

WIN GLOBAL 2008
Canada report
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1. Nuclear 2007 highlights:

New Build Applications and Environmental Assessments:

Ontario Power Generation (OPG) - A proposal was filed with the Canadian Nuclear Safety Commission (CNSC), Canada's nuclear regulator, by OPG to construct and operate up to four new reactors with a total capacity of 4800 MW on its Darlington nuclear site located near Oshawa, Ontario along the north shore of Lake Ontario. An Environmental Assessment is currently taking place.

www.opg.com

Bruce Power - A proposal was filed in 2006 with the CNSC by Bruce Power for the site preparation and the construction and operation of up to four new nuclear reactors at the Bruce Power site, located on the eastern shore of Lake Huron, north of Kincardine, Ontario. The project is expected to generate approximately 4,000 additional megawatts (MW) of electrical power at the Bruce site. Following acceptance of the application, an Environmental Assessment was launched in 2007, which will take approximately three (3) years to complete.

Technology has not yet been chosen for Ontario new build. As a result of global reviews of available nuclear technologies conducted by the Ontario's Ministry of Energy, Ontario Power Generation and Bruce Power, four vendors have been invited to compete in RFP process:

- AREVA NP - US Evolutionary Pressurized Reactor
- Atomic Energy of Canada Limited – ACR 1000 Advanced CANDU Reactor
- GE Hitachi Nuclear Energy – Economic Simplified Boiling Water Reactor
- Westinghouse Electric Company – AP 1000™ nuclear power plant

A decision is expected from the Ontario Government by the end of 2008.

www.brucepower.com

Bruce Power Alberta – Bruce Power on behalf of Bruce Power Alberta, launched the process that would result in the purchase of Energy Alberta. Energy Alberta had filed an application with the CNSC for a *Licence to Prepare a Site* for the future construction and operation of a new nuclear power plant near the community of Peace River, Alberta, in the Municipal District of Northern Lights to generate 2,000 megawatts of electricity. Bruce Power amended the application to include 4,000 megawatts of electricity from 2 to 4 reactors. The Environmental Assessment will begin in 2008. No specific reactor design has been chosen. The purpose of this nuclear project is to provide electricity and other forms of energy to assist in meeting the energy requirements of Alberta's oil tar sands projects. Producing oil from tar sands requires a combination of electricity, steam, and hydrogen for heavy oil production. Up to the present, these needs have been met in Alberta largely by burning natural gas.

The purchase of Energy Alberta assets by Bruce Power Alberta was completed on March 13, 2008.

<http://www.brucepower.com/pagecontentAB.aspx?navuid=9090>

Refurbishments:

Bruce Power - The Bruce A Units 1 and 2 Restart Project is the largest infrastructure project of its kind in Canada. It involves the replacement of fuel channels, calandria tubes, feeder tube spools and steam generators, as well as the complete overhaul of turbine generator sets. The work also includes upgrades to electrical systems, condensers, feedwater heaters, fire protection systems, environmental qualification features and secondary controls.

As the first phase of the Bruce A Refurbishment for Life Extension and Continued Operations Project, Units 1 and 2 are scheduled to return to service by 2010. Preparations to refurbish Units 3 and 4 are underway with costing, a timeline and an outage plan to be completed by fall of 2008 for final approval.

<http://www.brucepower.com/pagecontentU12.aspx?navuid=29>

NB Power - Refurbishment of Point Lepreau, New Brunswick – pre-work for 18 month refurbishment project starting Mar 2008.

NB Power landed a place on Mediacorp's list of the Top 100 Employers in Canada and was selected as one of the Top 5 Employers in New Brunswick.

<http://www.nbpower.com>

Other:

Atomic Energy of Canada Limited (AECL) NRU 50th Anniversary – AECL's NRU provides half of the global supply of medical isotopes for nuclear medicine, that are used in 25 million medical procedures a year, and supplies 75 percent of the world's cobalt-60 used to sterilize 45 percent of the world's single-use medical supplies.

<http://www.aecl.ca/>

Gentilly 2, Quebec - Work was launched on the expansion of the solid radioactive waste storage facilities at Gentilly-2 nuclear generating station. Pre-work was also completed with regard to possible future refurbishment.

<http://www.candu.org/hydroquebec.html>

Ontario Power Generation (OPG) – Deep Geologic Repository – A proposal was submitted to the CNSC is to prepare, construct and operate a deep geologic disposal facility at the Western Waste Management Facility located on the Bruce site, within the municipality of Kincardine, Ontario. The DGR would be designed to manage low and intermediate waste produced from the continued operation of OPG-owned nuclear generators at Bruce, Pickering and Darlington, Ontario. Environmental Assessment is taking place.

