

Sunny Days Ahead



Insuring a Solar Future for Canada 25 Million Megawatt-hours by 2025

A Solar Plan for Canada
By the Canadian Solar Industries Association (CanSIA)
November, 2004



CanSIA



What will it take to transform solar energy from a niche resource in Canada into a competitive, mainstream technology?

The Energy World is Changing

Canadians count on energy as a central pillar of our economic prosperity and for our personal well being. We are fortunate to have abundant energy resources – both renewable and non-renewable. However the world is changing in important ways.

While Canada will continue to have abundant energy resources – new energy supplies are more expensive to develop, especially in ways that are environmentally acceptable to local communities and to Canadian society as a whole. Large energy projects will increasingly cost more and take longer to develop.

At the same time Canada's energy delivery infrastructure is aging. Significant increases in investment is needed to replace much of the transmission and distribution network while further investment is needed to increase its capacity.

Finally, we have moved into an era of higher energy prices. The stresses on energy in Canada are mirrored in international energy markets. Supply systems everywhere are pressed to keep up with growing demand. Regional political uncertainties add to this stress. Energy prices are increasingly determined in world and regional markets.

Canada needs to look to new ways to adapt to this new, higher price reality. A shift in paradigm away from central power generation is needed to deal with the complex issues of energy supply and demand in the 21st century. Solar can play a significant part in this emerging energy reality.

How can solar's full potential for jobs, wealth, and protection of the environment be fully realized in Canada? *Sunny Days Ahead – Insuring a Solar Future for Canada (25 by 25)* is the Canadian Solar Industries Association's (CanSIA) vision of the steps needed to fulfill solar's potential, allowing it to become a significant energy provider in Canada by 2025.

Solar is the fastest growing energy source globally – in 2003 alone the solar electric industry grew by 36% internationally. In Canada, however, we have lagged behind. Canada ranks 14th of 20 reporting IEA (International Energy Agency) countries in deployment of photovoltaics (PV), and ranks 17th of 22 reporting countries for solar thermal. International growth has been the result of progressive government policies aimed at reducing prices through economies of scale, establishing key infrastructure foundations and supporting the development of sustainable solar markets.

Solar power is the only energy technology that allows grassroots ownership of power generation today. Solar power "on the roof" empowers individuals to make their own contribution to climate change. Surveys show consistently that solar is also the preferred energy choice of Canadians. The importance of these two points cannot be underestimated in developing broad based support for programs and policies to stimulate the growth of clean solar technologies.

Governments in Canada need to begin taking a more active role in exploiting this powerful, proven energy resource. A failure to act decisively and immediately will result in Canada missing opportunities to participate in the expanding international demand for solar technologies.

Sunny Days Ahead

Benefits of the 25 by 25 Program:

A minimum of 25 million megawatt-hours per year of renewable solar electrical and thermal energy.

\$30 to \$40 billion of economic activity for Canadians.

60,000 – 70,000 high quality jobs in the solar industry.

120,000 – 210,000 other jobs as a direct result of solar activities.

15 –30 million tonnes of greenhouse gas emission reductions annually.

The Benefits of Solar - Fitting into the Changing World

The Benefits

Solar produces power during periods of peak energy demand.

Few “Not in My Back Yard” concerns – the only energy source which does not require an environmental assessment.

Solar power is generated on the site of energy usage.

Solar’s costs are in the initial purchase price of the equipment – there are no energy costs.

Local energy production reduces reliance on imported energy and long distance transmission.

It produces local energy, autonomous from conventional energy supply.

Direct and lasting contribution to reduction of CO₂ and other emissions.

Why They Are Important

Peak shaving reduces the cost of generation and reduces stress on transmission lines.

A rapid installation time reduces forecasting risks.

Avoids line losses, line upgrades and infrastructure costs.

Provides stability to energy price forecasts. Reduces reliance on fuels that may fluctuate in price.

Keeps local energy dollars in the community. Creates jobs in every region of Canada.

Reduces disruption of energy due to natural or geo-political events.

Reduces environmental costs caused by the use and transportation of fossil fuels.



