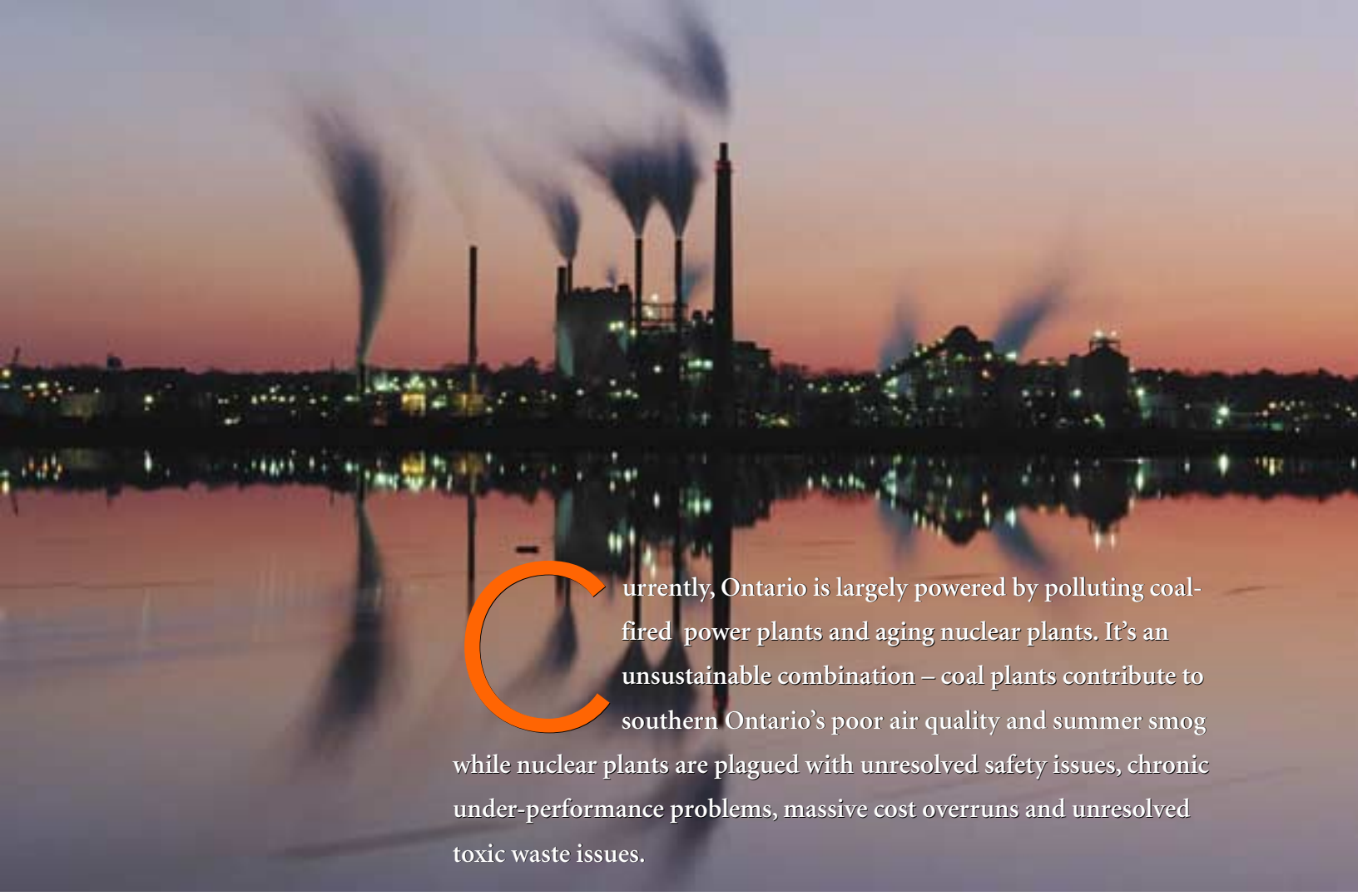
Smart Generation

POWERING ONTARIO WITH RENEWABLE ENERGY

Ontario is at a critical energy crossroads. The province's decision makers are about to choose how Ontario will produce and use electricity in the coming decades.

