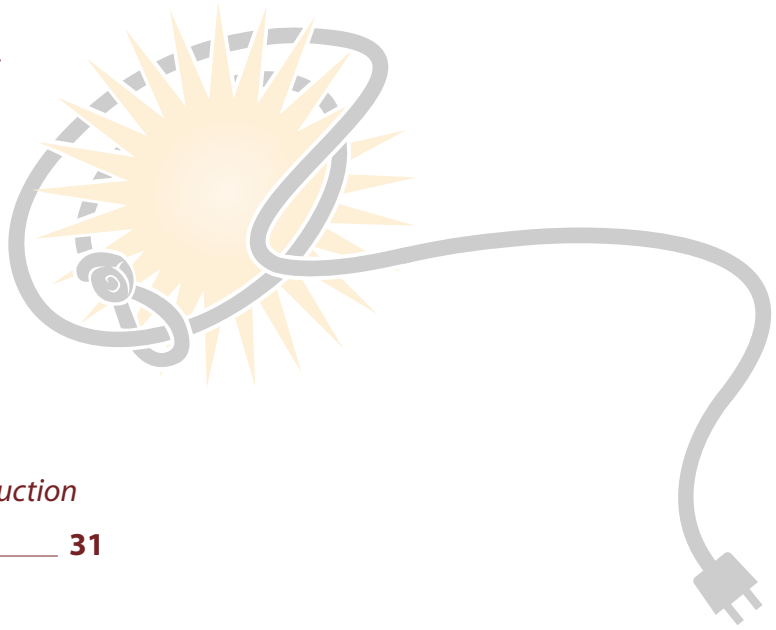
ALBERTA SOLAR
SHOWCASE

FINAL REPORT
MAY 2009

This study has been produced with the assistance of the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the author(s), and the Government of Canada and the Federation of Canadian Municipalities accept no responsibility for them.

TABLE OF CONTENTS

SIDEBARS



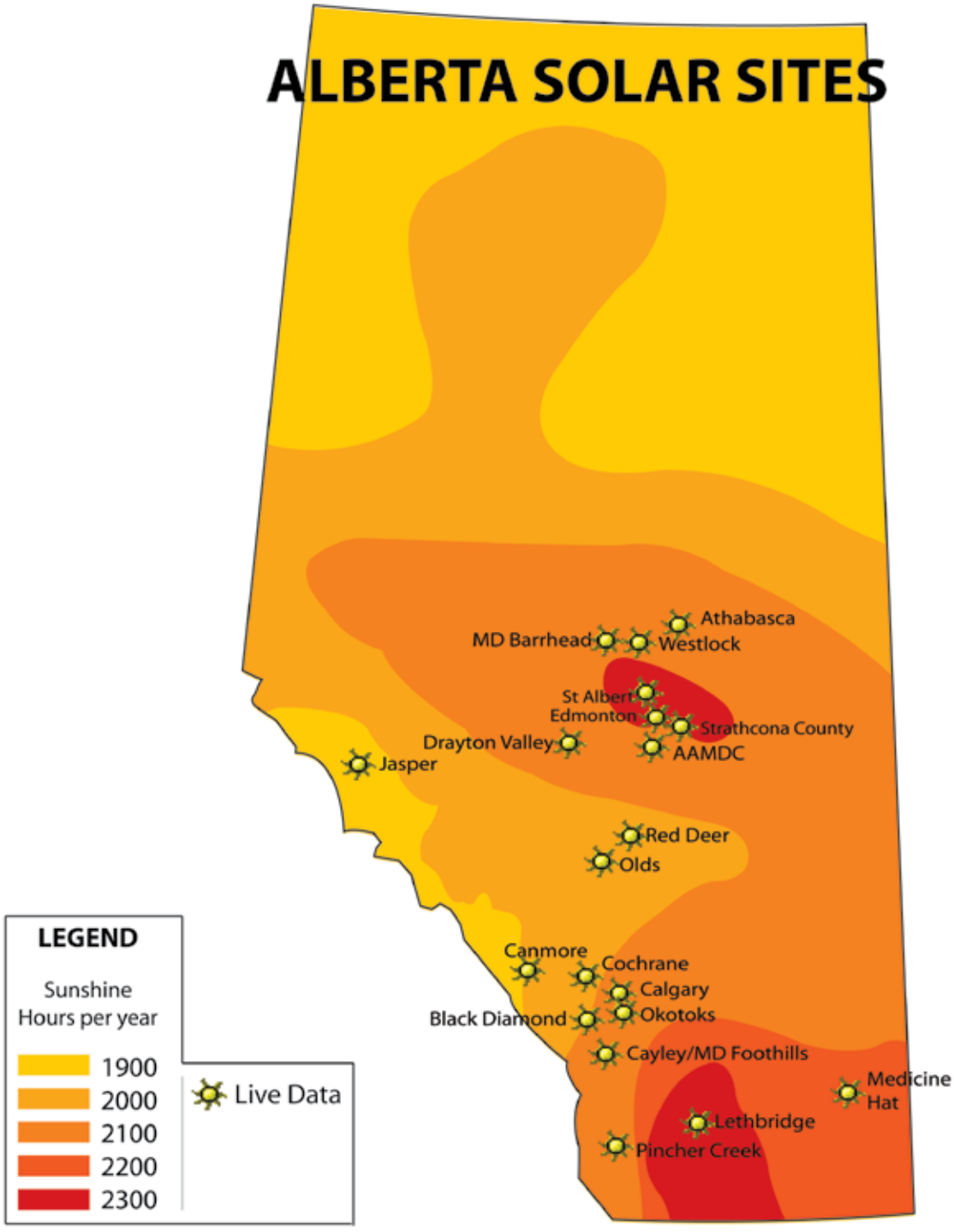


Figure 1: This map appears on the project website *www.lassothesun.ca*. Each of the little sun icons is clickable and takes the viewer to a page about that community's Alberta Solar Showcase project .

