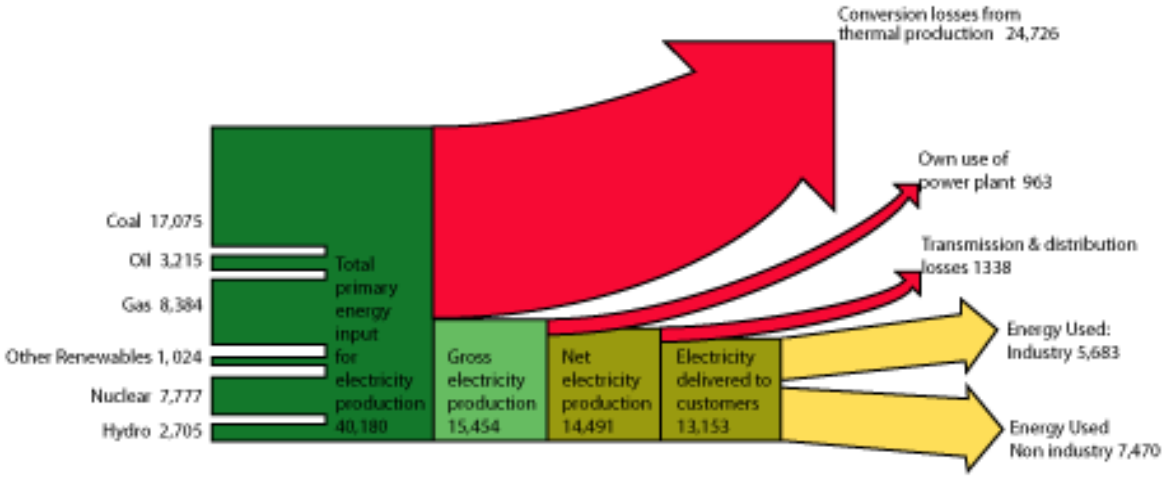
Decentralized Energy

According to the 2006 World Survey of Decentralized Energy, 12% of Canada's installed generation capacity came from decentralized energy sources.

Decentralized Energy (DE) is heating, cooling and/or electrical power that is produced, managed and stored at the point of consumption.



DE offsets centralised energy demands and has residential, commercial and industrial applications that can be:

- Integrated into buildings
- Connected to energy intensive processes and equipment
- Built to support district energy systems and micro-grids (thermal and/or electric output) for neighbouring consumers or entire communities

In terms of fuel, the most sustainable DE designs are based on:

- renewable energy, such as solar, geoexchange, hydrokinetic turbines and community integrated wind turbines,
- waste heat recovery, from industrial process exhaust heat, cooling towers and smoke stacks,
- wastes such as wood waste, agricultural residues such as manure and straw, household wastes and sewage.

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Generating Energy Close to You

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The term 'DE' may be relatively new, but the concept is as old as commercial electricity. The very first power plant in the world was built by Thomas Edison and the Edison Illuminating Electric Company using the 'dynamo' to convert steam into electricity. The Pearl Street Station in New York City in 1882, had six 90 kilowatt generators that provided 59 customers (which grew to 472 customers by 1883) with electricity while using waste heat to warm neighbouring buildings. Recycling the waste heat allowed Edison's plant to achieve approximately 50 percent efficiency which exceeds the efficiency of the majority of power plants currently serving the western world today.

Since this historical invention, society shifted to building bigger, centralized power plants to service rural populations. Regulations eventually discouraged the decentralized energy model to the point where only utilities were allowed to sell energy. Several decades later the inefficiency of centralized power plants prompted a change in regulations to allow utilities to buy energy from independent producers or non-utilities. Today we are seeing a massive push for decentralized energy generation and support for this generation is seen in the form of microgeneration regulations, standard offers, feed in tariffs, minimum system efficiency targets, large emitters penalties and emission reduction targets.

The benefits of decentralized energy include:

- improved energy generation system efficiency,
- increased efficiency in industrial processes,
- avoided electricity wastage from transformer and power line losses,
- deferred construction costs for transmission and distribution upgrades,
- reduced emissions and healthcare costs from pollution and occupational hazards inherent in centralized fossil fuel power,
- increased efficiency and reduced waste from residential and commercial buildings.

Canada is faced with substantial energy challenges as it strives to keep up with increasing demand on an aging and inefficient centralized grid system, and to tackle growing environmental concerns about the impact of traditional energy production. We are heavily dependent on finite fossil fuels, the dirtiest of which are being phased out of use in some provinces in Canada. Replacing and upgrading existing plants could be seen as a costly nightmare or an opportunity to move towards a cleaner more efficient energy network. As we rediscover the financial and environmental value of generating heat, power and cooling closer to the point of use, Canada's Decentralized Energy (DE) industry is blossoming and the future looks bright if both government and industry take the chance to use DE to help close the energy gap.

