

Solar Training Initiatives Reference Guide
City of Toronto and GTA
January 2011

Prepared by TREC

A project commissioned by:
Sector Growth and Sector Development Office
Economic Development and Culture
City of Toronto



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Summary

As Ontario's *Green Energy and Green Economy Act* continues to stimulate job growth and opportunity in the solar industry, key questions have arisen regarding the emerging skills gap in the industry and the demand for trained and qualified personnel. Industry stakeholders, private solar organizations and post-secondary institutions, are focusing their efforts on addressing these workforce challenges to ensure that Ontario meets its green energy mandate.

The following is a reference guide detailing solar training initiatives in the City of Toronto and the Greater Toronto Area. Section 1 refers to **Solar PV Training Initiatives** and Section 2 to **Solar Thermal Training Initiatives**. Each section is organized by region and type of institution, and includes the following:

Part A. Curriculum Profiles – include a Program Overview, a Sample of Skill Sets Achieved and information on Program Accreditation, where applicable.

Part B. Course Information – includes prerequisites or Entry Requirements for each program, a sample of applicable Career Opportunities and Contact Information

An **Appendix** detailing key industry stakeholders who indirectly influence the solar training landscape in Toronto and surrounding areas is also included. Information on their training-related initiatives is provided.

The *Solar Training Initiatives Reference Guide: City of Toronto and GTA* was prepared by TREC under its Green Collar Careers initiative. TREC works to provide an opportunity for everyone to participate in renewable energy development and conservation activities as well as encouraging environmental literacy through educational programming. The Green Collar Careers program stimulates youth awareness and engagement in the growing green sector through outreach activities and work placement opportunities. To find out how to get involved in the Green Collar Careers program, please contact:

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PART A. Curriculum Profiles

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details | NABCEP | ACCC | IREC |
|---|--|--|--|--|--|--------|------|------|
| Solar PV Training Programs City of Toronto | | | | | | | | |
| a) Post-Secondary Institutions | | | | | | | | |
| Centennial College | Aboriginal Education Initiative: Solar Energy Photovoltaics. (Open to First Nations and Metis) | 6 weeks | <p>This program teaches the fundamentals of solar powered electrical generation systems and practical considerations related to system design. It will also include hands-on installation and safety training. Financial analyses of solar projects will be completed and basic business skills review.</p> <p>This course is only being offered for the 2010/2011 school year. Course activities are expected to end in March 2011.</p> | <p>Explain characteristics of PV cells</p> <p>Perform solar site analysis using solar pathfinder</p> <p>Perform energy production analysis using RETScreen</p> <p>Learn project planning fundamentals including design and development</p> <p>Gain understanding of grid-tied solar inverters</p> <p>Gain comprehensive understanding of the FIT program</p> <p>Understand fundamentals of protective equipment, fall arrest and electrical safety</p> <p>Learn fundamentals of finance and pricing</p> | <p>ACCC* solar curriculum was adapted for this course</p> <p>*For information on ACCC, please see Appendix</p> | | | ✓ |
| Centennial College | Energy Systems Engineering Technology | 2-3 years Students can graduate as a Technician after the first two years or continue onto paid work experience or follow a purely academic path to an Advanced Diploma | <p>Through the Energy Systems Engineering Technology program, Centennial College teaches you the fundamental skills to understand energy and its uses in modern society. The program offers a unique blend of technical, managerial and entrepreneurial skills that are highly sought after in modern energy and sustainable building companies. You can graduate as a technician after the first two years or continue onto paid work experience or follow a purely academic path to an advanced diploma. Optional applied technology workshops such as Hands-on Solar Workshop available.</p> <p>Courses include: Renewable Energy System Electrical Circuits CAD/Blueprint Reading Mechanics and Materials Wind and Solar Energy</p> | <p>Employ AutoCAD software to prepare precise and fully annotated electronic schematics</p> <p>Use electronics test equipment to measure voltage, current and resistance</p> <p>Solve basic D.C. and A.C. series and parallel resistive circuits</p> <p>Gain practical experience installing PV panels and solar collectors</p> <p>Perform energy production analysis using RETScreen</p> <p>Perform Site Analysis for PV installation</p> | <p>The program's curriculum was developed independently using NABCEP* Learning Objectives as a resource</p> <p>*For information on NABCEP, please see Appendix</p> | ✓ | | |
| Humber College | Sustainable Energy & Building Technology (SEBT) program | 3 years (4 semesters of school and a 400 hour co-op placement) | <p>The three-year, multidisciplinary program will position you to work effectively with other professionals in providing truly integrated solutions in the sustainable technologies sectors that deal with energy efficiency and renewable energy. You will be able to assess site characteristics and client needs, provide advice on renewable energy, building design and heating/cooling system alternatives, prove energy efficiency through energy audits and energy performance simulation, cost the energy system and select appropriate suppliers and contractors.</p> <p>Courses include: Construction Drawings Energy Metrics, Surveying and Analysis Electric Circuits Building Science and Thermodynamics Renewable Electricity Technologies Mechanical Systems Building Energy Loads Computer-Aided Design Sustainable Building Design Low Energy Building Systems</p> | <p>Perform Site Analysis for PV installation</p> <p>Perform energy audit</p> <p>Gain knowledge of inverters, electrical storage and energy monitoring/control systems</p> <p>Understand of building codes and standards</p> <p>Design electrical and HVAC layouts using AutoCAD</p> <p>Conduct economic analysis of various renewable energy systems</p> <p>Analyze the effect of resistance, inductance and capacitance in series and/or parallel AC circuits</p> <p>Understand the basic principles and applications of transformers</p> | <p>Curriculum for this program was developed independently.</p> <p>Humber College has recently received and is reviewing ACCC* solar curriculum for future use. Humber is pursuing various accreditation possibilities.</p> <p>*For information on ACCC, please see Appendix</p> | | | |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details | NABCEP | ACCC | IREC |
|--------------------|--|-----------------------|--|--|--|---------------|-------------|-------------|
| Seneca College | Photovoltaic Systems Program (PVS) | 1 year, part time | Upon successful completion of the PVS program the student will gain a solid understanding of photo voltaic systems technology, site analysis, system design and installation methods in the solar industry. As well the student will be able to establish suitable locations for PV arrays and assemble/install a PV system. Courses include: PV Residential And Small Commercial Grid Connection PV Off-Grid And Remote Power PV/Battery Systems Design And Installation PV Farm System & Large Scale Design & Installation | Perform a PV site assessment Explain various PV panel types Explain voltage and current available when the inverter is pushed to maximum performance Demonstrate how to use a pyranometer to measure solar energy and how to measure PV output Describe the safety, performance and sizing of battery types. Describe and identify insolation characteristics for a site Calculate the amount of available energy sources for the system at the location Explain electrical load types and requirements, and calculate the load requirements for a system Demonstrate an understanding of the charge controllers operation of off grid/stand alone systems Size photovoltaic and battery systems to design limits Explain the operating requirements for generators on the system and calculate generator capacity requirements Gain practical PV installation experience | This program was developed using ACCC* solar curriculum. *For information on ACCC, please see Appendix | | ✓ | |
| Willis College | Ontario Solar Energy Technician Course | 2 weeks | This course is designed for current players in the solar industry and prepares participants for the NABCEP Entry Level exam. | Able to identify and use basic solar devices and equipment Understand basic principles and mathematics of electricity Gain basic knowledge in solar equipment assembly, installations and maintenance Understand basic electrical safety rules, precautions, and procedures Understand mechanical design features that effect the electrical performance Perform maintenance, troubleshooting and problem analysis on solar installations Understand PV Markets & Applications, including Ontario Fit & Micro FIT Program Solar Energy and PV Module Fundamentals, including system components PV System Sizing Principles, Electrical and mechanical Design, and Performance Analysis Gain practical installation experience | Certified NABCEP* practitioners. Willis College is a recently approved NABCEP Entry Level Exam Provider *For information on NABCEP, please see Appendix | ✓ | | |
| Willis College | PV Technical Sales | 2 weeks | A PV Tech Salesperson is a solar electric professional with demonstrated expertise in the siting, design, analysis, and performance of PV systems who gathers site specific information, analyzes customer needs, and energy usage for the purpose of advising and providing customers with the most appropriate solution for their situation. | Manage customer expectations and provide customer care Explain types of incentives and net cost Explain types of utility rates and net electric bill savings Calculate financial analysis Evaluate appropriate financing options Calculate/quantify environmental benefits proportional to estimated production Describe non-financial, non-environmental benefits Understand sales basics Determine customer needs Create and manage proposals Develop financial models | Certified NABCEP* practitioners. Willis College is a recently approved NABCEP Entry Level Exam Provider *For information on NABCEP, please see Appendix | ✓ | | |

