

# **UK-Canada Nuclear Skills Workshop**

## **Overview and next steps**

March 6-7, 2006, Toronto, Canada

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Eleanor Fast  
British High Commission, Ottawa  
March 2006

## **UK- Canada Nuclear Skills Workshop: Overview and Next Steps**

Over thirty leaders in nuclear skills and research from UK and Canadian academia, government and industry participated in a recent bilateral workshop. The British High Commission in Ottawa and Canadian High Commission in London organised the event which took place on March 6 and 7, 2006 in Toronto, Canada.

The workshop covered a wide range of topics related to the nuclear industry including impending skills shortages, university courses, professional development programmes, industrial skills training, research funding and facilities. The informative presentations and lively discussions provided an excellent forum for exchange of UK and Canadian experiences and examples of good practice, and for investigating collaboration opportunities.

There was agreement to take forward a number of bilateral initiatives and to establish a working group to aid the coordination of activities.

### **Brief overview of discussions**

The UK and Canada are at similar stages in terms of the political environment for nuclear, with the UK and the province of Ontario in Canada, both evaluating the role nuclear should play in the energy supply mix. We heard that public opinion was more favourable toward nuclear energy as a means of addressing climate change and the world's growing energy demand; within Canada, the Canadian Nuclear Association advertising campaign was thought to have had some positive impact. To help address Canada's energy requirements Bruce Power has recently announced refurbishment of some of its nuclear stations. Within the UK, an energy review has been launched and is currently out for public consultation. Both countries will face critical decisions of new nuclear build within the next few years, if energy demand in the next decade is to met.

The potential shortage of skilled labour was viewed as one of the major issues facing the nuclear industry, and one that could become particularly acute if new build or refurbishment occurs, particularly in Canada where the nuclear industry is competing with the growing oil and gas sector for personnel. Attracting students into nuclear academic programmes focussing on nuclear was not seen as a major problem; the greater challenge is increasing the number of young people wishing to pursue science and engineering based careers given strong competition from new economy sectors such as finance, IT, and media. Licensing and regulation emerged as an area where there could be major skills shortages in both countries given the need to rely on skilled and experienced individuals with a number of years experience, again a problem that will become particularly acute, but not insurmountable, if new build is proposed. There were differences in each country's situation on decommissioning and waste management, and interesting experiences were shared which will lead to ongoing discussions.

Obvious synergies were seen between university education programmes in nuclear, and with both countries offering courses by distance learning, there are opportunities for

sharing teaching material. Some administrative problems in sharing courses with international universities were identified but not considered to be a showstopper. Such issues will be addressed by a working group (see below) being set up as a result of the workshop.

Funding for nuclear research and education was of great interest. We heard from UK and Canadian research councils about funding for the Keeping the Nuclear Option Open (KNOO) programme in the UK, and the University Network of Excellence in Nuclear Engineering (UNENE) in Canada, as well as funds available in the UK and Canada that could be used to fund collaborative research, student exchanges or follow on workshops.

Information on government and academic research facilities and research programmes was shared, and it was clear there is great potential for learning through reciprocal site visits. Canada and the UK are both on the Generation IV International Forum and the very similar experiences shared by both countries were discussed.

### **The Way Forward**

From early planning stages through to each workshop session, participants had been asked to concentrate on what bilateral collaborations could result from discussions at the workshop. On the final afternoon we had an extremely productive session to agree on a way forward on these ideas and assign a lead and a timeline to each project. We hope this will be the beginning of joint working and a strong relationship between Canada and the UK. Next steps agreed by those present included:

A working group of approximately six people (three from each country) will be established to move forward some of the collaboration opportunities identified in the workshop, including:

- Investigating logistics of sharing educational materials.
- Plan a return visit of Canadians to the UK for a more in depth workshop on forging collaborations on a defined topic. Research Council funding possible for this event.
- Reciprocal site visits and knowledge exchange.
- Short visits of faculty and students.
- Setting up an information portal – UNENE has made available a web location.