Ontario Power Generation won the Institute for Nuclear Power Operations (INPO) award for performance improvement at its Darlington Nuclear Generating Station.

2. Nuclear overview:

a. Energy policy:

Electricity share (percent of nuclear).

In 2007 14.6 percent of Canada's electricity came from CANDU nuclear reactors. We have 22 reactors in Canada, 18 of which are operating units.

Pickering Units 2 & 3 (542 MW each gross) are in safe storage and Bruce Power Units 1 & 2 (805 WM each gross) at Bruce Power are currently being refurbished.

Future of nuclear power.

Projects: state of the projects, schedule.

New Build applications – see above

Time Line: Environmental Assessment - approximately 30-36 months

Site preparation and engineering – approximately 2 years

Construction – approximately 7 years

New Brunswick - The government of New Brunswick is accelerating its study on the feasibility of a second nuclear reactor at the province's Point Lepreau site. The feasibility study is to be completed and released in 2008.

Refurbishment - Bruce Units 1 & 2 are scheduled to restart in 2010

b. Public acceptance:

Opinion Polling:

2008 IPSOS Reid poll stated 41 percent of Canadians feel nuclear power should play more of a role in their province over the next decade

67 percent support refurbishment

48 percent support new build (this is historically high)

<http://cna.ca>

Statements from Government Officials in Canada:

Saskatchewan – "Our point is, let's lead in this area. We have the uranium, we're the Saudi Arabia of uranium and all we do is mine it. It's time for that to stop. It's time for us to take some advantage of the science and value-add opportunities around the uranium value-added chain." Premier Brad Wall, commenting on how Saskatchewan should play a leading role in the future research and development of nuclear power.

Regina Leader-Post, March 28, 2008

Ontario – "Building replacement nuclear facilities will bring economic benefit to Ontario. It will help Ontario meet its future energy needs, keep prices stable, cut our carbon footprint and reduce greenhouse gas emissions." Minister of Energy Gerry Phillips.

Ontario Ministry of Energy news release, March 7, 2008, Ontario Takes Next Step To Ensure Clean, Affordable And Reliable Energy Supply For Generations To Come

New Brunswick – The government of New Brunswick is accelerating its study on the feasibility of a second nuclear reactor at the province's Point Lepreau site. Speaking to the Canadian Nuclear Society (CNS) Annual Conference on June 6, 2007, New Brunswick Premier Shawn Graham said that the proposal for the study will be presented to cabinet within the next two weeks. "Clean power will be very important in our province in the years ahead, and the possibility of a second nuclear unit at Point Lepreau is very interesting to us and will be studied closely," the Premier said.

<http://www.cna.ca/english/pdf/Newsletters/2007/NC0804.pdf>

Federal Government – "I strongly believe that nuclear will play a critical role in developing a clean energy future for Canada. Why is that? We've got rising prices, we've got ongoing uncertainties in the global oil and gas marketplace, and of course the environmental concerns surrounding fossil fuels. All this means that new builds are back on track both here in Canada and abroad. Something that I've been looking forward to." Gary Lunn, Minister of Natural Resources
Gary Lunn's keynote address to the Canadian Nuclear Association, February 27, 2008

c. Nuclear equipment (number and type):

• Research and/or Isotope Producing		
Non-power reactors operating in Canada:		
McMaster University (Pool-type research reactor)		Hamilton, ON
Ecole Polytechnique (SLOWPOKE-2)		Montreal, QC
Ecole Polytechnique (Subcritical Assembly)		Montreal., QC
Dalhousie University (SLOWPOKE-2)		Halifax, NS
Saskatchewan Research Council (SLOWPOKE-2)		Saskatoon, SK
University of Alberta (SLOWPOKE-2)		Edmonton, AB
Royal Military College of Canada (SLOWPOKE-2)		Kingston, ON
AECL (NRU)		Chalk River, ON
AECL (Maple 1)		Chalk River, ON (Commissioning)
AECL (Maple 2)		Chalk River, ON (Commissioning)

Other nuclear research facilities licensed by CNSC include:
Canadian Light Source, Saskatoon, SK – Synchrotron light research
<http://www.lightsource.ca/>

TRIUMF, Vancouver, BC – Subatomic particle and radioisotope production research
<http://www.triumf.info/>