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|--------------------------------|--|---|--|--|---|---------------|-------------|-------------|
| Willis College | Photovoltaic Installation Diploma | 16 weeks | <p>This program is designed for electricians looking to gain insight and skills training in the emerging green energy industry. It encompasses technical skills specific to solar PV generation, as well as business and program management skills</p> <p>Courses include: Keys to Success – Learning Skills and Critical Thinking – 2 weeks Electricity for Solar Panel – 2 weeks Microsoft Applications 1 – 5 weeks Sales and Marketing for Green Energy – 2 weeks Solar Energy Technology - Photovoltaic – 4 weeks Job Search Skills – 1 week</p> | <p>Understand principles of electricity including proper use of test equipment, AC and DC circuits, and component theory and operation related to PV installations</p> <p>Learn fundamentals of DC circuits and AC circuits operation (transformers, capacitive, inductive circuit analysis techniques and safety requirements)</p> <p>Learn fundamentals of Microsoft XP, Outlook, Excel, PowerPoint and Word</p> <p>Develop skills required to seek and obtain employment in business and industry.</p> <p>Demonstrate how to use a pyranometer to measure solar energy and perform solar site analysis</p> <p>Perform energy production and financial analysis using RETScreen</p> <p>Gain practical installation experience (off-grid and grid-tied) systems)</p> <p>Learn how to wire inverters and connect solar array</p> | <p>Certified NABCEP* practitioners. Willis College is a recently approved NABCEP Entry Level Exam Provider</p> <p>*For information on NABCEP, please see Appendix</p> | ✓ | | |
| b) Private Institutions | | | | | | | | |
| Infinite Solar (Mississauga) | 5-Day Entry Level Solar PV Design and Installation Course | 5 days (Total of 40 hours of professional training) | <p>Our Entry Level Solar PV Design and Installation Course covers the fundamentals, concepts and theories of photovoltaics. This class will review the design, installation, and evaluation of residential and small commercial solar photovoltaic (PV) systems. The solar PV installation training course is based on standards set by IREC and includes site evaluation tools and techniques, solar electric component operation and connection, system design and sizing, and standard requirements and practices. Our hands-on solar training lab covers the common steps of residential and small commercial solar installations and provides students with the skills and experience necessary to successfully install solar PV systems.</p> <p>Infinite Solar also has plans to develop an intermediate level course that would prepare participants for the NABCEP Certified Installer exam, but are awaiting policy developments with regard to PV training standards in Canada</p> | <p>Gain practical inverter wiring and connection experience</p> <p>Gain practical PV installation experience, including roof penetrations and panel attachment</p> <p>Learn how to work with DC disconnects, inverters, AC disconnects, and load center/service panels to tie in with the utility</p> <p>Hands-on training on the following equipment: Rooftop Mounting Installation, Ballasted Roof mount installation, Pole-mount installation, Quick Mount PV, Oatley Flashing, Unirac Railing, Enphase Micro inverters with web monitoring, Sunny-Boy Inverters.</p> <p>Understand system sizing principles</p> <p>Perform maintenance and troubleshooting</p> | <p>Infinite Solar is an IREC-ISPQ* Accredited Continuing Education Provider. The course curriculum is based on standards set by IREC. Infinite Solar is also an approved NABCEP Entry Level Exam Provider</p> <p>*For information on NABCEP and IREC, please see Appendix</p> | ✓ | | ✓ |
| Infinite Solar (Mississauga) | 2-Day Solar PV Hands-on Workshop (This is the SAME workshop as above but without the in-class portion) | 2 days (Total of 10 hours of professional training) | <p>The goal of this intensive hands-on training workshop is to give our students in-depth exposure to various solar PV system installations. Our hands-on solar training lab covers the common steps of residential and small commercial solar installations and provides students with the skills and experience necessary to successfully install solar PV systems.</p> | <p>Gain practical inverter wiring and connection experience</p> <p>Gain practical PV installation experience, including roof penetrations and panel attachment</p> <p>Learn how to work with DC disconnects, inverters, AC disconnects, and load center/service panels to tie in with the utility</p> <p>Hands-on training on the following equipment: Rooftop Mounting Installation, Ballasted Roof mount installation, Pole-mount installation, Quick Mount PV, Oatley Flashing, Unirac Railing, Enphase Micro inverters with web monitoring, Sunny-Boy Inverters.</p> <p>Understand system sizing principles</p> <p>Perform maintenance and troubleshooting</p> | <p>Infinite Solar is an IREC-ISPQ* Accredited Continuing Education Provider. The course curriculum is based on standards set by IREC. Infinite Solar is also an approved NABCEP Entry Level Exam Provider</p> <p>*For information on NABCEP and IREC, please see Appendix</p> | ✓ | | ✓ |
| Schüco Solar (Mississauga) | Solar Photovoltaic Training (2 day course) | 2 days | <p>This workshop occurs over 2 days at the Schuco Canada facility in Mississauga. Participants spend 1.5 days in the classroom learning the theoretical background of solar PV technologies. The final afternoon is spent in their hands on learning lab where participants complete installations of solar thermal projects on both flat and titled roof as well as grid hook up. At the end of the course, participants are required to write an exam. Upon successful completion of the course and exam, participants receive a Certificate of Completion from Schuco.</p> | <p>Understand PV system design principles for grid-tied systems</p> <p>Understand key PV components and technologies</p> <p>Provide performance analysis</p> <p>Size PV string and inverters</p> <p>Develop code-compliant electrical design</p> <p>Gain knowledge of Schüco mounting system solutions</p> <p>Gain practical installation experience</p> <p>Perform system monitoring and communication</p> | <p>Successful completion of this course and the culminating exam grant participants 12 NABCEP credits.</p> <p>*For information on NABCEP, please see Appendix</p> | ✓ | | |

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|---|--|--|---|--|--|---------------|-------------|-------------|
| c) Industry Organizations | | | | | | | | |
| International Brotherhood of Electrical Workers | Solar Photovoltaic Training Course (Level 1) "Sun as a Source of Fuel" | 3 hours over 10 weeks. Offered on weekday evenings | This course is offered through the IBEW Education Department at their Training Centre. It is available ONLY to members of the IBEW and participants must be qualified Journeymen Electricians or senior level apprentices. Level One is a 30-hour course that takes place over 10, 3 hour weekday evening classes. It is a theoretical, in-class course that covers various aspects of PV installation including: health and safety, hazardous awareness, electronics review, AC/DC inverters, the feed-in-tariff program, environmental considerations, etc. | <p>Understand health and safety, protocol and hazard issues</p> <p>Understand basic electrical principles, including how AC/DC inverters work</p> <p>Understand basics of the Ontario Feed-In-Tariff program</p> <p>Explain environmental benefits of Solar PV</p> <p>*This course does not cover off-grid systems</p> | Through its national training arm, NETCO (see below), the IBEW aims to promote national certification standards in the area of solar PV installation | | | |
| International Brotherhood of Electrical Workers | Solar Photovoltaic Training Course (Level 2) "Sun as a Source of Fuel" | 8 hours over one weekend day | <p>This course is offered through the IBEW Education Department at their Training Centre. It is available ONLY to members of the IBEW and participants must be qualified journeymen electricians or senior level apprentices. Level Two is a one day weekend course that deals with the physical installation of solar PV. This occurs in their skills lab.</p> <p>This course is currently in development.</p> | <p>Understand health and safety, protocol and hazard issues</p> <p>Understand basic electrical principles, including how AC/DC inverters work</p> <p>Understand basics of the Ontario Feed-In-Tariff program</p> <p>Explain environmental benefits of Solar PV</p> <p>*This course does not cover off-grid systems</p> | Through its national training arm, NETCO (see below), the IBEW aims to promote national certification standards in the area of solar PV installation | | | |

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| Solar PV Training Programs Greater Toronto Area | | | | | | | | |
| a) Post-Secondary | | | | | | | | |
| Georgian College (Barrie) | Sustainable Systems Ontario Graduate Certificate program | 1 year | <p>Graduates of this one-year program have the knowledge and experience to transform and lead organizations in the sustainable and profitable use of energy and resources. Building on the skills of their chosen profession, graduates have the demonstrated ability to work in a multidisciplinary team environment in the development of innovative projects that reduce waste, make better use of limited natural resources and use renewable energy. Graduates have an understanding and appreciation of the disciplines outside their own field of expertise. This certificate prepares graduates for work in the public sector, the private sector and in non-government organizations as part of an interdisciplinary team leading projects that focus on the development and implementation of sustainable systems. They may choose careers in the areas of energy auditing, building or equipment retrofitting, devilmint impact assessment, or analyzing, installing, and maintaining renewable energy equipment.</p> <p>Courses include: Energy Regulations and Government Policy Environmental Impact and Sustainability Renewable Energy Siting and Analysis Renewable Energy Systems, Theory and Practice</p> <p>This program has recently been approved and will be offered in Fall 2011.</p> | <p>Use a wide variety of measuring instruments and standard protocols for the collection and organization of data and information</p> <p>Analyze and communicate the impact of various economic, social, geographical, political, and technological systems on the environment</p> <p>Determine and effectively communicate the feasibility of various sustainable system and technology options</p> <p>Interpret government policy to determine and recommend politically acceptable, fiscally responsible, and environmentally sustainable solutions to social problems</p> <p>Apply computer technologies to the analysis, design, installation, operation, and maintenance of sustainable systems and technology</p> <p>Simulate, model, and analyze a variety of materials, conditions, and systems related to natural and engineered environments</p> <p>Communicate effectively with various disciplines on the subject of sustainable systems using appropriate language and terminology</p> <p>Plan, organize, lead, and manage projects that require the effective integration of multiple disciplines, technologies, and processes</p> <p>Practice the use of sustainability principles within a chosen discipline or field of expertise</p> | <p>Curriculum for this program was developed independently with oversight from an industry advisory board.</p> <p>Georgian College has recently received and is reviewing ACCC* solar curriculum for future use</p> <p>*For information on ACCC, please see Appendix</p> | | | |
| Durham College (Oshawa) | Renewable Energy Technician | 2 years, full time. (4 semesters) | <p>Renewable energy technicians are part of the rapidly growing field of renewable, sustainable and alternative energy solutions. As an introduction, you will receive a basic exposure to traditional energy consuming systems followed by a solid foundation in the operation of renewable energy systems including solar and wind power and ground source heat pumps.</p> <p>Courses include: Solar Thermal Systems Solar Photovoltaic Systems Energy Battery Systems</p> <p>Durham College also has plans to add additional energy programs, which will be available in 2011.</p> | <p>Perform accurate energy audits on new and existing homes to assess their energy performance</p> <p>Gain practical installation and assembly experience with solar energy panels, geothermal heat pump systems and wind turbines</p> <p>Gain a working knowledge of the fundamentals of solar panel installation including orientation, connection, and site evaluations</p> <p>Learn the principles and components of connecting an independent energy producing system to the public power grid</p> <p>Gain knowledge of the Electrical Code requirements governing these installations in Ontario</p> | <p>Curriculum for this program was developed independently with oversight from an industry advisory board.</p> <p>Durham College has recently received and is reviewing ACCC* curriculum for future use</p> <p>*For information on ACCC, please see Appendix</p> | | | |