The choices they make will profoundly affect all Ontarians. Their decisions will either take the province down the same road of boosting supply to meet increasing demand or forge a new path towards a more sustainable electricity system through renewable energy and conservation.



Currently, Ontario is largely powered by polluting coal-fired power plants and aging nuclear plants. It's an unsustainable combination – coal plants contribute to southern Ontario's poor air quality and summer smog while nuclear plants are plagued with unresolved safety issues, chronic under-performance problems, massive cost overruns and unresolved toxic waste issues.

These centralized plants are part of an expensive and increasingly fragile transmission grid. Getting out of this crisis is not possible with the same type of thinking that led us into it – it is time for Ontario's priorities to change.

Smart Generation: Powering Ontario With Renewable Energy urges Ontario's decision makers to develop the province's abundant renewable sources of energy while creating a new focus on conservation. In return, Ontario will get a more reliable, cost-effective electricity system, cleaner air, more jobs, and a new and vibrant industry.

A provincial task force recently found that if nothing is done to reduce Ontario's insatiable appetite for energy, by 2020 the province will have a peak demand of more than 30,000 megawatts of power, but will have only 10,000 megawatts of generating capacity.

Clean sources of energy such as the sun, wind, water and heat from the ground can help meet that demand. These resources are called 'renewable' since their supply, unlike coal and oil, will never run out. Also unlike coal and oil, renewable energy is clean and non-polluting. Renewable energy protects the environment while strengthening the economy.

The worldwide growth rate of many renewable energy technologies today

is similar to the explosive growth of cell phones and computers in the 1980s and '90s. However, Canada and Ontario are lagging far behind renewable leaders such as Germany, Japan and the United States.

The need for renewable energy is starting to intensify in Ontario. Concerns about air pollution resulted in a promise by the Ontario government to close down its five coal-fired electricity power plants by 2007. That shutdown will give Ontario cleaner air but it will also leave a supply-demand imbalance of about 7,500 megawatts. That imbalance can be filled by renewable energy, conservation and efficiency.

Renewable energy will also help Ontario cut its greenhouse gas emissions, which will become increasingly important as Canada puts the Kyoto Protocol on climate change to work. Phasing out Ontario's coal plants would reduce 38 megatonnes of emissions – 16 per cent of Canada's entire target.

The distributed nature of new renewable energy technologies offers the most reliable, cost-effective option. So far, the province has set a modest goal to have 2,700 megawatts of renewable energy generation by 2010 (about 10 per cent of Ontario's current total installed capacity). Currently, only about one per cent of the province's energy supply – between 150 and 160 megawatts – comes from low-impact renewable sources.

***Smart Generation* shows how Ontario can:**

- **Install more than 12,000 megawatts of renewable energy capacity by 2020 – which can generate enough electricity to phase out Ontario's coal plants.**
- **Generate more than 35,000 gigawatt hours per year of electricity with local renewable sources by 2020, and more than 180 petajoules for the heating and cooling needs for new homes and offices in Ontario.**
- **Create 25,000 jobs in the renewable energy sector by 2010 and 77,000 by 2020.**
- **Support a culture of conservation to help reduce demand for electricity in the first place.**
- **Invest in local communities to enhance energy security.**

Smart Generation summarizes the potential of five sources of renewable energy for Ontario: wind, hydropower, biomass, geothermal and solar. It also makes key policy recommendations on how to rebuild the province's power system with these sources of energy. Doing so will create a bright future for Ontario.

The problem with conventional sources of energy

There is a risk that Ontario will favour large, expensive and centralized nuclear and natural gas plants to solve its electricity woes. Boosting nuclear power and natural gas, and continuing to rely on coal power are not sustainable solutions.

