

Solar Opportunity Identification



Economic Development Alliance

of Southeast Alberta

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December, 2009

GLOSSARY OF TERMS

CanSIA	Canadian Solar Industries Association
EDA	Economic Development Alliance of Southeast Alberta
FTE	Full-Time Equivalent
GHG	Greenhouse Gas Emissions
kW	Kilowatt
kWh	Kilowatt Hour
MHC	Medicine Hat College
MW	Megawatts
PEP	Palliser Economic Partnership
PV	Photovoltaic
REDA	Regional Economic Development Alliance
RESOP	Renewable Energy Standard Offer Program
SAAEP	Southern Alberta Alternative Energy Partnership
ST	Solar Thermal

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1.0 BACKGROUND

The Economic Development Alliance (EDA) of Southeast Alberta's mandate is to increase wealth, promote investment and work with businesses to expand and access new markets throughout the region it serves. The EDA's member municipalities are the City of Medicine Hat, Town of Redcliff, Cypress County, County of Forty Mile, and the Town of Bow Island. Through the EDA, these member municipalities strive to achieve sustainable economic growth and maximize value of resources in the region. The area's key sectors include energy, agriculture, metal fabrication and machinery, technology, tourism and transportation. In addition to these traditional sectors, the EDA strives to develop emerging sectors and attract investment in these to build industry.

The EDA has interest in developing the emerging Alternative Energy sector. Specifically, the EDA has interest in identifying opportunities for the region in the area of solar energy, given the positive attributes of the region and the increasing interest among municipalities and residents in utilizing solar energy. Spurring the interest in solar is also the fact that within Canada, the solar resource potential is generally concentrated in the southern part of the country. In fact, according to the Ontario Sustainable Energy Association, the very best potential is concentrated around southeast Alberta, southern Saskatchewan and in the southern half of the remaining Prairie Provinces.

In identifying potential solar opportunities for the region, the EDA would like:

- A scan of the solar industry;
- An assessment of the assets in the southeast Alberta region, pertaining to solar.
- An action plan to enable the seizing of potential opportunities identified.

2.0 CANADIAN SOLAR INDUSTRY

The Solar Sector includes solar thermal (ST) and photovoltaic (PV):

- ST is the production of thermal energy from sunlight for direct heating (solar hot water heating, solar air heating and cooling and solar pool heating). ST also includes the production of solar steam for power generation, food processing or other commercial applications.
- Solar energy used to generate electricity is known as solar PV. Solar PV systems can be consumer, off-grid (e.g. for use in cabins or recreational vehicles), near grid or grid-connected (connected directly to a building's electrical panel). Where solar PV is grid connected, electricity generated by the solar PV system is used first and then electricity supplied by the grid is used to make up the difference. When the system generates more than is used, the excess can be exported to the grid.

In Canada, interests of the ST and PV industries are represented by the Canadian Solar Industries Association (CanSIA). This not-for-profit organization promotes the professional and practical use of solar technologies in Canada and conducts research to advance the industry's interests.

According to CanSIA, even though solar energy represents less than one percent of the Canadian energy mix, the Canadian solar industry has shown significant strength and growth in both the PV and ST segments:

- PV segment:
 - From 1998 to 2007, the photovoltaic segment experienced an average annual growth rate of 19% in terms of installed PV power in megawatts (MW), with growth from 2006 to 2007 being 26% alone.
 - In 2006, the total domestic industry revenues were \$56 million and total industry revenues including exports were \$201 million.
 - Domestic market sales volume in Canada in 2007 was 5.29 MW, which was a 42% increase from 3.74 MW in 2006. Total sales, including exports (12.62 MW) grew by 167% from 2006 to 2007.
 - The PV industry is strengthening due to declines in the weighted average of module prices from \$11.09 in 1999 to \$4.47 in 2007, resulting in an average annual price reduction of about 9.6% over the timeframe.
 - Full-time employee equivalents (FTEs) working in various parts of the supply chain such as manufacturing, distribution, retail, sales, system integration, installation, consulting, research and development, engineering, management, and administration increased by 27% in 2007 over 2006.
- ST segment:
 - The ST systems segment has shown an increase of annual domestic collector sales from 20,368 square meters in 1998 to 60,910 square meters in 2007.
 - The total sales volume (domestic and exports) for all types of collectors in 2007 was 91,547 square meters compared to 76,042 in 2004, showing a 20.3% increase.
 - While specific statistics are not available in relation to employment for the

ST segment, CanSIA estimates that the types of job and demands for employees are similar to the PV segment.

Even with its growth, installed PV power in Canada is not tapping Canada's solar potential:

	Yearly PV Power (kWh/kW)	Estimated Total Installed PV Capacity (2006) in MW
Canada Average	1150	20
California (San Francisco)	1410	200
New Jersey (Newark)	1220	30
Japan (Tokyo)	885	1700
Germany (Berlin)	848	2500

The continued growth of the industry is dependent on proper policy framework and appropriate incentives. Currently, the federal government has several ecoENERGY programs aimed at encouraging renewable energy projects. The ecoENERGY for Renewable Heat program offers incentives to the industrial/commercial/institutional sector to install active energy-efficient solar air and/or water heating systems. The ecoENERGY for Renewable Power program provides a 1 cent/kWh incentive to eligible low-impact, renewable electricity projects constructed until 2011. The ecoENERGY Retrofit program provides grants (e.g. about \$1,250 solar water heating incentive) to encourage investing in energy and pollution saving upgrades. In addition, through the Income Tax Regulations, tax concessions are available for specified clean energy generation equipment. Eligible equipment includes solar, thermal, solar air and solar photovoltaic equipment.

Beyond these federal incentive programs, each province has its own programs at varying levels to encourage renewable energy programs. Appendix A details the federal and provincial programs across Canada.

By far, the most progressive province in this regard is Ontario. For example, the Ontario Government offers the Renewable Energy Standard Offer Program (RESOP) which pays 42 cents per kWh of electricity generated from solar energy. This rate is guaranteed for 20 years. Projects under RESOP must be under 10MW. The RESOP is the largest of its kind in North America and when introduced in 2006 was expected to add 1,000 MW of clean energy to the grid within a decade.



The RESOP attracted solar investment in the province in the form of solar farms (ground-mounted developments). In order to get 10MW, (which enables economies of scale) companies were looking for parcels of land of at least 100 acres. A 10 MW solar farm is estimated to cost several tens of millions of dollars to construct, requiring the companies to secure financial backing. Several projects have been started in Ontario since the introduction of the RESOP.

In September 2009, the Ontario Government placed new restrictions on ground-mounted solar development on three levels of agricultural lands. Specifically, the government limited solar development to barely more than 500 megawatts

on class 1, 2 & 3 lands. Unfortunately, based on earlier government decisions, according to CanSIA, the solar industry is already working on plans for 2,000 megawatts to be built on class 1, 2 and 3 agricultural lands over the next 15 to 20 years.

The restrictions were placed to ensure that prime agricultural lands are used for farming rather than locked for 15 to 20 years to “house” ground mounted solar panels. Farmlands are typical sites for cost-effective solar farms as they tend to be flat, free of obstruction, competitively priced and closest to distribution lines. Industrial or commercially zoned lands are typically serviced and have a higher value.