ACKNOWLEDGEMENTS

Climate Change Central thanks the participating municipal organizations, technical advisors and our project funding agency for their commitment to making the Alberta Solar Showcase a success.

We greatly appreciate the financial support of the Federation of Canadian Municipalities (FCM) to the Alberta Solar Showcase. FCM's contribution made it possible to build an Alberta-wide project to educate and install demonstration scale grid-connected solar photovoltaic (PV) systems in communities across the province.

Special thanks to the City of Medicine Hat for its initiative and ongoing support as our charter municipal partner in the funding application.

The success of this project is built on the leadership and commitment of the 20 participating municipal organizations and their vision, enthusiasm and commitment to exploring sustainable energy technologies.

Alberta Association of Municipal Districts and Counties
Town of Athabasca
Barrhead County
Town of Black Diamond
City of Calgary
Town of Canmore
Town of Cochrane
Town of Drayton Valley
City of Edmonton
Municipality of Jasper
Municipal District of Foothills and the Cayley School
City of Lethbridge
City of Medicine Hat
Town of Okotoks
Town of Olds
Town of Pincher Creek
City of Red Deer
City of St. Albert
Strathcona County
Town of Westlock

Gordon Howell of Howell-Mayhew Engineering and Kyle Kasawski of Conergy Canada planted the seeds to make this project happen and provided on-the-spot support and technical counsel.

Climate Change Central is especially grateful to the individual champions from each participating municipality who took the reins for their community's project. They persevered through the municipal permits and regulatory approvals, determined to get their array installed, inspected, approved, generating electricity and shining on the Alberta Solar Showcase website *(www.lassothesun.ca)*.

EXECUTIVE SUMMARY

Large grid-connected solar PV projects are springing up around the world to help meet the growing global demand for electricity. Incentives and rebates available in numerous jurisdictions are encouraging residents and businesses to install solar PV on their rooftops. Yet when the Alberta Solar Showcase launched in 2006 there were less than a hundred small solar PV systems connected to the electrical grid in Alberta, the sunniest jurisdiction in Canada.

Lack of awareness and regulatory issues were cited by local experts as the two leading reasons for low uptake of solar PV in Alberta. To address these, Climate Change Central approached the Federation of Canadian Municipalities (FCM) seeking support for the Alberta Solar Showcase project.

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. The project also helped to build capacity and experience within the local solar industry.

To demonstrate the technology and the grid-connection process, the project partnered with 20 Alberta municipalities to install and grid-connect small solar PV systems on public buildings. These systems range in size from just under one kilowatt (kW) to two kW.

The Alberta Solar Showcase resulted in the installation of approximately 25 kW of new grid-connected solar PV in the province, generating an estimated annual 30,000 kilowatt-hours (kWh) of electricity and an annual reduction of 26 tonnes of GHG emissions.

The spin-off effects of this project are ongoing. The Alberta government released new regulatory requirements for micro-generators in 2008, making it much easier to grid-connect solar PV systems. Some of the 20 participating municipalities are initiating other renewable energy projects and helping to enable local residents to do the same.

As the industry opens up to more and more grid-connected systems, the efforts to streamline the inspections and approvals for solar PV continue. Municipalities are beginning to incorporate enabling bylaws for solar PV systems, but there is still plenty of room to improve opportunities for solar PV systems through zoning, real estate, financial institutions, builders and developers, inspectors, regulators and the solar PV industry itself.

The Alberta Solar Showcase website *www.lassothesun.ca* is rich with resources and links to help anyone wanting to install and grid-connect solar PV. These resources include everything from an FAQ for solar PV to a detailed and thorough set of specifications developed for the project which can be used to ensure grid-connected solar PV systems are installed to high safety and quality standards.

A BRIEF HISTORY OF SOLAR PV IN ALBERTA

Alberta is blessed with an abundant solar resource, receiving more sunlight than any other province in Canada. Yet while many jurisdictions around the world with far less sunshine are investing in large solar PV projects, there are as few as a hundred solar PV systems connected to the electrical grid in Alberta. Most of these are quite small in size, generating between 25 and 50 per cent of the annual electrical needs of a typical Alberta household.

The first grid-connected solar PV system in Alberta, funded by EPCOR (Edmonton Power), was installed in 1995 in Edmonton on a private residence to evaluate the regulatory barriers for connecting solar PV to the grid. As recently as 2004, few Albertans had ever seen a grid-connected solar PV system because there were only a couple of dozen of these systems in the province and very few of those were installed in public places.

Prior to 2008, the process to obtain regulatory approvals was complex, labour intensive and time consuming.

The daunting nature of the approval requirements combined with the comparatively high capital cost of a solar PV system served to discourage all but the most ardent supporters of grid-connected systems.

Fortunately, those few determined individuals who installed grid-connected solar PV became strong promoters of the technology. In early 2005, Climate Change Central and a group of these solar advocates decided to engage community governments in installing small grid-connected solar PV systems.

A proposal was developed to inform and educate a wide cross-section of Albertans about this renewable energy technology and its potential application in reducing dependence on fossil-fuel based electrical supply.

With the support of Medicine Hat as our municipal partner and funding from the Federation of Canadian Municipalities (FCM), Climate Change Central launched the Alberta Solar Showcase in June 2006.

PURPOSE OF THE PROJECT

The primary purpose of the Alberta Solar Showcase was to educate various stakeholders on the benefits of solar PV. Through their involvement in the various stages of the project, municipal leaders and administrative staff, facility maintenance personnel, electrical inspectors, local electric utility companies and the local solar industry had the opportunity to learn more about grid-connected solar PV systems.

METHODOLOGY

Climate Change Central worked with the City of Medicine Hat to develop the Alberta Solar Showcase proposal, which benefited from the city's experience with Green Municipal Funding through the FCM. While Green Municipal Funding would typically be used to fund a single community infrastructure project, in this case FCM agreed that the Alberta Solar Showcase could engage multiple municipalities. Matching funding for the project was approved by the federation to a maximum of $350,000.