NUCLEAR: Nuclear power is extremely expensive and is highly subsidized. The last plant constructed in Ontario – Darlington – was billions of dollars over budget when it was completed in the mid-1980s. Nuclear power creates radioactive waste and there is no accepted method of managing that waste.

NATURAL GAS: Natural gas may be cleaner than coal and can play a limited role in local generation, but it still has significant climate change and human health impacts. Natural gas production contributes to wilderness and habitat destruction. A decrease in natural gas reserves has meant a doubling of its price – with wild price fluctuations – which makes it much less attractive as an energy source.

COAL: Considered to be one of the cheapest forms of energy, coal's price tag doesn't include its environmental and health costs. Coal is responsible for air pollution, mercury contamination in lakes and rivers, and greenhouse gas emissions that cause climate change. Ontario's coal-fired power plants also spew gases that blend together and form smog that irritates people's lungs and causes heart damage.

Wind energy has become a multi-billion dollar industry worldwide. In 2003, total revenues from the sale of wind-generated electricity, wind turbines, towers and development services reached nearly $28 billion.

Wind

The fastest growing source of energy in the world, wind power creates new jobs, offsets emissions from fossil fuel–fired power plants, stimulates new economic development, enhances security of electricity supply and fosters electricity price stability.

But Ontario is lagging far behind many countries already reaping the economic and environmental benefits of wind power.

Germany, with a surface area about one third the size of Ontario, currently has more than 15,000 MW of installed wind capacity. Using European experience as a guide, *Smart Generation* shows Ontario could install as much as 8,000 MW of wind power by 2012, generating about nine per cent of current electricity demand.

Wind energy has tremendous potential in Ontario, with more than 1,500 km of shoreline along the Great Lakes. Lake Huron's eastern shore, from south of Goderich up to Port Elgin, is prime wind territory. It's already home to six of Ontario's 10 turbines – demonstration sites that generate a mere 0.02 per cent of the province's supply.

Other provinces in Canada are moving more quickly to develop wind power. Quebec will install 990 MW and plans to develop an additional 1000 MW of wind energy, and has already begun wooing manufacturers to locate in the province. Prince Edward Island is considering a proposal to supply 100 per cent of the province's electricity with renewable energy.

Once considered prohibitively expensive, the cost of wind power has dropped remarkably during the past two decades because of economies-of-scale, larger turbines, and experience on how to build, install and operate wind turbines more effectively.

Not only is the price dropping, but so too is the time needed to get wind power up and running. It took Germany seven years to install its first 2,000 MW of wind capacity but took less than a year in 2003 to install an additional 2,645 MW. Spain, a relative newcomer, was able to install 1,377 MW of wind power in 2003 and is competing closely with the U.S. to become the world's second leader in total installed wind power.

Ontario could emulate Spain in the installation of its first 2,000 MW within four years by using today's larger, more productive wind turbines. Ontario could add an additional 2,000 MW by 2010 and double that within two more years, reaching 8,000 MW by 2012.

Economic benefits

Wind energy has become a multi-billion dollar industry worldwide. In 2003, total revenues from the sale of wind-generated electricity, wind turbines, towers and development services reached nearly $28 billion.

Installing 8,000 MW in Ontario by 2012 will generate nearly $14 billion in economic activity in the province. If Ontario aggressively develops wind energy, it can attract wind turbine manufacturers and their suppliers to the province.

In Germany, more than 45,000 people work in the wind industry (37,000 direct and indirect manufacturing jobs and an additional 8,000 jobs servicing wind turbines). If Ontario's wind development mimics that of Germany and Spain, there could be nearly 100,000 person years of cumulative employment by 2012.

Wind also presents a unique opportunity for a new cash crop in rural Ontario. Farmers can lease their land to a wind developer. Or farmers can install, own and operate the turbines themselves. According to the Ontario Sustainable Energy Association, if just half of Ontario's 55,000 farmers install one, one-megawatt wind turbine, they could pump $4 billion through the rural Ontario economy.

