FACT SHEET

RENEWABLE ENERGY
in Canadian Colleges and Institutes

Association of Canadian
Community Colleges

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CANADA is one of the LARGEST ENERGY CONSUMERS in the world.

75%

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69%

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28%

28 percent from the combustion of gas, oil or coal.

LESS THAN 2%

1.3 percent from renewable energies.

Colleges and institutes across Canada have been at the forefront of adopting and implementing a wide range of green power and green heat options.

Canada is one of the largest energy consumers in the world, but 75 percent of our primary energy comes from natural gas, oil and coal, with the balance from hydro dams and nuclear reactors. For electricity alone, 69 percent is generated by hydro and nuclear, 28 percent from the combustion of gas, oil or coal, and only 1.3 percent from renewable energies.

Canada's heavy reliance on fossil fuels results in energy-related greenhouse gas emissions of 156 megatonnes (MT) a year, according to Natural Resources Canada (footnote: 2002 Comprehensive Energy Use Database - http://oee.nrcan.gc.ca/neud/dpa/comprehensive_tables/index.cfm?text=N&printview=N).

The commercial / institutional (CI) sector consumes 1,130 PJ of secondary energy per year, of which 54 percent is needed for space heating, 20 percent for equipment and motors, 13 percent for lighting, 7 percent for water heating and 6 percent for space cooling. Total CI floor space is 580 million m^2, and the sector emits 64 MT of GHG a year, of which space heating, space cooling and water heating are responsible for two-thirds of those emissions.

Schools (of all types) consume 95 PJ of energy and emit 5.3 MT of GHG. With total classroom floor space of 88 million m2, schools rely on natural gas for 58 PJ of their energy, electricity for 21 PJ and oil for 9 PJ. Annual GHG emissions place schools in fourth place for CI buildings, behind offices (22 MT), retail (14 MT) and health care (6 MT), but higher than hotels and restaurants (5 MT), recreational facilities (4 MT), warehouses (4 MT) and other institutions (3 MT).

One way to reduce the environmental impact from the consumption of traditional energy is to increase the generation of electricity from renewables called GREEN POWER and to supply more space conditioning and water heating from GREEN HEAT.

Using wind turbines or solar panels to generate power, or using biomass and earth energy to heat colleges and institutes, provides the immediate reduction in GHG emissions required under international obligations. Renewables also reduce the harmful pollution that comes from the combustion of fossil fuels and the volatility of fluctuating energy prices while improving indoor air quality in classrooms and ensuring that future generations of Canadians will enjoy a standard of living that reflects a more appropriate use of energy resources.

Renewables all depend on the sun for their energy, whether it is the direct conversion of sunlight by PV modules for power or water heating by solar thermal collectors, or indirect adaptation by wind turbines that capture the breezes caused by differential heating of the global surface. Earth energy systems transfer solar heat from the ground into a college or institute, while biomass converts the solar energy stored by plants during their growth.

While some renewable energy systems may incur a first-cost premium to install, the 'lifecycle' cost for any green power or green heat system will always be much lower than conventional energy facilities, because the energy supply is 'free' and system operating costs are reduced. Renewables emit no pollution and do not require extensive distribution networks for their supply, both of which will become increasingly important factors in energy issues.

Colleges and institutes across Canada have been at the forefront of adopting and implementing a wide range of green power and green heat options. The following represent select examples from members of the Association of Canadian Community Colleges.

SOLAR PHOTOVOLTAIC & THERMAL

Solar electric photovoltaic (PV) modules convert sunlight directly into electrical energy by using solar cells which capture photons to produce a DC current. The output can be stored in a battery or converted to AC current with an inverter. PV modules are used extensively to power telecommunication towers and navigational buoys, remote camping lodges and pocket calculators. They can also be used to generate power for a home or office, with any surplus power being 'fed' back into the grid to lower consumer costs and to balance the load for the utility. It is increasingly common for PV modules to be integrated into building roofs and into windows, where they replace conventional building materials while they generate electricity.