Finding Municipal Participants

The next step was to engage 20 municipal partners and secure their commitment to installing a small solar PV system on a public building. Invitations were extended to communities which had initiated other sustainable projects through FCM's Green Municipal Funding, Partners in Climate Protection, The Natural Step and others.

ALBERTA ASSOCIATION OF MUNICIPAL DISTRICTS AND COUNTIES

1.8 kW, on roof of AAMDC Headquarters, Nisku

"Our membership keeps a good eye on us and holds us accountable," says Gerald Rhodes, Executive Director of AAMDC. "This summer, we had municipal representatives from across Canada on the FCM mission here to see what we've accomplished. We're very proud of that."

aamdc
trade • jubilee
Partners in Advocacy & Business

photo by Benn Kilburn

WHAT CAN THE SUN DO FOR US?

In addition to lighting, solar energy can be used to produce heat and generate electricity. When it is used to produce heat (usually hot water) it is known as ***solar thermal****. When it is used to generate electricity it is known as solar photovoltaic (photo=light, voltaic=electricity), referred to simply as* ***solar PV****.*

Solar PV systems can be either off-grid (remote telecommunications sites, highway signs, RVs and cabins) or grid-connected (connected directly to a building's electrical panel). In the latter case, the building uses the electricity generated by the solar PV system first and then uses electricity supplied by the grid to make up the difference. Whenever the solar PV system is generating more than the building needs, which could occur on any sunny minute of the year, the excess is exported to the grid.

Predictably, municipal leaders in Alberta have a wide variety of priorities. Some are advancing rapidly to implement programs and projects that show leadership in environmental responsibility, while others are testing the waters with a higher degree of caution. A few municipalities signed on as soon as they heard about the project, while others required varying levels of internal discussion before committing.

The Alberta Association of Municipal Districts and Counties (AAMDC) became one of the 20 partner organizations. The remaining 19 participants included municipalities from the largest cities in Alberta to smaller towns and rural counties, indicating that population was not a factor in the decision to participate. All of the partners shared one common theme: Their councils were committed to investigating and participating in projects that supported their commitment to sustainability.

How the Funding Worked

Participating communities each managed their individual projects. The financial contribution of each community partner fully covered the design, supply and installation of their PV system. The intent was to demonstrate that for the same total investment, **any** municipality could purchase, install, operate and monitor a grid-connected solar PV system.

Climate Change Central used the contribution from the Federation of Canadian Municipalities to manage the overall project; this included reporting requirements, financial management and developing educational and promotional components.

Through the Alberta Solar Showcase, the 20 participating municipalities also benefited from training workshops, technical support and specifications, common branding, a project website, communications support and educational display materials.

Solar PV System Procurement Process

Once an agreement between the participant and Climate Change Central was in place, each participant selected a contractor to supply and install approximately one kW of grid-connected solar PV on a community building that was in a visible location, where possible. To maintain a high standard of quality for this publicly-funded project, partners were required to use a Canadian Solar Industries Association member to supply all material for their installation (see CanSIA sidebar, page 23).

During the initial period of soliciting and developing agreements with partner municipalities, technical contractors developed a thorough and detailed set of specifications for small-scale solar PV systems (available under the "Resources" tab at *www.lassothesun.ca*). Participants committed to using these specifications, which helped to ensure that all 20 projects would meet or exceed standards of quality and safety consistent with the Canadian Electrical Code.

TOWN OF ATHABASCA

1.1 kW, on roof of Town Hall

"Renewable energy is going to become a greater part of our lives as alternate sources of energy become more important," says Mayor Colleen Powell.

"The Lasso the Sun project provides a visible example of how solar power can be used and will help encourage people to make more use of this resource. We are proud to be part of this project."

WHAT'S A KILOWATT?

Electrical capacity, the amount of electricity a system can generate, is always rated in watts (after James Watt, who helped invent the steam engine). A watt is a unit of power equal to one joule of energy flowing per second. A solar PV system that is rated to generate 1000 watts is a one kilowatt (kW) system. A system that generates 1000 kW is called a one megawatt (MW) system. The capacity of a typical Alberta coal-fired generating station is in the range of 100 – 400 MW (100,000 – 400,000 kW).

Electrical energy is measured in units of kilowatt-hours (kWh), the amount of power (in kW) flowing during a period of time (in hours). For example, if you turned on a hundred 10-watt light bulbs for one hour, you would consume one kilowatt-hour (kWh) of electricity. Monthly utility bills show electricity consumed in kWh.

Developing Training Workshops

Climate Change Central worked with technical contractors to develop a one-day training workshop to introduce and demystify grid-connected solar PV systems. These regional workshops, held in Westlock, Lethbridge, Cochrane and Red Deer, brought together key staff, electrical and building inspectors, utility representatives, elected leaders and municipal administrators from participating municipalities in the area.

Most of the municipal personnel managing projects were new to grid-connected solar PV technology. Since education was a major component of the project, participation in the training workshops was integral for all participants as they moved ahead with their individual projects.

The workshops thoroughly addressed practical aspects of the project, covering topics from choosing a location to choosing a contractor, what to consider when designing and installing a solar array, how to apply for required permits and approvals, and how to care for and manage a solar PV system. [1] Workshops also addressed the economics of solar PV and emphasized the importance of considering a much wider range of factors than simple payback when assessing the value of a PV system.

[1] *Information covered in the workshop sessions may be found under "What is Solar PV?" and "Resources" tabs at www.lassothesun.ca; see the "Introduction to Owners" section of the project Specifications (on the "Resources" tab).*

Solar Industry Capacity Building

Prior to the Alberta Solar Showcase, grid-connected solar PV systems in Alberta were few and far between. Similarly, only a handful of solar PV businesses had experience with installing grid-connected systems.