Fast facts

> *Ontario can install 8,000 megawatts of wind energy to supply nine per cent of its current demand for electricity by 2012. Doing so will produce nearly $14 billion in economic benefits and create almost 100,000 person-years of employment.*

> *Wind farms can become a new cash crop in rural Ontario by installing turbines on farmland. Farmers can still work the land around the wind turbines, and earn a royalty of about $5,000 a year per turbine.*

RIDING THE WIND IN CALGARY

Calgary, Alberta, is home to the first public light rail transit system in North America powered by wind.

The fleet of 116 trains, which run along more than 38 kilometres of track, are powered by 12 windmills located in southern Alberta. The power generated by the windmills is sent to the main power grid.

By using wind power to run the trains, the City of Calgary reduces carbon dioxide emissions by 26,000 tonnes each year – equivalent to eliminating 7. 5 million car trips in Calgary each year.

Repair and refurbishment of older hydro generating plants is a viable opportunity for non-utility generators in the province. This plant, constructed in 1906 and located in Galetta, Ontario, was originally developed with 2 x 400 kW synchronous generators. Upgrading the turbines and maximizing water resources has doubled plant capacity from 800 kW to 1,600 kW. (Courtesy of Canadian Hydro Developers and Powerbase Automation Systems Inc.)

Low-Impact Hydroelectricity

Large-scale hydroelectric power currently provides more than a quarter of Ontario's electricity needs.

Ontario's existing large hydroelectric facilities can play a role in supporting the 8,000 MW of wind power recommended by this study. Large hydro dams can be used as a 'battery' that allows water to be stored when wind-generated electricity is at its peak, and to release this water to produce electricity when it is needed.

Coupling wind power with existing hydroelectricity is a key strategy to ensure the province has a significant and stable electricity supply that manages electricity peaks. This innovative integration strategy is currently used in the state of Oregon and provides a practical solution to manage the intermittent nature of renewable resources such as wind.

Although Ontario has identified more than 2,000 potential hydropower sites, only 200 of those have been developed. *Smart Generation* shows Ontario could develop an additional 1,000 MW of small-scale, low-impact hydroelectric sites.

Large hydroelectric facilities have historically caused significant environmental damage including reservoir flooding, sedimentation, destruction of fish and wildlife habitats and greenhouse gas emissions.

Small-scale hydroelectric development requires comparatively little physical space while only occasionally causing more local ecosystem damage than natural flooding, drought, and erosion rates present before building the plant. While they can be designed to use as much of the flowing water as possible without harming the local ecosystem, projects should still meet rigorous environmental and social standards.

According to Ontario Power Generation, low-impact hydro accounted for approximately 95 per cent of its 2002 green power generation, providing about 700 gigawatt hours of electricity (enough power for 60,000 Ontario homes).

Economic benefits

Ontario's hydroelectric industry currently generates $1.7 billion in annual energy production and supports 3,600 jobs in the province. During the past 10 years, there has been only a small increase in the number of hydropower development projects in the province.

Developing 1,000 MW of additional low-impact hydropower in Ontario could result in a seven per cent increase in employment in this sector, accounting for an additional 240 jobs in the province.

Many new hydroelectric facilities can be located in parts of Ontario currently facing economic hardship and chronic underemployment. Small, low-impact hydroelectric facilities in particular are well suited for community development purposes because they create employment, increase economic activity and strengthen local energy security.

Fast facts

> *Coupling hydroelectricity with wind power is an innovative way to ensure the province has a significant and stable source of renewable electricity when needed.*

> *Building an additional 1,000 MW of small, low-impact hydropower in Ontario by 2020 could result in a seven per cent increase in employment in this sector, accounting for an additional 240 jobs in the province.*

HYDRO POWERS FIRST NATIONS COMMUNITY

A small hydro station in northern Ontario is doing a lot more than just generating electricity. It's helping local First Nations build a thriving community.

The Pic River First Nation, a small Ojibway community located between Thunder Bay and Sault Ste. Marie, has part ownership in two hydro stations. By selling power from the hydro stations to the Ontario grid, the community has generated more than $1 million in profits.

