SaskPower
Phone: 1-888-757-6937
Website: www.saskpower.com

Summerhill
Phone: 306-565-0377
E-mail: info@summerhillgroup.ca
Website: www.summerhillgroup.ca

Saskatoon

Nexus Solar Corporation
Phone: 306-373-5960
E-mail: forinfo@nexussolar.com
Website: www.nexussolar.com

Prairie Alternative Energy Solutions
Phone: 306-221-6378
E-mail: pkarras@prairieaes.ca
Website: www.prairieaes.ca

Raum Energy Inc
Phone: 306-651-0586
E-mail: support@raumenergy.com
Website: www.raumenergy.com

Solar Freedom International
Phone: 306-652-1442
E-mail: craig@solarfreedominternational.com
Website: www.solarfreedominternational.com

Solar Outpost Inc.
Phone: 306-955-7772
E-mail:
Website: www.solaroutpost.ca

Suncatcher Solar Homes
Phone: 306-493-2355
E-mail: angie@suncatchersolar.com
Website: www.suncatchersolar.com

Superior Windmill Inc
Phone: 1-888-821-5533
E-mail: info@superiorwindmill.com
Website: www.superiorwindmill.com

WSE Technologies
Phone: 306-244-8808
E-mail: info@wsetech.com
Website: www.wsetech.com

Val Marie

Truewest Solar
Phone: 306-298-2088
E-mail: info@truewest.ca
Website: www.truewest.ca

YUKON

Whitehorse

Green Heat
Phone: 867-393-4821
E-mail: info@greenheatyukon.com
Website: www.greenheatyukon.com

Leading Edge Projects Inc.
Phone: 1-867-668-3535
E-mail: john@leprojects.com
Website: www.leprojects.com

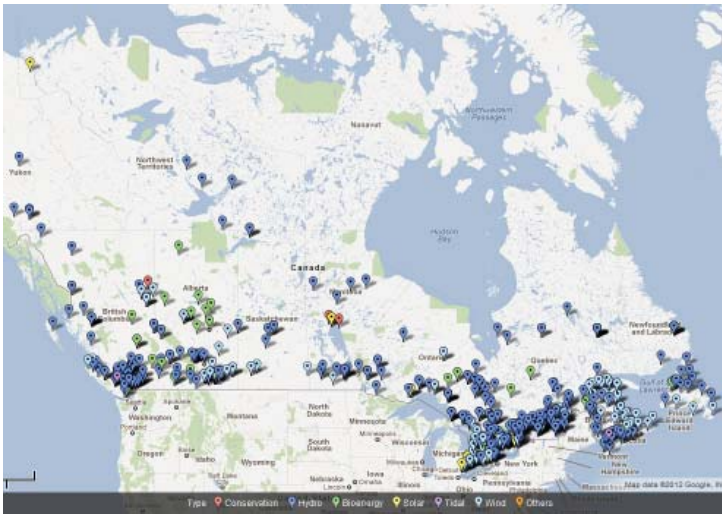
Yukon Energy Corporation
Phone: 867-393-5300
E-mail: hr@yukonenergy.ca
Website: www.yukonenergy.ca

APPENDIX D

Map of Renewable Energy and Energy Conservation Projects

The Green Skills Network has created a map of renewable energy projects across Canada, including projects that are currently operational or under construction. This map is provided to Employment Counsellors and Job Developers to allow them to identify potential leads for their clients.

The map includes large scale wind energy farms, solar energy farms, hydropower plants, bioenergy plants and conservation projects. Smaller scale projects, such as wind turbines and solar panels installed on private residential buildings, are not included in the map. As well, there are only a few conservation projects included. There are so many smaller projects, information about them would quickly overwhelm our mapping exercise.



Please visit
www.greenskillsnetwork.ca/energyprojects
to view the map

However, in some areas of the country, employment counsellors should be aware of smaller projects. For example, Feed in Tariff (FIT) programs in Ontario pay homeowners and small businesses for the renewable energy that they produce and connect to the grid. As of March 2012, approximately 190 solar PV projects are in commercial operation under the FIT project, with over 2,000 contracts pending. The information regarding the exact location of these projects is not included in the map because the projects are so numerous and so widespread. More information regarding the FIT program can be found by visiting the Ontario Power Authority's website at www.powerauthority.on.ca. Many of the employers listed in the employer inventory are involved in these smaller projects.

With regard to conservation projects, since the construction sector integrates green technologies into their traditional construction, it is difficult to differentiate between regular construction work and energy efficient building for the purposes of the map.