Several of the operating solar PV businesses in Alberta were already members of the Canadian Solar Industries Association (CanSIA). Over the course of the project, the number of Alberta-based CanSIA members nearly doubled. A few small solar businesses with off-grid experience reported that they joined CanSIA to increase opportunities for securing some of the grid-connected work that was available under this project.

As with any industry, experience and proficiency increase with practical projects. The Alberta Solar Showcase offered the industry an opportunity to design, supply and install 20 small grid-connected systems, providing a concentrated and guaranteed number of projects to help increase capacity within the small but dedicated solar industry in the province.

BARRHEAD COUNTY

2 kW, on south wall of County Office

"Alternative energy is the way of the future, so any project that brings awareness, knowledge and assistance to our community in this regard is appreciated," says Reeve Lawrence Miller.

"The Alberta Solar Project is raising questions from the community, it's generated a depth of understanding in the application process and it has also snowballed to other projects. We hope to see alternative energy continue to grow in our community as a result of this project."

IMPLEMENTATION

Project Timing

Medicine Hat was the first to install its Alberta Solar Showcase project. This installation was highlighted at the project launch event at Edmonton City Hall, in June 2006. Three more installations (Jasper, Pincher Creek, AAMDC) were completed in the summer of 2006.

In 2007, seven additional installations began transforming sunlight into electricity (Cayley School/MD Foothills, Black Diamond, Cochrane, Canmore, Westlock, Okotoks and Calgary). The final nine installations were completed by January 2009 (Drayton Valley, Strathcona County, Edmonton, Lethbridge, Red Deer, St. Albert, Barrhead County, Athabasca and Olds).

Weather played a role in planning the timing of installations. Winter installations were hampered by extreme cold and icy conditions. Installers used ropes and harnesses to access pitched roofs. Scaffolding was used to install wall mounted arrays.

PV Array Size and Location

The PV systems used in the project range in size from just under one kW up to two kW. The location of the systems includes town and city halls, fire stations, municipally operated recreational facilities (rinks and pools), a parks compound, a library, a day care, a senior's centre and a school.

The systems are mounted on south facing walls, pitched roofs, flat roofs, new construction and existing buildings. Most installations are very visible to the public, with the exception of some recreational facilities, library and fire stations, which tended to be too high to see the array from street level.

"Lasso the Sun" Website

One way of bringing all participants under one roof and making the 20 individual projects part of the Alberta Solar Showcase was to build a website that describes the overall project as well as each individual project.

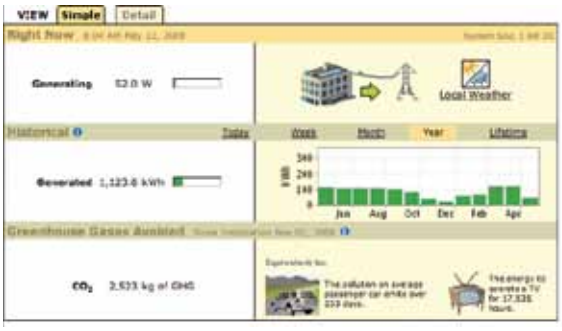
A project website *(www.lassothesun.ca)* was developed in 2006 to broaden the educational opportunities of the project to include researchers, schools and the general public.

The website contains a wealth of information on solar PV systems and links to additional resources. It also provides an online showcase for each of the 20 grid-connected solar PV projects across the province. Each project page includes a brief article describing the context for the participant's involvement in the project and an installation description.

A chart showing technical information about each project (called an "i-frame") is included on each of the 20 project pages. This chart shows how much electricity each site is generating at any given time, as well as historical energy generation from that site (see Figure 2).

The chart is produced from data collected by on-site monitoring equipment that records the electricity generated by the solar PV array and the inverter. The equipment converts the data into a bar graph, which shows daily, weekly, monthly and annual power generation and sends the information to the project website.

This simple, graphic monitoring feature enables viewers to see exactly how much electricity is being generated at that precise moment, and also allows a comparison of the electricity generated by all the sites around the province.



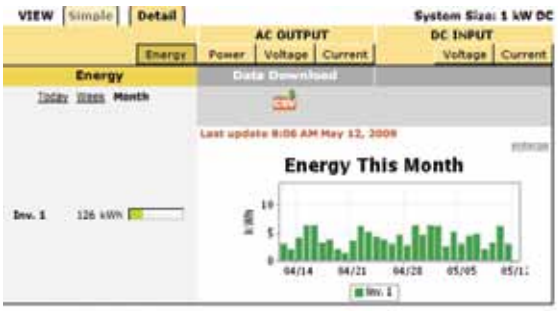


Figure 2: I-frame of real-time electricity generated

TOWN OF BLACK DIAMOND

1.8 kW, on roof of Oilfields Regional Arena

"We were very fortunate to be one of the first communities in Alberta to come on board with this project," says Mayor Rolly Magee of the Solar Showcase installation.

"Having working examples of two renewable energy systems on a busy sports arena in Black Diamond is impressive for the town. Best of all, in conjunction with our conservation efforts, it's making a difference to our bottom line."

CITY OF CALGARY

1 kW, on glass roof of walkway into main Municipal Building

"This small Solar PV demonstration project informs and educates Calgarians about renewable energy technologies and shows our leadership in reducing the impact of electricity generation on the environment," says Calgary Mayor Dave Bronconnier.

"We are absolutely committed to reducing Calgary's ecological footprint and exploring alternate energy sources is one of the City's strategies to achieve that goal."

THE CITY OF CALGARY INFRASTRUCTURE SERVICES

photo by David Vonesch

TOWN OF CANMORE

1 kW, on cedar roof of Biosphere Institute of the Bow Valley

"Installing a solar PV project was a natural progression in our sustainability efforts," says Mayor Ron Casey.

"We are looking forward to educating our residents and visitors about how solar energy works. Additionally, we want to explore the possibilities for solar energy use throughout the municipality."

CANMORE T.M.