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|--|--|----------------------------|---|---|--|---------------|-------------|-------------|
| Mohawk College of Applied Arts and Technology (Hamilton) | Energy Systems Engineering Technology – Clean and Renewable Energy | 3 years + co-op placements | <p>Students will focus on clean energy and renewable energy sources including wind, bioenergy, hydro power, solar photovoltaic, solar thermal, geothermal, strategies for conservation and clean energy supported by micro grids and distributed energy systems. This program is unique in introducing a multi disciplinary approach that focuses on the generation, capture, storage, and distribution of clean and renewable energy and their integration with conventional systems</p> <p>Courses include: Clean and Renewable Energy Technology Smart Metering and Distribution Smart Regulations Energy Management</p> <p>Mohawk College has also been recently approved for an Energy Systems Technician program, which is expected to be available in Fall 2011</p> <p>(Please see <i>Sample of Skill Sets Achieved</i> for the Learning Outcomes of the Technician's program)</p> | <p>Energy Systems Engineering Technology – Clean and Renewable Energy Design and analyze electrical and/or mechanical components, processes and systems through the application of engineering principles.</p> <p>Analyze and prepare graphics and other technical documents to appropriate engineering and architectural standards using industry-specific software and procedures.</p> <p>Use a variety of troubleshooting techniques and test equipment to identify problems with electrical and/or mechanical components of conventional, renewable and clean energy technologies.</p> <p>Design, build and troubleshoot working prototypes of sustainable energy systems and subsystems to meet job requirements, functional specifications and relevant standards; and integrate renewable and clean energy technology into the system design.</p> <p>Adhere to the legal, regulatory and health and safety codes and guidelines.</p> <p>Contribute to the financial and technical planning and implementation of sustainable construction and development projects.</p> <p>Energy Systems Engineering Technician – Clean and Renewable Energy Install, maintain, diagnose, repair, modify and calibrate clean and renewable energy systems appropriate for small scale (<20,000 ft²) residential, commercial or industrial structures.</p> | <p>Course work and curriculum for the Solar PV and Solar Thermal portions of the program are in development, but Mohawk College intends to reference ACCC's solar curriculum.</p> <p>*For information on ACCC, please see Appendix</p> | | ✓ | |
| | | | | <p>Retrofit existing conventional systems applying green energy management techniques for efficient and clean energy generation and distribution.</p> <p>Perform an assessment of the total energy losses in an existing structure, be it residential or small-scale (<20,000 ft²) commercial or industrial structure.</p> <p>Assess and make recommendations in regard to the energy efficiency of major energy-consuming systems.</p> <p>Outline mechanisms for improved energy efficiency through changes in structure, energy systems or control strategies.</p> <p>Predict the cost savings to be realized with the implementation of clean and renewable energy strategies.</p> <p>Adhere to the legal, regulatory and health and safety codes and guidelines.</p> | | | | |

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|---|---|---|---|--|--|---------------|-------------|-------------|
| b) Private Institutions | | | | | | | | |
| Canadian Renewable Energy Academy (Vaughan) | 5-day solar PV Workshop | 5 days. (3 days in-class and hands-on, 2 full days of hands-on) | This workshop is designed to provide participants with the knowledge and tools required to grasp both business and technical aspects of solar photovoltaic integration. CREA's initiative to bring a standard of education to the Ontario market place is embodied by this workshop; to this end the workshop has been created by not only industry professionals in order to ensure technical aptitude of the graduate but it has also been afforded guidance from education specialists to ensure that once a graduate, the individual can be assured that the certificate of completion will endure regulatory compliance as the sector and trade of solar PV installation is established here in Ontario. | Understand fundamentals of grid-tied PV system design & estimation Identify economic, financial (financial modeling) & regulatory considerations Identify safety issues (Fall Arrest Certificate Included) Understand principles of electrical component selection and functions (in-depth review of Ontario code requirements) Perform site evaluation including shade analysis Gain practical installation experience on a rooftop system including racking and roof integration technologies | CREA has the only Ontario based faculty that includes a NABCEP®-certified Instructor from Ontario. The course prepares you to write NABCEP's Entry Level Solar PV Installer exam (Exam not included). *For information on NABCEP, please see Appendix | ✓ | | |
| Efan Green (Markham) | Planning & Installing Solar PV Systems with Hands-on Training | 5 days | This course will provide an overview of the three basic PV system applications, primarily focusing on grid-direct systems. The goal of the course is to create a fundamental understanding of the core concepts necessary to work with all PV systems, including: system components, site analysis, PV module criteria, mounting solutions, safety, and commissioning. The course will also cover the basics of sizing a residential grid-direct system, wire sizing, overcurrent protection, and grounding. This workshop is run intermittently. Check website for course availability and schedule. | Understand PV markets and applications Understand safety basics Understand electricity basics Understand solar energy fundamentals Understand PV module fundamentals ie. system components, system sizing principles, electrical design, mechanical design. Perform analysis, maintenance and troubleshooting | Course content is based on NABCEP® Learning Objectives, and customized for compliance to Canadian Building and Electrical Code. Course prepares students to write the NABCEP® Entry Level exam. (Exam is not included) *For information on NABCEP, please see Appendix | ✓ | | |
| Kortright Centre (Woodbridge) | Green Energy Introduction | 1 day | Technologies covered in this program include solar (photovoltaic), wind electrical energy and domestic solar hot water systems. The objective is to enable home or cottage owners to decide what technologies make sense for them, considering their own motivations and resources available. Motivations such as energy independence, energy security, environmental impact and economic investment for using each technology will be discussed | Gain general understanding of solar PV, solar thermal and wind technologies as it applies to residential energy savings and efficiency | None | | | |
| Kortright Centre (Woodbridge) | Photovoltaic Generation | 1 day | This course is an introduction to the fundamentals of photovoltaics (PV). Whether you would like to become an educated consumer, or are considering a career in the industry, PVG will provide you with the basic theory of photovoltaics including practical applications and installation. The course discussions will include PV generation in grid tied and off-grid applications and the Feed in Tariff (FIT) program as it relates to the Green Energy Act of Ontario. | Gain general understanding of solar photovoltaic systems, including practical applications and installation. Understand both grid tied and off-grid applications of PV generation Gain general understanding of Feed in Tariff (FIT) program as it relates to the Green Energy Act of Ontario | None | | | |
| Kortright Centre (Woodbridge) | Utility PV Installation | 1 day | The Utility PV Installation course offers participants a hands-on opportunity to assemble and install a grid-tied PV system. The course begins with the theory of site assessment, installation and system sizing. Participants are then broken into small groups and are able to assemble a complete grid-tied system. The equipment used in this workshop is representative of systems currently being installed under the FIT program throughout Ontario. The majority of the course will be spent outdoors; participants should dress appropriately for the weather. | Gain general understanding of site assessment, installation and system sizing considerations in solar PV generation Gain practical PV installation experience assembling a complete grid-tied system. | None | | | |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details | NABCEP | ACCC | IREC |
|---------------------------------|--|-----------------------|---|--|---|---------------|-------------|-------------|
| Kortright Centre (Woodbridge) | Photovoltaic Training Course | 5 days | To meet the growing demand for trained installers and educators, Kortright has developed a new five-day training session that includes theory, hands-on laboratory, and installation components that prepare you to write the NABCEP (North American Board Certified of Energy Practitioners) entry level certification exam, to enter into the growing solar energy marketplace. | <p>Understand photovoltaic markets and applications</p> <p>Understand solar and electrical fundamentals and site planning</p> <p>Understand photovoltaic fundamentals and system components</p> <p>Understand photovoltaic system design, sizing and building Integration.</p> <p>Understand code, regulations and safety</p> <p>Gain practical PV installation experience</p> | <p>Course prepares students to write the NABCEP* Entry Level exam. (Exam is not included)</p> <p>*For information on NABCEP, please see Appendix</p> | ✓ | | |
| Ontario Solar Academy (Markham) | 5-Day Solar PV Design and Installation Course | 5 days | Course covers fundamental knowledge and reviews the design, installation, and evaluation of residential and commercial solar photovoltaic (PV) systems. The solar training, based on the NABCEP learning objectives, includes site evaluation tools and techniques, solar electric component operation and connection, system design and sizing, and standard requirements and practices. This special Ontario Solar Academy course guides students from system fundamentals to advanced mechanical and electrical concepts in accordance with Electrical Code requirements in Ontario. | <p>Learn site evaluation tools and techniques, including shade analysis</p> <p>Gain practical understanding of solar electrical component operation and connection, system design and sizing, and standard requirements and practices, in accordance with Electrical Code requirements in Ontario.</p> <p>Perform analysis, maintenance and troubleshooting</p> <p>Learn project design fundamentals</p> <p>Gain practical inverter wiring and connection experience</p> <p>Gain practical PV installation experience (mounting and grounding)</p> | <p>Ontario Solar Academy is an IREC-ISPQ* Accredited Continuing Education Provider. Students who attend Ontario Solar Academy's courses will soon also be eligible to sit for the NABCEP Entry Level Exam. Although training alone does not qualify one to sit for the more intensive NABCEP Certified Solar Installer Exam, attendance at an ISPQ-accredited program counts towards the "Board Recognized Training" requirement for installer recognition.</p> <p>*For information on NABCEP and IREC, please see Appendix</p> | ✓ | | ✓ |