While the map is thorough, it is not exhaustive. If your organization knows of any project which should be added to the map, please contact the Network at info@greenskillsnetwork.ca.

APPENDIX E

Pathways to Success in the Green Economy: Five Green Jobs Training Programs

A book called *"The Upside of Down,"* written by Thomas Homer-Dixon, is often referenced within the context of the Green Economy because the landscape depicted in the book closely mirrors the 'story' of the Green Economy. In the book, Homer-Dixon describes major global stresses that converge and lead to breakdowns in national and global order. He then further explains that the worst consequences of these breakdowns can be avoided by applying creative and bold reforms. For a growing number of activists, environmentalists, social service providers, entrepreneurs and policy-makers, investing into and fostering the Green Economy is a powerful means of alleviating the energy, economic, demographic, environmental and climate stresses currently weighing down on our societies.

And, there are some powerful examples of this approach working here, in Canada, today. All the programs that we have examined for this report, whether initial drivers for them were efficient use of energy, individual reform, social inclusion, job creation or job training, have shown that endeavours in the green economy positively address multiple 'global stressors' in the communities in which they are delivered.

Green Job training programs, for instance, lead individuals to job placements or further career training in the field. Their growing numbers and know-how then spur further demand, in this way increasing the spread of environmental practices while increasing the number of employed individuals.

Programs focusing on energy efficiency have not only significantly reduced the use of fossil fuels in some areas, but have trained and sustainably employed high risk populations and increased the general wealth of some

impoverished neighbourhoods. Other programs have also seized the opportunity to build on environmental training by integrating Aboriginal cultural approaches, which have always harmonized social order with sound environmental practices. These programs successfully bridge the employment gap for aboriginal communities, increase environmental preservation while increasing the social inclusion of participating Aboriginal communities and decreasing poverty.

Because the multiple ways for achieving success in the Green Jobs sector is so clearly demonstrated, one may conclude that success is not dependent on a single formula or approach. Rather, it is most likely that the successes are based on the fulfillment of multiple gaps by these programs through a Green Economy approach. Among others, the needs they fill most certainly include environmental sustainability, poverty alleviation, employment and social inclusion.

The following are examples of five successful and ongoing Green Jobs programs throughout Canada. They demonstrate different or hybrid models that are innovative and successful. The programs have either developed new approaches or borrowed and built on each other's lessons learned and positive achievements. Because the diversity of the program models used and the

variation of communities' needs does not allow for direct comparison between programs, we have chosen to use a case-study approach. Each of these programs serves as a model for future programs or can be service providers for organizations wishing to pursue a Green Jobs program in their area.

The five green jobs training programs studied here include Choices for Youth's Train for Trades, Eco Canada's BEAHR Training Programs, First Work's Green Skills Network, Kortright Centre's High Skills Major Program, and Warm Up Winnipeg's BUILD Program.

Case Study Brief Overviews

Choices for Youth's Train for Trades Program

Offered by Choices for Youth in St. Johns, Newfoundland, Train for Trades supports youth aged 18-25 who face barriers to employment. Participants are provided with training and one year of full-time employment in home energy retrofitting. Working in small teams, they renovate and upgrade 30 public housing units in a year. During their down-time, the youth get involved with other construction projects, such as with Habitat for Humanity, or trainings, such as First-aid, GED prep, and more. Program alumni have almost 80% involvement in continuing education or sustainable employment.

What sets this program apart is their intensive support model. Support workers with construction backgrounds work alongside the youth. Throughout the program, the support workers provide assistance and guidance to ensure that participants are able to successfully navigate a personal life plan and attain the stability needed to finish the training and obtain sustainable employment. Moreover, the youth are supported through any substance abuse, criminal justice issues or family challenges.

Eco Canada's BEAHR Training Programs

The BEAHR Training Programs are licensed environmental job trainings available to Aboriginal Communities through eligible trainers. These trainings are inclusive of Aboriginal culture and knowledge. Trainees enter one of two program streams, either work force or technician training. Workforce training programs prepare learners to work at the assistant level while technician training programs combine various workforce training modules, and graduates are potentially eligible for college level diploma programs. The training programs are short-term, employment-focused, community-based, inclusive of elder participation, blended with local knowledge, practical and offer relevant field experience.

What makes these programs unique is their integration of Aboriginal culture, local knowledge, involvement of Community Elders, their original development being based on multi-stakeholder participation, and their flexibility to tailor to any target community's specific needs. Further, qualified environmental practitioners and educators may licence the curriculum for delivery anywhere in Canada through ECO Canada, allowing the program to be offered anywhere across the country.