TOWN OF COCHRANE

1.2 kW, on roof of Big Hill Leisure Pool

"The solar PV pilot project will help us make informed decisions about alternative energy options for the future," says Mayor Truper McBride, who believes Cochrane is on the leading edge of municipal energy management.

"Cochrane Town Council, administration and residents work together to reduce our ecological footprint while maintaining our unique quality of life."

TOWN OF DRAYTON VALLEY

1 kW, on roof of Early Child Development Centre

"Drayton Valley is starting to think green in everything we do. For our first solar project we chose the Early Child Development Centre because it's a great location in the heart of the community. People will get a chance to see it and learn about the benefits of the technology," says Mayor Moe Hamdon.

"Most people aren't aware of how much solar PV we can generate here - we get lots of sunshine and long daylight hours in the summer. Our understanding of renewable energy will improve with education from projects like this."

ALBERTA REGULATIONS AFFECTING SOLAR PV

When electricity in Alberta was deregulated in the latter half of the 1990s, electricity supply was split into three areas. There are companies that generate electricity, companies that transport or distribute electricity ("wire owners" or "wire service providers") and companies that sell electricity (retailers).

For many years it was a lengthy and arduous process for micro-generator owners (such as those with solar PV systems) to acquire the necessary permits and approvals to connect their system to the grid.

The process involved over 60 steps of paperwork and included several government agencies as well as the wire owners. If you wanted to generate a small amount of renewable electricity in Alberta, you were subject to the same process as if you were a 400 megawatt (MW) coal-fired generating station.

On February 1st, 2008, following a two-year process of public and stakeholder consultation and review, the Alberta government announced a new Micro-Generation Regulation, which became fully operational in January 2009. These new procedures significantly streamline the approvals process for small-scale electricity generators and are a meaningful improvement over the previous procedures.

The new regulation applies to anyone generating electricity with a system less than 1000 kW in size. This is further divided into two categories, one for micro-generators less than 150 kW, the other for micro-generators between 150 kW and 1000 kW.[2]

[2] *For further information about Alberta's Micro-Generation Regulation, go to: www.auc.ab.ca. Look under micro-generation.*

Project Specifications

To help ensure that each installation adhered to consistent, high-quality standards for equipment, materials, installation and commissioning, the project contracted Howell-Mayhew Engineering to develop a thorough and detailed set of specifications for the project. These specifications were reviewed with participants during the training sessions, and included an introductory chapter specifically for municipalities explaining how a solar PV system works.[3]

A step-by-step guide to interconnecting solar PV systems, developed specifically for the project, detailed the application steps and processes required by each of the agencies involved in the process during the course of the project. This was particularly useful for the initial installations, as the process was time consuming and tedious until the new provincial micro-generation regulations were enacted in July 2008.

[3] Project specifications are available at www.lassothesun.ca under the "Resources" tab.

CITY OF EDMONTON

1 kW, on roof of Meadows Fire Station

"The City of Edmonton is proud to participate in the Alberta Solar Showcase Project," says Edmonton Mayor Stephen Mandel.

"Edmontonians are passionate about protecting our environment and are proud of our City's track record on green initiatives. Through EcoVision Edmonton, City Council is committed to ensuring Edmontonians live in a sustainable city and this installation of solar modules on the Meadows Fire Station is another step in achieving that vision. We look forward to showcasing this project to municipalities from around the world at the 2009 ICLEI Local Governments for Sustainability World Congress, June 14-18 in Edmonton."

THE CITY OF Edmonton

RESULTS

Participating Communities' Role in the Project

In terms of population, the 20 partner communities range from the largest to among the smallest in the province. Geographically, participants are located across the entire southern half of the province. This is the most densely populated region of Alberta, and partner communities represent about 75 per cent of the total population of the province.

Public Education

Most municipalities hosted a public launch to announce and inform local residents about their Alberta Solar Showcase project. In communities where the installation was part of a new building, the solar PV project launch was part of an opening celebration for the entire building.

At launch events, dignitaries (mayors and other community leaders) spoke to their specific solar PV system; in some cases the installer spoke to the technical aspects of the installation and the project manager spoke to the overall Alberta Solar Showcase. Presentations were followed by a ceremonial flipping of the switch to activate the solar PV system.

Media and Recognition

Each participating municipality gained local recognition by including local media in project launch events and issuing press releases. Presentations at launches and conferences are helping to spread the word across Alberta. The project was the topic of a presentation at the national CanSIA conference in the fall of 2006. It is featured in CanSIA's spring 2009 newsletter. To highlight the importance of having an educational institution involved in the project, Cayley School received an Award of Excellence from the Calgary Educational Partnership Foundation, presented in January 2008 by the Mayor of Calgary.

Climate Change Central's Role in the Project

Climate Change Central, as project manager, provided technical support, training sessions, ongoing communications with each of the participating municipal organizations and a final wrap-up workshop. These activities were essential to the success and continuity of the overall project, particularly when projects experienced technical, regulatory or political hurdles.

Ongoing Technical Support

Ensuring that appropriate technical support was available at all times to all partners was extremely important. Climate Change Central retained the services of experts to help resolve technical issues as they arose. Prompt response to these issues was paramount to the communities so they could maintain the momentum of their projects.

Delivery of Training Sessions

Each training session provided background on the project and its purpose as well as a description of the history of grid-connected solar PV in Alberta. Technical information about solar PV systems and interconnection was followed by a hands-on, outdoor demonstration of a model PV system.[4]

Participants included representatives from participating communities, resulting in a diversity of technical and administrative experience within each municipality.

[4] Information covered in the workshop sessions may be found under "What is Solar PV?" and "Resources" tabs at www.lassothesun.ca; see the "Introduction to Owners" section of the project Specifications (on the Resources tab).

MUNICIPALITY OF JASPER

1 kW, on wall of Jasper Activity Centre

"Installing solar energy was uncharted territory for the town, so challenges were inherent, but the benefits of the project have made the process worthwhile," says Mayor Richard Ireland.