Income from the hydro station has helped finance a women's crisis centre, a youth centre, a recreation centre and high-speed Internet access.

Biomass can become a reliable source of heat and electricity in Ontario. It can also lead to significant job creation, especially in rural areas where it could provide new income for farmers who can grow crops such as switchgrass for bio-fuel, and use manure in anaerobic digesters to generate heat and power.

Biomass

Energy from biomass can be generated from organic matter of vegetable or animal origin. This can include forestry products such as sawdust and bark, as well as agricultural residues like straw and manure.

The big advantage that biomass offers over other renewable energy sources such as wind and solar is that it can be easily stored and used when needed. It can provide a constant, non-fluctuating supply of electricity and heating. Ontario's forestry and agricultural sectors generate by-products that can be readily converted to energy.

Smart Generation shows how Ontario can generate more than 2,450 MW of power using a variety of biomass sources by 2020, which can provide a new source of income for the province's forestry and agricultural sectors. In addition to electricity generation, biomass sources have significant potential to displace electricity and fossil fuels currently used for residential and commercial space heating in Ontario.

It is becoming increasingly uneconomical to use electricity, natural gas, heating oil and propane for home heating. Ontario currently uses about 57 petajoules of electricity in the residential sector for space and hot water heating. Biomass sources can help displace this load and significantly reduce peak winter loading problems on the electrical grid, and reduce the overall need for power in the province.

Two of the leading biomass-using countries in the world are Finland and Sweden. Biomass supplied 19 per cent of Finland's total primary energy supply and almost eight per cent of its fuel mix in district heating. In Sweden, biomass accounts for 15 per cent of total primary energy supply and 53 per cent of the fuel mix in district heating.

There are various technologies to convert biomass into electricity and heat. In Germany, Austria and Sweden, home heating with 'pellet boiler systems' is popular. These pellet systems operate like conventional central heating systems. The boilers are fed wood pellets made mainly of compressed sawdust and shavings from logs processed for lumber and other wood products. Canada now exports more than 100,000 tonnes of pellets to Northern Europe but very little of this resource is used domestically.

Biomass can become a reliable source of heat and electricity in Ontario. It can also lead to significant job creation, especially in rural areas where it could provide new income for farmers who can grow crops such as switchgrass for bio-fuel, and use manure in anaerobic digesters to generate heat and power.

Economic benefits

In Germany, more than 50,000 people are employed by the biomass sector. In Ontario, total job creation is highly dependant on the main sources of biomass used. However, by 2007, a range of 250 to 1,050 jobs could be created in the biomass power sector. By 2020, this figure could range from 1,470 to 6,174 jobs.

Fast facts

> *Ontario can use biomass to generate 426 megawatts of energy by 2007, and 2,450 megawatts by 2020.*

> *By 2007, a range of 250 to 1,050 jobs could be created in the biomass power sector in Ontario. By 2020, this figure could range from 1,470 to 6,174 jobs.*

QUEBEC COMPANY TURNS BIOMASS INTO ENERGY

A new form of renewable energy that turns fast growing grasses into a low-cost, environmentally friendly means of heat energy is changing the rural energy market in Quebec.

Dell-Point Technologies of Blainville, Quebec, has designed a biomass technology that can use pellets made from switchgrass. These pellets burn at the same efficiency as oil in a high-efficiency oil furnace.

The pellets are burned in stoves, much like a wood or gas stove. A hopper on the back of the stove can hold up to 60 pounds of fuel, which is then automatically fed to the combustion chamber, according to how much heat is required. The technology reduces space-heating costs by 50 per cent or more, as pellets cost only half as much as conventional fuels.

Manitoba Hydro is leading Canada in supporting geothermal heat pumps for a variety of applications, including homes and other buildings such as recreation centres. According to Manitoba Hydro, the installation of 1,000 geothermal heat pumps in homes generates $15 million in construction-related activity.