25 million megawatt-hours by 2025

	Number of Systems	Energy (MWh per year)	Sales 2005 - 2025 (\$million)
Residential			
Solar Domestic Hot Water	2.4 million systems (6m ² each)	8,006,000	\$7,200
Photovoltaics ¹	1.3 million systems (3kW each)	3,870,000	\$23,400
Solar Pool Heating	240,000 systems	3,670,000	\$720
Commercial & Institutional			
Solar Hot Water	6 million m ²	3,311,000	\$3,000
Building Integrated Photovoltaics ²	3 MW	2,000	\$20
Industrial & Commercial			
Solar Air Ventilations	11 million m ²	5,980,000	\$3,440
Total³		24,838,000	\$37,780

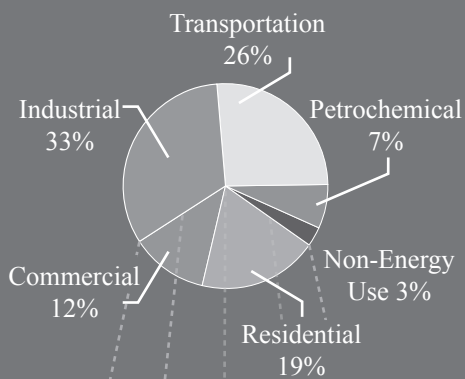
1. Includes solar on all new building (the net-zero energy initiative) and only building on the PV Early Adapters program
2. Includes only systems in the Solar on Government Buildings program
3. Passive solar is not included in this total, as its benefits are not reported in current Canadian energy statistics. Given proper government policies passive solar could provide over 75 million megawatt-hours of thermal energy to new homes built between 2008-2025.

Solar energy encompasses a variety of different energy forms – generating electricity to run lights and motors, heat for water and space heating needs, and illumination for the daylighting of homes and buildings. When considered separately they are often overlooked as being too insignificant to be considered as energy policy options for the future. Yet when combined the power of solar is impressive. Given the international growth rate of solar technologies in other nations – solar could supply 25 million megawatt-hours of renewable heat and electrical energy annually to Canadians by 2025 – enough to fully power over 2 million energy-efficient Canadian homes.

