Evaluation Framework for City of Toronto Environmental Initiatives

Green Jobs, Skills Training and Local Procurement Opportunities

Economic Development & Culture and Toronto Environment Office,
City of Toronto
Sheyda Saneinejad
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Background

In December 2009, City Council approved The Power to Live Green: Toronto's Sustainable Energy Strategy, which detailed an approach to build upon the goals for reducing greenhouse and smog causing emissions by adopting a number of recommendations to act as principles and targets for Toronto's sustainable energy future.

In an effort to build upon its adoption of the Green Economic Sector Development Strategy, and in recognizing the creation of jobs and economic opportunities as a result of the emergence of the green energy sector, the Green Jobs Action Team has been established. The objective of this action team is to advance policies, investments, collaborations and partnerships in the city to ensure that Toronto is delivering its commitments in the Power to Live Green, by making more jobs green and by creating more green jobs.

A number of City divisions have been developing and implementing several environmental initiatives in order to meet the goals and objectives of the City's sustainable energy strategy. While the environmental benefits of these initiatives are mostly quantified, their economic impact, in terms of employment effect, workforce requirement and business development has not been thoroughly evaluated. Many of the City's environmental initiatives present several prospects for creating a variety of local green employment and procurement opportunities. Therefore, the Green Jobs Action Group has identified the need to quantify these opportunities and skills requirements and plan ahead in order to strengthen Toronto's green economy.

Purpose

The purpose of this document is to provide a framework for evaluating the employment impact of environmental initiatives developed by the City of Toronto. The focus of this evaluation is on green jobs, skills requirements and local procurement opportunities. It must be noted that the estimation parameters and their level of accuracy used for the model developed as a part of the evaluation process only allow for policy-level employment estimates. More detailed and accurate estimation tools and techniques must be used by professionals in the related fields for individual project labour estimation and budgeting.

Introduction

The Tower Renewal Office in 2010 commissioned a study by Professor Ted Kesik from University of Toronto to look at workforce challenges and opportunities in the tower renewal initiative in Toronto[1]. The methodology used in conducting this study has guided a major component of the green job evaluation process and framework.

This evaluation framework has been developed through the process of evaluating the following three City of Toronto environmental initiatives:

- Installation of 2 MW of Solar PV panels on City of Toronto facilities;
- Home Energy Assistant Toronto (HEAT) program, Home Energy Help program, and the currently under development Live Green Home Energy Retrofit program; and
- Eco-Roof Incentive Program (ERIP) and Green Roof By-Law.

[1] Kesik, Ted. (2010). "Tower renewal workforce challenges & opportunities" Report prepared for the Tower Renewal Office

For each of these initiatives the number and types of green employment opportunities were estimated through development of Microsoft Excel based user interactive models. Additionally, gaps and opportunities for improvement in existing workforce development options were identified through an inventory of existing programs and surveys and conversations with industry stakeholders. Lastly, to the extent possible, local procurement opportunities for materials involved in each evaluated field were assessed.

Although each of the three evaluated environmental initiatives are quite different from one another, there exists many common components in the evaluation methodology used for each one. These common elements, and the lessons learned through the evaluation process, have formed this evaluation framework. The remainder of this document will formalize and describe the recommended steps for performing similar types of evaluations for other environmental initiatives.

Defining Study Objectives and Scope

One of the primary decisions in the process is about types of jobs to be included and the scope of existing and future programs to be evaluated. This decision influenced by the needs of staff and the reasons why the study is being conducted. Factors to be considered are:

- Are we interested and do we have the means to quantify indirect and induced employment in addition to direct employment
- How are resulting jobs geographically distributed and should there be a distinction between total jobs versus local jobs
- Which stages of project should be the evaluation focus on (e.g. financing, marketing and outreach, design and planning, implementation, operation and maintenance, etc)

The assessment of each environmental initiative should ultimately result in two employment estimates. The first is the number and type of green jobs created as a result of the initiative, program or policy as it is currently defined and/or implemented, and the second is the projected number and type of potential for green job as a result of expansion of the initiative based on a set of specified targets and assumptions. Therefore, It is important to clearly define the scope and characteristics of the initiative being evaluated and the assumptions made with regards to its expansion prior to data collection and development of the employment model.