| Ontario Solar Academy (Markham) | 2-Day Advanced Solar PV Design and Electrical Code | 2 days | Course covers in depth coverage of inverter string sizing, wire sizing, system design and installations that follow local electrical code for residential and commercial solar photovoltaic (PV) system | See program description | <p>Ontario Solar Academy is an IREC-ISPQ* Accredited Continuing Education Provider. Students who attend Ontario Solar Academy's courses will soon also be eligible to sit for the NABCEP Entry Level Exam. Although training alone does not qualify one to sit for the more intensive NABCEP Certified Solar Installer Exam, attendance at an ISPQ-accredited program counts towards the "Board Recognized Training" requirement for installer recognition.</p> <p>*For information on NABCEP and IREC, please see Appendix</p> | ✓ | | ✓ |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details | NABCEP | ACCC | IREC |
|---|---|--|--|---|---|---------------|-------------|-------------|
| c) Industry Organizations | | | | | | | | |
| Association of Canadian Community Colleges (ACCC) | ACCC received funding from the Ministry of Natural Resources to develop solar PV and solar thermal curriculum. For more information on ACCC, please see Appendix | Courses are designed to be delivered in 65 to 70 hours | ACCC Course Curriculum details 3 PV Courses: PV Residential and Small Commercial Grid Connection System Design and Installation. Through a series of lecture and labs this course will introduce the students to the design and installation concepts of a PV System. Students will be introduced to solar insolation characteristics; PV panel theory, construction and performance; site analysis; battery types, PV charge control types; electrical integration; utility tied regulations installation and safety; and an introduction to national and international incentive programs. PV for Electricians: Residential and Small Commercial Grid Connection System Design and Installation. As above. PV Stand Alone and Off-Grid Systems Design And Installation. Through a series of lecture and labs this course will introduce the students to the design and installation concepts of a PV Stand Alone and an Off Grid System. Students will be introduced to site analysis: Electrical load calculations, Battery calculations, PV and Battery sizing, Generator integration, and Microgrid options. This course curriculum was released and made available to ACCC's member colleges in late 2010. Please see Appendix for a list of colleges that have requested this curriculum. | PV Residential and Small Commercial Grid Connection System Design and Installation Perform a PV site assessment Describe different light levels for maximum power transfer Explain voltage and current available when inverter is pushed to maximum performance Demonstrate how to use a pyranometer to measure solar energy and how to measure PV output, and describe solar insolation characteristics Explain and identify various PV panel types Describe the safety, performance and sizing of battery types PV for Electricians: Residential and Small Commercial Grid Connection System Design and Installation As above PV Stand Alone and Off-Grid Systems Design And Installation Perform a PV site assessment for a stand alone or off grid system Calculate the electrical load and demand for the system as well as calculate the battery capacity for this electrical load and demand Size /calculate the photovoltaic and battery system for the required design, and the backup generation requirements for a stand alone or off grid system Describe the operation of a Microgrid | These courses were developed to give colleges support in delivering courses that will expand the development of the solar industry in Canada and provide a trained workforce across the country. The project's objective is to offer standard solar curriculum that is relevant and consistent on a national level. For requests to review ACCC curriculum, please contact Don Young (see right) | | | ✓ |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details | NABCEP | ACCC | IREC |
|--|--|---|--|--|---|---------------|-------------|-------------|
| Discontinued Solar PV Training Programs and Workshops | | | | | | | | |
| a) Post-Secondary | | | | | | | | |
| Seneca College | Photovoltaic (PV) Technician Program | combined distance learning and in-class study (3 years) | Seneca College, in partnership with CanSIA, offers an eleven-part training program for people who want to become professionally trained in the design and installation of solar photovoltaic (PV) systems. The program provides a comprehensive understanding of related electric theory and the fundamentals of PV systems. By a combination of individualized distance learning and in-class study, students will learn the theory and practice required to use and install a solar electric system. Hands on training provided in partnership with Kortright Center. | <p>Understand photovoltaic fundamentals and system components</p> <p>Understand photovoltaic system design, sizing and building Integration.</p> <p>Understand code, regulations and safety</p> <p>Gain practical PV installation experience</p> | This program was developed in partnership with CanSIA but is no longer active. Seneca currently offers the Photovoltaic Systems Program (PVS) through its Continuing Education department (see Section 1) | | | |
| Centennial College | RETScreen Introductory Workshop | 1 day | <p>Centennial's hands-on workshop will introduce participants to using RETScreen version 4 software for setting up renewable energy models to estimate energy production and build business cases for renewable energy projects. Energy model results are only as accurate as the inputs that go into them. Thus, in addition to helping participants navigate through the software, the workshop will also give context to the input values, where they come from, and how they may change from project to project; some time will also be spent on how to use energy efficiency models to assist in the decision making process for building retrofit projects; and current financial metrics, such as incentive programs and tax breaks related to clean energy projects are integral to the workshop.</p> <p>This workshop is not currently being offered, as there is no qualified instructor. Centennial intends to offer the program again in the future if an instructor can be found.</p> | <p>Perform energy production analysis using RETScreen v.4</p> | None | | | |
| Centennial College | Advanced RETScreen Workshop for Solar Photovoltaic Systems | 1 day | <p>This advanced RETScreen course will explore various examples ranging from grid-connected micro FIT and FIT projects to off-grid projects with storage. In addition to looking at parameters affecting energy performance, a large portion of the course will also focus on financial modeling, including multiple funding scenarios, incentives, tax laws and other important variables.</p> <p>This workshop is not currently being offered, as there is no qualified instructor. Centennial intends to offer the program again in the future if an instructor can be found.</p> | <p>Perform energy production analysis using RETScreen v.4 as it applies to both grid-tie and off-grid systems</p> <p>Gain understanding of financial modeling for solar installations, including multiple funding scenarios, incentives, tax laws and other important variables.</p> | None | | | |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details | NABCEP | ACCC | IREC |
|---|--|---|---|-------------------------------|---|--------|------|------|
| Solar PV Certification Programs | | | | | | | | |
| CSA Standards and NETCO (National Electrical Trade Council) | Certified Construction Electrician- Solar Photovoltaic Systems | Dependent on experience, applicants must fulfill all requirements in order to qualify for certification | <p>CSA Standards is developing a certification for individuals who are qualified construction electricians who install and maintain solar photovoltaic (PV) power generation systems and equipment for use in settings such as industrial, commercial, institutional, power generation and residential settings in compliance with appropriate codes, standards and industry best practices.</p> <p>The program is designed to:</p> <ul style="list-style-type: none"> * Ensure that construction electricians who install and maintain Solar PV systems have the demonstrated knowledge and skills to competently perform the tasks required for this line of work * Promote national standards across Canada necessary for the safety, quality, reliability and consumer acceptance of Solar PV installations <p>This certification is designed for licensed Construction Electricians, and is expected to be available by summer 2011</p> | N/A | This is a national third-party independent certification program developed in partnership by: CSA Standards, NETCO (National Electrical Trade Council), CECA (Canadian Electrical Contractors Association) and IBEW (International Brotherhood of Electrical Workers) | | | |
| North American Board of Certified Energy Practitioners (NABCEP) | PV Installer Certification | Dependent on experience, applicants must fulfill all requirements in order to qualify for certification | <p>The NABCEP PV installer certification is a voluntary certification that provides a set of national standards by which PV installers with skills and experience can distinguish themselves from their competition. Certification provides a measure of protection to the public by giving them a credential for judging the competency of practitioners.</p> <p>NABCEP Certified PV Installers are highly experienced individuals who have passed a rigorous examination and have demonstrated the capability to supervise complete PV system installations, and who have a detailed working knowledge of the electrical codes, standards and accepted industry practice associated with PV installations. The target candidate for NABCEP certification is the person responsible for the system installation (e.g., contractor, foreman, supervisor, or journeyman).</p> <p>*While NABCEP is the recognized "gold standard" for solar PV and solar thermal installation in the US, it currently does not hold the same status in Canada</p> | N/A | NABCEP is the recognized "gold standard" for solar PV and solar thermal installation in the US | | | |

