

PHOTOVOLTAIC TECHNOLOGY STATUS AND PROSPECTS CANADIAN ANNUAL REPORT 2014

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GENERAL FRAMEWORK

Canada's Department of Natural Resources (NRCan) supports priorities to promote the sustainable and economic development of the country's natural resources, while improving the quality of life of Canadians. CanmetENERGY [1], reporting to the Innovation and Energy Technology Sector of NRCan, is the largest federal energy science and technology organization working on clean energy research, development, demonstration and deployment. Its goal is to ensure that Canada is at the leading edge of clean energy technologies to reduce air and greenhouse gas emissions and improve the health of Canadians.

The Canadian Solar Industry Association (CanSIA) is a member of the International Energy Energy PVPS implementing agreement and works with industry stakeholders and government decision makers to help develop effective solar policy and identify key market opportunities for the solar energy sector.

Provincial and Territorial government policies are now all supporting "net-metering" or "net-billing" of PV power in Canada. With the significant decline in the PV system costs and a recognition of opportunities to reduce "soft costs" (non-equipment, regulatory and administrative costs), PV generation is gradually approaching grid parity. These policies are aimed at simplifying the regulatory framework for customers that want to invest in their own renewable energy micro-generation as part of their overall energy

conservation measures and to reduce their electricity bills.

The Province of Ontario, Canada's most populous and second largest province, leads the country in photovoltaic (PV) investments. As of December 2014, the cumulative PV installed capacity stood at 474 MW_{AC} under the Renewable Energy Standard Offer Program (RESOP), 902 MW_{AC} under the Feed-in Tariff Program (FIT) and 174 MW_{AC} under the microFIT program for a total of 1550 MW_{AC}. The total amount of installed and under development PV capacity in Ontario is approximately 507 MW_{AC}.

NATIONAL PROGRAMME

RESEARCH AND DEMONSTRATION

NRCan's CanmetENERGY is responsible for conducting PV R&D activities in Canada that facilitate the deployment of PV energy technologies throughout the country. The PV program coordinates national research projects, contributes to international committees on the establishment of PV standards, produces information that will support domestic capacity-building and organizes technical meetings and workshops to provide stakeholders with the necessary information to make informed decisions.

A new Business-led Network of Centres of Excellence was established in 2014 [2]. The Refined Manufacturing Acceleration Process (ReMAP), headquartered at Toronto-based Celestica, is developing an ecosystem for commercialization that links academics,

companies and customers. With access to 38 labs and manufacturing lines across the country, the ReMAP network will work with participating companies from the information and communications technologies, healthcare, aerospace, defence and renewable energy sectors to quickly identify innovations that are most likely to succeed, and then accelerate the product commercialization and global product launch.

The PV Innovation Research Network, funded by the Natural Sciences and Engineering Research Council (NSERC), brings together a core group of 32 academic researchers in Canada, as well as CanmetENERGY, the National Research Council, the Ontario Center of Excellence and 15 industrial partners. The network held its fifth national scientific conference in Montreal in May 2014. The PV Innovation Network is scheduled to end its research activities in the Fall of 2015.

The NSERC Smart Net-Zero Energy Buildings Strategic Network (SNEBRN) performs research that will facilitate widespread adoption in key regions of Canada of optimized net zero energy buildings design and operation concepts by 2030. CanmetENERGY is contributing to this research effort and has been leveraging its activities through its leadership of the recently completed Task 40/Annex 52, entitled “Towards Net Zero Energy Solar Buildings” - a large international collaboration jointly managed by the IEA SHC and EBC programs. To achieve this objective, some 75 T40/A52 experts from 19 countries, including Canada, have documented research results and promoted practical case studies that can be replicated worldwide [3].

IMPLEMENTATION

ONTARIO’S ENERGY PLAN AND PROCUREMENT

In its 2013 Long Term Energy Plan (LTEP), Ontario highlighted that as PV system cost decreases and more PV systems are deployed at customer sites, the microFIT program could gradually transition to a net metering program [4]. Net metering was

also identified as supporting conservation objectives. In addition, the IESO has set aside some capacity at each transformer station for microFIT projects where there is already existing capacity. This prevents procurement of larger generation facilities from crowding out microFIT applications.

JURISDICTIONAL SCAN

In 2013, the Yukon Territory released its micro generation policy that will reimburse customers for the amount of electricity exported to the grid at a rate reflective of the avoided cost of new generation in the territory. This program will offer a tariff of 21 cents for grid connected and 30 cents on diesel generation micro grids up to 5 kW on shared transformer, 25 kW on a single transformer and up to 50 kW on a case by case approved by the local utility [5].