First Work's Green Skills Network

The Green Skills Network coordinates and delivers training for high-demand entry-level positions in the green economy. The Network primarily targets at-risk youth between the ages of 18 and 24. Two curricula have been created for solar panel installation and conservation retrofitting, and include the development of both hands-on technical skills and theory-based knowledge. The Network works in partnership with stakeholders across Ontario, including youth employment centres, public and private trainers, and green industry professionals. Additionally, it has reached out to over 1500 rural youth through green job fairs aimed at raising awareness.

The Green Skills network is unique due to its relationships with over 70 employment centres across the province. These centres provide students with a variety of employment services including assistance in obtaining and retaining employment. Because of this strong relationship and the centres' access to employment support training dollars, the Network is often able to subsidize participation in training programs either wholly or partially. Furthermore, the Network uses First Work's in-house evaluation department, Evidence, to integrate evaluation

into all of its operations, which allows for continuous improvement with every training session delivered.

Kortright Centre's High Skills Major Program

Kortright offers a variety of sustainable energy demonstrations and trainings to children, youth and adults. One program, offered in partnership with the Toronto and Region Conservation Authority, is one of the Ontario Ministry of Education's High Skills Majors. Directed at high-school aged youth to increase their awareness and interest in green energy, this program provides half-day and full-day workshops with hands-on, interactive demonstrations.

One thing that sets Kortright apart is its variety of trainings for children and youth to increase their awareness about the green energy sector and potentially spark their interest in the sector, while also offering training to seasoned professionals looking to increase their knowledge and skills. Further, their substantial collection of demonstration equipment is extensive, offering training and workshop participants a view of a wide spectrum of the technology available within the green energy sectors.

Warm up Winnipeg's BUILD Program

BUILD - Building Urban Industries for Local Development - is a social enterprise non-profit contractor and a training program located in Winnipeg, Manitoba. Focussing on Winnipeg's sixteen lowest income neighbourhoods, the program is designed for people most employers (and social service agencies) would deem "unemployable"; those without a high school diploma, no experience in the labour market, some with criminal records, with unstable home environments, and without a driver's license. Participants can complete a six-month training or a Level 1 apprenticeship to retrofit homes with insulation, high-efficiency toilets, and water-and-energy-saving devices. Participants also receive training for parenting, money management, drivers' education and resume development.

The social enterprise model for Warm-up Winnipeg has helped it achieve an extraordinary level of success and has made it an example for other programs. Bringing in millions of dollars in contracts, BUILD continues to expand their offerings, moving into new areas. Finally, their success has been described in numerous articles, in a book and via numerous on-line videos about their program.

The following table provides an overview to help compare the programs reviewed					
	Choices for Youth Train for Trades Program	**Eco Canada** BEAHR Training Programs	**First Work** Green Skills Network	**Kortright Centre** High Skills Major Program	**Warm up Winnipeg** BUILD program
Pathways to Employment Program Approach	Extreme High Risk Populations (Intensive Training Model)	Aboriginal Populations (Licensed Training Model)	Marginalized Youth (Short-term Training Model)	Secondary School Students (Formal Education Model)	Extreme High Risk Populations (Social Enterprise Model)
Program location(s):	St Johns, Newfoundland	Across Canada	Across Ontario	Kortright offers this training to the GTA and surrounding regions	Winnipeg, Manitoba
Launch year	2008	2006	2010	2006	2006
Programs Offered	• Construction and home retrofitting	• Workforce Training Programs • Technical Training Programs	• Solar Panel Installation • Conservation Retrofitting	• Secondary school credits and sector specific training in energy and the environment.	• Warm Up Winnipeg Training Program • Aboriginal Apprenticeship Program.
Program	• One year of training and work experience	• Between four and 16 weeks	• Between three and five days (followed by short-term job placement)	• One day or less	• Training Program is six months (910 hours) • Apprenticeship program is 1,800 hours
Target Population	• Youth ages 18-25 in the metro St. Johns area who face barriers to employment	• Aboriginal Learners with minimum requirements of Grade 8	• High risk unemployed youth between the ages of 18-24.	• Secondary students interested in the green sector	• High risk populations who face severe barriers to employment
Evaluation Appro aches and Success Stories	• A full evaluation of this program has been published that included feedback from trainees. • .Almost 80% of graduates are either employed or pursuing education related to the trades.	• Each training session evaluated through feedback forms, reports, and instructor evaluations. • Feedback from trainees 60-90 days after completion shows high rate of employment or continued education.	• Evaluation built into program operations; each training delivery is individually evaluated. • Evaluation reflects successful training and work placements	• Evaluated through feedback surveys • Feedback shows students are satisfied with the hands on experience, demonstrations, and instructors.	• A program evaluation is currently nearing completion. • As of March 2012, BUILD has insulated 875 houses and completed 3288 water retrofits, resulting in savings of $1,146, 933.
Extras	• Support workers provide participants with support to finish training and obtain employment and navigate a personal life plan.	• Programs are designed to include Aboriginal culture and knowledge.	• Partner employment centres offer employment services including work placement opportunities, job coaching, and academic upgrading.	• State of the art demonstrations, materials, and equipment available at the centre.	• Additional support available including driver's education, academic upgrading, resume writing and other workshops
Website	www.choicesforyouth.ca/trainfortrades.html	www.eco.ca/beahr	www.greenskillsnetwork.ca	www.trca.on.ca/school-programs/facilities-and-programs/specialist-high-skills-majors.dot	www.warmupwinnipeg.ca