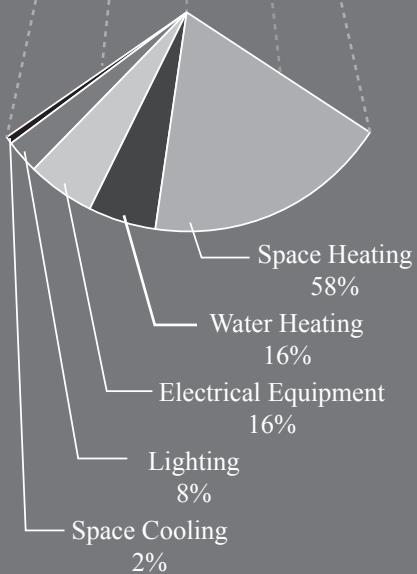


Key Challenges

Canada's Demand for Energy

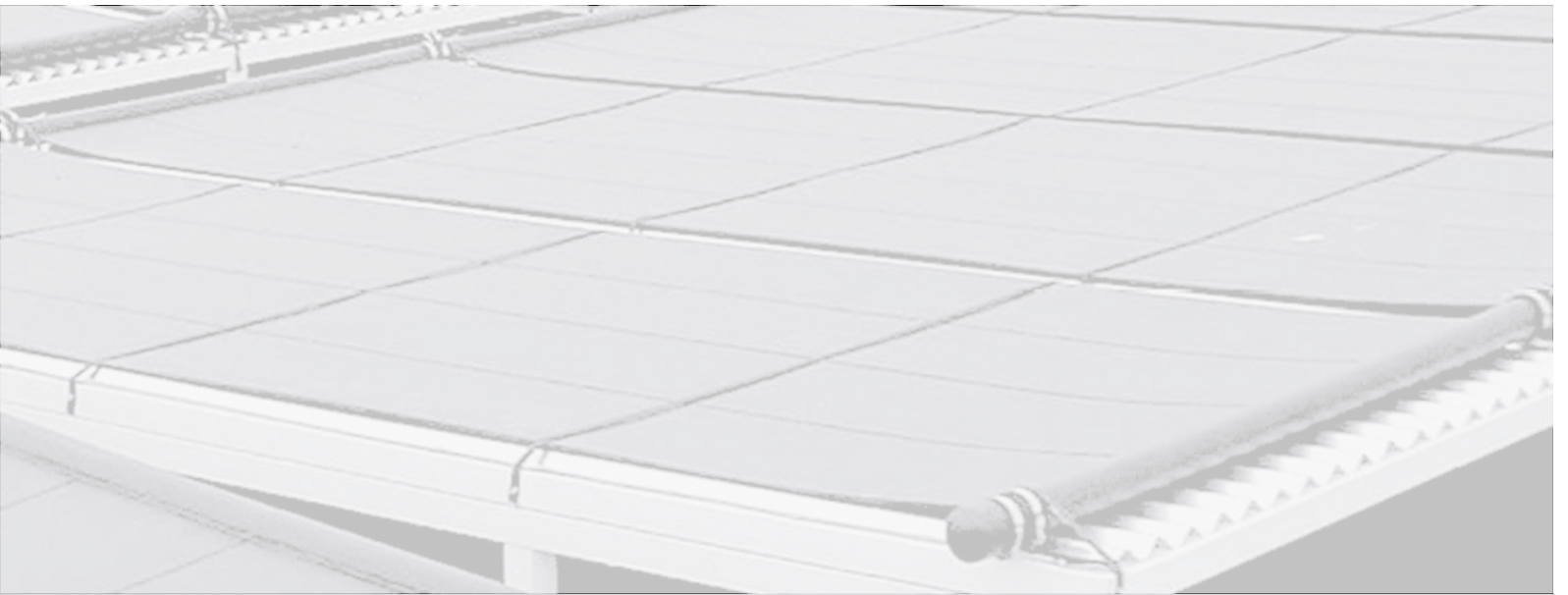


Energy Use in the Residential and Commercial Sectors



The key challenges to growing the Canadian solar marketplace are:

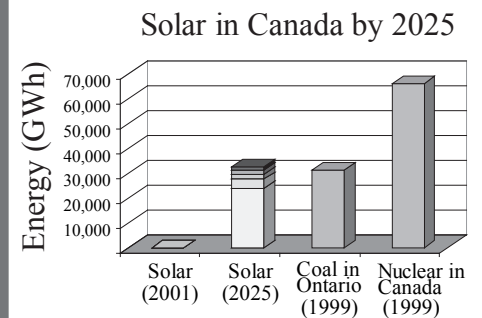
- Its small production and deployment scale in Canada, which keeps prices high and public acceptance low. Canada lags all our major trading partners in deployment of solar technologies.
- The lack of government funding of solar development and deployment compared to international averages. Canada lags all our major trading partners in support programs for solar technologies.
- On-again-off again government funding of existing solar programmes. Inconsistent funding sends confusing signals to the marketplace and prevents industry from developing long-term business plans.
- The lack of financing solutions, and the current method of pricing solar differently compared to other energy technologies, results in the pricing of solar out of reach for most users.
- A lack of regulations for the use of solar technologies which forces solar manufacturers, installers and buyer to invest considerable resources to insure that local compliances and concerns are met.
- A lack of education about solar's benefits to a variety of audiences, including energy users, governments and utilities, and financial markets.



The Need for Market Stimulation

Governments in Canada have regularly intervened in energy markets through direct spending, tax incentives and regulations to insure that oil, gas and nuclear provided a secure energy supply and to develop regional economies.

Subsidies and fiscal policies have made these technologies attractive to investors and reduced their costs to consumers. As a result these energy sources have developed to their full potential and given Canadians the standard of living we enjoy today.



Solar is in need of assistance today so that it can be prepared for its role in the medium-term as a major energy source for Canadians. The need for economic stimulation is due to a number of factors:

- Solar is at an early stage of market entry, while current fiscal and regulatory policies support the needs of central power generation technologies such as nuclear, coal, and fossil fuels. Many of these fiscal and regulatory policies work to the disadvantage of solar.
- Market prices for energy do not fully incorporate environmental externalities so the environmental advantages of solar to Canadian society are not recognized.
- Solar technologies are produced in exceedingly low quantities in Canada and therefore their production and installation costs are higher. Market stimulation will support cost reductions at both the manufacturing and deployment levels.
- The cost of solar is accounted for differently than other energy sources. While central power plants' energy costs are amortized over the life of the power plant (typically 20-40 years), solar is expected to compete on a payback basis (typically 4-8 years). Government fiscal measures can help rectify this inequality.

By 2025 energy produced by solar panels on Canadian homes and businesses could provide as much energy as all of Ontario's coal power plants did in 1999.