The Northwest Territories (NWT) has launched a Solar Energy Strategy to install solar systems with the capability to supply up to 20 percent of the average load in NWT diesel communities for 2012-2017 [6].

The province of Saskatchewan’s net metering rebate provides up to 20 % of system costs for installations up to 100 kW for environmental preferred technologies including photovoltaics to a maximum of \$20 000 per eligible net metering project for a limited period ending on November 30, 2014.

Alberta’s micro generation regulation was reviewed in 2013. This is a non-incentivized market where the recent increase in the price of electricity (30% over the last 6 years) and the decreasing cost of solar PV makes solar electricity nearly competitive. Enmax, a utility, has initiated a Micro Renewable Energy Program to simplify the financing and installations of Solar PV residential rooftop systems [7].

British Columbia was the first province to adopt a net metering Policy in 2004. In 2013 a progress report was released that provided an update of the BC Hydro Net Metering program and a regulatory scan to benchmark /compare to similar programs across Canada and selected programs in the USA [8].

INDUSTRY STATUS

Canada’s solar sector has experienced continued significant investments over the last 4 years. Employment in PV-related areas in Canada has grown with a 2013 labour force estimated at over 5 925 compared to 2 700 jobs in 2009. The Ontario government projects 6 000 jobs will be created from the four year FIT procurement targets. In 2013 the solar PV module manufacturing industry in Ontario accounted for over 1,900 full time direct jobs in the design, manufacturing and testing of modules, while the PV inverter industries in the Province provided an additional estimated 250 jobs. Racking, the other major segment of manufacturing accounts for approximately 700 jobs.

MARKET

PV power capacity in Canada grew at an annual rate of 25% between 1994 and 2008. In recent years this growth was 98% in 2011, 48 % in 2012 and 54% in 2013 due to the Ontario incentive programs.

Recent information from industry suggests module pricing to be approximately 0,85 CAD per watt. This can be compared to 5.53 CAD in 2004. This represents an average annual price reduction of 20% over a 10-year period

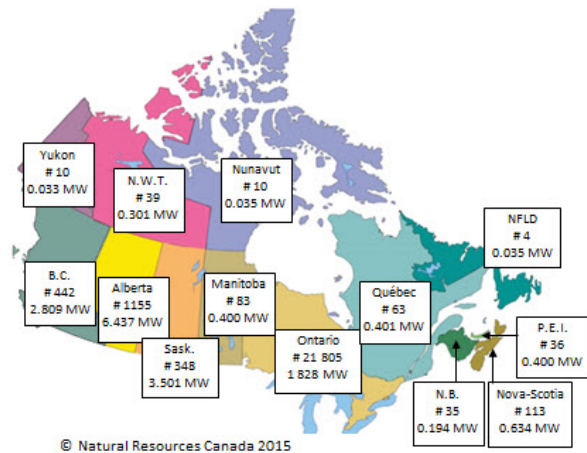


Figure 1: Map showing the Canadian provinces, the capacity (in megawatt) and the number of utility interconnected PV Systems in 2014

FUTURE OUTLOOK

Ontario has set a “50 MW annual procurement target for microFIT starting in 2014 to encourage the development of a prosumer market” [9]. The contract prices paid by the microFIT program are reviewed annually to reflect the current costs. The Ontario government "is exploring the potential for the microFIT program to be transitioned to a net metering or self-consumption program in the future" [9]. In December 2014, the Canadian Solar Industry Association (CanSIA) released its solar industry roadmap 2020 that identified five key areas of focus [10].

The CanSIA Roadmap 2020 Five Areas of Focus	
BARRIERS	SOLUTIONS
<ul style="list-style-type: none"> Unsupportive and unstable policy and regulatory environment Confusing, slow and expensive electrical grid interconnection requirements High non-hardware costs (i.e. soft costs) of solar electricity systems Inadequately informed public regarding solar electricity benefits and applications Unfulfilled relationships with conventional industry participants and synergistic sectors 	<ul style="list-style-type: none"> Develop a supportive and stable policy and regulatory environment that recognize the total value of solar electricity, including externalities. Simplify and streamline permitting and processes for grid interconnection and metering of solar electricity systems. Reduce soft costs to levels consistent with global best practices. Educate the Canadian population on the true benefits and costs of solar electricity, and empower them to take action to support and adopt solar. Develop new and enhance existing relationships with technologies, applications and stakeholders to create synergies that enables greater solar electricity use in Canada.

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