Case Study

Choices for Youth's Train for Trades Program

www.choicesforyouth.ca/trainfortrades.html

I. Program Description

Name of Program

Choices Train for Trades – Basic construction and home retrofitting training for "at risk" youth.

Location

St Johns, Newfoundland

Target Population

Youth ages 18-25 in the metro St. Johns area who face barriers to employment and desire to transition from income support to sustainable long term employment.

Program Model / Brief Description

Intensive Training Model

Choices for Youth Train for Trades is a community based program in which participants are assigned support workers with construction backgrounds to work right alongside the youth. Throughout the program, the support workers provide assistance and guidance to ensure that participants are able to successfully navigate a personal life plan and attain the stability needed to finish the training and obtain sustainable employment.

Selection for the program is based on referrals from each agency within the city of youth who face barriers to obtaining employment and have no income. Youth are selected based on their willingness to make a change in their life and can meet the demands of a full time job

Ten youth are selected for the program each year and are given construction and home retrofitting training and the opportunity to work on construction projects. The training offers them one year of work experience to stabilize their lives and build their resume so that they can obtain further employment or pursue further post secondary training in the trade industry.

Training for construction and home energy retrofits include: vapor barrier installation, wall framing, insulating, gyprocing, and plastering. Additionally, Choices Train for Trades has partnered with the Carpenters Millwrights College to provide a 4 week specialized course on Orientation to Construction, WHIMIS, First Aid/CPR, Fall Arrest, Back Injury Prevention, Confined Space, Power Line Hazard, Ram Set and Introduction to Tools.

Construction projects to date have included retrofitting 100 occupied housing units including demolition, framing, plastering, insulation, electrical, plumbing and more. Each project is accompanied by a certified electrician and plumber.

Program Desired Outcomes

- Maximize skills development and employment opportunities
- Implement an Intensive support model to foster positive relationships
- Form partnerships for the design and delivery of the program
- Develop strategies to enhance social enterprise/self employment for youth in trades industries

Program Success Rate

- Based on a program evaluation conducted, 79% of participants have either found full time work or are pursuing post secondary

education in the trade industry after completing the program

Program Cost

The cost of the program has been shared between Newfoundland & Labrador Housing Corporation (NLHC) and the Newfoundland/ Labrador Provincial Government. All tools and equipment are donated by Dewalt. Funding is justified as a cost saving for society as youth transition from income support to sustainable employment.

Program Sustainability

The first phase of this program began in August 2008 and has continued through 2 additional phases. The program continues to research labour market trends to ensure that youth participants are receiving job training that correlates with the needs of the construction industry.

Programs are financed by government and government agencies such as the Province of Newfoundland/Labrador and the NLHC.

Part II. Insights into the Program: Interview(s) / Perspective(s)

Program-related real-life experiences

The skills and knowledge acquired by youth identified as "at risk" allows them to transition from relying on income support to obtaining sustainable long term employment, additionally, the support and guidance given allows participants to overcome personal and professional barriers.

Rationale for this particular intervention

The success of the Train for Trades program stems from its ability to identify the barriers "at risk" youth face in obtaining and maintaining employment, provide the accountability support to help guide and overcome these barriers and provide opportunities for training and sustainable employment in the construction and trade industry. Additionally, this program helps bridge the gap in the labour market by helping fulfill the need for more skilled trade workers.

The objective of this initiative is to break the cycle of income support dependency and train youth with skills in construction and environmentally sustainable home retrofitting. Youth are equipped with the skills and support to sustain employment and increase their quality of life through a stable income.