The scope of the initiative at its current state can be defined based on a specific period of time over which the initiative has been running, a specific amount of budget allocated to a certain stage of the program, or a pre-defined unit of projects to be completed as a part of the initiative (e.g. Mega Watts of solar energy installed or number of homes retrofitted). There may be other possibilities for defining the scope depending on the nature of the initiative being evaluated.

In order to increase overall efficiency and avoid potential future partial duplication of work, it is important to identify all relevant current initiatives and those at the planning stage and assess the possibility of expanding the study scope in order to cover all aspects. As an example, the evaluation of the home energy retrofit field, mentioned earlier, started off with an evaluation of only the Home Energy Assistance Toronto (HEAT) program. Upon consultation with staff directly involved with this program areas of overlaps were identified between the HEAT program evaluation and other home energy retrofit initiatives by the City. These include the Home Energy Help program for low income housing and the Live Green Home Energy Efficiency program, which was at the planning stage at the time. Therefore, the job evaluation study was expanded to cover all three initiatives in order to take advantage of efficiencies expected in the process due to the similarities between the three.

Projection of future green jobs is based on a set of assumptions on expansion of the initiative. These assumptions may be based on long-term City targets, other governmental targets, or simply complete expansion of a technology to all applicable cases within the city. For the latter option a good understanding of the term "applicable", as it relates to the specific field, is essential.

Identifying Variables

In order to make accurate employment estimations it is important to identify the set of quantifiable variables that have a major impact on labour intensity.

The primary variable is the unit of analysis base on which employment hours are quantified. Examples include jobs/m^2 of green roof, jobs/typical Toronto home and jobs/MW of installed Solar PV energy. There may be cases where jobs in certain components of a project are a function of one unit, while jobs in another component are a function of a different unit. As an example, jobs in planning and design of green roofs are mainly a function of the number of green roof projects as opposed to the total area of green roof installed. In contrast, jobs involved in installation of green roofs are very much a function of the size of the project.

There are a number of mandatory components that are a part of every project. Beyond these mandatory components there are likely numerous optional or case specific features that could have a significant impact on the total employment estimate. Such variables need to be identified for cases where they are quantifiable. Table 1 below provides examples of quantifiable job estimation variables identified in evaluation of green roof component of the ERIP.

Table 1 - Quantifiable job estimation variables for green roofs

Variable	Employment effect
Whether the green roof is on a new building versus and existing building	Incremental engineering and architecture work specifically associated with green roof design, planning and storm water analysis on a new building is minimal since such work is component of the overall building design. In contrast, a notable amount of work is required by engineers and architects for green roofs on existing buildings, especially if a structural analysis report is part of permitting requirements
Whether the existing roof requires structural analysis	
Whether the green roof system is the modular/roll-on type or the built-in-place type	Built-in-place green roof systems are estimated to be about 25% less labour intensive overall, compared to modular and roll-on systems
Whether the existing roof requires a new waterproofing membrane	Replacement on the roofing membrane is a labour intensive component of green roofs, however, not all green roof installations are accompanied with roofing replacement.
Whether the green roof system is accompanied by an automatic irrigation system	Installation of an automatic irrigation system calls for certain amount of works in plumbing and general trades
Whether a storm water report is part of the requirements	An average storm water analysis and report takes about 40 engineering hours of work, however this requirement was lifted during the course of the ERIP.

There may also be numerous unquantifiable optional features associated with projects involved in a program. It is recommended that minimum employment estimations be made for projects without such additional features, while making note of possibilities for additional employment opportunities in more complex projects.