The solar industry is regarding the new restriction as potentially preventing growth, investment and income generation for Ontario farmers. The industry further argues that the solar farms are meant to be decommissioned after use, ensuring a safe environment and agricultural rejuvenation until the land is no longer used for solar.

3.0 PROVINCIAL SOLAR INDUSTRY

Alberta receives more sunlight than any other province in Canada. In Alberta, a solar PV system will generate 1,000 to 1,200 kWh of electricity and save 0.8 to one tonne of GHG per year for every kW of rated PV capacity. The actual output of a PV module is an annual average of 13 percent of its rated output since sunshine can't be captured during all hours of the day.

In 2006, Climate Change Central (with financial support from the Federation of Canadian Municipalities (FCM) and application leadership from charter municipal partner City of Medicine Hat) launched the Alberta Solar Showcase. The project was designed to inform and educate municipal leaders, administrative staff, facility maintenance personnel, electrical inspectors and utility providers about grid-connected solar PV systems. When the Alberta Solar Showcase was launched, there were less than a hundred small solar PV systems connected to the electrical grid in Alberta, the sunniest place in Canada. As a result of the project, 20 Alberta municipalities installed and grid-connected small solar PV systems in public buildings ranging from under one kilowatt to two kilowatts.

As a spin-off effect of the project, in 2008, the Province released new regulatory requirements for micro-generators (up to 1 MW of electricity produced from renewable sources such as solar, small scale hydro, wind or biomass), making it easier to grid-connect solar PV systems. The new regulation does not provide as much an incentive as some other jurisdictions (such as Ontario) for exported solar PV electricity, but it is a significant step in the right direction. The Micro-Generation Regulation expires in 2013 and will be reviewed by the government when there are 3,000 micro-generators installed or 25,000 kW of installed micro-generation capacity.

While micro-generation regulations have been introduced, the Province of Alberta currently has no solar incentives in place. There are discussions regarding the implementation of a net metering program.

In addition to the lack of incentives, challenges to the uptake of solar PV in Alberta include:

- Lack of awareness of solar PV.
- Regulatory issues (provincial regulations, municipal bylaws, zoning, etc.).
- Longer payback period (2 to 3 decades) compared to other forms of alternative energy.
- Relatively low energy conversion efficiency of solar panels (13% in Alberta) compared to other forms of alternative energy.
- Issue of the storage of solar power. Batteries and fuel cells have a low power density compared to oil; batteries and fuel cells are expensive; advanced batteries require lithium (Bolivia – 35.8% and Chile – 39.7% are the two places with significant lithium reserves); and batteries don't work well in cold climates.

4.0 OPPORTUNITIES FOR GROWTH

CanSIA estimates that with the right incentives and policy frameworks to support the industry, it is expected that by 2025, the PV segment alone could meet 10% of Canada's new electricity requirements¹. While the solar industry in Canada is lagging behind other industrial nations and trading partners, there are many factors that make the growth of solar energy conducive in Canada, especially given that several Canadian cities (including the City of Medicine Hat) have solar potential comparable to the sunniest parts of the world.

The international focus on climate change, energy security, and demand for improved air quality is increasing awareness of solar energy as an alternative energy option. In fact, grid connectivity is becoming a reality and consumer awareness of the benefits of solar power, solar water heating and solar air heating is on the rise. Acceptance can be accelerated through policy and industry leadership, with the voice of CanSIA being critical. Awareness combined with the trend to "go green" will help the industry and increase the demand for PV.

As shown in the Canadian Solar Industry snapshot, both the PV and ST industries are growing both in revenues and installed capacity. Further technological advances will result in PV module prices declining globally, which in turn will lead to lower turnkey prices/watt of installed systems. Mass marketing and over production will reduce PV system prices further within the next ten years. New manufacturers entering the industry will contribute to the positive position as will continued research and development in concentrating solar power and developing less expensive solar solutions. DENA, The German Energy Agency, commissioned by CanSIA to study the benefits and barriers to development of solar power in Ontario estimates that price reductions will be in the magnitude of 50% leading to turnkey systems being priced around \$3.38 (Canadian) by 2015. In fact, Canadian manufacturers of PV cells and modules may soon have greater export potential.

The increasing demand for solar has significant implications on the labour force. Based on a 2009 Labour Force Survey of the Canadian Solar Industry conducted by CanSIA and the Electricity Sector Council, solar companies expect the number of full-time equivalent employees to grow by 101% (from 2008) in 2011. Specifically, companies forecasted increased need in the areas of project management (178%), installation (146%), sales (120%), and manufacturing (107%). Other significant findings are:

- In 2008, some 41% of companies were experiencing labour shortages, specifically in installation (75% of those experiencing shortages). The most frequently mentioned areas of skills shortages were installation (75% of companies); technical areas (39%); systems design and integration (39%); sales (39%); project management (25%); and engineering (25%).
- By the end of 2011, 51% of companies expect to face shortages, once again in the area of installation (78%) followed by systems design and integration (51%), project management (40%), engineering (40%), sales (38%) and technical areas (36%).

¹ "The Potential for Solar Power in Canada", Presentation by CANSIA at the CANSIA/NRCan PV Forum, 12 February 2008.

- Of those companies experiencing a labour shortage, 51% stated that the shortage is critical to the growth of their companies leading them to 2011.
- Industry wide, recommendations to mitigate the labour shortage included the inclusion of solar studies in the engineering and technical curricula of universities and colleges; the development of a nationwide Canadian certification program of high standards for both photovoltaic and solar thermal installers; and the introduction of an apprenticeship program for project management and installation within the solar industry.

It is clear that the solar industry is poised for growth. Government support to encourage development and adoption through policy and incentives continues to be a requirement. Collaboration between the solar industry and the utilities will also spur growth providing opportunities. Increased demand will lead to a significant need in technically qualified professionals and semi-skilled tradesmen in the various nodes of the supply chain, providing a host of opportunities for training institutions and diversifying the workforce into the emerging alternative energy economy. Human resources are critical, since the availability of qualified personnel will attract investment to Canada's solar industry.

5.0 BARRIERS TO GROWTH

While the solar industry is growing and poised to provide opportunities, it does face a host of barriers. A significant barrier is the lack of a consistent road map for the industry. Each province has its own approach and the level of priority placed on solar varies.

In Alberta, there are no explicit targets for solar PV to supply any specific percentage of the Province's electricity demand within any timeframe. On the other side of the equation, there is a lack of clear strategy in place for the development of solar within the province. A strategy is required that includes a plan for solar PV deployment, including how industry growth can be accelerated, how the cost structure can be competitive with traditional generation and how grid parity can be achieved so that solar PV is someday seen as a clean electricity alternative.

A plan is also required to mobilize resources within the industry, especially human resources. In Canada, there is no federal or provincial Solar PV installer certification process officially recognized by the Canadian Government. CanSIA offers a certification process that is designed to certify existing installers, but beyond this, training and education of people to enter careers in solar technologies have not been made a priority. Sustainable jobs and related training in manufacturing, system integration, installation and operation and maintenance need to be promoted.

The cost of solar, while coming down, is still relatively high for adoption. Solar electric uses photo voltaic panels to make DC electricity which is stored in batteries and then converted to AC power and used or sold to the grid. It has been estimated that comparing on a cost per kilowatt of capacity basis, solar power installations at \$10,000 a kilowatt are costly compared to wind at \$3,500 or biomass installations at \$6,000 a kilowatt. While the costs of solar are moving down quickly, these costs become more pronounced with the recognition that currently in the Province of Alberta, there are no solar incentives in place.