Challenges and Lessons Learned

An initial challenge was the lack of sustainability of purchasing and renovating a new building every year. In the first year the building was free but there was no expectation around that opportunity being presented year after year.

A current challenge includes having too few spots for the needs of the Community youth. Lessons learned include the importance of partners to support the program, the importance of selecting youth who are prepared to commit and follow through with the work, and ensuring that any "down-time", i.e., time between retrofitting projects, provides additional opportunities for youth.

Evaluation Approaches

"Nineteen participants successfully completed the first two phases of the Train for Trades program, resulting in a retention rate of 79%. There are currently 10 youth involved in Phase III.

"A number of barriers were identified by the Train for Trades youth including lower education levels, mental health and addictions issues, and criminal justice involvement that prevented them from obtaining and/or maintaining stable, long-term employment, thus continuing the cycle of dependency on income support.

"Youth highlighted that Train for Trades was integral in overcoming the aforementioned barriers. Almost 80% of these youth are either employed or pursuing education related to the trades, with 26% currently working in trades-

related fields and 21% pursuing post secondary education. Ten percent have graduated from a post secondary program and are pursing trades-related work, and 16% are working in an unrelated field.

"Focus groups and interviews with youth, staff, and community partners highlighted program strengths. These included youth's acquisition of trades-related and soft (transferrable) skills, the importance of holding youth accountable for their actions, and empowering youth using an intensive support model.

"These groups identified program expansion, diversified training, and coordination of services as key elements to continued program growth. In addition, working toward program sustainability and social enterprise, and continuing to link training opportunities with labour market demands were also noted. Moreover, continual, comprehensive, long-term evaluation of the program is recommended to ensure that the goals and objectives are being met and supported.

"Finally, this evaluation outlines the various successes of Train for Trades in meeting the program goals and objectives. Recognition and implementation of suggestions from youth, staff, and community partners, as well as from the writers, will contribute to the continued growth and achievements of the Train for Trades program."[39]

[39] Button, P., & Keating , K. (2011). Train for Trades Program Evaluation. Page 5. St. John's, NL.

Case Study

ECO Canada's BEAHR Training Programs

www.eco.ca/beahr

I. Program Description

Name of Program

BEAHR Training Programs - Environmental Training Opportunities for Aboriginal Communities

Location

Community-based Training Programs are deliverable nationwide.

Target Population

Aboriginal Learners (First Nation, Metis, Inuit) with minimum requirements of Grade 10 educational attainment independent of age.

Program Model / Brief Description

Licensed Training Model

BEAHR programs are community-based environmental training programs that are inclusive of Aboriginal culture and knowledge. Programs are delivered by 3rd party licensed trainers from both public and private organizations and provide trainees with introductory skills for working in the environmental field. Programs are offered in two separate streams, which are work force training and technician training.

Workforce training programs prepare learners to work at the assistant level. Technician training programs are a combination of various workforce training modules, and graduates from these programs are potentially eligible to transfer to college level diploma programs (dependant on articulation agreements).

Programs are not accredited.

The training programs are short term, employment focused, community based, inclusive of elder participation, national in scope, blended with local knowledge, practical and offer relevant field experience.

Workforce Training Programs

Local Environmental Coordinator (12 weeks)
Environmental Site Assessment Assistant (5 weeks)
Contaminated Sites Remediation Coordinator (5 weeks)
Land Use Planning Coordinator (4 weeks)
Solid Waste Coordinator (5 weeks)
Environmental Monitor Training Program (5-7 weeks)

Technical Training Programs

Certificate of Applied Environmental Techniques (15 weeks)
Certificate in Environmental Planning and Administration (16 weeks)

Programs are inclusive of Aboriginal culture and local knowledge, involve the participation of Elders, and are intended to be adaptable and, therefore, able to address any community's specific needs.

Qualified environmental practitioners and educators may licence the curriculum for delivery anywhere in Canada through ECO Canada.

The programs are adaptable to the needs of the community receiving the training and can be adjusted to fit a variety of different requirements.

Provided program resources:

- Instructor's guide
- Instructor's CD
- Student's guide

Program Desired Outcomes

- Generate employment
- Build local environmental capacity
- Integrate traditional knowledge into environmental management
- Promote sustainable development in Aboriginal communities
- Fill a service gap

Program Success Rate

- Trainee feedback 60-90 days after program completion shows high rate of employment or continued education.
- Trainer feedback 30 days after program completion shows positive response from community and trainers involved.
- The program has seen over 1,000 students register and maintains an 80% graduation rate.