Employment Data Collection Process

The first step in data collection is conducting a thorough review on existing studies on investigating employment opportunities in the related field. Certain industries, such as the Solar photovoltaic industry, have quite a vast body of existing literature on employment effects, while that may not be the case for other less cohesive or loosely defined industries. In the former case, it is important to evaluate whether there are significant additional benefits in collecting employment data from scratch or whether existing literature provides adequate information at the required level of detail.

Some factors to consider when conducting literature reviews include:

- Understanding the unit of analysis used by a study;
- Understanding assumed project life time and whether employment estimates are made in person-years of employment or for the total life of project; and
- Understanding what type of jobs (direct, indirect and induced) are quantified.

Identification of industry stakeholders related to an initiative is an important step in deciding on the most efficient mode of collecting the required information for the evaluation process. There are generally 3 types of stakeholders directly or indirectly involved in implementation and delivery of an environmental initiative. These include:

- City of Toronto staff and potential partnering organizations involved in development and delivery of the program;
- Material and service providers in the industry, specifically those involved in specific projects associated with the program being evaluated, when applicable.
- Industry organizations and professional bodies in fields related to the initiative

Development of the Job Estimation Model

The jobs estimation model is ideally an interactive tool developed using Microsoft Excel or similar software, where the user (municipal staff) can adjust the assumptions and parameters. The tool would then output the estimated number and types of green job under the specified set of assumptions based on pre-defined calculation steps. The main user interface pages of the model should guide the user through colour coded cells indicating what is default information, what are modifiable default assumptions, what are modifiable system or program specific variables, and what are estimation outputs.

The main component of the data collection stage would ultimately result in a database of jobs associated with various components of delivering each initiative. Table 1 is an example of such database for the construction/installation component of home energy retrofit measures.

Table 2 Breakdown of jobs in home energy retrofit construction/installation (per home)

Phase	Job Component	Job Title	Type of work	Total Hours	Full time Employees
Construction / Installation					
	Basic draft proofing,			8	
		General labourer/trainee	draft proofing windows, doors, ceiling and basement wall penetrations	8	2
	Foundation insulation			25	
	Foundation header	Certified insulation applicator		8	2
	Foundation walls	Certified insulation applicator		16	2
		Foreman		1	1
	Roof insulation			12	
		Foreman		2	1
		General labourer/trainee	insulation installation	10	2
	Wall insulation			37	
		Certified insulation applicator		36	3
		Foreman		1	1
	Heating equipment replacement			16	
		Trained licensed gas fitter		8	1
		General labourer/trainee		8	1
	Central air conditioning equipment replacement			6	
		HVAC Licensed technician		3	1
		General labourer/trainee		3	1
	Installation of low-flow toilets			2	
		Plumber		2	1
	Other conservation measures			1.5	
	Electricity efficiency	General labourer/trainee	installation of (efficient bulbs, power bars with timer, outlet covers)	0.75	1
	other conservation measures	General labourer/trainee	Installation of other conservation products (showerheads, aerators, hot water pipe wraps, programmable thermostats)	0.75	1

sThere are a number of distinctions that should be made about each job in order to facilitate further employment impact analysis. These include:

- The occupation type required for each job (e.g. engineering/architecture; plumbing, general labour, etc)
- Whether the task requires a one-time job commitment or a long term contract such as a maintenance job.
- Whether each project component can be classified as a new green job or a greened existing job.

Based on the data in Table 2 a matrix of project component vs. skill type is developed. Table 3 is an example of such matrix.