Solar thermal collectors use sunlight to heat water or air. Black collector surfaces are pointed south to capture the sun's energy that can heat water for showers or swimming pools, for commercial car washes or other industrial process, and the hot water can also be used in radiant floors for space heating. Products range from basic black pipe used in seasonal swimming pools, to evacuated tubes that can boil water in an Arctic climate, although the majority are single-glazed collectors. Air collectors can be mounted on the south walls of buildings to pre-heat incoming air and to reduce demand for traditional combustion fuels.

Solar Case Study

RED RIVER COLLEGE

The Princess Street Campus of Red River College in downtown Winnipeg has the largest building-integrated photovoltaic (BIPV) array in Canada. The 133 Kyocera modules replace the window glass in a curtain-wall that forms the outer envelope of the 20,000 m2 building. Rated at 12.6 kW, the system generates 50 kWh per day of electricity that is used within the building, although a net metering agreement with Manitoba Hydro allows surplus power to be fed to the grid. As an energy efficient strategy, the project is highly visible and the use of solar modules as part of the building envelope allows the costs of green power from this source to be reduced by a typical cost of $100-$125 per square foot, to $25-$50 per square foot. The solar cells are laminated between glass layers and incorporated into the high performance sealed glazing units of the building's curtain wall system. Installed in February 2003, the project was supported by the Manitoba government, City of Winnipeg, Manitoba Hydro, Red River College, and the Princess Street Consortium project team. Red River College placed fifth in the World Environment Building Competition in Oslo, Norway.

CONTACT: Red River College, Princess Street Campus
204-949-8337

WIND

Wind is one of the most rapidly-growing sources of generation around the world, and Canada has developed 430 MW (Dec 2004) of turbines, of which two-thirds are located in Alberta. Although wind has long been a source of mechanical energy, modern turbines are designed to generate electricity for utility grids and complement the output of hydroelectric reserves in many jurisdictions. The latest turbines for offshore application offer 5 MW of capacity, although small units for stand-alone or remote applications can supply 100 watts.

Wind Case Studies

ST. LAWRENCE COLLEGE

The Cornwall Campus of St. Lawrence College, in collaboration with Ontario Power Generation, installed a 44 kW Vergnet turbine at Windmill Point in 2001. The 30 m unit has worked without interruption, and the College plans to install a turbine of up to 3 MW in the same location as well as a similar unit on the elevated point of its Brockville campus. It is also working with private developers in Kingston on a 2 MW unit.

CONTACT: Patrick J. Finucan, Director Academic Operations
Cornwall Campus 613-933-6080, ext. 2223

AURORA COLLEGE

Aurora College has installed a hybrid system to generate power for its own research institute. The system consists of a 1.4 kW photovoltaic array and a 850 watt wind turbine.

CONTACT: Aurora Research Institute 867-777-3298

YUKON COLLEGE

Yukon College installed a 1.5 kW wind turbine and a 2 kW solar PV array in a hybrid green power system that is used as a demonstration facility.

CONTACT: Clint Sawicki, Northern Research Institute 867-668-8772
Doug Craig, Boreal Alternative Energy 867-668-5744

CÉGEP DE LA GASPÉSIE ET DES ÎLES

The Gaspé campus of Cégep de la Gaspésie et des Îles installed a 55 kW Bonus turbine that had been previously installed in 1987 in Kuujjuaq. The Integrated Centre for Professional and Technical Training (Centre intégré de formation professionnelle et technique) uses the unit for technical training.

CONTACT: Isabelle Vilchenon 418-368-2201, ext. 470

EARTH ENERGY

Ground-coupled heat pumps, also known as geothermal or GeoExchange systems, transfer low-temperature solar energy from the earth and, through the use of compressors and heat exchangers, upgrade that heat to a higher temperature for use in space heating and water heating. In reverse mode, systems provide space cooling by rejecting heat into the ground. Compared with conventional boilers and chilling towers, earth energy has the maintenance and overall lifecycle cost of any HVAC system, according to analyses by Natural Resources Canada and the U.S. Environmental Protection Agency.