A major obstacle in the adoption of solar energy (and other alternative energies) is the retail price of electricity generated from these sources. Recognizing that these sources are more expensive than electricity generated from fossils fuels, mechanisms such as feed-in-tariff² or net metering³ may be helpful.

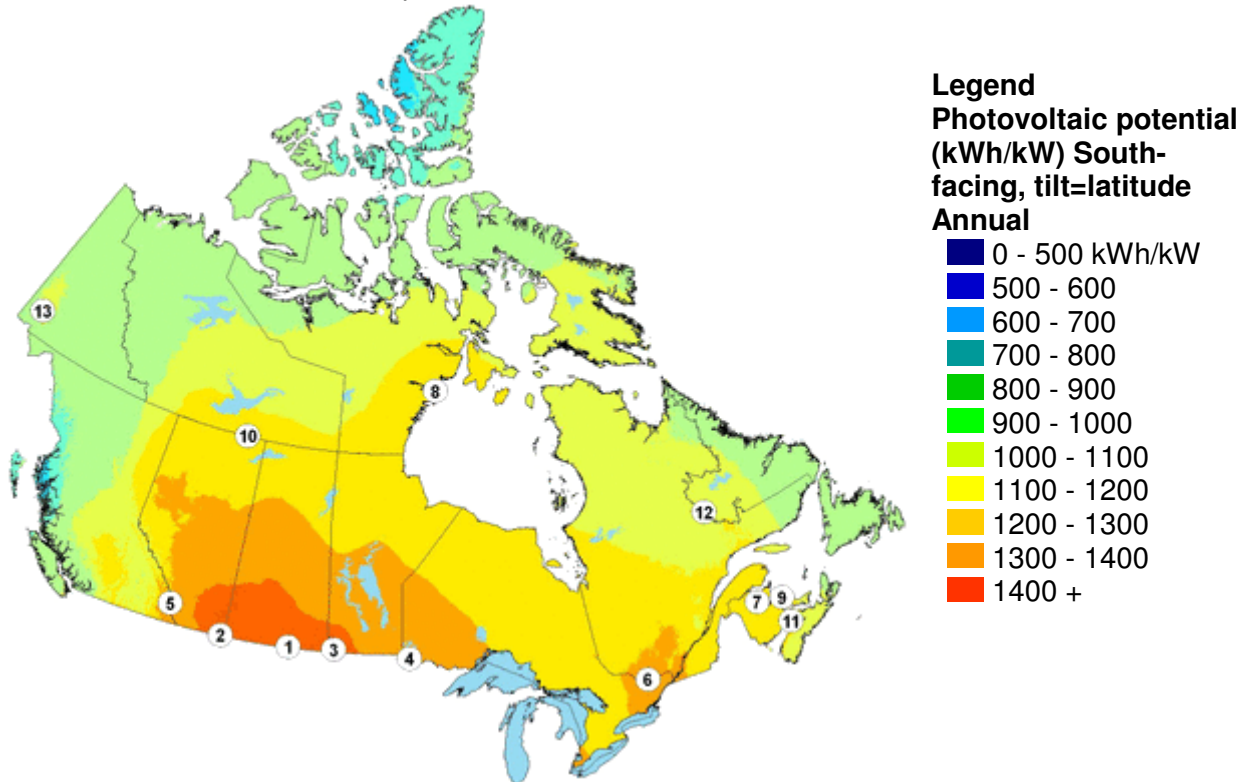
² Feed in Tariff involves regional or national electricity utilities being obligated to buy renewable electricity at above-market rates set by the government. The difference between renewable electricity rates and traditional rates is spread over all of the customers of the utility

³ Under net metering, system owners are not paid for their electricity generated, but are able to offset the cost of electricity that would have been used without the solar PV system.

6.0 SOUTHEAST ALBERTA ASSETS

Location, Location, Location

Southeast Alberta is part of the region of Canada that has the high photovoltaic potential. In fact, of the thirteen “PV hotspots” in Canada, Wild Horse, Alberta is second, only to Regway, Saskatchewan. The other hotspots are listed below.



- 1 Regway SK, 1384
- 2 Wild Horse AB, 1373
- 3 Waskada MB, 1370
- 4 Rainy River ON, 1265
- 5 Elkford BC, 1236
- 6 Quyon QC, 1208
- 7 Chatham NB, 1168
- 8 Chesterfield Inlet NU, 1158
- 9 Miminegash PE, 1136
- 10 Fort Smith NT, 1126
- 11 Amherst NS, 1125
- 12 Wabush NF, 1074
- 13 Burwash Landing YT, 1056

In comparison to major Canadian cities and capitals and major cities worldwide, the southeast Alberta region (using Wild Horse and Medicine Hat ratings) is comparable:

**Photovoltaic municipal rankings in terms of yearly PV potential
(for South-facing PV panels with latitude tilt)**

Major Canadian cities and capitals

Municipality	Yearly PV potential (kWh/kW)
Wild Horse (Alberta)	1373
Medicine Hat (Alberta)	1367
Regina (Saskatchewan)	1361
Calgary (Alberta)	1292
Winnipeg (Manitoba)	1277
Edmonton (Alberta)	1245
Ottawa (Ontario)	1198
Montréal (Québec)	1185
Toronto (Ontario)	1161
Fredericton (New Brunswick)	1145
Québec (Québec)	1134
Charlottetown (Prince Edward Island)	1095
Yellowknife (Northwest Territories)	1094
Victoria (British Columbia)	1091
Halifax (Nova Scotia)	1074
Iqaluit (Nunavut)	1059
Vancouver (British Columbia)	1009
Whitehorse (Yukon)	960
St. John's (Newfoundland/Labrador)	933

Major cities worldwide

City	Yearly PV potential (kWh/kW)
Cairo, Egypt	1635
Capetown, South Africa	1538
New Delhi, India	1523
Los Angeles, U.S.A	1485
Mexico City, Mexico	1425
Wild Horse , Alberta	1373
Medicine Hat, Alberta	1367
Regina, Saskatchewan	1361
Sydney, Australia	1343
Rome, Italy	1283
Rio de Janeiro, Brazil	1253
Ottawa, Canada	1198
Beijing, China	1148
Washington, D.C., U.S.A.	1133
Paris, France	938
St. John's, Newfoundland/Labrador	933
Tokyo, Japan	885
Berlin, Germany	848
Moscow, Russia	803
London, England	728

The high solar PV potential combined with flat topography in many areas of the region provide opportunities for a variety of solar projects.

Commitment in the Region

Medicine Hat's PV potential in kWh/kW on an annual basis is 1,367. The region's solar advantages have not gone unnoticed by decision makers in the City of Medicine Hat. In 2006, the City was a municipal partner of Climate Change Central and helped launch Alberta Solar Showcase, which assisted 20 Alberta municipalities to install and grid-connect small solar PV systems in public buildings ranging from under one kilowatt to two kilowatts.

As part of the Alberta Solar Showcase, the City of Medicine Hat installed a one kilowatt solar electric system on the roof of the Medicine Hat Library. During the first year after installation, the system generated 1,300 kWhs and allows the Library to use all available solar electricity before it draws electricity from the City of Medicine Hat Electric Utility.