PART B. Course Information

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---|--|---|--|--|--|
| Solar PV Training Programs City of Toronto | | | | | |
| a) Post-Secondary Institutions | | | | | |
| Centennial College | Aboriginal Education Initiative: Solar Energy Photovoltaics. (Open to First Nations and Metis) | Professional Installation Course Students receive: Centennial College Certificate in Solar Photovoltaic Grid-tied System Fundamentals RETScreen solar PV Technical and Financial Analysis Safe-Tech Certificate of Training in Fall Prevention. | Ontario Secondary School Diploma (OSSD) or equivalent, or be 19 years of age or older (mature student). Basic level of fitness is required as some work is done outside on rooftops. Open to all Aboriginal participants from across Ontario. | Entry level installer Those seeking further education can use the training to apply for pre-apprenticeship openings in the construction and electrical trades, or apply to diploma courses in the energy sector | Sundeep Khosla Program Coordinator sundeep.khosla@cogeco.ca 416-566-9421 http://www.centennialcollege.ca/aboriginalinitiatives/solar_energy |
| Centennial College | Energy Systems Engineering Technology | Ontario College Diploma | * Ontario Secondary School Diploma (OSSD) or equivalent, or mature student status; * Compulsory English 12C or U or skills assessment, or equivalent * Math 11M or U, or 12C or U, or skills assessment, or equivalent * Minimum C grade required for technologist graduation | Green HVAC Technician Energy Consultant Green Building Construction and Design | El-Hedi Maloufi Program Coordinator emaloufi@centennialcollege.ca 416-289-5000 x 2192 www.centennialcollege.ca |
| Humber College | Sustainable Energy & Building Technology (SEBT) program | Advanced Diploma with co-op | * Ontario Secondary School Diploma (OSSD) or equivalent, or mature student status; * Grade 12 English (ENG4C or ENG4U) * Grade 12 Mathematics (MAP4C, MCT4C, MDM4U, MCB4U, MGA4U, MCV4U or MHF4U); * Two Grade 11 or Grade 12 C, U or M courses in addition to those listed above | Energy Auditor Energy Consultant Energy Manager | Kerry Johnston Program Coordinator School of Applied Technology kerryjohnston@humber.ca 416-675-6622 x 4512 www.humber.ca |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|--------------------|--|------------------------------------|--|-------------------------------------|---|
| Seneca College | Photovoltaic Systems Program (PVS) | Continuing Education Certificate | A basic level of electrical background is recommended for students entering this program. Program is designed for individuals who possess an electrical background, such as 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. | Entry Level PV Solar Installer | Vince Bennici Technology Program Coordinator Faculty of Continuing Education vince.bennici@senecac.on.ca 416-491-5050 x2499 www.senecac.on.ca |
| Willis College | Ontario Solar Energy Technician Course | Career College Certificate Program | None- no prior knowledge necessary | None (would need further education) | Ron Brandt Director, Toronto Centre Lawrence Campus Willis College 416-485-8588 Ron.Brandt@torontocentre.williscollege.com www.williscollege.com |
| Willis College | PV Technical Sales | Career College Certificate Program | None- no prior knowledge necessary | None (would need further education) | Ron Brandt Director, Toronto Centre Lawrence Campus Willis College 416-485-8588 Ron.Brandt@torontocentre.williscollege.com www.williscollege.com |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|--------------------------------|--|--|---|--|---|
| Willis College | Photovoltaic Installation Diploma | Career College Diploma Program | Must be a Licensed Electrician | This course is designed as a skills upgrade for licensed electricians looking to gain access to emerging opportunities in solar PV | Ron Brandt Director, Toronto Centre Lawrence Campus Willis College 416-485-8588 Ron.Brandt@torontocentre.williscollege.com www.williscollege.com |
| b) Private Institutions | | | | | |
| Infinite Solar (Mississauga) | 5-Day Entry Level Solar PV Design and Installation Course | Professional Installation Workshop | Basic computer skills Familiarity with equations, fractions & algebra Ability to safely lift 50 lbs. Background in solar is helpful and being familiar with electricity basics is expected | Entry Level PV Installer | Infinite Solar 1-289-801-1880/ 1-215-667-1267 www.infinite-solar.ca |
| Infinite Solar (Mississauga) | 2-Day Solar PV Hands-on Workshop (This is the SAME workshop as above but without the in-class portion) | Professional Installation Workshop | Prior solar technology knowledge. If you are not already in the industry/have taken an introductory course, you need to take the 5 day course instead. | Entry Level PV Installer | Infinite Solar 1-289-801-1880/ 1-215-667-1267 www.infinite-solar.ca |
| Schuco Solar (Mississauga) | Solar Photovoltaic Training (2 day course) | Professional Installation Workshop Students receive a Certificate of Completion | None. A background knowledge of solar and electrical systems is recommended. | PV Installer | Susan Muschett Registrar Schuco Solar SusanMuschett@schuco-usa.com 860-616-0128 www.schuco.com |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---|--|---|---|--|---|
| c) Industry Organizations | | | | | |
| International Brotherhood of Electrical Workers | Solar Photovoltaic Training Course (Level 1) "Sun as a Source of Fuel" | Professional Installation Workshop (In-class) Students receive a Certificate of Completion from the IBEW | Must be a member of the IBEW and participants must be qualified Journeymen Electricians or senior level apprentices. | This course is designed as a skills upgrade for licensed electricians looking to gain access to emerging opportunities in solar PV | Paul Barber Project Manager IBEW, Local 353 barberpaul@sympatico.ca 416-510-3530 www.ibew353.org |
| International Brotherhood of Electrical Workers | Solar Photovoltaic Training Course (Level 2) "Sun as a Source of Fuel" | Professional Installation Workshop (Hands-on) Students receive a Certificate of Completion from the IBEW | Must have completed Level 1. Must be a member of the IBEW and participants must be qualified Journeymen Electricians or senior level apprentices. | This course is designed as a skills upgrade for licensed electricians looking to gain access to emerging opportunities in solar PV | Paul Barber Project Manager IBEW, Local 353 barberpaul@sympatico.ca 416-510-3530 www.ibew353.org |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|--|--|------------------------------|--|--|--|
| Solar PV Training Programs Greater Toronto Area | | | | | |
| a) Post-Secondary | | | | | |
| Georgian College (Barrie) | Sustainable Systems Ontario Graduate Certificate program | Ontario Graduate Certificate | A college diploma or university degree in the area of Engineering or Science with a strong background in mathematics or equivalent. | This certificate prepares professionals for work energy management and policy-related work in their respective fields- in the public sector, the private sector and in non-government organizations as part of an interdisciplinary team leading projects that focus on the development and implementation of sustainable systems. | Ron Sky, PEng. Professor, Engineering Technology Georgian College rsky@georgianc.on.ca 705-728-1968 X 5228 www.georgianc.on.ca |
| Durham College (Oshawa) | Renewable Energy Technician | Ontario College Diploma | <p>OSSD, GED, ACE (BTSD) or Mature Student Status (MSS)</p> <p>Plus senior level (Grade 11 or higher) subject credits:</p> <ul style="list-style-type: none"> * Grade 12 English * Grade 12 mathematics (college technology MCTC4C, general tech MTT4G) * Construction Technology TGJ4M and/or Manufacturing Technology TMJ4E and/or Technological Design TTJ4C recommended * Computer literacy skills recommended | <p>Renewable Energy Sales Representative</p> <p>Energy Auditor</p> <p>Energy Manager</p> <p>Energy Consultant</p> <p>*An electrical background or further training in the area would be necessary to gain employment as an installer</p> | <p>Don Murdock</p> <p>Program Coordinator</p> <p>Durham College</p> <p>don.murdock@durhamcollege.ca</p> <p>905-721-2000 x 4069</p> <p>www.durhamcollege.ca</p> |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|--|--|--------------------------|--|--|---|
| Mohawk College of Applied Arts and Technology (Hamilton) | Energy Systems Engineering Technology – Clean and Renewable Energy | Advanced Ontario Diploma | OSSD or equivalent (GED, College and Career Preparation) including: * Grade 12 English, C or U or equivalent * Grade 12 Mathematics, C (Math for College Technology is recommended) or U, or Mohawk College Prep Math for Technology or equivalent | Entry level employment within the electricity sector, HVAC industry, building and construction sector, in various technical support roles related to the manufacture, installation, testing and repair of clean and renewable energy systems, and individual components. | Jay Notay Associate Dean, Electrical and Computer Engineering Technology jay.notay@MohawkCollege.ca 905-575-2142 www.mohawkcollege.ca |
| | | | | | |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---|---|---|--|--|--|
| b) Private Institutions | | | | | |
| Canadian Renewable Energy Academy (Vaughan) | 5-day solar PV Workshop | Professional Installation Workshop | Basic computer skills Grade 10 Math Ability to safely lift 50 lbs. | An electrical background or further training in the area would be necessary to gain employment as an installer | Eddie Della Mora Founder and Director Canadian Renewable Energy Academy 647-832-0553 www.renewableenergyacademy.ca |
| Efan Green (Markham) | Planning & Installing Solar PV Systems with Hands-on Training | Professional Installation Workshop | Knowledge of basic math. No solar or electrical experience necessary. | An electrical background or further training in the area would be necessary to gain employment as an installer | Efan Green service@efan.ca 1-877-471-EFAN (3326) www.efan.ca |
| Kortright Centre (Woodbridge) | Green Energy Introduction | Introductory Seminar (overview of general concepts, resources, technologies and practices) | None | None. This workshop is designed to give home owners awareness of the various green energy technologies that can reduce their domestic energy use | Svend DeBruyn Program Instructor/Developer sdebruyn@trec.on.ca 905-832-2289 www.kortright.org |
| Kortright Centre (Woodbridge) | Photovoltaic Generation | Technology Seminar (hands-on seminar that expands on a specific renewable energy technology or building design concept) | Completion of Kortright's Green Energy Introduction Seminar | None (would need further education) | Svend DeBruyn Program Instructor/Developer sdebruyn@trec.on.ca 905-832-2289 www.kortright.org |
| Kortright Centre (Woodbridge) | Utility PV Installation | Installation Workshops (hands-on workshop that include the installation of a complete renewable energy system) | Completion of Kortright's Photovoltaic Generation Workshop | None (would need further education) | Svend DeBruyn Program Instructor/Developer sdebruyn@trec.on.ca 905-832-2289 www.kortright.org |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---------------------------------|--|---|---|--|---|
| Kortright Centre (Woodbridge) | Photovoltaic Training Course | Professional Installation Workshop Students receive: Certificate of Course Completion on behalf of Kortright Certificate of Training in Fall Prevention. | None | An electrical background or further training in the area would be necessary to gain employment as an installer | Svend DeBruyn Program Instructor/Developer sdebruyn@trec.on.ca 905-832-2289 www.kortright.org |
| Ontario Solar Academy (Markham) | 5-Day Solar PV Design and Installation Course | Professional Installation Workshop Passing a final exam qualifies students for Ontario Solar Academy's "Solar Professional Certificate: Level One." | Basic computer skills Familiarity with equations, fractions & algebra Ability to safely lift 50 lbs. | Entry Level PV Installer | Tammy Phelan Registrar Ontario Solar Academy tammy@solaracademy.ca 416-900-7191 |
| Ontario Solar Academy (Markham) | 2-Day Advanced Solar PV Design and Electrical Code | Professional Installation Workshop | Requires a solid foundation in solar technology. Successful completion of 5-Day Solar PV Design and Installation Course (or similar) is highly recommended (see above). | Entry Level PV Installer | Tammy Phelan Registrar Ontario Solar Academy tammy@solaracademy.ca 416-900-7191 |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---|---|--------------------------------|---|---|---|
| c) Industry Organizations | | | | | |
| Association of Canadian Community Colleges (ACCC) | ACCC received funding from the Ministry of Natural Resources to develop solar PV and solar thermal curriculum. For more information on ACCC, please see Appendix | Course Curriculum for Solar PV | <p>PV Residential and Small Commercial Grid Connection System Design and Installation Prerequisites are determined by individual colleges, although previous knowledge of electrical principles is highly recommended.</p> <p>PV for Electricians: Residential and Small Commercial Grid Connection System Design and Installation Prerequisites are determined by individual colleges, although previous knowledge of electrical principles is highly recommended.</p> <p>PV Stand Alone and Off-Grid Systems Design And Installation Completion of PV Residential and Small Commercial Grid Connection System Design</p> | N/A- as determined by individual colleges | Don Young, PEng Dean, Faculty of Applied Science St. Lawrence College donyoung@sl.on.ca 613-544-5400 x 1530 www.stlawrencecollege.ca |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| <i>Institution</i> | <i>Program Name</i> | <i>Program Type</i> | <i>Entry Requirements</i> | <i>Career Opportunities</i> | <i>Contact/Web Address</i> |
|--|--|--|--|---------------------------------------|---|
| Discontinued Solar PV Training Programs and Workshops | | | | | |
| a) Post-Secondary | | | | | |
| Seneca College | Photovoltaic (PV) Technician Program | Recognition of Achievement from Seneca College | contact Program Administrator | PV Solar Installer PV Solar Design | Centre for the Built Environment, Seneca College, Energy Training Office energy.training@senecac.on.ca 1-800-572-0712 http://eto.senecac.on.ca/photovol.html |
| Centennial College | RETScreen Introductory Workshop | Introductory Workshop Students receive a Statement of Recognition of Course Completion on behalf of Centennial College. | None. (Most students will have prior post-secondary knowledge of renewable energy and/or engineering backgrounds.) | None (would need further education) | Robert Hellier Manager, Centennial Energy Institute energy@centennialcollege.ca 416-289-5000 x 8363 http://www.centennialcollege.ca/CEI/RETScreen |
| Centennial College | Advanced RETScreen Workshop for Solar Photovoltaic Systems | Introductory Workshop Students receive a Statement of Recognition of Course Completion on behalf of Centennial College. | A working knowledge of RETScreen is preferred, though a brief review will be provided at the beginning. | None (would need further education) | Robert Hellier Manager, Centennial Energy Institute energy@centennialcollege.ca 416-289-5000 x 8363 http://www.centennialcollege.ca/CEI/RETScreen |