Table 3 matrix of project component vs. occupation type for home energy retrofits

	Hours of work / dwelling unit							
	Energy Advisor/ Auditor	engineer/ architect	General labourer/ trainee	Foreman	Licensed gas fitter	Licensed HVAC technician	Licensed plumber	Certified insulation applicator
Construction/Installation								
basic draft proofing,	0	0	8	0	0	0	0	0
Foundation wall insulation	0	0	0	0.5	0	0	0	16
Foundation header insulation	0	0	0	0.5	0	0	0	8
Roof insulation	0	0	10	2	0	0	0	0
Wall insulation	0	0	0	1	0	0	0	36
replacement of heating equipment	0	0	8	0	8	0	0	0
replacement of air conditioning equipment	0	0	3	0	0	3	0	0
installation of low-flow toilets	0	0	0	0	0	0	2	0
Other basic conservation measures	0	0	0.75	0	0	0	0	0
Energy Audit (Pre and Post audit)	5.5	0	0	0	0	0	0	0
Energy Audit (Pre audit only)	3	0	0	0	0	0	0	0
Contract Administration	0	0	4	0	0	0	0	0

The job component versus skill type matrix provides values in hours of work per unit area of analysis. Total number of hours of work associated with an initiative can therefore be calculated by multiplying this matrix by the scale of the initiative being evaluated. Total sum of hours can then be converted to person-years of employment based on the assumption that there are 1960 hours of work in one working year. 1960 is commonly used in similar types of analysis as average total number of hours a full time employed person works in one year[2]. There are certainly limitations in making this broad assumption. Certain occupations have longer work hours than other. In addition, depending on the state of the industry business owners might ask employees to work overtime in the event of increased work load, rather than choosing to hire new staff. Nevertheless, this estimation approach is deemed acceptable at this level of analysis since it normalizes employment potentials and facilitates further evaluation and comparisons.

Employment estimation results can be broken down by project component, occupation type, and new versus existing green jobs (when applicable). Another useful analysis measure is the number of jobs generated per unit of monetary value of government spending (e.g. grants, incentives, etc). For programs where the initiative under evaluation is a partnership between the City and other organizations it may be required to isolate the impact of City of Toronto contributions. This can be done

[2] Singh, Virinder and Jeffrey Fehrs (2001). "the work that goes into renewable energy" Research report: Renewable Energy Policy Projects, Washington, DC.

by assuming a direct relationship between the portion of total monetary contribution by the City of Toronto and the portion of total jobs generated due to this monetary contribution.

The job estimation model would ideally provide options for two types of analysis:

The first type of analysis is for a hypothetical sample project involved in the initiative. The user interface should allow for modifications to be made by the user in order to customize the project to the extent that the data and built in calculations allow. Table 4 illustrates an example of this type of analysis for a green roof.

Table 4 Example of individual project analysis - Green Roof

Roof area [m2]	1000
% Green Roof coverage	50%
Roof area covered [m2]	500
Specifications	
→ green roof is installed on a	Existing building
→ Extensive Green roof system is	Installed on Site
→ require new roofing membrane (applies only to existing buildings)	Yes
→ Require structural evaluation (applies only to existing buildings)	Yes
→ Irrigation System	Yes
→ Storn Water Evaluation	Yes
Hours of new green employment	**806**
Hours of greened existing employment	**170**
Hours of work breakdown by Project Phase	
Planning and Design	87
Manufacturing and Installation	665
Operation and Maintenance	269
Hours of work breakdown by Occupation Type	
Engineer/Architect	84
Drafter	3
Roofing Foreman	28
Roofing trainee	142
Foreman	54
General labourer/trainee	666
Plumber	43

The light blue coloured cells indicate modifiable variables and specifications while the dark blue and grey cells indicate model outputs. In addition, the pie-chart icons along the sides provide opportunities for quick graphic visualization of results.

The second type of analysis is evaluating employment opportunities of actual and future initiatives. Calculations for this analysis are similar to those made for the sample case with the addition of incorporating the influence of program design and implementation specifications.

Assessment of Workforce Training and Recruitment

Matrix of Training Programs

Identifying existing education and training programs available within the city of Toronto and the surrounding regions is the first step in this investigation.