The City's commitment to sustainable utilities and environmental stewardship was also apparent in 2006 when it conducted a an Alternative Energy Review to identify the City's

options to diversify its energy portfolio to reduce reliance on natural gas for the production of both thermal (furnace, hot water heating) and electrical energy (lighting, cooling). The Review resulted in local priorities being identified: Thermal Renewables (solar and geothermal) and Electric Renewables (wind and solar).

In January 2008, the City of Medicine Hat released its Community Environmental Roadmap. This roadmap, complete with performance measures and targets, details how the City can help the community reach its targets, including the availability of incentive programs and rebates for energy efficient applications and renewable installations. In terms of renewable energy, the City identified a target of 25 percent residential energy to be provided from renewable sources by 2025. To assist with this target, incentive and rebate programs that cover solar installations have been introduced, even though at this time the Government of Alberta offers no solar incentives. The initiative, named HAT Smart, educates and assists residents and utility customers to improve the environment.

The City's residential incentive program covers a HAT Smart incentive of \$3,000 for solar water heating and \$6,000 for solar electric. On the commercial side, HAT Smart will fund 50 percent of the install cost (up to a maximum of \$50,000 per applicant) for solar thermal (solar water heating, solar air heating) and renewable energy (solar PV, wind power).

In addition to assisting the community with energy efficiency and renewable energy installations, the City continues to explore possibilities in its alternative energy priority areas. Two projects already under way are:

- Wind Farm Project – The City is in the process of exploring the possibility of developing and operating a 16.5 Megawatt wind farm in the Box Springs area.
- Aquifer Thermal Energy Storage (ATES) Project – This project uses a local aquifer (an underground layer of earth, gravel, or porous stone that yields water) to heat and cool buildings. The ATES system was developed for the Southlands 4B site, a two building condominium complex with four levels and 72 units. A centralized energy centre along with buried pipe carrying aquifer water utilizes a solar domestic hot water system to heat the buildings using thermal energy. The project is estimated to result in a 60 percent decrease in natural gas consumption compared to traditional heating and cooling technology.

Continuing its exploration in alternative energy, the City of Medicine Hat has an additional project that is being considered for funding by various agencies:

- M-HaSTE (Medicine Hat Solar Thermal Energy) Project – In partnership with Alberta Research Council, the city's utility plant is proposing to install, operate, and test a 1 Megawatt concentrating solar thermal field in Medicine Hat. The solar array will produce high temperature steam which will be incorporated into an existing combined cycle gas power plant, increasing its thermal efficiency and power output while simultaneously decreasing its carbon emissions to the atmosphere, reducing the amount of fossil fuels burned in the plant. This project positions the City as the first to deploy concentrating solar thermal renewable energy at a pre-commercial scale in Canada. Benefits of the project include: (1) testing and demonstrating the latest concentrating solar thermal technology in a Canadian context; (2) reducing the carbon footprint of power generation in Western Canada; (3) establishing the potential fossil fuel savings attainable by solar steam substitution; and (4) establishing the techno-economies of concentrating solar thermal energy production and assess its potential use in other Western

Canadian applications that require large steam/heat loads.

Given the City's commitment to alternative energy and its initiatives spurring residential and commercial installations, employment spin-offs will increase. That is, installers and other technicians will be required as demand grows, not unlike the trend in the industry nationwide. A key asset in the region in this regard is Medicine Hat College.

Training for the Future

Medicine Hat College (MHC) offers more than 30 diplomas and certificates and 25 university transfer programs. MHC serves southeastern Alberta and southwestern Saskatchewan with a main campus in Medicine Hat that services almost 2,500 students each year and the Brooks Campus serving another 200 students. MHC offers unique diploma programs and continues to expand its offerings. Medicine Hat College already offers trades programs, including plumber/gasfitter, steamfitter/pipefitter and electrician, which will provide a base of expertise for the energy economy workers.

Adding relevant facilities to meet current and future industry needs, MHC officially opened the EnCana Power Engineering Technology Centre on October 8th, with Premier Ed Stelmach in attendance. A key program offering continues to be the two-year Power Engineering Technology program, which prepares licensed power engineers to operate large energy systems in all types of industries as required by Government regulations in Canada.

While training at MHC is not specific to alternative energy systems, it is clear that the existence of this regional asset provides an opportunity to develop a workforce that is proficient in the emerging sector.

Industry Interest

Not only is municipal commitment to alternative energy initiatives strong, but industry is viewing the region's solar PV potential as providing opportunities. One such example is a local Medicine Hat Company. This company intends to design, construct and operate a utility scale solar PV demonstration plant on a 12-acre parcel of land near the vicinity of its operations. Though granted approval from their parent company, the project needs government funding to be obtained before it can go forward. If successful, the project will be developed in partnership with the City of Medicine Hat, and is intended to:

- Demonstrate currently available solar PV technologies;
- Provide testing of different solar technologies with a combined output of 1MW;
- Provide significant education and experience to regional stakeholders in design, equipment, supply chain logistics, installation, energy and power performance, development and electric-grid regulations, policy and economics;
- Provide a technology incubation area for private and academic sector trials where new solar technologies can be demonstrated within a utility-scale plant;
- Provide energy for use in the company's existing facilities or for export into the Medicine Hat electric distribution grid;
- Provide the company with offset credits; and
- Identify barriers and opportunities pertaining to economically-viable industrial-scale solar PV utilization in Alberta.

This company is open to partnerships with other stakeholders in this project, including

Medicine Hat College and other technical and trades training institutions. The project, if approved by funding agencies, provides opportunities for the region and its stakeholders.

7.0 OPPORTUNITIES IN SOUTHEAST

Solar energy offers not only environmental benefits to a region but also economic advantages. Domestic economic activity increases from the growth of solar installations and operations. Regional prosperity occurs as a result of new and challenging jobs, unique and diverse training opportunities that build on a base of knowledge and expertise, and the quality of life increases. The creation of a cluster of players involved at various levels of the value chain (testing, product development, use, training, sales, export, etc.) spurs additional investment and creates new business models involving both public and private sector funds. The opportunity exists for education and training specific to solar energy to be identified and developed for delivery by colleges, universities, apprenticeship programs and associations.

Southeast Alberta is in a unique position to be able to seize opportunities related to solar. Some of these may be:

- 1. Education and Training.** A major component of the value chain is installers. Proper installation is a critical component in the overall customer adoption and satisfaction equation of relatively new solar technology. Therefore, there is a demand for certified installers. In the City of Medicine Hat, as more residents and businesses participate in the rebate/incentive programs, demand for certified installers will increase and will be a critical success factor in meeting targets.

On a larger scale, the growth in employment in PV-related organizations in Canada should parallel the growth of the PV industry. Greater specialization and training will be required to compete globally. The demand will be in all areas of the value chain.

CanSIA currently offers a PV Technician certificate in partnership with as Seneca College in eastern Canada. The program offers an understanding of electrical theory relevant to the fundamentals of the PV system. In addition, it deals with solar theory, batteries, charge controllers and Balance of System (BOS) components. The Canadian Electrical Code for PV systems is also part of the curriculum and this is followed by a practical review of equipment, e.g. PV standalone systems and PV Grid Connected systems.