Geothermal heat pumps

Geothermal heat pumps are one of the cheapest and most reliable ways to heat and cool most buildings today.

Geothermal pumps draw energy from the earth, using a series of underground pipes. In winter, these systems bring the earth's warmth up into a building, concentrate it, and distribute it using heat pumps and ventilation systems. In summer, they work in reverse, extracting heat from inside to be discharged into the cooler earth. The earth itself supplies the renewable thermal energy, and the systems run with almost no pollution or greenhouse gas emissions.

Smart Generation shows geothermal pumps can be widely used to provide heating and cooling for all new residential and commercial buildings in Ontario. By 2010, Ontario can install 125,000 residential geothermal pumps, saving the equivalent of 7.7 petajoules per year. By 2020, the province can install 341,000 geothermal systems in new homes, saving the equivalent of 21 petajoules per year (the equivalent of about 750,000 tonnes of coal, or 3.7 million barrels of oil).

Ontario can follow the example set by Manitoba Hydro, which has become a Canadian leader in geothermal heat pumps. Manitoba Hydro currently offers homeowners a loan up to $15,000 to install a geothermal heat pump when building a new home or replacing an old heating system. According to Manitoba Hydro, installing 1,000 geothermal heat pumps in homes generates $15 million in construction-related activity.

The City of Winnipeg is developing plans for a 100 per cent geothermal new subdivision. If built, it would be the largest geothermal housing development in Canada.

In Ontario, about 8,500 homes and 500 institutional and commercial buildings are currently using geothermal systems. These systems offset the need for electricity-hogging air conditioners and heating systems based on electricity or natural gas.

Economic benefits

The cost to install a geothermal system that can provide 100 per cent of heating and cooling is about $20,000 for a new 2,000 square foot home in a Toronto subdivision. The energy savings achieved by installing a geothermal heat pump are considerable. Annual heating costs are $400, markedly lower compared to $1,000 for electric furnace or electric baseboards, $1,250 for a gas furnace or $1,600 for a conventional oil furnace.

Installing 125,000 home geothermal systems could result in 18,750 jobs by 2007. By 2020, the installation of 341,000 geothermal pumps could create up to 51,150 jobs.

TORONTO OFFICE TOWERS COOLED BY LAKE ONTARIO

More than 100 office towers in downtown Toronto are now using an alternative source of air conditioning – cold water from Lake Ontario.

Enwave District Heating is using "deep water cooling" in Toronto, making it the largest lake source cooling system in the world. The deep lake cooling project takes cold water from the bottom of Lake Ontario and draws it into a downtown pumping station. From there, through a series of heat transfers, the cold lake water is used instead of electricity to air condition buildings along the Enwave network.

The Air Canada Centre, the Metro Convention Centre, the Steam Whistle Brewing Company, the Royal Bank Tower and the offices at 1 University Avenue are just some of the buildings cooled by water from Lake Ontario. The project is expected to save 30 million kWh a year and free 35 megawatts of capacity from the provincial grid.

Fast facts

- *Ontario can use geothermal energy for 20 per cent of the air conditioning and water heating load in all provincial and municipal buildings by 2010. This level should rise to 50 per cent by 2020.*
- *Geothermal energy can be widely used to provide heating and cooling for all new residential and commercial buildings in Ontario. By 2010, Ontario could install 125,000 residential geothermal systems that would provide heating and cooling, saving the equivalent of 2.1 million MWh per year.*

Ontario has a greater solar resource than many of the world's solar leaders, including Germany and Japan. In fact, Toronto has a better summer solar resource than Miami, Florida.

Solar energy

Solar energy can be used in Ontario to generate pollution-free electricity and heat for homes, offices and institutions. The most promising solar technologies in the short-term are those that capture the heat of the sun's rays to heat indoor space or water.

Photovoltaic (PV) cells directly convert sunlight into electricity and are made of semi-conducting material. The simplest photovoltaic cells power watches and calculators; larger systems can light houses and provide power to the electrical grid.