Program Cost

The licensing fee is $55 dollars per students per instructional week plus the cost of materials for students and instructor, which varies from program to program. Other costs depend on the sponsoring organization (trainer and community requirements – training facility, equipment needed, instructor wages, trainee cost subsidies, etc.).

The costs for the program are generally shared by the community, industry sponsors and the government

Program Sustainability

The program was originally launched in 2001. It continues to be delivered while its materials remain updated and relevant to its target communities and industries.

Programs are financed by companies, communities or government programs (examples include: energy companies, provincial or federal funding or Human Resources and Skills Canada programs)

Part II. Insights into the Program: Interview(s) / Perspective(s)

Program-related real-life experiences

The skills and knowledge acquired by Aboriginal program participants qualifies them for work in the environmental sector (not just contaminated sites) and the skills gained (in class and field work components) are transferable to other sectors of the economy. A trained Aboriginal workforce allows employers to hire locally while also contributing to the local economy and to Aboriginal communities.

Rationale for this particular intervention

Solid Waste Coordinator training program: Its success stems from its ability to provide quality education in solid waste initiatives that will help build local environmental capacity, while also heightening awareness of environmental issues, which are a priority in Aboriginal communities.

"The whole initiative is about promoting sustainable development in the First Nations communities. Educating, empowering, and involving the young members of the communities for environmental sustainability is the only solution to preserve the fragile environment and promote sustainable development in the region..."[40]

Designing training programs on thorough consultations with stakeholders is highly effective and successful.

Challenges and Lessons Learned

- Difficulty following up with program participants beyond 3 months (due to contact information) in order to measure long-term impacts.

[40] Job and Industry News. "BEAHR's Solid Waste Training Program Makes its Debut in Manitoba". Fall Issue of 2011. Retrieved from www.eco.ca/pdf/Aboriginal-Programs-News-Fall-2011.pdf

- Difficulty measuring broader community-level impacts of the programs
- Difficulty engaging employer stakeholders to measure impacts
- Programs (curriculum) need updating to remain relevant
- Sustainability somewhat dependent on specific government funding programs

Evaluation Approaches

Training programs are evaluated through participant feedback forms, program reports and instructor evaluations at the end of training sessions.

Case Study

First Work's Green Skills Network

www.greenskillsnetwork.ca

I. Program Description

Name of Program

Green Skills Network, a Department of First Work, the Ontario Association of Youth Employment Centres

Location

Ontario – The network has been active in 15 of First Work's 70 partner employment centres, including Kingston, London, Markham, North Bay, Toronto, Val Caron, Woodstock, Etobicoke, Sudbury, Red Lake and Welland. There is strong potential to expand into more locations.

Target Population

High risk unemployed youth between the ages of 18-24 motivated for work in the green economy

Program Model / Brief Description

Short-Term Training Model

The Green Skills Network delivers courses for entry-level jobs in the green economy, such as solar panel installation and conservation retrofitting. It works in partnership with stakeholders across Ontario, including youth employment centres, public and private trainers, and green industry professionals. Students receive hands-on technical skills development, employability skills development, insight into the green economy, and assistance in obtaining employment. In just two years, the Network has trained over 200 at-risk youth across the province. Additionally, it has reached out to over 1500 rural youth through green job fairs. The Green Skills Network is a department of First Work, the Ontario Association of Youth Employment Centres.

The following are among the Green Skills trainings intended to increase the employability of youth participants:

Conservation Retrofitting Training

The Residential Conservation Retrofit Assistant course includes the fundamentals of repairing and installing technologies to make buildings more energy and water efficient. The 5-day 35-hour intensive training focuses on the practical components of retrofitting to develop the knowledge and skills necessary to become an entry-level conservation retrofit contractor assistant.

Solar Panel Installation Assistant Training

The Solar Panel Installation Assistant course includes the fundamentals of the installation of residential and commercial solar PV systems. The 3-day, 21-hour intensive training focuses on the practical components of installation to develop the knowledge and skills necessary to become an entry-level solar panel installer assistant.

These courses have often been tied into larger programs that offer additional employability skills training and job placement support. One example is the six month Green Shine program implemented across eight communities in Ontario, which included an 18-week paid work placement component. Another example is the REDY Program (Reducing Energy Demand with Youth) implement across six communities in Ontario, which was in partnership with Social Housing Services Corporation.

Program Desired Outcomes

- Participant successful employment or furthering of education
- Positioning participants on a green skills career path

Program Success Rate

Training program success rates are as high as 83% participants completing the program through to the end of the placement, with 50% of those completing the program intending to return to school to further their skills. 60% of those completing the program received employment offers from employers that hosted work placements. Over 200 at-risk youth have been trained across the province.