Leads in setting up the working group are **Paul Howarth** (UK) and **Mohan Mathur** (Canada), it aims to be up and running by June 2006.

The UK's Keeping the Nuclear Option Open (KNOO) research programme and other public-sector sources will aim to fund one or two Canadians to participate in the annual meeting of the KNOO programme in September 2006. Contact **Robin Grimes**.

Opportunity for UK participation in the UNENE meeting in June 2006. Travel funding for this is likely to be available. Contact **Rick Holt**.

UK student participation is welcomed at the Canadian Nuclear Society student meeting in June 2006. Contact **John Luxat**.

Canadian students are invited to the UK Student Conference, UNTF, in April 2007. Contact **John Roberts**.

There was great interest in student and research exchanges and collaborations. These will be taken forward by communications with individual labs, several opportunities have already been identified. Contact **Robert Heathman** (EPSRC – UK) and **Andre Isabelle** (NSERC – Canada) to discuss funding student exchanges and overseas travel grants. The British High Commission's (competitive) post doc short visit scheme is a way to fund Canadians to visit the UK, next deadline June 1<sup>st</sup>, 2006, contact **Eleanor Fast**.

A full workshop package including a CD of presentations, bios of participants and full report will be produced and distributed to all participants and to others upon request. Contact **Eleanor Fast**.

Eleanor Fast  
BHC Ottawa  
March 2006

## Appendix 1: Contact Details for participants in UK-Canada nuclear skills workshop

Name	Title	Organisation	Email	Telephone
R. Mohan Mathur	President	UNENE	<a href="mailto:rmmathur@unene.ca">rmmathur@unene.ca</a>	519-433-8637
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Duncan Hawthorne	President and CEO	Bruce Power	<a href="mailto:Duncan.hawthorne@brucepower.com">Duncan.hawthorne@brucepower.com</a>	519-361-2091
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Jean Koclas	Prof	Ecole Polytechnique	<a href="mailto:jean.koclas@polymtl.ca">jean.koclas@polymtl.ca</a>	514-340-4711 x4263
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David Shoemsmith	Prof	Western Ontario	<a href="mailto:dwshoesm@uwo.ca">dwshoesm@uwo.ca</a>	519-661-2111 Ext. 86366
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Pierre Guimond	Director, Regulatory Affairs	CNA	<a href="mailto:guimondp@cna.ca">guimondp@cna.ca</a>	613-237-1632
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Keith Parker	CEO	Nuclear Industry Association	<a href="mailto:Keith.parker@niauk.org">Keith.parker@niauk.org</a>	020 7766 6647
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Paul Howarth	Director	Energy Unit, BNFL	<a href="mailto:Paul.ja.howarth@bnfl.com">Paul.ja.howarth@bnfl.com</a>	01925 833919
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Simon Walker	Prof	Imperial	<a href="mailto:s.p.walker@imperial.ac.uk">s.p.walker@imperial.ac.uk</a>	020 7594 7058
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Louise Rousseau	Counsellor	Canadian High Commission	<a href="mailto:Louise.Rousseau@international.gc.ca">Louise.Rousseau@international.gc.ca</a>	
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Julie Metcalfe	PA to Consul General	Consulate General Toronto	<a href="mailto:Julie.metcalfe@fco.gov.uk">Julie.metcalfe@fco.gov.uk</a>	
Julia Hinde	1 <sup>st</sup> Sec, Science and Technology	British High Commission	<a href="mailto:Julia.hinde@fco.gov.uk">Julia.hinde@fco.gov.uk</a>	613-364-6146
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## Appendix 2: Agenda

# NUCLEAR SKILLS TRAINING

## Sharing UK and Canadian perspectives

March 6&7, 2006

MaRS Collaboration Centre, 101 College Street, Toronto, Ontario, Canada

*Objective: A workshop to share best practice and investigate possibilities for UK/Canada collaboration in nuclear skills training*