Many homeowners and businesses are giving PV a serious look as the efficiency of solar systems improves, and as Ontario's power grid gets more stressed and more fragile. PV systems can generate clean, reliable power with little maintenance and free fuel.

According to *Smart Generation,* by 2025 the province could install: 1,263 MW of solar systems; 800,000 solar domestic hot water systems; 120,000 solar pool heaters; and passive solar heating in 420,000 new homes. With strong policy measures, solar energy in Ontario could provide as much energy in 2025 as coal did in 1999.

Solar energy currently provides eight per cent of the average Canadian home's heating requirements (in the form of sunlight entering through windows). This proportion of solar energy could be easily increased to 22 per cent with minor changes in community planning and building design.

Solar energy can also provide up to 50 per cent of residential hot water heating and 15 per cent of commercial hot water heating at a cost below the price of heating water with electricity.

Building owners in Ontario can reduce their hot water energy bills by 50 per cent by installing solar water heaters. Solar hot water systems can be installed in almost every kind of building, from a single suburban home to an apartment building, and from a car wash to a factory.

Japan was a minor solar player in the early 1990s but rose to become the world's largest producer and user in less than a decade through supportive policies and active public education initiatives. Germany, with a modest solar resource but strong policies, has also become a world leader in solar technology. In the German city of Freiburg, solar panels are commonly found on homes, hotels, sports arenas, schools, businesses and institutes.

Economic benefits

The worldwide market for solar photovoltaic cells grew 34 per cent in 2003 to more than $4 billion (U.S). Forecasts indicate the market will exceed $30 billion by 2013. Its high growth rates are leading to a downward trend in prices. Canada sits well behind the global curve, with per-capita spending on solar cells that is one-sixth the world average.

Currently the majority of solar manufacturing jobs in Canada are focused on products exported outside of Canada. Canadian solar firms are industry leaders internationally, however they have to focus on exports as there is a lack of domestic markets for their products.

Employment in the solar sector is found in manufacturing, installation, operations and maintenance. Ontario could create almost 20,000 jobs in the solar sector by 2025 if strong policy measures are implemented to develop this industry.

Fast facts

> *By 2025 Ontario could install: 1,263 MW of solar systems; 800,000 solar domestic hot water systems; 120,000 solar pool heaters; and solar passive design in 420,000 new homes.*

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SOLAR PLANT A BOOST TO ONTARIO'S ECONOMY

A cutting-edge solar cell manufacturing plant in southwestern Ontario is helping put Canada on the map as a leader in renewable energy. Cambridge, Ontario, is home to Canada's first full-scale solar manufacturing plant, which opened in June 2004.

Spheral Solar expects its 193,000 square foot facility will be producing revolutionary new photovoltaic technology in commercial quantities.

Not only will it expand Canada's presence in the global photovoltaic marketplace, the plant will also create 200 jobs and the investment of more than $100 million in the Canadian economy by the end of 2005.

Currently, the primary markets for the Cambridge company are international but changes in public policy could create significant opportunities here at home for this and other Ontario-based solar industries.

Harvesting renewable resources like the wind and switchgrass will only be viable with the right public policy support. Public investment in renewable energy is critical to level the playing field with conventional fossil fuels and nuclear energy, which are heavily subsidized and exclude the tremendous health and environmental costs.

Conclusion

Smart Generation shows that making renewable energy a central part of Ontario's electricity restructuring strategy will give the province a more reliable and cost-effective electricity system, cleaner air, and more jobs.

In order to reap these benefits, strong policy measures will be needed. Effective policies will help ensure the province's renewable sources are fully tapped in a sustained and stable manner, positioning Ontario as a North American leader in renewable energy.

RENEWABLE ENERGY MECHANISM

There are currently no policies that enable the large-scale adoption of renewable energy that is possible and necessary in Ontario.

Countries such as Germany, Spain and Japan are world leaders in renewable energy and provide clear examples of what can be quickly achieved if the right policy mechanisms are in place.