Among participants in the many locations at which these programs were provided, any challenges were related with individual motivation, which happened in several instances.

Program Cost

Programs are free of charge for at-risk program participants. A social enterprise model is being developed where courses will be opened up to the general public for a fee.

Program Sustainability

Post-training job placements rely on employer demand for relevant job skills. Therefore, tailoring the training to meet employer needs is integral to its sustainability. Also, the availability of job readiness training funds is required for the continued availability of the training.

Part II. Insights into the Program: Interview(s) / Perspective(s)

Program-related real-life experiences

Participating youth added to their employability skills and gained knowledge in a more specialized area and gained hands-on work experience. They also earned income for their work. A good number of participants received offers for full time work after completing their placements.

Rationale for this particular intervention

The green economy is a growing field and in need of individuals trained in the necessary skills for entry level work. Switching over to a green economy will also be facilitated by increasing the supply of people knowledgeable about green approaches in construction, energy and other fields. By training unemployed youth in green skills, the youth are able to secure work and income, and also increase the use of green practices.

Challenges and Lessons Learned

By targeting high risk youth, the programs also must deal with the challenge of troubled youth, who may not be able to follow through on their commitments for personal – behavioural reasons. Also, It is necessary to identify and coordinate training with employer needs well in advance.

Evaluation Approaches

First Work's in-house evaluation department, Evidence, assesses each training delivery through feedback surveys and interviews with all stakeholders. Training feedback and program reports reflect that students are satisfied with the courses, including both the curriculum and the trainers. Additionally, partner employment centres have indicated that employers recognize and appreciate the skills and knowledge developed through Green Skills Network courses. Through Evidence's consistent evaluation techniques, the Green Skills Network has been able to improve with each training delivery, which has resulted in increased completion and hiring rates from training to training. For example the Network's pilot training saw a completion rate of 50% and a hiring rate of 35%, whereas a training delivery several months later resulted in a completion rate of 95% and a hiring rate of 70%.

Case Study

Kortright Centre's High Skills Major Program

www.trca.on.ca/school-programs/facilities-and-programs/specialist-high-skills-majors.dot

I. Program Description

Name of Program

High Skills Major – Combined Secondary school credits and Sector specific training and education including green energy, conservation, water conservation and green skills.

Location

Kortright offers this training to the GTA and surrounding regions

Target Population

Secondary students who want to focus their education toward a specific employment sector.

Program Model / Brief Description

Formal Educational Model

The Specialist High Skills Major (SHSM) is a Ministry approved program that allows students to focus their education on a specific job sector while meeting the requirements of their Ontario Secondary School Diploma (OSSD). The program is career- focused and helps students transition from high school to the workplace or serves as a foundation for further post secondary education.

The training components centre on both practical theory and application and hands on job shadowing.

This program offers exposure to the green economy by introducing students to different green skills and offering training in areas such as Photovoltaic installation.

Program Desired Outcomes

- Have students develop specialized knowledge and skills.
- Explore and refine career goals to make informed decisions about the future.
- Obtain the skills necessary to transition into the workplace or further education.

Program Success Rate

N/A

Program Cost

N/A

Program Sustainability

N/A

(This program has been funded by the Government of Ontario and ongoing since 2006.)

Part II. Insights into the Program: Interview(s) / Perspective(s)

Program-related real-life experiences

The knowledge obtained by participants provides a foundation of skills and hands on experience for further work opportunities in green skills sectors. After graduation students are equipped to transition into the workplace or post secondary school. Having a specialized program that trains in green sector skills allows employers to meet labour demands with a group of skilled workers in a growing industry.

Rationale for this particular intervention

Photovoltaic training offered prepared students for entry level positions in the sector. In this particular training, students work through three levels:

1. Awareness
2. Practical theory and application
3. Hands-on training

Following these levels of training, students are given a one week professional training for new installers or to upgrade existing skill sets. Within the one week training, they assume basic electrical knowledge.

The Photovoltaic training is based on state of the art demonstrations and train approximately 70 students a year. Throughout the trainings students become aware of the green economy, are given exposure to PV and are exposed to different job opportunities available in the sector.

Challenges and Lessons Learned

There are challenges in ensuring that there continues to be state of the art equipment and demonstrations

There is no budget for marketing. Parent and youth perceptions of the legitimacy and viability of the industry can interfere with student buy-in to the program.

Evaluation Approaches

Feedback surveys show that students appreciate the hands on experience they obtain, the demonstrations and the knowledge level of their instructors.