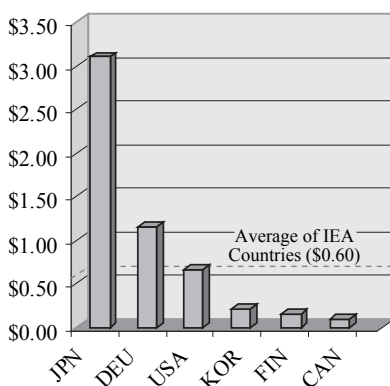
CanSIA recommends the adoption of the following federal policies and programs that will help develop a viable, vibrant Canadian solar industry. These policies and programs are needed to create the market momentum to propel the industry into becoming an engine of economic growth in Canada.

Key Federal Recommendations

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International Solar (PV) Funding

PV Public Budgets (2001) for R&D, Demonstration, & Market Stimulation - \$CAD per capita



Overlying Principles

1. National Strategy

Canada needs a long-term plan for solar energy, as part of an overall Renewable Energy Strategy.

2. Integrating Solar

All solar projects and programs must be done in unison with increased energy efficiency measures in buildings. Solar, wind, biomass, hydro, and earth energies should complement, not compete with, each other.

3. Increased Funding

Increasing government funding and the number of programs in support of research, development, demonstration and commercialization of solar is required. Canada lags far behind international averages in its support of solar technologies.

4. Focused Funding

Canada can maximize the impact of its current funding levels for solar by creating comprehensive programs focused on targeted communities across Canada. Working with provincial and municipal governments will leverage additional support.

5. Valuing Externalities

The Canadian government must begin to account for the hidden health, environmental and social costs associated with conventional fossil fuel based energy.

Specific Measures

6. Financing Mechanisms

Low-interest financing mechanisms for solar purchasers who do not have access to capital should be established. CanSIA recommends the establishment of two financing mechanisms for solar deployment.

A. Financing Solar Installations

A green mortgage program that encourages the integration of all solar technologies into new buildings and a solar loan program for retrofitting solar on existing buildings.

B. Financing Solar Energy Purchases

For those individuals and firms that want to sell the sun's energy. An energy production incentive (for heat) and feed-in tariffs (for electricity).

7. Expanding the Government's Green Energy Procurement Commitment

A. Technology Set-Asides

Photovoltaics and other renewable technologies that still have potential for significant cost reductions should have set-asides to allow government commitments to benefit all renewable electrical generating technologies. Increased purchases will bring down costs.



Key Federal Recommendations

B. Procurement of Green Heat

A commitment to purchase 20% of government's heating needs from renewable technologies will make a significant impact on the solar thermal industries. This is similar to the government's commitment to purchase 20% of its electricity from renewable energy sources.

8. High Profile Demonstrations on Government Buildings

The government must encourage consumer demand for solar energy equipment through leading by example. Government must begin using solar technologies on its own buildings. A commitment to install solar technologies on all new buildings will send an important message to Canadians. Building integrated solar makes good economic sense now.

9. Deployment Programs

Government incentive programs for solar should be instituted immediately to encourage public adoption.

A. Solar Thermal

Residential Deployment

A program for the installation of 80,000 solar domestic hot water systems on existing homes within 10 years. This will increase the industry's capacity – preparing it for widespread acceptance in the marketplace.

B. Photovoltaics

A PV Early Adopters Program for existing homes and commercial buildings is needed

to begin developing the market. The target should be the installation of 30,000 3-kW roof top systems and 3MW of commercial capacity within 10 years.

C. Solar Thermal

Commercial Deployment

A stabilized long-term commitment for the increased funding support of commercial solar thermal systems is critical. On-again-off again funding since 1997 has limited the success of the federal Renewable Energy Deployment Initiative (REDI).

D. Net-Zero Energy Homes

An immediate demonstration of 1,500 net-zero energy homes in new communities across Canada with a long-term plan to shift all new home construction to net-zero energy by 2030. This will make Canada a leader in the future of home building technologies.