• Electricity production.		
Pickering A (ON)	2 reactors	542 MW each (Gross)
Pickering B (ON)	4 reactors	540 MW each (Gross)
Darlington (ON)	4 reactors	934 MW each (Gross)
Bruce A (ON)	2 reactors	805 MW each (Gross)
Bruce B (ON)	2 reactors	845 MW each (Gross)
Bruce B (ON)	2 reactors	872 MW each (Gross)
Gentilly-2 (Quebec)	1 reactor	675 MW (Gross)
Point Lepreau (NB)	1 reactor	680 MW (Gross)

<http://www.nuclearsafety.gc.ca>

d. Nuclear waste management:

The Nuclear Waste Management Organization (NWMO), submitted a report to the federal government in November 2005 providing solutions to managing Canada's used nuclear fuel. Their recommendations include: storage at reactor sites and long-term geological storage.

The NWMO was established in 2002, to develop with Canadians a management approach for long-term care of Canada's used nuclear fuel. The NWMO recommended Adaptive Phased Management to the Government of Canada in 2005.

Adaptive Phased Management features:

- Centralized containment and isolation in deep geological repository suitable rock (Canadian Shield and Ordovician sedimentary rock)
- Optional shallow underground storage facility while developing deep geological repository
- Continuous monitoring and potential for retrieval for an extended period of time
- Seek an informed and willing community
- Focus site selection in provinces directly involved in the nuclear fuel cycle
- The NWMO recommendation would have the used CANDU fuel remain safely stored at Canadian nuclear reactor sites until the design, siting, environmental assessments, site licensing, specific site R & D, transportation systems, confirmation of suitability of site, final design, safety analysis, public consultations and decision to construct are completed.

The NWMO states it will take 10 years to confirm a site and another 20 years to confirm site suitability.

<http://www.nwmo.ca/>

Deep Geologic Repository

Phase one of the Ontario Power Generation (OPG) geoscientific site characterization to verify the Bruce site as a safe location for the long-term management of low and intermediate level nuclear waste for its proposed Deep Geologic Repository, ran from October 2006 – December 2007. Included in the site characterization was a 2D seismic survey, the installation of a low level seismicity monitoring network as well as the drilling, coring, testing, and instrumentation of two deep vertical boreholes.

Phase two of the program began in March 2008 and consists of similar work programs for the drilling of two more vertical deep boreholes at separate sites. The positioning of boreholes at three separate drill sites will provide significant site-specific information about the stratigraphy and lateral nature of the limestone bedrock formations underneath the Bruce site. Two diagonal deep boreholes will also be drilled as part of phase two work in 2009.

The gathering of geoscientific data, along with environmental baseline monitoring at the Bruce site, safety assessment analyses, finalization of the conceptual and preliminary engineering design and completion of the environmental assessment, is all part of the regulatory process for the DGR, which is expected to last about five years. A decision on the project is estimated for 2012.

e. Nuclear research:

AECL - Atomic Energy of Canada Limited (AECL) is the original developer of the CANDU® reactor, one of the three major commercial power reactor designs now used throughout the world. Over 5,000 highly skilled employees enthusiastically deliver a range of nuclear services: from R&D support, construction management, design and engineering to specialized technology, waste management and decommissioning in support of CANDU reactor products.

The primary focus for AECL's R & D program is concentrated on eight key programs: safety; software performance; physics and fuel; fuel channels; components and systems; hydrogen and heavy water; environmental emissions and health physics; and control and information. These R&D programs include underlying work to ensure that CANDU technology has a solid technical base through to applied programs that result in qualification of equipment, processes and systems for power and research reactors.

For over 60 years, AECL has continued to evolve the CANDU design from the CANDU prototypes in the 1950s and 1960s through to the second-generation reactors now in operation, including the Generation II+ CANDU 6. The next phase of this evolution, the Generation III+ Advanced CANDU Reactor™ (ACR™), continues the strategy of basing next generation technology on existing CANDU reactors. Beyond the ACR, AECL is developing the Generation IV CANDU Super Critical Water Reactor.