SOLAR PV TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---|--|--|---|--|---|
| Solar PV Certification Programs | | | | | |
| CSA Standards and NETCO (National Electrical Trade Council) | Certified Construction Electrician- Solar Photovoltaic Systems | Professional Certification Program- Solar Photovoltaic Systems | <p>Pre-requisites: Candidates interested in testing for this certification must have the following experience:</p> <ul style="list-style-type: none"> * Construction Electrician (NOC 7241) Certificate of Qualification * Completion of a recognized Solar PV specific training program consisting of in-class and hands-on instruction (program's curriculum will be assessed to ensure it aligns with exam contents) * Successful completion of the Construction Electrician- Solar PV Systems Examination | Certified Construction Electrician- Solar Photovoltaic Systems | Miles Murphy Product Manager, Personnel Certification miles.murphy@csa.ca 416-747-2320 |
| North American Board of Certified Energy Practitioners (NABCEP) | PV Installer Certification | Professional PV Installer Certification program | <p>To qualify as a NABCEP Certified PV Installer, applicants must have:</p> <ul style="list-style-type: none"> a) Experience installing PV systems occurring at some point in the two (2) years prior to submitting an application for the exam in addition to the completion of 40 hours cumulative of training ; OR b) Be an existing licensed contractor in good standing in solar or electrical construction-related areas with experience installing PV systems occurring at some point in the two (2) years prior to submitting an application for the exam in addition to the completion of 40 hours cumulative of training; OR c) Four (4) years of electrical construction-related experience working for a licensed contractor, including experience installing PV systems occurring at some point in the two (2) years prior to submitting an application for the exam in addition to the completion of 40 hours cumulative of training ; OR d) Three (3) years experience in a U.S. Dept. of Labor-approved electrical construction trade apprentice program, including experience installing PV systems occurring at some point in the two (2) years prior to submitting an application for the exam in addition to the completion of 40 hours cumulative of training; OR e) Two (2)-year electrical construction-related, or electrical engineering technology, or renewable energy technology/technician degree from an educational institution or four (4)-year construction-related or engineering degree from an educational institution, including experience installing PV systems occurring at some point in the two (2) years prior to submitting an application for the exam AND f) Successful completion of the NABCEP PV Installer Certification examination | Solar PV Installer | N/A |

PART A. Curriculum Profiles

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details |
|--|---|----------------------------------|--|---|--|
| Solar Thermal Training Programs: City of Toronto | | | | | |
| a) Post-Secondary | | | | | |
| Willis College | Solar Water and Pool Heating System Diploma | 16 weeks | <p>This program is designed for licensed plumbers looking to gain insight and skills training in the emerging green energy industry. It encompasses technical skills specific to solar thermal technology, as well as business and program management skills</p> <p>Courses include: Keys to Success – Learning Skills and Critical Thinking Plumbing for Thermal Energy Microsoft Applications Sales and Marketing for Green Energy Thermal Energy Technology Job Search Skills</p> | <p>Learn principles of plumbing for thermal energy installations including proper use of equipment, component theory, operations related to Thermal installations and safety requirements.</p> <p>Learn fundamentals of Microsoft XP, Outlook, Excel, PowerPoint and Word</p> <p>Gain understanding of the installation, operation, maintenance, troubleshooting, and repair of solar thermal systems.</p> <p>Conduct site assessment, perform system checkout and be capable of installing solar collectors, water heaters and storage tanks, piping and pipe insulation, and mechanical and plumbing equipment.</p> | Certified NABCEP® practitioners, and recently approved NABCEP Entry Level Exam Provider |
| Solar Thermal Training Programs: Greater Toronto Area | | | | | |
| a) Post-Secondary Institutions | | | | | |
| Durham College (Oshawa) | Renewable Energy Technician | 2 years full time. (4 semesters) | <p>Renewable energy technicians are part of the rapidly growing field of renewable, sustainable and alternative energy solutions. As an introduction, you will receive a basic exposure to traditional energy consuming systems followed by a solid foundation in the operation of renewable energy systems including solar and wind power and ground source heat pumps.</p> <p>Courses include: SOLAR THERMAL SYSTEMS: Students will study active and passive solar systems applied to residential homes. Through the compilation of theoretical and practical thermodynamic and heat transfer studies, students will be able to identify, differentiate and evaluate solar thermal configurations, including assistance on installing solar thermal technologies.</p> | <p>Perform accurate energy audits on new and existing homes to assess their energy performance</p> <p>Gain practical experience in the installation and assembly of solar thermal technologies</p> | <p>Curriculum for this program was developed independently with oversight from an industry advisory board. Durham College has recently received and is reviewing ACCC curriculum for future use</p> <p>*For information on ACCC, please see Appendix</p> |
| b) Private Institutions | | | | | |
| Kortright Centre | Solar Domestic Hot Water | 1 day | <p>This intermediate-level workshop assists participants with the selection and purchase of a solar water system, and goes into more detail about the function of various domestic hot water systems. Both year-round and seasonal systems will be covered. Thermosyphon, integrated storage, drain-down, drain-back, closed-loop, and systems utilizing heat exchange fluids will be covered. Packaged, as well as component systems, will be reviewed. A tour of the various Solar Domestic Hot Water systems at Kortright will be taken.</p> | <p>Gain a fundamental understanding of solar thermal technologies</p> <p>Analyze the advantages and disadvantages of solar thermal as a heating source</p> <p>Identify components of six types of solar thermal installations</p> | None |

SOLAR THERMAL TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details |
|--|--|---|--|---|---|
| c) Industry Organizations | | | | | |
| Association of Canadian Community Colleges (ACCC) | ACCC Course Curriculum details 4 Courses (see right) | Courses are designed to be delivered in 45 to 50 hours. | <p>Courses include:</p> <p>Residential Solar Hot Water System Installer. Through a series of lectures and labs, this course will provide students with the background knowledge and hands-on skills necessary to install a residential solar hot water system. Topics covered include: types of collectors, types of systems, roof top installation methods, collector piping, storage, pumping, commissioning, and controls. This is a course for installers of small packaged systems.</p> <p>Residential Solar Hot Water Design. Students will explore residential solar hot water applications and learn how properly design them to meet a portion of the clients heating load. Computer aided modeling software, such as Natural Resources Canada's RETScreen, will be used extensively throughout the class, with the expectation that students will be capable of analyzing potential projects using site collected data.</p> <p>Commercial Solar Hot Water Installer. Students will explore commercial solar hot water applications and learn how properly plan, and install them.</p> <p>Commercial Solar Hot Water Design. Students will explore commercial solar hot water applications and learn how properly design them to meet a portion of the clients heating load. Computer aided modeling software, such as Natural Resources Canada's RETScreen, will be used extensively throughout the class, with the expectation that students will be capable of analyzing potential projects using site collected data.</p> <p>This course curriculum was released and made available to ACCC's member colleges in late 2010. Please see Appendix for a list of colleges that have requested this curriculum.</p> | <p>Residential Solar Hot Water System Installer Identify typical system components and different systems architecture Mount collectors on Roofs and review hoisting techniques and fall protection Install pipe runs from roofs to service rooms, solar tanks and equipment in service rooms Start-up and commissioning a system Service and Troubleshooting systems</p> <p>Residential Solar Hot Water Design Describe the typical residential applications of solar hot water systems and complete a residential solar site assessment Size and select solar system components based on the specific residential application and solar site assessment Prepare a detailed cost estimate for a residential solar system installation Model the thermal and economic performance of a solar system using recognized modeling software Prepare and present a detailed technical report that clearly outlines the system's cost, and thermal performance</p> <p>Commercial Solar Hot Water Installer - similar skill sets achieved as "Residential Solar Hot Water Installer" except for commercial systems Commercial Solar Hot Water Design - similar skill sets achieved as "Residential Solar Hot Water Design" except for commercial systems</p> | <p>These courses were developed to give colleges support in delivering courses that will expand the development of the solar industry in Canada and provide a trained workforce across the country. The project's objective is to offer standard solar curriculum that is relevant and consistent on a national level.</p> <p>For requests to review ACCC curriculum, please contact Don Young (see left)</p> |
| CanSIA | CanSIA Solar Hot Water System Installer Workshop | 1 day | <p>This course will provide the cognitive skills that are required to install solar hot water systems and is a requirement of the CanSIA Canadian Solar Hot Water System Installer Certification program.</p> <p>This workshop provides a review of installation procedures, practises and requirements. Included in the workshop cost are two CanSIA manuals; STT 100 – Fundamentals, and STT 200 – Installation, Maintenance and Design.</p> <p>Workshop is offered intermittantly through the Kortright Centre</p> | Gain understanding of solar thermal installation procedures and requirements | <p>CanSIA is a national trade association that represents over 500 solar industry organizations. Its strategic objectives include: strengthening the canadian solar industry; removing market barriers; increasing professionalism; strengthen labour force training and expertise; improve awareness and understanding of the industry; and be the lead proponent of the goal to supply 10% of Canada's new energy needs with solar.</p> <p>For more information on CanSIA's training initiatives, please see Appendix</p> |
| Discontinued Solar Thermal Programs and Workshops | | | | | |
| Schüco Solar (Mississauga) | Solar Thermal Training (2 day course) | 2 days | <p>This workshop occurs over 2 days at the Schuco Canada facility in Mississauga. Participants spend 1.5 days in the classroom learning the theoretical background of solar thermal technologies. The final afternoon is spent in their hands on learning lab where participants complete installations of solar thermal projects on both flat and tilted roofs. At the end of the course, participants are required to write an exam. Upon successful completion of the course and exam, participants receive a Certificate of Completion from Schuco.</p> <p>Course is currently on hold due to lack of industry demand. Course may be made available again in 2011</p> | <p>Understand basic principles of solar thermal technology</p> <p>Gain practical installation experience, on both flat and tilted roofs</p> | None |

SOLAR THERMAL TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Length | Program Overview | Sample of Skill Sets Achieved | Program Accreditation Details |
|---|---|---|---|--------------------------------------|--|
| Solar Thermal Certification Programs | | | | | |
| CanSIA | CanSIA Solar Hot Water System Installer Certification | Dependent on experience, applicants must fulfill all requirements in order to qualify for certification | CanSIA has developed this program for both new and experienced members of the solar industry in anticipation of federal, provincial and municipal programs supporting the deployment of solar domestic hot water systems for residential applications. This will insure that SHW installations are done by professional and trained installers and will provide guidelines on who can install government-supported systems. Natural Resources Canada (NRCan) has funded the development of this certification. | N/A | CanSIA is a national trade association that represents over 500 solar industry organizations. Its strategic objectives include: strengthening the Canadian solar industry; removing market barriers; increasing professionalism; strengthen labour force training and expertise; improve awareness and understanding of the industry; and be the lead proponent of the goal to supply 10% of Canada's new energy needs with solar. For more information on CanSIA's training initiatives, please see Appendix |
| North American Board of Certified Energy Practitioners (NABCEP) | Solar Thermal Installer Certification | Dependent on experience, applicants must fulfill all requirements in order to qualify for certification | The NABCEP solar thermal installer certification is a voluntary certification that provides a set of national standards by which solar thermal installers with skills and experience can distinguish themselves from their competition. Certification provides a measure of protection to the public by giving them a credential for judging the competency of practitioners. It is not intended to prevent qualified individuals from installing solar thermal systems nor to replace state licensure requirements. *While NABCEP is the recognized "gold standard" for solar PV and solar thermal installation in the US, it currently does not hold the same status in Canada | N/A | |