In the United States, the North American Board of Certified Energy Practitioners (NABCEP) has done a task analysis of solar electric installers and has a certification program (www.nabcep.org). A comparison of the basic requirements for CanSIA's PV technician certificate and NABCEP's PV installer certification shows that the NABCEP aims to certify the technician that already has field experience whereas CanSIA's program is intended for the novice aiming to become a technician.

For the ST sector, CanSIA offers a Canadian Solar Hot Water System Installer (Level I) certification. The aim of the certification is to ensure that Solar Domestic Hot Water System installations are undertaken by trained installers. To work in the industry, an experienced applicant requires two years experience in Solar Domestic Hot Water systems or an accredited plumber could complete a roof/fall safety workshop, a course offered by a qualified manufacturer, CanSIA or other training institution and successfully complete a written examination to obtain the certificate.

(A detail of all solar training related offerings in Canada as provided by CanSIA are listed in Appendix B).

The Southeast Alberta region is fortunate to have a post-secondary institution such as Medicine Hat College. Opportunities exist to work with CanSIA or NABCEP to develop training programs that build on trades training currently being offered at the college. Further, in collaboration with CanSIA, MHC has the opportunity to work towards a federally and provincially recognized Solar PV and ST installer certification process.

Job opportunities for installers as they complete the program/certification process through the College already exist in the Medicine Hat area due to the incentives/rebate programs being utilized by residents/businesses. Further, nationwide, the industry is anticipating increased need for technically trained people at various stages of the value chain, providing the opportunity to create stronger links with industry across the nation.

2. **Provincial Solar Centre for Excellence** - The City of Medicine Hat's alternative energy projects and industry's proposal for a solar demonstration and evaluation project creates a small mass of solar activity in the Southeast region. Given the high PV and ST potential of the region, an opportunity exists to develop a solar cluster, slowly drawing greater expertise and attracting investment. Already, the pieces are taking shape:
 - Ideal location with the second highest PV potential site in Canada located in the region;
 - Municipal commitment to alternative energy projects directed at meeting specific targets;
 - Municipal commitment to helping residents and businesses understand and adopt alternative energy solutions;
 - Private industry commitment to developing an incubation, demonstration and evaluation area for new solar technologies if successful in getting funding (potentially available to MHC for training and research);
 - Post-secondary institution (MHC) capable of expanding its existing offerings to meet the growing workforce demands of the alternative energy economy; and
 - Regional economic development organization (EDA of Southeast Alberta) capable of working with government to progress solar energy on the Provincial government's agenda.

The "pieces" identified above have the potential to provide the "infrastructure" and the environment to slowly develop a solar cluster with an overall vision of being a Provincial Solar Centre of Excellence, encompassing research, training and industry support.

3. **Solar Farms** – Solar farms are cropping up in southern Ontario. Solar farms have economic benefits to local communities during the building phase such as rent/lease to landlords/farmers, employment of local contractors, local assembly and manufacturing. Solar farms are also popular as they provide farmers with a way to diversify their income to counter volatile crop prices. One 10MW solar farm⁴ on 100 acres is, conservatively enough power for 1,225 homes. Solar projects are estimated to create 15 job years per MW installed. Many of these jobs are created in the local community. Sites ideal for solar farms must have the following criteria:
 - Large, uninterrupted land mass.

⁴Solar farms in Ontario seem to be using the ratio of one 10MW solar farm on 100 acres.

- Relatively flat topography.
- Availability of distribution/transmission infrastructure in the vicinity and close to load centers to have impact.
- Reasonable land prices.
- Environmental, planning and zoning approvals.

In Ontario, the debate over solar farms has arisen over the use of prime agricultural land for ground mounted solar systems which put land out of commission for 15 to 20 years. Ideally, brown fields where the soil inventory shows low productive value is ideal. However, large parcels of non-prime agricultural or industrial land void of buildings are difficult to find or too costly.

In Southeast Alberta, there may very well be land that fits the criteria available for solar farms. The availability of land, especially in the eastern part of the region coupled with the high PV potential in the area, provides opportunities to attract solar farms. However, this opportunity is further into the future as the Province of Alberta only allows micro-generation (under 1 MW) at this point and does not provide incentives of any type to attract attention.

If after an assessment of land available in the region, ideal potential sites are identified, the EDA of Southeast Alberta may have a role to play in laying the ground work of attraction of solar farms to the area. Specifically, the EDA can work with the province to:

- Develop a roadmap/strategy for solar energy, including targets, plans for solar deployment and an action plan for accelerating the growth of the industry;
- Develop incentives to attract solar investment in the province and encourage adoption of solar technologies at the residential and commercial/industrial levels.

Solar farms are the start – with large solar development projects, a province can get the kind of volume it needs to convince manufacturers of solar panels and related technologies to invest in the province.

APPENDIX A – SOLAR INCENTIVES

The following is a list of incentives offered in Canada as listed on the CanSIA website (www.cansia.ca).

FEDERAL SOLAR INCENTIVES

ecoENERGY for Renewable Heat

The ecoENERGY for Renewable Heat program runs from April 1, 2007 to March 31, 2011. Incentives are offered to the industrial/commercial/institutional sector to install active energy-efficient solar air and/or water heating systems. The incentive will be based on a rate per square metre of collector area multiplied by a collector-specific Performance Factor and an Incentive Rate. Eligible projects must be completed and commissioned within nine (9) months of the signing of a contribution agreement with NRCan. Preliminary estimates suggest that, by 2011, the program will have supported installations in about 700 buildings. As well, pilot projects will be conducted to increase the use of residential solar water heating systems (please note that this program does not offer incentives directly to homeowners).

ecoENERGY for Renewable Power

This program provides a 1 cent/kWh incentive for up to 10 years to eligible low-impact, renewable electricity projects constructed over the next four years - April 1, 2007 to March 31, 2011.

ecoENERGY Retrofit

This program provides grants to homeowners and financial incentives to small and medium-sized businesses, industry and public institutions to help them invest in energy and pollution-saving upgrades. For example, there is a \$1,250 residential solar water heating incentive with this program.

Class 43.1 Accelerated Capital Cost Allowance and Canadian Renewable and Conservation Expenses

A 50% accelerated CCA is provided under Class 43.2 of Schedule II to the *Income Tax Regulations* for specified clean energy generation equipment. Eligible equipment includes solar thermal, solar air and solar photovoltaic equipment while project size restrictions have been eliminated.

Class 43.2 was introduced in 2005 and is currently available for assets acquired on or after February 23, 2005 and before 2012. For assets acquired before February 23, 2005, accelerated CCA is provided under Class 43.1 is 30%.

For more information visit <http://oee.nrcan.gc.ca/industrial/financial-assistance/tax-incentives.cfm?attr=24>

Other information available at www.budget.gc.ca/2007/bp/bpa5ae.html

PROVINCIAL / TERRITORIAL GOVERNMENT INCENTIVES

ALBERTA SOLAR INCENTIVES

The Province of Alberta currently has no solar incentives in place however there are discussions regarding the implementation of a net metering program.