Owing to the evolutionary nature of these advanced reactors, advanced technology from the development programs is also being applied to operating CANDU plants, for both refurbishments and upgrading of existing systems and components. In addition, AECL is developing advanced technology that covers the entire life cycle of the CANDU plant, including waste management and decommissioning. Thus, AECL maintains state-of-the-art expertise and technology to support both operating and future CANDU plants.

f. Other nuclear activities:

Cameco Corporation - Canada is the world's largest producer of natural uranium, providing more than a quarter of total world production from its Saskatchewan mines. In October 2007, Cameco announced that it has beneficially acquired an additional 5.7 percent of Cue Capital Corp. (Cue), bringing to 15.4 percent its ownership in the Vancouver, B.C.-based junior exploration company. The acquisition further advances a strategic alliance with Cue to facilitate uranium exploration and development in Paraguay. In August, Cameco announced that its wholly owned subsidiary, Cameco Global Exploration II Ltd., has concluded a strategic alliance with Western Uranium Corporation (WUC), which allows Cameco's subsidiary to acquire a 70 percent joint venture interest in WUC's current properties. As part of the transaction, Cameco's subsidiary also became a 10 percent shareholder of WUC. WUC is a uranium exploration and development company with its head office in Vancouver, B.C. Its principal properties are in Nevada and New Mexico in the US, and Nunavut and the Northwest Territories in Canada.

<http://www.cameco.com/>

MDS Nordion - As a global leader in molecular medicine, MDS Nordion is committed to making a difference in people's lives through the prevention, diagnosis and treatment of disease. They offer innovative technologies, world-class facilities and a strong track record with 60 years of success, touching the lives of patients in over 70 countries. MDS Nordion provides medical isotopes for molecular and diagnostic imaging, sterilization technologies for disease prevention and radiotherapeutics for targeted cancer therapy.

To maximize innovation, research and development capabilities, strong partnerships between private industry and academia are critical for the life sciences industry to thrive in Canada and around the world. One such example is the recent partnership between MDS Nordion and the University of Ottawa Heart Institute. Together they are establishing a Molecular Imaging Centre of Excellence to advance cardiology research. This state of the art facility will attract some of the world's brightest researchers to continue their work to combat heart disease. The centre aims to improve cardiology research by using molecular imaging technology, which looks at the physiology and cellular activity of the body rather than simply the anatomical structure.

With their focus on molecular imaging platforms, MDS Nordion is leading the development of innovative technologies to change the landscape of healthcare on a global scale.

www.mds.nordion.com

3. Nuclear competencies:

Nuclear Competencies:

- Nuclear energy is a \$5-billion-a-year industry in Canada, providing 21,000 direct jobs and 10,000 indirect jobs.
- Current estimates for retirement in the Canadian electricity sector - this includes generation, transmission and distribution - indicate that 17,066 trades, engineering and managerial staff are expected to retire within the next seven years.
- Estimates provided by employers indicate that over 17 percent of the existing workforce will be eligible for retirement in the next five years and almost 37 percent of the workforce will be eligible for retirement by 2014.
- Further, the majority of staff reported being unlikely to work past the date that they are eligible for retirement. Nuclear staff is older than the general population in the power sector.

To address the issue of maintaining long-term human resource capability, Canadian nuclear utilities established in 2002 the University Network of Excellence in Nuclear Engineering (UNENE) as an alliance of Canadian universities, nuclear power utilities, research and regulatory agencies for the support and development of nuclear education, as well as research and development capability in Canadian universities.

The main objective of UNENE is to contribute a sustainable supply of qualified nuclear engineers and scientists to meet current and future needs of the Canadian nuclear industry as well as our regulator. This is done through university education, and university-based training, as well as by encouraging young people to choose careers in the nuclear industry. UNENE not only funds research chairs in nuclear engineering at Canadian universities to support the Canadian nuclear industry, but through these chairs promotes internships and provides valuable financial aid and scholarships to attract and retain students in areas critical to the industry.

<http://www.unene.ca/>

The University of Ontario Institute of Technology (UOIT), Canada's newest publicly funded university was created in June 2002 and accepted its first students in September 2003. The UOIT includes the School of Energy Engineering and Nuclear Sciences (SEENS). SEENS offers undergraduate degrees in nuclear engineering, radiation science and related areas. The program focus is on reactor kinetics, reactor design, plant design and simulation, radiation detection and measurement, radiation protection, radiation biophysics and dosimetry, environmental effects of radiation, production and utilization of radioisotopes, radiation chemistry and material analysis with radiation techniques. Since its doors opened to its first 900 students in 2003, UOIT has grown. It presently has 4,300 students; more than 30 undergraduate offerings; two masters programs, and six more in September of 2007; more than 100 core faculty members, all of whom have PhDs; and faculties in engineering, science and health sciences. Canada's first cohort of nuclear engineers graduated in June, 2007. In addition, AECL, OPG, COG, Bruce Power, McMaster University, École Polytechnique, and the Canadian Nuclear Society established the CANTEACH program. CANTEACH is an initiative of the Canadian nuclear industry and educational institutions in an effort to meet the succession planning requirements within their organizations. The aim of CANTEACH is to develop a comprehensive set of education and training documents, with university participation.