PART B. Course Information

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|--|---|--|--|--|---|
| Solar Thermal Training Programs: City of Toronto | | | | | |
| a) Post-Secondary | | | | | |
| Willis College | Solar Water and Pool Heating System Diploma | Career College Diploma Program | Must be a Licensed Plumber | This course is designed as a skills upgrade for licensed plumbers looking to gain access to emerging opportunities in the solar industry | Ron Brandt Director, Toronto Centre Lawrence Campus Willis College 416-485-8588 Ron.Brandt@torontocentre.williscollege.com www.williscollege.com |
| Solar Thermal Training Programs: Greater Toronto Area | | | | | |
| a) Post-Secondary Institutions | | | | | |
| Durham College (Oshawa) | Renewable Energy Technician | 2 Year Ontario College Diploma | OSSD, GED, ACE (BTSD) or Mature Student Status (MSS) Plus senior level (Grade 11 or higher) subject credits: * Grade 12 English * Grade 12 mathematics (college technology MCTC4C, general tech MTT4G) * Construction Technology TGJ4M and/or Manufacturing Technology TMJ4E and/or Technological Design TTJ4C recommended * Computer literacy skills recommended | Renewable Energy Sales Representative Energy Auditor Energy Consultant *Further trades training in the area would be necessary to gain employment as an installer | Don Murdock Program Coordinator don.murdock@durhamcollege.ca 905-721-2000 x 4069 www.durhamcollege.ca |
| b) Private Institutions | | | | | |
| Kortright Centre | Solar Domestic Hot Water | Technology Seminar (hands-on seminar that expand on a specific renewable energy technology or building design concept) | Completion of Kortright's Green Home Introduction Seminar | None (would need further education) | Svend DeBruyn Program Instructor/Developer sdebruynt@trec.on.ca 905-832-2289 www.kortright.org |

SOLAR THERMAL TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|--|--|--|--|---|---|
| c) Industry Organizations | | | | | |
| Association of Canadian Community Colleges (ACCC) | ACCC Course Curriculum details 4 Courses (see right) | Course Curriculum for Solar Hot Water | <p>Residential Solar Hot Water System Installer None</p> <p>Residential Solar Hot Water Design</p> <ul style="list-style-type: none"> • Solar Hot Water Installers Course (Level I) • Working computer knowledge. • Experience using the Microsoft Office or equivalent software (e.g. Open Office). • High school or equivalent math. • Verbal and written communication skills. <p>Commercial Solar Hot Water System Installer As above</p> <p>Commercial Solar Hot Water Design As above</p> | N/A- as determined by individual colleges | Don Young, PEng Dean, Faculty of Applied Science St. Lawrence College donyoung@sl.on.ca 613-544-5400 x 1530 www.stlawrencecollege.ca |
| CanSIA | CanSIA Solar Hot Water System Installer Workshop | Professional Solar Thermal Hot Water Installer Workshop | You do not have to be an experienced installer or a licensed plumber to participate in this workshop. However you must obtain installation experience in order to become a CanSIA certified installer. Inexperienced installers who take this course may complete the experience requirements at a later time. | None (would need further education) | Jen Kennedy Administrative Assistant CanSIA info@CanSIA.ca 1-866-522-6742 x 221 www.CanSIA.ca |
| Discontinued Solar Thermal Programs and Workshops | | | | | |
| Schuco Solar (Mississauga) | Solar Thermal Training (2 day course) | Professional Installation Workshop Students receive a certificate of completion | None. General background knowledge of solar and hot water systems is beneficial. | Solar Hot Water System Installer | Susan Muschett Registrar Schuco Solar SusanMuschett@schuco-usa.com 860-616-0128 www.schuco.com |

SOLAR THERMAL TRAINING INITIATIVES (City of Toronto and GTA)

Prepared by TREC

| Institution | Program Name | Program Type | Entry Requirements | Career Opportunities | Contact/Web Address |
|---|---|--|--|--|--|
| Solar Thermal Certification Programs | | | | | |
| CanSIA | CanSIA Solar Hot Water System Installer Certification | Professional Solar Hot Water Installer Certification | To become a CanSIA Certified Solar Hot Water System Installer you must: a. Successfully complete Roof/Fall Safety course b. Successfully complete CanSIA SHW System Training c. Be a provincially licensed plumber OR accredited pipe fitter OR accredited HVAC technician AND have experience installing two (2) SHW systems Or Have experience installing four (4) SHW systems. d. Successfully completed the CanSIA SHW System Installer (Level 1) Examination | Certified Solar Hot Water System Installer | Jen Kennedy Administrative Assistant CanSIA info@CanSIA.ca 1-866-522-6742 x 221 www.CanSIA.ca |
| North American Board of Certified Energy Practitioners (NABCEP) | Solar Thermal Installer Certification | Professional Solar Thermal Installer Certification program | To qualify to sit for the NABCEP Solar Thermal Installer Certification examination, the candidate must demonstrate that he/she meets at least ONE of the following minimum entry requirement tracks: 1-a.) Four (4) years of experience installing Solar Hot Water Systems OR 1-b.) Two (2) years of experience installing Solar Pool Heating Systems in addition to completion of a board-recognized training program OR Note: It is necessary to choose only ONE of the two requirements listed in category "1" above, if this is your chosen category. 2.) Two (2) years of experience installing Solar Thermal Systems in addition to completion of 40 hours cumulative of training; OR 3.) Be an existing licensed contractor in good standing in solar or construction-related areas with one (1) year of experience installing Solar Thermal Systems; OR 4.) Four (4) years of HVAC, mechanical, pipe-fitting or plumbing-related experience working for a licensed contractor, including one (1) year of experience installing Solar Thermal systems OR 5.) Three (3) years experience in a government/trade union-approved construction trade apprentice program, including one (1) year of experience installing Solar Thermal Systems OR 6.) Two (2) year construction related, or engineering technology, or renewable energy technology /technician degree from an accredited educational institution plus one (1) year of experience installing Solar Thermal Systems OR 7.) Four (4) year engineering degree from an accredited educational institution, including (1) year experience installing Solar Thermal Systems OR 8.) NABCEP® Solar PV Installer Certification AND 16 hours of Board-recognized training, AND include installation of at least two solar hot water systems. These two systems require permitting and inspection process by a permitting authority – OR – in the absence of such, an appropriate underwriter authorized to provide an inspection certificate. In regions where neither of these inspection options exist, the Application Review Committee will judge experience based on supplied documentation. 9) Successful completion of the NABCEP Solar Thermal Installer examination | Certified Solar Thermal Installer | N/A |

APPENDIX: Stakeholders And Training-Related Initiatives

Prepared by TREC

The following organizations are all key stakeholders with regard to solar training initiatives, and have indirectly influenced the solar training landscape in Toronto and the Greater Toronto Area. Information on their training-related initiatives are detailed below.

| Institution | Organization Overview | Status on Solar PV and Solar Thermal Training Initiatives | Contact/Web Address |
|--|---|--|---|
| <p>Association of Canadian Community Colleges (ACCC)</p> | <p>The Association of Canadian Community Colleges (ACCC) is the national, voluntary membership organization created in 1972 to represent colleges and institutes to government, business and industry, both in Canada and internationally. ACCC interacts with federal departments and agencies on the members' behalf and links college capabilities to national industries.</p> | <p>ACCC received funding from the Ministry of Natural Resources to develop solar PV and solar thermal curriculum, with oversight from CanSIA and ESC. The curriculum is now complete and available online to all member colleges. Adaptation of the course curriculum is voluntary, and at the discretion of individual member colleges. For detailed information on this curriculum (eg. course description, skill sets achieved), please refer to the Solar PV Training and Solar Thermal Training documents.</p> <p>The following colleges have requested ACCC's solar curriculum.</p> <p>Please see Solar PV Training for details on the programs of the following colleges:</p> <p>George Brown College* Humber College Seneca College Mohawk College Georgian College Durham College</p> <p>The following colleges' programs have not been detailed in this database, as they fall outside the Toronto jurisdiction: St Lawrence College (Kingston) Lampton College (Sarnia) Niagara College (Niagara) Sault College (Sault St. Marie) Cambrian College (Sudbury) Algonquin College (Ottawa) St Claire College (Windsor) Connestoga College (Kitchener/Waterloo)</p> <p>*George Brown College does not currently offer a solar training program, but plans to use the ACCC curriculum for future program curriculum development</p> | <p>Paul Toupin Manager Canadian Partnership Programs - Association of Canadian Community Colleges ptoupin@accc.ca 613-746-2222 x3153 www.accc.ca</p> <p>Don Young, PEng Dean, Faculty of Applied Science St. Lawrence College donyoung@sl.on.ca 613-544-5400 x 1530 www.stlawrencecollege.ca</p> |

APPENDIX: Stakeholders And Training-Related Initiatives

Prepared by TREC

| Institution | Organization Overview | Status on Solar PV and Solar Thermal Training Initiatives | Contact/Web Address |
|---|---|--|---|
| Canadian Council of Professional Certification | The Canadian Council of Professional Certification was established for the purpose of recognizing the accomplishments of professionals working in their specific disciplines. Certification is granted and a professional designation awarded when applicants have met the criteria set out by each disciplines board of examiners. | The CCPC has introduced various certifications that pertain specifically to wind energy training initiatives. The CCPC does not currently offer solar PV certification or accreditation, and have no plans to develop any unless solicited. | Russ Pickering President Canadian Council of Professional Certification 416-724-4833 rp@ccpcglobal.com www.ccpcprofessionals.com |
| Canadian Solar Industries Association (CanSIA) | CanSIA is a national trade association that represents over 500 solar industry organizations. Its strategic objectives include: strengthening the Canadian solar industry; removing market barriers; increasing professionalism; strengthen labour force training and expertise; improve awareness and understanding of the industry; and be the lead proponent of the goal to supply 10% of Canada's new energy needs with solar. | Through its policy work, CanSIA is committed to providing leadership and facilitation to ensure that a consistent training pathway exists for colleges, training providers and emerging solar professionals alike. To this end, CanSIA has begun to transition out of its role as a training provider. It is currently working with sector councils and key national and provincial stakeholders to develop a broad national framework to address workforce challenges in the solar industry. CanSIA played an advisory role in the development of ACCC solar curriculum. Please see below for details. | Wesley Johnston Director of Policy and Research wjohnston@CanSIA.ca 613-736-9077 ext.224 www.CanSIA.ca |
| CSA Standards and NETCO (National Electrical Trade Council) | CSA Standards is a leading standards developer for gas-fired product and alternative energy standards and a solutions-oriented organization serving businesses, trade associations, governments, and industries in the U.S. and the global marketplace. The National Electrical Trade Council (NETCO) is a joint Labour-Management partnership of the International Brotherhood of Electrical Workers (IBEW), First District, Canada and the Canadian Electrical Contractors Association (CECA). It provides leadership through national coordination on workforce skills development and public policy issues of importance to the electrical industry in Canada. | The personnel certification program for Construction Electricians-Solar PV Systems is a national third-party independent certification program was developed in partnership by: CSA Standards NETCO (National Electrical Trade Council) CECA (Canadian Electrical Contractors Association) and IBEW (International Brotherhood of Electrical Workers) It is the first program in Canada to offer a certification based on the tasks that qualified journeyperson Construction Electricians carry out in applying their skills to the installation of solar equipment. (see Solar PV Training for program details) | Miles Murphy Product Manager, Personnel Certification miles.murphy@csc.ca 416-747-2320 |