Earth Energy Case Study

SIR SANDFORD FLEMING COLLEGE

The new wing of the Sir Sandford Fleming College Frost Campus in Lindsay drilled 65 wells, five of which are located under the $10 million environmental technology wing at the School of Environmental & Natural Resource Sciences. The wells are 100 m deep and circulate a liquid through high-density polyethylene pipe to absorb heat from the earth. Numerous heat pumps are located throughout the ceiling to disperse heat into the 4,000 m2 wing, and reduce the physical space required for conventional HVAC facilities. The wing requires 66 percent less energy compared to buildings built to current standards, and has been rated as one of the most environmentally-sound buildings in Canada. Other features include a wind turbine, a green roof and wastewater treatment through a series of constructed wetlands.

CONTACT: Pauline Janitch, Communications Officer
Sir Sandford Fleming College, Frost Campus
705-749-5530, ext 1370
http://www.flemingc.on.ca/news/releases/200410121039.cfm

GENERAL INFO

Green power and green heat options are best implemented as an integral component of a strong institutional commitment to energy efficiency. The growing range of renewable energy technology options will alleviate rising energy prices to improve the financial bottom line, and will also enhance the learning environment for students and staff.

The federal government established the Renewable Energy Deployment Initiative (REDI) in 1997 to provide information and financial assistance in implementing green heat systems. Details on this program are available at:

http://www.nrcan.gc.ca/redi

or by calling (toll-free) 877-722-6600.

A shareware program, RETScreen, was developed by Natural Resources Canada to provide a pre-feasibility site assessment for solar, wind, earth energy and biomass, as well as four other technologies in inter-changeable modules. The software is available at http://retscreen.net and is used in a number of college and institute training courses.

Industry Associations

WEB SITES

A number of industry associations can provide specific information on their respective renewable energy technologies:

Canadian Bioenergy Association (CanBIO)
http://canbio.ca

Canadian Solar Industries Association (CanSIA)
http://cansia.ca

Canadian Wind Energy Association (CanWEA)
http://canwea.ca

Earth Energy Society of Canada (EESC)
http://earthenergy.ca

Other sites provide additional information on renewable energy:

Canadian Association for Renewable Energies (we c.a.r.e.)
http://renewables.ca

Canadian GeoExchange Coalition (CGC)
http://www.geo-exchange.ca

Canadian Renewable Energy Education and Training
http://www.creet.ca

Canadian Renewable Energy Network (CanREN)
http://canren.gc.ca

David Suzuki Foundation Report
Smart Generation: Powering Ontario with Renewable Energy
http://www.davidsuzuki.org/files/Climate/Ontario/Smart_Generation_full_report.pdf

Pollurion Probe's Primer on the Technologies of Renewable Energy
http://www.pollutionprobe.org/Publications/Primers.htm

Renewable Energy Deployment Initiative (REDI)
http://nrcan.gc.ca/redi

CONTACT

Contact Us

WWW.ACCC.CA

For more information on ACCC's Renewable Energy program, please visit our website at
http://www.accc.ca/english/services/renewable_energy.cfm

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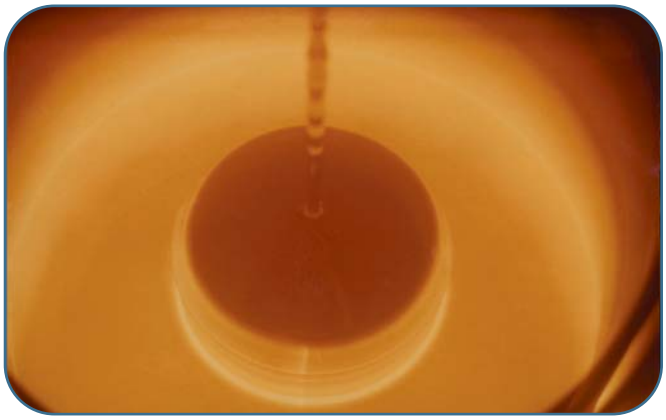

SOLAR

RENEWABLE ENERGY

earth energy

WIND

ACCC

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