**** ALTHOUGH NOTE LISTED ON THE CANSIA WEBSITE, IT SHOULD BE NOTED THAT THE CITY OF MEDICINE HAT HAS HAT SMART SOLAR INCENTIVES (www.hatsmart.ca). UNDER THE RESIDENTIAL INCENTIVE PROGRAM, UPTO \$3,000 IS AVAILABLE FOR SOLAR HOT WATER AND UP TO \$6,000 IS AVAILABLE FOR SOLAR ELECTRIC. UNDER THE COMMERCIAL INCENTIVE PROGRAM, 50 PERCENT UP TO \$50,000 IS AVAILABLE FOR SOLAR THERMAL AND/OR SOLAR ELECTRIC PROJECTS.**

BRITISH COLUMBIA SOLAR INCENTIVES

Energy Conservation Sales Tax Exemptions

The Province of BC provides provincial sales tax (PST) exemptions on renewable energy equipment including solar energy equipment.

Innovative Clean Energy Fund

This fund will support the development of clean power and energy efficiency technologies in the electricity, alternative energy, transportation, and oil and gas sectors. For more information visit www.gov.bc.ca/empr/popt/innovative_clean_energy_fund.html

Standing Offer Program

BC Hydro is in the process of developing a Standard Offer Program which would see clean energy electricity projects up to 10 megawatts obtain a standard rate or payment for generated power. Solar energy projects will be acceptable in this program however the payment rates are not as supportive as other Standard Offer rates currently implemented in Ontario. For more visit www.bchydro.com/info/ipp/ipp51323.html

MANITOBA SOLAR INCENTIVES

The Province of Manitoba does not have any specific solar incentives however there are a variety of energy efficiency programs. For more information please visit http://www.gov.mb.ca/est/climate/mb_doing/energy_efficient.html

Net Metering Program

Net Metering is available in Manitoba. Contact Manitoba Hydro at <http://www.hydro.mb.ca/index.shtml> for more information.

NEW BRUNSWICK SOLAR INCENTIVES

The province of New Brunswick does not offer direct solar energy incentives however they have initiated financial incentives in conjunction with the Federal ecoENERGY Retrofit program which can lead to the installation of a solar hot water heating systems upon recommendation by your ecoENERGY auditor.

Existing Homes Energy Efficiency Upgrades Program

The program is designed to provide New Brunswick owners of single-family homes with financial assistance to make their houses more energy-efficient in order to conserve energy. This program works in partnership with the Federal ecoENERGY Retrofit Program which will provide a \$500 rebate after installing a certified solar hot water heating system.

Some of the incentives which this program provides include:

Efficiency NB will subsidize up to \$400 of the cost of your ecoENERGY home evaluation. For more information please visit www.energycynb.ca/coupon-e.asp

Efficiency NB will then provide a grant of up to \$2000 or an interest-free loan of up to \$10,000 to eligible New Brunswick homeowners who make energy efficiency upgrades to their home as recommended in their ecoENERGY Initial evaluation report. For more information visit www.energycynb.ca/Promo/indexpromo-e.asp

Energy Smart Commercial Building Retrofit Incentive Program

The Energy Smart Commercial Buildings Retrofit Program provides financial incentives of up to \$2,000 towards an evaluation to determine the potential for energy efficiency upgrades in a commercial building and a maximum of \$50,000 towards the energy retrofitting project costs. For more information visit www.energycynb.ca/business-e.asp

Start Smart New Commercial Building Retrofit Incentive Program

The Start Smart New Commercial Building Retrofit Incentive Program provides financial incentives of up to \$60,000 to offset the costs associated with designing sustainable high efficiency buildings based on estimated annual energy savings.

The incentive for an eligible building that meets the criteria is calculated as a one-time financial incentive equal to the difference between the estimated annual energy cost if the building were constructed to the MNECB standard, to a maximum of \$60,000.

For more information visit www.energycynb.ca/business-e.asp

NB Power Net Metering Program

NB Power has created a Net Metering Program which allows distributed renewable

energy projects to connect to the electrical grid system.

NEWFOUNDLAND LABRADOR SOLAR INCENTIVES

The Province of Newfoundland Labrador currently has no solar incentives in place nor do they have a net metering program established.

NORTHWEST TERRITORIES SOLAR INCENTIVES

Energy Efficiency Incentive Program (EEIP)

This program provides rebates to residents for new energy efficient products purchased through NWT vendors which includes a \$500 rebate for the installation of a qualified solar hot water heating system. EEIP also matches grants from Natural Resources Canada's ecoENERGY Retrofit Program (an additional \$500 rebate for installation of a qualified solar hot water heating system), which provides grants based on Home Audits recommendations for homeowners who make their homes more energy efficient. For more information visit www.enr.gov.nt.ca/eps/EEIP.html

Community Renewable Energy Fund

The Community Renewable Energy Fund funds promising technologies that require demonstration in the NWT in order to prove they are feasible in the north. Funding is available to Community and Aboriginal governments, GNWT departments, boards and agencies and non-profit organizations to establish feasibility studies or alternative energy demonstration projects as part of their operations. The objective of this fund is to promote projects that advance the knowledge and effectiveness of new clean energy technologies in northern environments. For more information visit www.enr.gov.nt.ca/eps/AETP.html

Small Renewable Energy Fund

The Small Renewable Energy Fund is available to assist residential homeowners and commercial businesses that want to incorporate commercially available, clean energy technologies into their home or business for the production of electricity. This program provides funding of up to one-third of the cost of qualified alternative energy systems. The maximum amount that will be provided to any recipient will be \$5,000 per year. Eligible technologies under this program include solar PV systems. For more information visit www.enr.gov.nt.ca/eps/AETP.html

NOVA SCOTIA SOLAR INCENTIVES

Commercial/Industrial Solar Hot Water & Solar Hot Air Rebate

Conserve Nova Scotia provides a 15 % rebate of the installed cost of a solar water heating system for residential, institutional, industrial or commercial use. The maximum provincial rebate is \$20,000.

Also, Conserve Nova Scotia provides a 15 % rebate of the installed cost of a solar air heating system for residential, institutional, industrial or commercial use. The maximum provincial rebate is \$20,000.

Residential Solar Hot Water Rebate - Energuide for Homes

Homeowners that take part in the Energuide program will have the option of receiving one Provincial solar water heating rebate:

1. The 15% rebate on the installed cost of the system + the \$500 Federal rebate,
2. OR \$500 Energuide matching Provincial rebate + the \$500 Federal rebate.

* In most cases homeowners will get a higher overall rebate if they choose option #1.

Residential Solar Air Rebate

Conserve Nova Scotia provides a 15 % rebate of the installed cost of a solar air heating system for residential, institutional, industrial or commercial use. The maximum provincial rebate is \$20,000.

Nova Scotia Power Net Metering Program

To provide more options when it comes to renewable energy, Nova Scotia Power has launched a new program called "*Net Metering*". Residential and commercial customers are now able to connect small renewable energy generating units (100 kilowatts or less) to Nova Scotia Power's electrical grid.

The program provides Nova Scotians with a risk free way of meeting their own energy needs from renewable sources while still having the security of being able to draw from the provincial power grid when needed.

NUNAVUT SOLAR INCENTIVES

The Government of Nunavut does not offer any solar incentives however they do offer an Energy Retrofit Program on a pilot program basis in most regions. For more information visit <http://cgs.gov.nu.ca/en/energy-services/nerp>

ONTARIO SOLAR INCENTIVES

Go Solar Ontario

"Go Solar Ontario, is a market transformation campaign that provides Ontario residents with the information and links they require to install solar energy systems to heat water or generate electricity.