APPENDIX: Stakeholders And Training-Related Initiatives

Prepared by TREC

| Institution | Organization Overview | Status on Solar PV and Solar Thermal Training Initiatives | Contact/Web Address |
|---|--|--|---|
| ECO Canada | <p>ECO (Environmental Careers Organization) Canada is a not-for-profit organization that was first established in 1992 under the federal government's Sector Council initiative.</p> <p>ECO Canada is an organization focused on supporting Canada's environment industry by communicating with industry stakeholders, conducting research and creating the necessary resources required to address human resource needs in order to ensure the success of this dynamic sector.</p> <p>Primarily, ECO Canada brings together industry and academic professionals, and government to discover, discuss and develop solutions to the human resource needs of the Canadian environment industry.</p> | <p>ECO Canada offers professional designations for environmental professionals. Overseen by the Canadian Environmental Certification Approvals Board (CECAB), the Environmental Professional certification is the only designation of its kind in Canada to provide professionals with formal recognition of their unique environmental competencies. ECO Canada offers certification for Environmental Professionals with the specialization of Resource Management - Energy.</p> <p>At this time, ECO Canada does not offer certification for renewable energy professionals and do not have any immediate plans to develop such certifications.</p> | <p>Rhea Castillo Coordinator, ECO Canada Accreditation Program Coordinator, Client Relations-EP Certification ECO Canada 403-476-1949 RCastillo@eco.ca www.eco.ca</p> |
| Electricity Sector Council | <p>The Electricity Sector Council (ESC) is the hub for research into human resources trends and sector-specific solutions to Canada's skilled-labour shortage. ESC was founded in 2005 as a not-for-profit partnership between business, labour, education and government.</p> <p>Training and Development project The primary purpose of this project is to undertake a diagnostic of the heightened demands of the training function being fuelled by the pending retirements, career progression and, changing technology in the electricity and renewable energy industry most notably in the areas of smart grid and renewable generation. Through the project activities, the project will build a framework for industry action to identify strategies and tactics in support of improved training capacity in the industry and thus support improved workforce availability.</p> | <p>At this time, the ESC has not developed any specific solar training initiatives. However, the ESC's skills profiles for the positions of Solar Thermal Installer and Solar PV Installer were taken into consideration in the development of ACCC's solar curriculum.</p> <p>In addition, the ESC's Training and Development project (see left) aims to address workforce challenges in the electricity sector, including the area of renewable energy generation.</p> | <p>Angela Splinter Director, Projects and Development Electricity Sector Council 1-613-235-5540 splinter@brightfutures.ca www.brightfutures.ca</p> |
| International Brotherhood of Electrical Workers | <p>The International Brotherhood of Electrical Workers (IBEW) represents approximately 725,000 members who work in a wide variety of fields, including utilities, construction, telecommunications, broadcasting, manufacturing, railroads and government. The IBEW has members in both the United States and Canada and stands out among the American unions in the AFL-CIO because it is among the largest and has members in so many skilled occupations.</p> | <p>The IBEW Education Department is currently offering 2 solar PV training courses. It is available ONLY to members of the IBEW and participants must be qualified Journeymen Electricians or senior level apprentices. Level One is a 30-hour in-class course, and Level Two is a one day weekend course that deals with the physical installation of solar PV (see Solar PV Training for program details)</p> <p>Through its national training arm, NETCO (see below), the IBEW aims to promote national certification standards in the area of solar PV installation</p> | <p>Paul Barber Project Manager IBEW, Local 353 barberpaul@sympatico.ca 416-510-3530 www.ibew353.org</p> |

APPENDIX: Stakeholders And Training-Related Initiatives

Prepared by TREC

| Institution | Organization Overview | Status on Solar PV and Solar Thermal Training Initiatives | Contact/Web Address |
|---|--|---|--|
| Interstate Renewable Energy Council (IREC) | <p>IREC is a U.S. non-profit organization committed to accelerating the sustainable utilization of renewable energy. IREC works with industry, government, educators and other stakeholders to ensure that the broader use of renewable energies is possible, safe, affordable and practical, particularly for the individual consumer.</p> <p>To ensure continuity, consistency, and quality in the delivery of training, IREC is implementing the Institute for Sustainable Power Quality (ISPQ) framework of standards and metrics to provide a means to compare content, quality, and resources across a broad range of training programs covering renewable energy, energy efficiency and distributed generation technologies. This international framework ensures legitimacy of what's being taught and by whom.</p> <p>This International Standard specifies requirements for competency, quality systems, resources, and qualification of a curriculum against which trainers and training programs can be evaluated. Highlights of the requirements include:</p> <ol style="list-style-type: none"> 1. The program shall be designed to prepare individuals with knowledge and skills required for a professional trade with the curriculum content following an approved task analysis 2. Facilities shall be sufficient and safe for the training 3. The organization has appropriate financial resources and that administrative and management procedures and policies are in practice 4. Written policies shall ensure the competence, impartiality, and integrity of the program | <p>IREC has recently begun to accredit training programs offered in Canada. Candidates must apply for IREC-ISPQ accreditation. Currently, there are 2 IREC-accredited training programs in Canada: Infinite Solar Ontario Solar Academy (see Solar PV Training for program details)</p> | <p>Pat Fox ISPQ Accreditation & Certification for Training Programs & Instructors Interstate Renewable Energy Council (IREC) patfox@irecusa.org 518-458-6059 irecusa.org</p> |
| North American Board of Certified Energy Practitioners (NABCEP) | <p>The North American Board of Certified Energy Practitioners (NABCEP) is the "gold standard" for PV and solar thermal installation certification. Designed to raise industry standards and promote consumer confidence, NABCEP offers certification and certificate programs to renewable energy professionals throughout North America.</p> <p>NABCEP currently offers:</p> <p>NABCEP Entry Level Exam This exam is designed for those individuals wanting to get into the solar field; achievement of the NABCEP PV Entry Level Exam is a way for candidates to demonstrate that they have achieved a basic knowledge of the fundamental principles of the application, design, installation and operation of grid-tied and stand-alone PV Systems. However, completing coursework and passing the exam does not qualify an individual to install PV systems.</p> <p>A student is eligible to sit for the PV Entry Level Exam upon successful completion of coursework offered by a registered NABCEP PV Entry Level Exam Provider. (Please see Solar PV Training for information on NABCEP Entry Level Exam Providers)</p> <p>NABCEP Solar PV Installer Certification Please see Solar PV Training for certification requirements</p> <p>NABCEP Solar Thermal Installer Certification Please see Solar Thermal Training for certification requirements</p> | <p>While NABCEP is the recognized "gold standard" for solar PV and solar thermal installation in the US, it is currently not a recognized standard in Canada. However, a number of solar training programs have made reference to NABCEP standards- for a complete list, please refer to Solar PV Training and Solar Thermal Training respectively.</p> | <p>N/A</p> |

APPENDIX: Stakeholders And Training-Related Initiatives

Prepared by TREC

| Institution | Organization Overview | Status on Solar PV and Solar Thermal Training Initiatives | Contact/Web Address |
|--|---|--|---|
| Ontario Electrical League | <p>The Ontario Electrical League is a non-profit, Provincial Organization, dedicated to 21 Chapters with over 2500 members from the Electrical Industry.</p> <p>League members include electrical contractors, electricians, municipal utilities, electrical inspectors, distributors, manufacturers, manufacturers representatives, consulting engineers and educators.</p> <p>The League's role is to communicate, educate, represent and promote Ontario's electrical industry through Chapter meetings, the "Dialogue" magazine, Contractor Newsbrief, Contractor News, Chapter Newsletters, conferences, seminars, the League Web Site, promotional programs and community activities.</p> | <p>The OEL is currently developing 2 courses- one for experienced contractors and trades professionals, and one for pre-apprenticeship stream participants. At this time, both programs are in preliminary stages of development- details to follow.</p> | <p>Mary Ingram President, Ontario Electrical League 905-238-1382 league@oel.org</p> |
| Ontario Sustainable Energy Association | <p>The Ontario Sustainable Energy Association (OSEA) is a province-wide, member-based, non-profit organization representing more than 1500 individuals including private citizens, cooperatives, farmers, First Nations, businesses, institutions and municipalities. OSEA members are engaged in or supporting Community Power projects and renewable energy.</p> <p>The Building Capacity Through a Multi-Skilling Model Initiative is an initiative to understand and address the workforce challenges of Ontario's emerging green economy</p> | <p>The objectives of the Multi-Skilling Model are twofold:</p> <p>a) To provide workers with the pathway to gain the knowledge needed to participate in the emerging economy and</p> <p>b) To provide a multi-skilled workforce that adds to the capacity of the industry when executing everything from systems expansion, manufacturing to independent projects. The achievement of objectives will bring operational flexibility and resilience to the emerging markets. In turn, the multi-skilled worker will continually add value to their own working lives as they follow this journey to knowledge.</p> <p>The Multi-Skilling Initiative does not currently offer any solar PV or solar thermal training initiatives</p> | <p>Harry French Director, Community Power Services Group Ontario Sustainable Energy Association Harry@ontario-sea.org 416-977-4441 x 5204 ontario-sea.org</p> |