Their leadership and success is based on a set of common factors:

- Active political commitment for renewable energy
- Supportive education initiatives for research and development, training and public awareness
- Strong incentive systems to achieve wide public participation
- Implementation of a renewable energy mechanism.

Renewable Energy Mechanisms (REMs) allow renewable systems to connect to the electricity grid and specify the price paid for renewable energy in the form of fixed-price contracts. The provincial legislature, in consultation with stakeholders, would determine the premiums to be paid for every kilowatt-hour generated from different renewable technologies. In other words, REMs eliminate two of the most important obstacles inhibiting renewable energy development: the ability to connect to the grid and market uncertainty.

The guaranteed premiums are essential to address market distortions of conventional energy supply, which is subsidized and excludes the health and environmental costs.

Good policy decisions will:

- Create stable demand for renewable energy technologies
- Ensure favourable access to the electricity grid at attractive prices
- Facilitate low-cost financing
- Provide tax incentives and smart subsidies
- Establish standards, support education and training initiatives and encourage active stakeholder participation.

Ontario is in a unique position to establish a 21st century approach to energy. Renewable energy, along with strong energy efficiency and conservation measures, will help protect the environment while strengthening the economy, creating a brighter future for Ontario.

Policy recommendations for Ontario

1. **Expand the mandate of Ontario's proposed Conservation Bureau to include a fully integrated energy efficiency, conservation and renewable energy strategy.**
2. **Make investment in renewable energy a priority of the Ontario Power Authority (OPA).**
3. **Position the Conservation Bureau centrally in the machinery of the OPA so that conservation, efficiency and renewable energy development become guiding principles of the OPA.**
4. **Create renewable energy mechanisms (REMs) to support widespread renewable energy development.**
5. **Implement a stable funding mechanism to finance the activities of the Conservation Bureau.**
6. **Create a provincial education strategy to: train and certify renewable energy specialists; map all renewable resources available in the province; increase public awareness on renewable energy and support programs.**
7. **Collaborate with the federal government to establish a provincial revolving loan fund to provide interest free loans to install renewable energy systems on farms, and in residences and businesses.**
8. **Initiate a process with the federal government to quantify the environmental and social costs of all forms of electricity generation so these costs can be included in the price of each electricity option.**
9. **Develop a collaborative process with the largest users of electricity (i.e. auto and steel manufacturers) to establish a system to deal effectively with electricity peak use.**
10. **Direct all levels of government to purchase their electricity needs from renewable energy sources, and to ensure that any new government-funded building incorporates renewable energy technologies for heating and cooling.**

ENERGY CONSERVATION & EFFICIENCY

With all the focus on finding new ways to generate power, it's easy to forget that the cheapest kilowatt is often the one that's never generated. Conservation and efficiency offer a far better return than the huge costs and risks of building new power stations.

One way of conserving energy is to reduce demand for that energy in the first place. Some of the greatest potential savings can be found in more efficient industrial and commercial motors, lighting, office equipment and in appliances such as refrigerators, freezers, washers and dryers.

Ontario can adopt strong energy efficiency standards for appliances, space heating systems, homes, commercial buildings and new renewable power generating facilities. It can also create an energy efficiency retrofit program for residential, government and commercial buildings.

Smart Generation: Powering Ontario With Renewable Energy was commissioned by the David Suzuki Foundation to provide a detailed analysis of the potential for renewable energy in Ontario. The report shows strong policies to support renewable energy, conservation and efficiency will give Ontario a more reliable, cost-effective electricity system, cleaner air, more jobs, and the development of a new and vibrant industry.

The full report, *Smart Generation: Powering Ontario With Renewable Energy*, is available online at www.davidsuzuki.org

David Suzuki Foundation

SOLUTIONS ARE IN OUR NATURE

The David Suzuki Foundation works through science and education to protect the diversity of nature and our quality of life, now and for future generations. We seek the best research to provide innovative solutions that will help build a clean, competitive economy that does not threaten the natural services that support all life.

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