"Jasper has gained not only economically from utility bill savings, but is also gaining knowledge and experience from this project while increasing public awareness about the potential of alternative energy."

Wrap-up Workshop

A one-day workshop was held in September 2008 at the Banff Centre, offering the first and only opportunity for representatives from all 20 participating municipalities to gather and discuss the project. This session also provided an opportunity for guest presentations on a number of topics of collective interest. These included presentations and discussion about carbon offsets and provincial regulatory changes affecting micro-generators.

One session was dedicated to participants providing feedback on various aspects of the project including project management, technical support, public outreach and the project website.

Participants indicated that they appreciated the level of technical support provided by Climate Change Central and its solar contractors. They appreciated the breadth and thoroughness of information shared during the one-day training sessions. Most participants agreed that the regulatory approvals process was lengthy, but the comprehensive steps provided through the project were clear and well laid out.

Some reported that they are rethinking internal business protocols and environmental stewardship policies, armed with new knowledge from this project. The website received strong support, though participants noted some challenges getting their system up on the site.

This occurred for a variety of reasons, including internal equipment and connection delays, IT security concerns relating to internal firewalls and the complexity of coordinating the steps in the process among all the players. For most municipal participants, this was the first time they had worked with Climate Change Central and they viewed it as a positive experience.

Suppliers and installers of the 20 grid-connected solar PV systems also attended the workshop and provided feedback on the specifications and other aspects.

There was strong agreement among them that education is hugely important – for designers, suppliers, installers, inspectors, policy makers, municipal permitting and regulatory approval organizations. Electricians and electrical and building inspectors need consistent information about solar PV installations and grid connection. Some wire owners also need to understand these systems better. Installers also noted the need to grow the market at the same time as increasing the emphasis and opportunity for training.

The wrap-up session provided a chance for Climate Change Central project organizers to recognize the project participants and celebrate the importance of the leadership they demonstrated through their involvement in the Alberta Solar Showcase.

MUNICIPAL DISTRICT OF FOOTHILLS AND THE CAYLEY SCHOOL

1.3 kW, on wall of Cayley School

With the generous support of the MD of Foothills, Cayley school installed a one-kilowatt solar PV system. The array is designed like an awning over the windows of a south-facing music room to help reduce an overheating problem.

Once the system was up, the school installed a 1.8-kilowatt horizontal-axis wind turbine to provide even more renewable energy. As Principal Bill Holmes reminds the students, "You will never be greater than the vision that guides you, so you have to think big!"

M.D. of FOOTHILLS No. 31

photo by Rick Dunsmore

NET METERING OR NET BILLING?

Several jurisdictions in Canada have enacted legislation to account for any electricity exported back onto the grid by small electricity generators. From a payment point of view, there are two ways to credit a customer for exported electricity: ***net metering*** *or* ***net billing****. Both of these processes are often referred to as net-metering, which is confusing. Here's how they work:*

Net metering *is an on-site real-time electricity measurement process. It is the simple physical process by which electricity being used will turn a meter forward and electricity being exported onto the grid will turn the meter backward. At the end of the billing period, the meter reads the "net" of the imports minus the exports. This single reading forms the basis for customer billing.*

Net billing *is an off-site post-measurement billing process. Net billing uses two separate meters to measure imported and exported electricity and then prices are applied to each for subsequent billing or crediting. These prices can be the same or different.*

In some jurisdictions, every kilowatt-hour (kWh) of exported solar electricity is valued on par with, or slightly less than what a kWh of grid electricity would cost the consumer. In other jurisdictions it is valued as a significant contribution to the electrical supply system and is given a much higher value, called a feed-in tariff. Ontario, for example, has a significant solar PV feed-in tariff.

Response to Project Website
www.lassothesun.ca

Climate Change Central is fielding an increasing number of enquiries from agencies, organizations and individuals who have discovered the Alberta Solar Showcase project.

Many of these enquiries have come from the project website and relate to obtaining additional practical information about the potential for installing a grid-connected solar PV system on a facility or home. In response, Climate Change Central developed a Solar PV FAQ document for the project website.[5]

The website will remain beyond the completion of the project, continuing to provide up-to-date tracking of real-time power generation for each site and fulfilling an important role in helping educate and inform the public about solar PV in Alberta.

[5] *For more information see the "FAQ" tab at www.lassothesun.ca.*

WHAT IS THE CANADIAN SOLAR INDUSTRIES ASSOCIATION?

The Canadian Solar Industries Association (CanSIA) is a not-for-profit industry organization representing the interests of the solar thermal and solar PV industry.

CanSIA formed in 1992 as a merging of two organizations, one representing solar thermal, the other representing solar PV. These two organizations joined forces to promote the professional and practical use of solar technologies in Canada. www.cansia.ca

CITY OF LETHBRIDGE

1 kW, on high south wall of Civic Ice Centre

"Developing an understanding of the economic and environmental benefits of various forms of grid-connected renewable energy is key to our vision for the future," says Mayor Robert Tarleck. "It was appropriate, then, that the City should seize the opportunity to connect the Alberta Solar initiative with our own one kilowatt PV project."

CITY OF MEDICINE HAT

1 kW, on roof of Medicine Hat Public Library

"Medicine Hat is proud to be part of the Alberta Solar Showcase," says Mayor Garth Vallely.

"We believe the future is in using our existing resources wisely, while turning our focus to sustainable alternative energies. Our city has been dependent on natural gas - a non-sustainable resource - for more than 100 years, so we are very interested in pursuing other sources of renewable energy."

Medicine Hat
The Gas City

TOWN OF OKOTOKS

0.8 kW, on wall of Town Hall

"As a leader in sustainable development, the Town of Okotoks is making broad and comprehensive choices that recognize a strong reciprocal relationship between the environment and community development," says Bill McAlpine, Mayor of Okotoks.

"The solar array on our new Municipal Centre is just the latest alternative energy project in our community, with plans on other future endeavours. Thank you to Climate Change Central for the Alberta Solar Showcase and for their expertise throughout this project."