DE generation is growing as a result of:

- uncertainty about the future availability of fossil fuel resources,
- increasing environmental concerns,
- the health risks associated with fossil fuels use,
- volatile pricing for fossil fuels, and
- the immense capital requirements for upgrades to our aging and inefficient infrastructure.

All levels of Canadian society are working to secure a sustainable source of affordable, reliable and clean energy. In the short to medium term, this will depend on our ability to achieve a balanced-growth energy supply mix that utilizes a combination of centralized and decentralized generation.

Ambitious targets have been set by the Canadian Government of reducing greenhouse gas (GHG) emissions by 17% by 2020, compared to 2005 levels, and of providing 90% of Canada's electricity by non-emitting sources, including renewables and nuclear power. The Government's Clean Energy Fund1 demonstrated a commitment to this target through the expansion of Decentralized Energy (DE) generation in Canada.

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> **Electricity Sector Council**

Succession planning is a concern. According to Canada's Electricity Sector Council, "nearly one third of electricity-producing firms do not have a plan to manage the loss of the significant percentage of skilled workers eligible to retire within the next 7 years." Leaders in the industry are working to increase the number of skilled professionals in nationally and internationally, through programs dedicated to training, certification and accreditation of system designers and installers. Universities, colleague sand technical institutes are taking bold steps to provide the training and education that is needed to support the growing decentralized energy economy. All provinces and territories are promoting decentralized energy to some degree and our national installed capacity increases annually.

Progressive utility business models are needed in Canada to embrace the opportunities that are inherent in decentralized energy and smart grid infrastructure. This includes owning and operating or even leasing thermal and electric generating systems that are integrated into buildings and communities. Improved controls and communications in metering and energy data management is another area where leadership from utilities is needed.

A number of policies and initiatives are being used to facilitate the integration of DE in to the centralized energy system. Canada's "Leadership in Energy and Environmental Design" certification, LEED Canada, based on that of the US Green Building Council, is helping expand the market for DE in new and existing buildings. The certification is available for commercial, institutional and housing applications. More than 2000 projects have registered for LEED certification in Canada. DE features such as CHP and small scale renewables help buildings gain credits towards the certification.

Natural Resource Canada developed the RETScreen© tool for users to help them evaluate options for Renewable-energy and Energy-efficient Technologies (RETs). WADE Canada offers RETScreen© training courses that help participants gain a working understanding of the software and carry out feasibility studies on the economic and environment impacts of specific DE projects.

What incentives are we seeing in provinces and territories in Canada? The Government of Ontario has pledged to phase out coal-fired electricity generation by 2014. A reduction of carbon dioxide emissions of up to 30 megatonnes will be achieved by reducing capacity by two thirds, creating numerous opportunities for the expansion of DE to fill this gap.

The use of Feed-in Tariffs to support the renewable component of DE generation has been established in Ontario since 2006 and was revised in 2009 as part of the Green Energy and Green Economy Act (Ontario Bill 1504). It is now seen to be the most generous in North America. Feed-in Tariffs rewarding investor with a guaranteed pricing structure (price per kilowatt hour) for a fixed period of time, around 20 years. The FIT and microFIT programs support projects over and under 10 kilowatts respectively, offering energy developers, homeowners, farmers and small businesses financial security. The FIT applies to DE in the form of biomass, biogas, landfill gas, small-scale wind, rooftop and ground mounted solar photovoltaic and small-scale waterpower projects when the energy is consumed on site. The remaining Canadian provinces are considering such policies; the British Columbia Ministry is working towards the introduction of FIT regulation in early 2011, to support fulfillment of British Columbia's Energy Objectives.

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Alberta Climate Change and Emissions Management Corporation

The Ontario Power Authority drafted a Clean Energy Standard Offer Program (CESOP) in 2006 to encourage a variety of clean energy generation technologies, including natural gas-fired combined heat & power (CHP), by-product fuel-fired generation projects, and generation projects fuelled by under-utilized energy (thermal or mechanical) sources. Generators with outputs less than 10 MW thermal or mechanical will be eligible. This move acknowledges the significant cumulative contribution that small generators can offer to security of supply.