Renewable Energy Standard Offer Program

This is a type of Feed in Tariff program which pays solar energy producers a rate of 42 cents/kilowatt hour for grid tied solar power over a contract life of 20 years for projects under 10 megawatts. For more information visit www.powerauthority.on.ca/sop

Net Metering Program

Electricity consumers in Ontario who produce some of their own power may take advantage of "net metering", an initiative of the Ministry of Energy. Net metering allows you to send electricity you generate from renewable sources to the distribution system for a credit toward your energy costs. In essence, it's a "trade" of electricity you supply against electricity you consume. For more information please visit www.oeb.gov.on.ca/html/en/industryrelations/smallgenerators_sellingelectricity.htm

Home Energy Retrofit Program

To help homeowners save energy, save money and help reduce greenhouse gas emissions, the Ontario government has created the Ontario Home Energy Retrofit Program. More than \$1300 in available Federal and Provincial incentives is available for the installation of a solar domestic hot water system. For more information visit www.energy.gov.on.ca/index.cfm?fuseaction=conservation.homeretrofit

Industrial/Commercial/Institutional Solar Thermal Heat

The Ontario government is making \$14.4 million available over four years to encourage the industrial/commercial/institutional sector to convert to solar thermal heating. This initiative is piggy backing on the Federal ecoENERGY Renewable Heat Program. The Federal program allows businesses, industries, schools, universities, municipalities and hospitals to receive 25% of the cost of the installation of a solar thermal heating system to a maximum of \$80,000. The Ontario Provincial government will match the Federal offer and contribute an additional 25% leading industrial/commercial/institutional solar projects to receive a 50% rebate on the initial upfront development costs. To access the provincial grant you must first access the federal grant program. Qualifying details (and other key FAQ's) can be found at: www.ecoaction.gc.ca/ecoenergy-ecoenergie/heat-chauffage/conditions-eng.cfm#3

OPA Electricity Retrofit Incentive Program (Commercial)

The Ontario Power Authority (OPA) through the Every Kilowatt Counts initiative has developed a commercial incentive program.

Retrofitting an existing facility with newer equipment is natural business practice. Commercial building owners/tenants can retrofit their building with solar hot water heaters and other electricity saving equipment and receive a rebate from the OPA.

Ontario PST rebate on renewable installations

The Ontario government is extending the retail sales tax rebate on qualifying renewable equipment to January 1, 2010 to encourage the use of solar and other renewable technologies. The program provides a full rebate on the PST paid for renewable equipment used for the installation of a solar, wind, micro hydro-electric or geothermal system, or enhancement to an existing system. Only residential households or residential builders are eligible for this rebate. For more information visit www.rev.gov.on.ca/english/refund/sesr/

Pilot Financing for Residential Renewable Energy

Residents in Peel Region and part of York Region are eligible for zero interest loans up to \$50,000, or rebates, for the installation of alternative and renewable energy technologies in their homes, under a pilot program called PowerHouse, funded by the Government of Ontario and operated by Hydro One and Enersource. Residents of Mississauga, Brampton, Caledon and parts of York Region are eligible. Both PV and solar thermal projects are eligible under this program. **Projects must be completed by Feb. 15, 2009.** For full program details visit www.powerhouseprogram.ca

PRINCE EDWARD ISLAND SOLAR INCENTIVES

Renewable Heat Loan Program

Available to all homeowners, this program provides loans to assist in the installation of renewable energy equipment in Island homes. Eligible systems include solar air and solar domestic hot water systems. The Renewable Energy Loan Program provides loans up to \$5,000 at an interest rate of six per cent – the money is paid back at a rate of \$90 per month regardless of the loan balance.

Sales Tax Exemption

There is a Provincial Sales Tax (PST) exemption on small-scale renewable energy equipment. Items which are exempt from provincial sales tax include solar thermal and solar photovoltaic systems.

Net Metering

Newly established Net-Metering System Regulations make it more steam lined for Island homeowners, small businesses or farmers who have an interest in generating their own electricity to install small-scale generating systems (100 kilowatts or less).

Minimum Purchase Price Regulations

The Minimum Purchase Price Regulations establish the price which utilities must

pay for power produced by large-scale renewable energy generators – that is those capable of producing more than 100 kilowatts of energy. The rate has been set at 7.75 cents per kilowatt hour with 5.75 cents of that as a fixed rate and 2.0 cents as a variable rate.

Solar photovoltaic systems are eligible under this regulation.

QUEBEC SOLAR INCENTIVES

The Province of Quebec does not have any specific solar incentives however you can visit l'Agence de l'efficacité énergétique (www.aee.gouv.qc.ca/index.jsp) for energy efficiency information.

For additional information on energy efficiency programs and incentives please visit the Hydro Québec website at www.hydroquebec.com.

Net Metering Program

Hydro Québec has a net metering option which allows households or entities to feed surplus power generated from distributed systems, such as solar PV systems, into the grid.

For more information visit www.hydroquebec.com/autoproduction/en/mesurage_net.html

SASKATCHEWAN SOLAR INCENTIVES

Energy Star Rebate for New Homes

Saskatchewan residents who build or purchase a newly constructed ENERGY STAR qualified or R-2000 home between April 1, 2007 and March 31, 2008 are now eligible to receive up to \$2,400 in rebates. This includes \$1,000 rebate for the installation of a solar domestic hot water heating system. For more information please visit www.saskenergy.com/saving_energy/energystarnewhomes.asp

Saskatchewan EnerGuide for Houses Retrofit Grant Program

The Government of Saskatchewan has extended and enhanced the Saskatchewan EnerGuide for Houses retrofit grant program until March 31, 2011. Individuals who qualify under this new program also qualify for the ecoENERGY Retrofit Initiative introduced by the Federal government on April 1, 2007. This allows existing homes which install a solar domestic hot water heating system to receive a combined \$1,500 from the Saskatchewan government as well as the Federal ecoEnergy program. For more information please visit www.saskenergy.com/saving_energy/energuide.asp

Solar Heating Initiative for Today (SHIFT)

The SHIFT program provides funding for new solar water heating systems to large, non-residential consumers of hot water in Saskatchewan. The program is available for businesses, industries, multiple-unit residential buildings over three stories, public institutions such as hospitals and schools, and municipal and provincial facilities. The SHIFT incentive matches the ecoENERGY for Renewable Heat incentive level combining to provide up to 50 % of eligible project costs.

For more information please visit <http://ecoaction.gc.ca/ecoenergy-ecoenergie/heat-chauffage/sk-shift-eng.cfm>

Net Metering Program and 25% Rebate on Start Up Solar Projects

Net metering allows individuals who use their own renewable energy sources to offset their consumption from SaskPower. Net metering is one program in a suite of sustainable and renewable energy initiatives that is designed to ensure that the province is supplied with safe, reliable and sustainable electricity now, and into the future.

The Saskatchewan Research Council (SRC), with funding from Saskatchewan's Green Strategy, has up to \$300,000 per year, for four years, to support net metering installations within the province. SRC will pay a one-time fee of 25% of eligible start-up costs up to a maximum of \$100,000 (i.e., maximum \$25,000). Projects with generating capacities of 100kW or less, including solar photovoltaic projects, that comply with the local utility's net metering policies and enter into net metering contracts with their local electric utilities are eligible for funding under this program.