Okotoks
Historic Past. Sustainable Future.

TOWN OF OLDS

1 kW, on wall of Olds Aquatic Centre

"We are very proud to participate in the Alberta Solar Showcase. It is one of a variety of initiatives that we believe keeps Olds at the forefront of sustainability," says Mayor Judy Dahl.

"We appreciate that one small, grid-connected system cannot contribute significantly without a lot of work on reducing energy use in the rest of a building. Therefore, the town is investigating other opportunities to be the leader in energy efficiency and this includes possibilities of LEED certification for municipally owned buildings."

Town of Olds
Your PARTNER in Opportunities

TOWN OF PINCHER CREEK

1 kW, south wing of Town Hall, overlooking a preschool playground

"The Pincher Creek Town Council fully supports energy conservation and renewable energy," says Mayor Don Anderberg.

"We are encouraged that our participation in the Alberta Solar Municipal Showcase will lead the way for additional projects in our community."

TOWN OF PINCHER CREEK ALBERTA

photo by Ron Hann

Reducing Regulatory Barriers

Provincial Regulations

One of the core objectives of the Alberta Solar Showcase project was to use the 20 installations to create province-wide support for simplifying the municipal permits and regulatory approvals process for grid-connected micro-generation systems.

With the implementation of a new provincial Micro-Generation Regulation in July 2008, one significant aspect of this objective was largely met, enabling the final participant installations to test the new process. The Alberta Utilities Commission introduced the new regulation at the wrap up workshop of the Alberta Solar Showcase project in September 2008.[6]

The new process requires the applicant to complete and submit a straight forward form to their local electricity delivery company (wires owner). The new regulation allows the micro-generator system owner to be paid, at a slightly lower rate than what a customer pays, for any electricity exported back into the grid.

While the new regulation does not provide as much of an incentive as some other jurisdictions (such as Ontario) for exported solar PV electricity, it is a significant step in the right direction.[7] The Alberta Micro-Generation Regulation expires in 2013 and will be reviewed by the government when there are 300 micro-generators installed or 25,000 kW of installed micro-generation capacity.

[6] Further information about Alberta's Micro-Generation Regulation is available at www.auc.ab.ca. Look under micro-generation.

[7] See earlier description of Feed-In Tariffs in sidebar, "Net metering or Net billing?"

Municipal Regulations

During the City of Calgary installation, the Alberta Solar Showcase project revealed a surprising requirement in the city's permitting process. In November 2007, the contractors installing the system were informed that they would need to obtain a standard Development Permit. In Calgary, this was an expensive and time-consuming process. This requirement resulted in additional cost and significant delays.

Fortunately, city council had also noticed the cumbersome nature of this requirement. City staff was asked to prepare a proposal to modify their land use bylaw so that it would not unduly restrict the ability of Calgary residents to install solar technologies. Through the Alberta Solar Showcase project, Climate Change Central invited interested stakeholders to discuss the issues with city staff tasked to develop these bylaw changes.

The meeting was positive and productive, and within a few months the City of Calgary presented a draft amendment to its land use bylaw, containing many of the groups' suggestions. The proposal received a unanimous green light from the Calgary Planning Commission, followed by unanimous passing at an October 2008 meeting of city council.

Soon afterward, in hopes of taking proactive steps and following the City of Calgary's lead to simplify solar regulations, the City of Edmonton requested information about the new bylaw. Though Edmonton's permitting process for solar systems was already very simple, they still required a standard development permit.

CITY OF RED DEER

1 kW in Civic Yards Project

"Participating in the Alberta Solar Showcase aligns with our commitment to lead by example when it comes to environmental initiatives in Red Deer," says Mayor Morris Flewwelling.

"The City of Red Deer already had plans to include a solar PV system at the new Civic Yards, so this showcase gave us an opportunity to highlight the project and demonstrate how we're being sustainable."

THE CITY OF Red Deer

Electricity Generation and Annual GHG Reduction

The Alberta Solar Showcase resulted in the installation of approximately 25 kW of new grid-connected solar PV in the province. Using a capacity factor of 13 per cent[8], the project will result in an estimated annual electricity generation of 30,000 kWh[9] and an estimated annual reduction of 26 tonnes of GHG emissions.[10]

These savings represent a meaningful starting point for the municipalities involved, many of which are regularly tracking the generation from their system on the project website. Some schools are analyzing the greenhouse gas reductions and electricity generated as part of class projects.

As well, involvement in the Alberta Solar Showcase could lead to more GHG reductions in the future. Several partner communities have taken additional steps toward further reducing their carbon footprint through efficiency measures and renewable energy systems.

A few examples include Black Diamond and Cayley School, which installed small grid-connected wind turbines to complement solar PV. AAMDC installed an additional 5.6 kW of grid-connected solar PV. Red Deer installed an additional 15 kW PV system on another building in its civic yards. Several participants are committed to earning LEED certification for any new municipal buildings.[11]

[8] *This is the ratio of actual energy generated to the amount a system would generate if it always operated at its rated capacity.*

[9] *See sidebar "Calculating Alberta Solar PV System Performance".*

[10] *Using 0.863 kilograms of CO_2 equivalent emitted per kilowatt-hour of electricity generated, based on the portion of coal, hydro and wind in Alberta's electricity supply.*

[11] *LEED stands for Leadership in Energy and Environmental Design, an achievement-based rating system used to certify buildings as bronze, silver, gold or platinum. For more information please visit www.cagbc.org/leed/what/index. This link can also be found on www.lassothesun.ca under the "Links" tab.*

CITY OF ST. ALBERT

1 kW, on roof of Firehall #3

"The City of St. Albert and our residents are very dedicated to the protection of our environment, and are pleased to be a part of the Alberta Solar Showcase," says Mayor Nolan Crouse.

"Through some of our projects, such as the recently opened Fire Station #3, we are looking at ways to harness renewable solar energy, thereby reducing the impact on the environment."