<http://www.uoit.ca/>

4. WIN 2007 Main Achievements:

GIRLS Science Club - Women in Nuclear (WiN) launched the first GIRLS Science Club, in August 2007, with "The Science behind CSI."

The GIRLS Science Club sessions are designed to spark a life-long interest in science and motivate girls to develop, maintain or continue studies in science and technology. Each Science Club uses the theme "The Science behind", to demonstrate how science is used in every day life and every occupation.

Each GIRLS Science Club has a female mentor who draws on their own career or personal interests to deliver a program that makes science meaningful, relevant, creative and most importantly, fun by providing learning through hands-on activities. Post-event evaluations have shown the participants left with a positive attitude towards science.

Various themes have been developed to demonstrate that science is cool and that rewarding careers await those who continue with science studies in secondary and post-secondary education.

Strategic partnerships have been behind subsequent GIRLS Science Clubs with local veterinary services, conservation authorities and engineers and scientific workers employed by the industry. The Science behind CSI, Wild Animals, Animal Care, Rocks, Space and Nature have all been enthusiastically received by the participants.

GIRLS Science Club for Girls is run on Professional Development Days and is held in 2-4 hour sessions. WiN-Bruce is subsidizing a full week GIRLS Science Camp, August 25-29, 2008 run by McMaster University students.

Our hope is to ignite scientific curiosity in children so that they:

- Ask intelligent questions around such issues as climate change and energy options
- Connect scientific knowledge to their world
- Consider a career in science and hopefully come back to us as nuclear workers to help with Human Resource crunch in the industry

<http://www.wincanada.org/news/winbruce--girls-girls-in-real-life-science>

Skills Canada – WiN-Canada has partnered with Skills Canada to promote skilled trades and technology with young girls and women as a first choice career option. WiN-Canada has sponsored a networking dinner and provided mentors from the industry at various networking dinners across Ontario. Several mentors from the industry will participate in a Young Women's Conference in May where young students from Grades 7-10 will attend a two-day conference on the trades and learn first-hand about the exciting and well paid careers that await them should they chose a skilled trade.

<http://www.skillscanada.com/>

Website – WiN-Canada launched a new and improved website www.win-canada.org in early 2008. Much of the development was accomplished in 2007. The website features many social media features such as the industry's first blog in Canada; a members' forum and a Facebook group, which global members are invited to join. The Women of WiN feature, not only recognizes the talents of women working in Canada's nuclear industry, but provides a database of job opportunities and mentors in the industry for young women looking at nuclear as a career choice.

Book Launch – WiN-NB, one of our local chapters, started a great program donating books to local libraries, which provide good research material on the nuclear industry for students.

WINFO – Contributed three articles to WINFO in 2007.

WiN-Canada conference – WiN-Canada held a sold-out conference in 2007 for 130 members in Ottawa. The conference included a series of mini-sessions, geared to women's busy lives, were presented on the topics of:

- Writing a Technical Paper to Get Published
- Nuclear Facts,
- Leadership Skills
- Violence in the Workplace

The general assembly included each of the six chapters delivering their reports on activities held over the past year and plans for 2007.

Christaine Bergevin, from SNC Capital, delivered our luncheon address on nuclear facts and figures, a financial look at the industry.

The afternoon session started with a panel discussion on what women opinion leaders *really* think about nuclear power. The session's moderator was Joanne Thomas-Yaccato, President of the Thomas-Yaccato Group, a gender based research company. Panelists included Sarah Powell an Environmental Lawyer with Davies, Ward, Phillips & Vinberg; Christina Blizzard, Queen's Park Columnist for Sun Media; Dr. Lynn Buchanan, Chief Scientist for MDS Nordion; Donna McFarlane, Vice President of Communications and Marketing, University of Ontario Institute of Technology and Christina Wanke, Internet Consultant. The fruitful discussion yielded many helpful points around what the public really need to know about the nuclear industry and suggestions on how we might best relay our message.

The day ended with our keynote speaker, Mitch Joel, President of Twist Image. Joel spoke passionately about social media and how this new media could be used to broaden our approach and audience to get our positive message out to the public.