10. Changing the Tax Structure

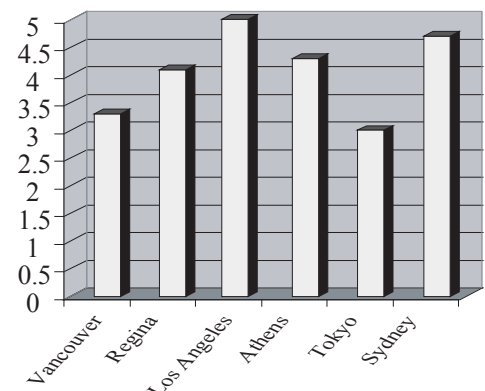
Currently many of the tax programs offered to other renewable energy technologies, such as wind and hydro, are not available to solar energy developers. As an example the Canadian Renewable and Conservation Expenses Class 43.1 should be expanded so that:

A. The size restriction for PV systems is removed

B. The restrictions on applications for solar thermal systems are removed.

The amount of solar energy falling on 15 square kilometres of Canadian surface equals the entire energy capacity of all the nuclear power plants in Canada.

Solar Energy (yearly average peak hours per day)





One of the primary barriers that solar technologies have to overcome is the myth that it is an expensive energy source. It is not.

Valuing Heat Energy

Recently there has been a focus on the challenges facing the supply of electricity to Canadians. However, only 24% of the energy used in the residential and commercial sectors is for energy to run lights and other electrical loads, while 74% of energy demand is for thermal energy to supply space and water heating needs. Further, a significant portion of demand for electricity is for thermal loads. In Ontario alone there are over 800,000 electric water heaters requiring 1,200 MW of power station capacity to operate. Provinces with challenges in their electrical markets should focus on the eliminating the use of electricity for heating. Solar hot water heaters are an excellent method of reducing peak demand for many electric utilities.

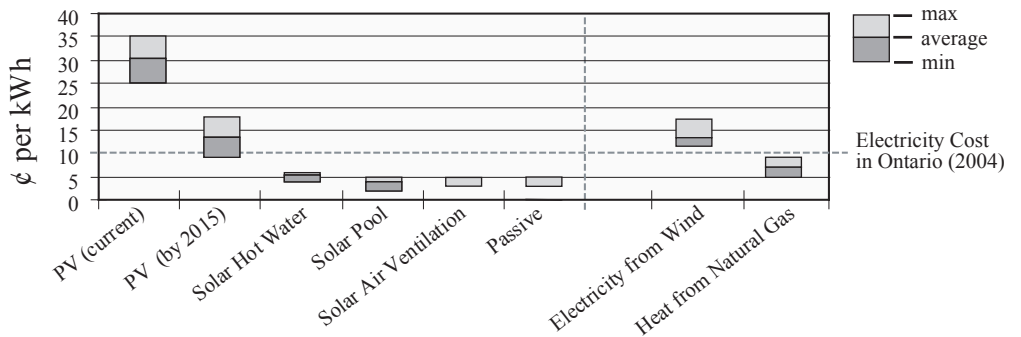
Accounting for the Costs of Sunshine

If solar is accounted for by the same methodology used for central power plants then it is one of the cheapest sources of energy known. Unlike other energy sources, solar is usually owned by the energy user. For other energy sources the consumer purchases the energy – either through a wire or a pipeline. This puts solar at a significant disadvantage over conventional, and even other renewable energy technologies. Power from central power stations is based on life cycle costs while the purchasing of solar is on a first cost

basis. Thus central power plants (powered by gas, wind or other sources) have a 20-40 year return on investment, while solar needs to compete on payback expectations of 4-8 years.

As well, the financing of large central power plants is provided by equity investments or low interest financing and often subsidized by direct or indirect government policies. The owner of a solar power plant does not have access to this low-cost, long-term money.

The Cost of Sunshine



Note: Energy costs are calculated over the life of the generator and priced on the customer side of the meter.



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About CanSIA

The Canadian Solar Industries Association (CanSIA) is the national trade organization representing firms involved in the design, manufacture, sale and installation of solar electric, solar thermal and passive solar technologies. For over twenty-five years, CanSIA has supported, promoted, and advocated the use of solar energy for the benefits of Canadians, our economy and our environment.

CanSIA works to strengthen the Canadian solar industry through increasing the professionalism of companies, by fostering domestic and international markets, and by promoting the use of all forms of renewable energies.

Further details on A Solar Plan for Canada – Sunny Days Ahead (25x25) can be found in CanSIA's full 25x25 documents – Volume 1: Perspectives and Strategy for Growth; and Volume 2: Background Information.