THE CITY OF St. Albert

STRATHCONA COUNTY

1 kW, on wall of Parks Compound

"It is an honour for us to be part of the Alberta Solar Showcase project," says Mayor Cathy Olesen.

"We welcome the opportunity to learn more about how this valuable renewable resource can contribute to our sustainability plans into the future."

Strathcona County

photo by Rick Dunsmore

TOWN OF WESTLOCK

2.1 kW, on south side of Town Hall

"We are always looking for ways to keep the community informed of our sustainability initiatives," says Mayor Bruce Lennon. "The Alberta Solar project and its website offered a great educational opportunity."

Town of Westlock

SOLAR PV SYSTEM PERFORMANCE IN ALBERTA

To calculate the annual energy production of a solar PV system, take the rated generating capacity of the PV modules, multiply by the number of modules and then multiply by 13 per cent x 24 x 365.25.

Why 13 per cent? Because the rated capacity of a PV module is based on what it could generate over a very bright sunny hour if it was mounted at the optimum direction and tilt angles.

Since some hours are not full sun, less is generated when the sun is not shining on the module at the optimum angles, and nothing is generated in the dark, the actual output of a module is an annual average of 13 per cent of its rated output in central Alberta weather conditions.

An approximate but easy to remember estimate for Alberta is that a solar PV system will generate 1000 to 1200 kWh of electricity (11 per cent to 14 per cent capacity factor) and save 0.8 to one tonne of GHG per year for every kW of rated PV capacity.

TOOLS AND OPPORTUNITIES

Through the installation of these 20 demonstration-scale systems on public buildings, the Alberta Solar Showcase successfully promoted and deployed grid-connected solar PV systems into communities, offering numerous opportunities to educate and inform Albertans about the technology.

However, the more we open up the industry, the more challenges to widespread adoption of this technology emerge. Some of these challenges relate to municipal permits, taxation and solar access zoning, and differing interpretations of the electrical code. This is important work to continue in conjunction with the ongoing work of building capacity for all stakeholders, including electrical inspectors, real estate agents, lending agents, home builders, electric industry regulators, designers, suppliers, installers, marketers, trades and professional training institutions, and government and corporate policy makers.

The Alberta Solar Showcase project leaves a number of valuable resources as a legacy. These practical resources are available on the project website for use by Albertans looking to include the quiet, safe convenience of renewable grid-connected solar PV into their electrical energy portfolio. They include the detailed specifications for use in planning and installing any grid-connected PV system, a solar PV FAQ document, a listing of Canadian Solar Industries Association member practitioners in Alberta, links to a number of valuable resources and each of the 20 individual projects and the record of their electricity generation information.

The role of demonstration projects such as the Alberta Solar Showcase is to encourage and support changes in the way that municipalities view renewable energy. When these technologies are installed in real situations, it increases the opportunity to uncover and address a variety of challenges. This makes projects like the Alberta Solar Showcase essential to the growth of these technologies.

The project has informed municipal leaders, broadened public awareness and increased knowledge about solar PV in participating communities, provided hands-on experience for the local solar industry, electricians and electrical inspectors and increased the technical understanding of everyone involved.

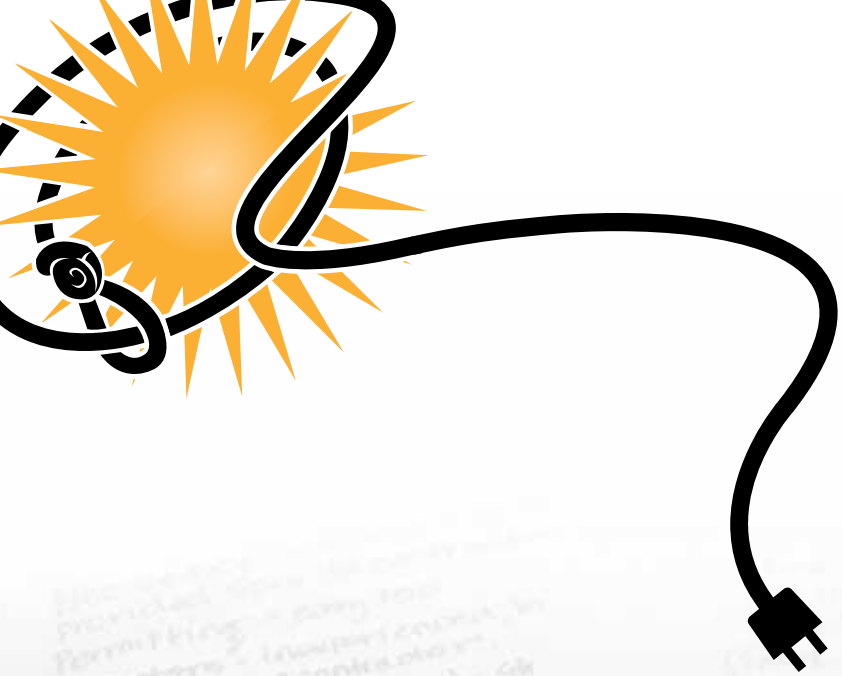
At the same time, by reducing the number of steps for regulatory approval for grid-connected micro-generators, the Alberta Utilities Commission and the Alberta government are showing commendable leadership and providing a solid foundation for growth in Alberta's solar PV industry.

In many parts of the world, the price of PV is becoming competitive with conventional electricity supply. In some places it is expected to reach parity with grid electricity within a few years.

The Alberta Solar Showcase couldn't have happened at a better time. It has helped local governments develop effective policies and helped to establish knowledgeable design and supply chains to prepare Alberta for grid-parity.

We hope that through this project and the ongoing educational efforts of Climate Change Central and our 20 partners, solar PV can play an increasingly significant role in helping Alberta meet the challenges of our energy future.

photo by Jenny Bruns



Climate Change Central

FCM
Federation of Canadian Municipalities