There are a number of professional organizations that have conducted studies or complied databases on training programs in green industries in Toronto and surrounding regions. Some examples include the 2007 Clean Air Partnership report titled *Skills for Energy Efficient Construction*[3], or the online database of College and University programs on green building marketplace compiled by the Greater Toronto chapter of the Canadian Green Building Council[4].

The main focus of evaluation of existing skills training programs is colleges and universities located within the city of Toronto boundaries. However, a large number of individuals trained in colleges and universities in the regions surrounding the city of Toronto are ultimately employed in Toronto. As a result programs offered through other University and College programs outside of Toronto should also be looked at. The following is a list of current colleges and universities in Toronto and vicinity that should be part of the inventory.

Table 5 - College and Universities in Toronto and Vicinity

Institutions within City of Toronto	Institutions in the Vicinity of Toronto
University of Toronto; Ryerson University; York University; Ontario College of Art and Design University; George Brown College; Humber College; Willis College; Centennial College; and Seneca College.	University of Waterloo (Kitchener-Waterloo); University of Guelph (Guelph); McMaster University (Hamilton); Trent University (Peterborough); University of Ontario Institute of Technology (Oshawa); Durham College (Durham); Sheridan College (Oakville, Brampton, Hamilton); Conestoga College (Kitchener-Waterloo); Mohawk College (Hamilton and Brantford); Fleming College (Peterborough, Lindsay, Cobourg, Halliburton); Georgian College (Barrie)

Table 6 and Table 7 are examples of college and university programs inventories for the skills required in the home energy retrofit industry.

[3] Penney, Jennifer (2007). "Skills for energy efficient construction" Clean Air Partnership

[4] Ontario centre for Green Building Design and Development. University and College programs. Accessed through http://www.greenbuildingontario.ca/education-careers/university-a-college-programs

Table 6 - College programs related to building energy retrofit industry in Toronto and vicinity

	Conventional Trade programs						Conventioal Engineering/Architecture programs				Integrated Programs
	Construction Carpenter	Electrician	Facilities Maintenance Mechanic/Electrical	Plumber	Refrigeration and AC Mechanic	Gas Fitter / Gas technician	Construction Engineerg-Buildign renovation	Civil	Mechanical	Architecture	
Centennial											
Humber							Home renovation technician				Home Inspection Certificate , LEED Green Building: Core Concepts and Strategies
Seneca									with a Building Science stream		Bridging to green careers, Building Systems Engineering Technician
George Brown											LEED Green Building: Core Concepts and Strategies
Mohawk											
Fleming							Construction Skills				Sustainable Building Design and Construction Sustainable Renovations
Conestoga										Architecture - cosntruction enginering	Construction Techniques (Gas, Welding, Plumbing, Electrical and HVAC)
Durham											
Sheridan											
Georgian											

Table 7 - University programs related to building energy retrofit industry in Toronto and vicinity

University	Building Science	Civil Engineering (Construction Management)	Civil engineering (Structural)	Mechanical Engineering	Electrical Engineering	Architecture
University of Toronto						
Ryerson University						
University of Waterloo						
McMaster University						
University of Guelph						
UOIT						

Workforce Development Survey

In order to gain an understanding of some of the challenges faced by industry players in terms of workforce development and labour recruitment an online survey is recommended. The survey should gather information on the following main areas:

- Basic information about the respondent company and their business size;
- Whether they would manage with their existing staff size if demand for their services suddenly doubled;
- What skill areas are most challenging to recruit in their field;
- What are the primary sources for finding labour in their field;
- What partnerships are working to help with recruitment and workforce development;
- What are the barriers/obstacles with recruitment;
- What are the primary sources for workforce development in the industry; and
- What are some of the gaps in quality or quantity of existing training programs.

The detailed online survey used for evaluation the solar industry's workforce challenges is provided in the Appendix.