The DE industry in British Columbia is supported by the Governments investment of $32.6 million, announced in 2009, as part of the Innovative Clean Energy (ICE) Fund, aimed at commercializing clean and alternative energy technologies and reducing greenhouse gas emissions. It is predicted that around 1,200 jobs will be created in the province. In the same year, the Green Energy Advisory Task Force was appointed to provide insights and recommendations on a comprehensive strategy to put B.C. at the forefront of clean energy development. The result, British Columbia has new Clean Energy Act that sets the foundation for a new future of electricity self-sufficiency, job creation and reduced greenhouse gas emissions, powered by unprecedented investments in clean, renewable energy across the province. Feed in tariffs and standing offers are just two programs under this act.

Alberta was the first jurisdiction in North America to pass climate change legislation requiring large emitters to reduce their emissions intensity. Since 2007, companies that produce more than 100,000 tonnes of greenhouse gas emissions annually are legally required to reduce their greenhouse gas intensity by 12 per cent. One compliance option is to pay into the Climate Change and Emissions Management Fund at $15/tonne. The CCEMC applies funds to projects that focus on four key areas: greening energy production, energy conservation and efficiency, carbon capture and storage, and adaptation.

"A naturally replenishing, clean, and efficient source of power could be just the answer Alberta needs to reduce its greenhouse gas emissions." Renewable energies that are derived from feedstock, natural or mineral waste, sunlight, wind, geothermal heat, mini-hydro, and biomass sources have been proven to make significant and sustainable reductions in GHG emissions all over the world. In CCEMC's latest RFP, $50 million in funding is dedicated to these kinds of renewable energy projects.

In terms of microgeneration, 2009 saw Alberta's Micro-Generation Regulation come into effect. The policy was implemented to allow Albertans to generate their own environmentally friendly electricity from so-

lar panels, small-scale hydro, wind, biomass, micro-cogeneration and fuel cells and to receive credit for any power they don't use and send into the electricity grid.

Nova Scotia recently saw new regulations to help stabilize electricity costs for Nova Scotians while promoting a greener, more sustainable province for generations to come. The new regulations enable the province to increase the amount of renewable electricity produced in communities across Nova Scotia, to help government achieve the goals it set in the province's new Renewable Electricity Plan.

"These regulations are another step towards implementing some of the most aggressive renewable energy goals in the world," said Premier Darrell Dexter.

Interesting applications of DE in Canada include the recent installation of a combined solar heat and power generating system at Concordia University in Montreal. The technology known as Building Integrated Photovoltaic/Thermal (BIPV/T) is the first installation of its kind in this particular configuration.

At the University of Northern British Columbia a Biomass Gasification System is currently being installed and will be used to heat much of the campus. The system will convert wood residue to synthetic gas, which will replace 85% of the Universities natural gas use.

Increasingly DE is incorporated into modern town planning. Many communities are now designed to have a reduced impact on the environment and be affordable, enjoyable places to live and work.

In Okotoks, Alberta, a housing community of 52 homes built in 2007, known as Drake Landing Solar Community, receives 90% of its thermal requirements from solar energy. The first of its kind in North America, a total of 800 flat plate glazed solar collectors (2.9 m2 each) placed on garages provide low temperature (40 to 50 ºC) district heating. A 35 m diameter field of 144 boreholes, each 37 m deep stores solar energy from summer to winter.

The Dockside Green development in Victoria, British Columbia is a mixed use community, with LEED Platinum certification. The buildings in the 121,000 m2 development, built in 2008, consume 50% less energy than the model national energy code and 65% less potable water than conventional housing with 100% of sewage and storm water treated on site. District heating is provided by an on-site wood waste bio-gasification plant.

The next generation of energy delivery will adopt a holistic approach to development that equally promotes advancements in technology innovation as well as fundamental improvements in building design and community planning. This holistic approach is already emerging and is enabling Canadians to profit once again from their talent for imaginative and robust energy solutions.

BECOME A MEMBER OF
Canada's Alliance for Decentralized Energy

Join WADE Canada support the voice of decentralized energy in Canada

WADE Canada works to foster the competitive advantage of our members by enabling DE project implementation, promoting opportunities for DE, bringing policy issues to the table, attracting capital and encouraging new entrants to the industry. In addition to the many membership benefits listed below you will receive monthly WADE Canada newsletters and notifications, in which you can promote your activities and raise the profile of your business.

- Participate in DE projects
- Access to public and private capital for DE projects
- Access export markets through WADE Canada's international network of affiliates
- Targeted recruitment of skilled and qualified people
- Receive discounted rates for WADE Canada events and partner events

For a list of our members, rates and our on-line membership application please visit us at www.wadecanada.ca

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