For more information please visit www.saskatchewan.ca/Default.aspx?DN=dcdd9949-022b-4e98-98ab-9cfdeb87bf60

YUKON SOLAR INCENTIVES

The Government of Yukon does not offer any solar incentives however they do provide energy efficiency incentives and also coordinates an Energuide for Homes program in conjunction with the Federal Government. This program offers a \$500 rebate for the installation of a qualified solar hot water heating system. To learn more visit www.nrgsc.yk.ca

APPENDIX B – SOLAR TRAINING

Some training is available in Canada. The following is a list of training available as detailed on the CanSIA website (www.cansia.ca):

CANADIAN SOLAR INDUSTRIES ASSOCIATION (CanSIA)

CanSIA offers both workshops and training courses for members of the industry.

Solar Installer Certification Programs

CanSIA offers certification programs for installation of solar equipment:

- Solar PV Technician Program
- CanSIA Solar Hot Water System Installer Certification
- SDHW Installer Workshops

Other CanSIA Solar Courses in Canada

CanSIA offers many educational services. These include courses run through:

- Seneca College - in partnership with CanSIA, offers an eleven-part training program for people that want to become professionally trained in the design and installation of solar photovoltaic (PV) systems.
- Kortright Centre for Conservation

OTHER CANADIAN RENEWABLE ENERGY EDUCATIONAL INSTITUTIONS

British Columbia Institute of Technology

BCIT offers courses in photovoltaic system design.

Cambrian College

ENERGY SYSTEMS TECHNOLOGY (ESTY)

The Energy Systems Technology program prepares students for employment in the sustainable energy field, with a focus on energy systems for residential and small commercial buildings. Students will study energy systems harnessing energy from renewable sources - sun, wind, water, geothermal heat, and biomass - in order to have a sustainable environment that will meet our present needs without compromising the ability of future generations to meet theirs. Topics on energy management, energy efficiency and energy conservation and sustainable building and development are also covered in the program.

Contact Information:
Kameal Mina, PhD
Professor, Energy Systems,
Computer Studies and Engineering Technology
1400 Barrydowne Road Sudbury, ON P3A 3V8
Tel: 705.566.8101 ext. 7578
kameal.mina@cambriancollege.ca

Centennial College

Through the Centennial Energy Institute, Centennial's School of Engineering Technology and Applied Science provides critical job skills for the new energy economy, and provides clarity to those seeking to implement modern energy technology through activities in training, applied research, consulting and technology demonstration.

The Energy Institute offers 2 and 3-year diploma programs in Energy Systems Engineering Technology as well as a number of applied technology workshops such as Hands-on Solar Workshop. Programs are offered at all levels from general interest to advanced for degree and Certificate of Qualification holders.

Contact: Mr. Herbert Sinnock
Manager, Centennial Energy Institute
P.O. Box 631, Station A
Toronto, ON M1K 5E9
Telephone: (416) 289-5000 x8363
Fax: (416) 289-5160
Email: energy@centennialcollege.ca
www.energyinstitute.ca

Humber College

Sustainable Energy & Building Technology (SEBT)

Humber's Sustainable Energy & Building Technology (SEBT) program prepares Canadians for exciting careers in the rapidly growing green building sector. The three-year full-time program, offered at Humber's North Campus, allows students to acquire energy expertise in wind, solar and earth energy generation, low carbon, energy efficient building design, heating, cooling, ventilation and lighting systems. Business courses and a paid summer co-op also prepare students for seamless entry into the workplace, or as self-starters. This multi-disciplinary program has been developed in response to demand for such professionals by the energy and building sectors

SEBT grads will be engaged in building projects that intend to significantly reduce their carbon footprints, energy, water and other resource requirements, as well as low carbon energy development projects. Locations for such work range from densely urban to rural to remote. Examples include off-grid homes and cottages, "green" real-estate development initiatives, energy efficient industrial, commercial and institutional facilities, residential and commercial retrofits, municipal energy management, community power

and other Renewable Energy projects.

Humber College provides “Hybrid” training demanded by industry and not offered through standard engineering, architectural or building trades programs. The program has a powerful combination of analytical, creative and practical skills, applied to sustainable energy and building technologies. Business and entrepreneurial skill development, plus a summer co-op, prepares grads for entry into a rapidly developing industry.

For more information contact:

Robert Hellier, Coordinator
Humber College
205 Humber College Blvd.
Toronto ON M9W 5L7
T 416 675 6622 ext. 4536
Email Robert.hellier@humber.ca
Ontario College Application Service (OCAS) program code is 31551

Lakeland College

Lakeland College in Vermilion, Alberta is offering an online certificate program in Renewable Energy and Conservation. Courses focus on Solar Power, Wind Power, GeoEnergy Exchange, Biofuels, and Waste Reduction, Reuse & Recycling. Courses are eight weeks long, running two courses at a time. For full program details, visit www.lakelandcollege.ca.

NBCC Moncton

Electrical Engineering Technology Program – Alternate Energy Systems Option
NBCC Moncton offers a two year Electrical Engineering Technology Program with an Alternate Energy Systems Option in the second year. The first year of training covers the fundamentals of electrical engineering technology and is common for all students in the program. In the second year, students specialize in courses related to the production, distribution and installation of electrical energy with emphasis on sources of sustainable energy such as wind, solar, geothermal and biomass.

For more information:

Mr. Crawford Brewer, P. Eng, Senior Electrical Engineering Technology Instructor
Ms. Holly McKnight, Information Technology Department Head
Tel: (506) 856-2220

St. Lawrence College

St. Lawrence College Energy Systems Engineering Technician Technologist Program (2 year technician, 3 year technologist)

The ESET program covers theory, design and equipment installation in the fields of heating, ventilation, air conditioning, air handling, controls and renewable energy technologies including solar air, solar hot water, solar electric, small wind, and

ground exchange heat pumps.

Program graduates will work with developers, designers, architects, construction, sustainable energy design/install companies, utilities, and energy systems researchers.

St. Lawrence College's newest facility, "Energy House" is an off-grid training facility that offers a comprehensive selection of renewable energy equipment, new in the winter of 2008, a building controls lab and grid connected renewable electricity lab further complement the program.

For more information:

Steve Lapp, M.Sc. P.Eng.

Coordinator - Energy Systems Engineering Technician (ESET) and Technology Program

Tel: (613) 544-5400 ext. 1528

Fax: (613) 545-3913

Email: slapp@sl.on.ca

Trimline Design Centre Inc.

Trimline Design Centre has recently built a new Training Centre to hold 1, 2 and 5 day workshops on a number of topics including solar thermal, PV, biodiesel, straw bale, geothermal, hydronics, inverters and wind turbines, among others.

For more information:

Harold Verburg

Tel: (780) 466-9034

Email: harold.verburg@trimlinedesigncentre.com

Willis College of Business and Technology & GPEKS Constructions Inc. - Clean Energy Institute

Renewable Energy Project Feasibility Analysis Courses

The Clean Energy Institute offers nine on-line courses in Renewable Energy Project Feasibility Analysis. Each of these certificate courses focuses on understanding the technology and quantifying a project's benefits, return on investment, and level of risk. Through case studies, assignments, and real projects, graduates achieve a high level of understanding of the factors that influence a project's success. Graduates go on to accelerate the adoption of Renewable Energies.

For more information

Frederic Pouyot, Director of the Clean Energy Institute

Tel: (613) 686-4474 ext 1

Email: registrar@cleanenergyeducation.net