A free basic account has been set up with the online surveying tool, Survey Monkey. The surveys designed for the three evaluated initiatives are saved on this online account. The tool allows for existing surveys to be copied and modified for future evaluation of other initiatives. The user name for the account at surveymonkey.com is "*green.jobs*" (without quotations) and the password is "*workforce*" (without quotations).

Prior to conducting an online survey a strategy for engaging potential respondents should be developed. This can be by contacting individual stakeholders through the phone and informing them about the study scope and goals before e-mailing them a web link of the online survey. This initial engagement would result in much improved survey response rates. Another effective strategy is reaching out to industry players at conferences or industry events. A high number of respondents to the solar workforce survey, for instance, were informed about the study and the survey at the annual Canadian Solar Industries Association (CanSIA) conference, where a paper copy of the questionnaire was handed out to them for their reference. This was followed up with an e-mail providing them the link to online survey.

Identification of Local Procurement Opportunities

In addition to opportunities for green employment as a direct result of delivering the initiative there may be other economic development opportunities through local procurement of materials. Information should be collected about amount, type and source of manufactured products used for various job components. In addition, understanding future trends in supply and demand for specific materials could add valuable insight.

Depending on the range of different material involved and on the size and nature of the market for these materials, an inventory of major local manufacturers and suppliers and their current and future production capacity could be compiled. Table 8 is an example of such an inventory for the solar industry in Toronto.

The supply chain analysis of the industry should ultimately indentify a number of business development opportunities. Firstly, the areas of strength of the local economy in the related industry and certain areas of the market which may require business retention strategies should be identified. Secondly, opportunities for business expansion and local entry into the major component markets should be investigated.

Table 8 Solar PV Component Manufacturers with Sales Offices in Toronto[5]

Company	Manufactured Component	Location of Manufacturing Plant	Production Capacity (MW)	Potential Expansion (MW)
Advanced Energy	Inverters	Toronto	N/A	N/A
Celestica	Inverters	Toronto	N/A	N/A
power One	Inverters	Scarborough	500	tbd
SAE Power	Inverters	Scarborough	500	tbd
Santerno (Carraro Group)	Inverters	TBA	500	N/A
Schneider Electric (Xantrex)	Inverters	Mississauga	N/A	N/A
Solarbridge Technologies	Inverters	Toronto	N/A	N/A
Sustainable Energy Technologies	Inverters	Cambridge	350	N/A
Canasia SolarCorp.	Modules	London	50	200
Celestica	Modules	Toronto	100	200
Eclipsall Energy Corp.	Modules	Looking for a facility in	64	128
Morgan Solar Inc.	Modules	Toronto	5	N/A
Opel Solar International Inc.	Modules	Unknown	N/A	N/A
Opsun Panels Inc	Modules	Markham	50	N/A
Siliken	Modules	Windsor	50	N/A
SunEdison	Modules	New Market	50	200
Advanced Solar Investments Ltd.	Racking	Cobourg	N/A	N/A
Opsun Panels Inc	Racking	Markham	N/A	N/A
Samco Solar	Racking	Toronto	N/A	N/A
Sasco Strut	Racking	North York	N/A	N/A
Invotronics	Wiring and electrical	Scarborough	N/A	N/A
Protectolite Inc.	Wiring and electrical	Toronto	N/A	N/A

Concluding Remarks

A number of examples are provided throughout this framework based on evaluation of three City of Toronto environmental initiatives. It is evident though these examples that each initiative has a number of unique characteristics, which require unique approaches to its evaluation. These characteristics may be related to the technologies used in the field and/or program design specifications. This report has identified common elements amongst the evaluation processes and makes recommendations for taking the most efficient and productive approach in evaluation of an initiative.

It is clear that the evaluation of any environmental initiative requires an informed study of the technology, procedures and the local service and material market. In addition, having existing relationships with the network of industry stakeholders can significantly improve efficiency of data collection and quality of the information gathered. As such it is recommended that this evaluation should be conducted by staff directly involved with development or implementation of the environmental initiative of interest.