Case Study

Warm up Winnipeg's BUILD program

www.warmupwinnipeg.ca

I. Program Description

Name of Program

BUILD - Building Urban Industries for Local Development - is a social enterprise non-profit contractor and a training program.

Location

Winnipeg, Manitoba

Target Population

Extremely high risk populations who face severe barriers to employment

Program Model / Brief Description

Social Enterprise model

BUILD retrofits homes with insulation, high-efficiency toilets, and water-and-energy-saving devices. It has two employment streams: a six-month training program, and a select number of Level 1 apprenticeships.

The program focuses its efforts in 16 of Winnipeg's lowest income neighbourhoods and is partnering with neighbourhood renewal corporations. Additionally, BUILD has formed a multi-year partnership with Manitoba Housing Authority (MHA) to retrofit their units. The BUILD board is comprised of volunteers from the Aboriginal community

Training Program

The program is designed for people most employers (and social service agencies) would deem "unemployable"; those without a high school diploma, no experience in the labour market, some with criminal records, with unstable home environments, and without a driver's license.

One-on-one work with trainees to access on-site workshops and classes on parenting, money management, math upgrading and high school completion occurs. The training also includes cultural activities, such as "Bring your kids to work day." Trainees are also put in contact with community elders. Drivers' Training includes classroom and in-car driver education. Trainees are also taught to update their resumes and account for newly acquired skill-sets. Those electing to do so receive help entering into trades-based education programs. Trainees also receive help being matched with potential employees.

Trainees that finish the six-month work program either go on to complete their high school and enter apprenticeship programs (largely in carpentry), or they move directly into the work force. BUILD has been able to hire a select number of former trainees as part of our permanent staff, including taking on some of our former trainees as apprentices.

Aboriginal Apprenticeship Program

As the majority of our trainees are Aboriginal, BUILD has an Aboriginal apprenticeship program in carpentry. BUILD hires apprentices that have successfully completed the training program or have received a referral from the Aboriginal Leadership Institute, the Neeginan Construction Technology Program, or Urban Circle.

Program Desired Outcomes

Social Inclusion – Poverty Reduction

- Paid career training for individuals that have no high school education, work experience or driver's licence.
- Life skills for trainees including driver's training, financial literacy, and providing a free bank account.

- Creates jobs for neighbourhood people, employing 19 to 100 individuals at a time
- Lowers utility bills in impoverished homes and neighbourhoods
- Empowers impoverished communities

Environmental
- Lowers utility bills
- Decreases greenhouse gas emissions

Program Success Rate
- 50% turnover rate
- 90% of trainees end up in trades-based education
- Reduction of utility bills in Manitoba by $1 million per year

Program Cost
As a successful social enterprise generating its own revenue, there is no cost associated with running the program.

Program Sustainability
The program is sustainable as long as the demand for its contracting services continues.

Part II. Insights into the Program: Interview(s) / Perspective(s)

Program-related real-life experiences
Anecdotal accounts of individuals in this program describe former high risk individuals transforming their lives from being socially marginalized and involved with the criminal justice system to being meaningfully employed trades people and responsible members of society.

Further yet, because utility costs of retrofitted single family homes and rental units have been dramatically cut, the general wealth of people living in the dwellings has increased. Next to this, these same neighbourhoods have seen an increase in their employment rates as well as greater investment into their local economies. Materials procured for the work are locally sourced.

Rationale for this particular intervention
The catalyst for the program was a government drive to lower the cost of utilities through retrofitting subsidized housing units. The BUILD program became the service provider with the idea to address multiple social issues while fulfilling the terms of the commissioned retrofitting work.

Challenges and Lessons Learned
The program has engaged government in negotiations over the delivery of contract services. The main challenge for the program has been to marry the idea of investing into social issues through a government procurement platform, in this way ensuring that high-risk communities receive the government contracts.

Evaluation Approaches
A program evaluation is currently nearing completion.

As of March 2012, BUILD has insulated 875 houses and completed 3288 water retrofits, resulting in savings of $1,146, 933.

Shaun Loney, Executive Director of BUILD has recently published a book called “Build Prosperity” describing how wealth can be generated for impoverished communities in Manitoba through fossil fuel efficiency measures based on the experience of his program, BUILD.

First Work
215 Spadina Avenue, Suite 350
Toronto, ON
M5T 2C7

Tel: 416-323-9557

www.firstwork.org

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CANADIAN EDUCATION AND RESEARCH INSTITUTE FOR COUNSELLING
INSTITUT CANADIEN D'ÉDUCATION ET DE RECHERCHE EN ORIENTATION