[5] Briz, Sylvie (2010). *Solar Supply Chain in the City of Toronto*. Prepared for Sector Growth & Sector Development Office, Economic Development & Culture City of Toronto.

Appendix – Online Survey Sample

City of Toronto Solar Workforce Survey

The City of Toronto Economic Development and Culture Division along with the Toronto Environment Office are undertaking a study to identify gaps in supply of skilled labour in the solar PV industry. This study will also identify gaps in university and college training program. The study will ultimately identify ways in which the City of Toronto can help with the uptake of the solar PV industry.

To help us reach these goals we ask that you take about 5 minutes to complete this online survey. We assure you that any information you provide is entirely confidential and the source of the data will not be reported. Only aggregate data from several sources will be analyzed.

If there are any questions or comments please feel free to call Sheyda Saneinejad at 416-397-4831 or e-mail her at ssanein@toronto.ca.

Thank you!

1. Please enter the name of your firm.

Please enter the name of your firm. .

Is your business located in the Greater Toronto Area and Hamilton?

2. At what capacity is your business involved in the Solar PV industry?

- ☐ Design and manufacturing of components
- ☐ Installation
- ☐ Maintenance and monitoring

Others (please specify)

3. What is your current production/installation volume (e.g. 10 to 15 MW/year, 1000 converters / year, etc.)?

Do you have existing capacity to produce/install more or would you need to hire more staff if demand were to increase?

What could the City of Toronto do to help the growth of the solar Industry?

4. What are the top 4 skill areas that are most challenging to recruit?

- ☐ Electrician/Electrical technician
- ☐ Roofer
- ☐ Foreman

- ☐ General labourer
- ☐ Electrical Engineer
- ☐ Mechanical Engineer
- ☐ Structural engineer
- ☐ Manufacturing engineer
- ☐ Quality assurance engineer/technician
- ☐ Chemical/Process engineer

Others (please specify)

5. What are the primary sources for finding labour in your field today?

- ☐ head hunters
- ☐ on-line postings
- ☐ united way programs
- ☐ high school recruitment fairs
- ☐ OYAP
- ☐ union calls
- ☐ colleges
- ☐ father and son industry,
- ☐ inter-generational recruitment
- ☐ engineers through universities

Others (please specify)

6. What partnerships are working to help you recruit and/or source labour?

- ☑ Colleges
- ☐ co-ops
- ☐ OYAP/YMCA
- ☐ Friends and family
- ☐ Unions

Other (please specify)

7. What are the top 3 - 5 barriers/obstacles for recruitment and selection today in GTA?

- ☐ Perception of the trades not viewed as a career
- ☐ Nepotism

- ☐ Low salary for apprenticeship
- ☐ Shortage of qualified engineers
- ☐ Many youth don't have the Grade 12 Physics and Math
- ☐ Non English speaking people need CIC Enhanced Language Training

Others (please specify)

8. What are the primary sources for training and workforce development today?

- ☐ Union training centres
- ☐ Co-op in high schools
- ☐ Universities for Engineers
- ☐ Colleges and universities for green technology
- ☐ Colleges for construction trades
- ☐ INGO associations e.g. Canada Green Building Council
- ☐ On-job training
- ☐ Government training centres
- ☐ Associations e.g. Kortrigh Centre for conservation, Infiti Solar, CanSIA

Others (please specify)

9. What partnerships exist in training and development?

- ☐ Apprenticeships monitored by local Apprenticeship Councils
- ☐ Construction association and Ministry of Training, Colleges and Universities and Apprenticeship Council
- ☐ LEED training
- ☐ Home Builders Association and Carpenters Union
- ☐ Colleges of the Trades
- ☐ Co-ordination between locals and companies
- ☐ Unions working with universities and colleges

Others (please specify)

10. What are some of the gaps in quality and quantity of training programs available through colleges and universities?