### Day 1: Monday, March 6, 2006

8:45 Arrival

9:00 Welcome  
**David Reddaway**, British High Commissioner

9:10 Session 1: Introduction to the UK and Canada - the political environment for nuclear power and overview of skills situation.  
**Keith Parker**, Chief Executive Officer, Nuclear Industries Association, UK  
**Duncan Hawthorne**, President and Chief Executive Officer, Bruce Power, Canada

Questions moderated by: **Martin Hill**, Counsellor, Economic, Science and Trade, British High Commission

10:10 Coffee

10:25 Session 2: University Networks and Courses.  
**R.M. Mathur**, President, UNENE, Canada  
**Jon Billowes**, Deputy Director, Dalton Institute, UK  
**George Bereznai**, Dean of Energy Engineering and Nuclear Science, University of Ontario Institute of Technology, Canada  
**Robin Grimes**, Imperial College, UK

Questions and discussion moderated by: **Bill Garland**, Professor of Nuclear Engineering, McMaster University and UNENE Program Director and Secretary / Treasurer

12:15 Lunch

13:15 Session 3: How do we make the nuclear sector a more appealing career option?

- Young person's perspective  
**Becky Ferris**, Chair, BNES Young Generation Network, UK  
**Brent Williams**, Young Generation Representative, Canadian Nuclear Society

- National Strategies for overcoming skills shortages  
**Colin Mitchell**, Department of Trade and Industry, UK  
**Pierre Guimond**, Canadian Nuclear Association, Canada

Questions and discussion moderated by: **Julia Hinde**, First Secretary Science and Technology, British High Commission

15:00 Coffee

15:15 Session 4: Industrial Skills Training - Decommissioning and Waste Management

**Nigel Couzens** and **Neil Smart**, Nuclear Decommissioning Authority, UK  
**Syed Rizvi**, Manager, Staffing and Training, Ontario Power Generation, Canada  
**John Roberts**, Manager, Immobilisation Science Laboratory, University of Sheffield, UK  
**David Shoesmith**, Professor, University of Western Ontario, Canada

Questions and discussion moderated by: **Sean Russell**, Technical Adviser, Nuclear Waste Management Organisation, Canada

16:30 Summary of day

**R.M. Mathur**, President, UNENE, Canada

16:45 Close

18:30 Reception hosted by **Nicholas Armour**, British Consul General in Toronto  
Reception to be held at: 123 Dunvegan Road, Toronto

# NUCLEAR SKILLS TRAINING

## Sharing UK and Canadian perspectives

March 6&7, 2006

MaRS Collaboration Centre, 101 College Street, Toronto, Ontario, Canada

### Day 2: Tuesday, March 7, 2006

8:45 Arrival

9:00 Welcome

**Louise Rousseau**, Counsellor, Energy, Resources and Mining, Canadian High Commission, London

9:05 Session 5: Industrial Skills Training: Reactor Technology

**Jerry Hopwood**, Advanced CANDU Technology, AECL

**Paul Howarth**, Head of Group Science and Skills Strategy, BNFL

Questions and discussion moderated by: **Louise Rousseau**, Counsellor, Energy, Resources and Mining, Canadian High Commission, London

9:50 Session 6: Nuclear R&D: funding initiatives

**Robert Heathman**, Engineering and Physical Sciences Research Council (EPSRC)

**Andre Isabelle**, Director, Environment and Natural Resources Division, Natural Sciences and Engineering Research Council (NSERC)

Questions and discussion moderated by: **Roger Newman**, University of Toronto

10:30 Coffee

10:50 Session 6 (cont): Nuclear R&D: facilities and programs

**Sylvana Guindon/ Steve Bushby**, Natural Resources Canada

**Simon Walker**, Imperial College, London

**John Luxat**, McMaster University, Canada

**Simon Biggs**, Director, Nexia Solutions/Leeds University Research Alliance in Particle Science and Engineering, UK

Questions and discussion moderated by: **Nick Stuart**, Head of Science and Technology, UK Trade and Investment

12:15 Lunch

13:15 Session 7: Opportunities for research collaborations.

Participants with active research programmes have maximum of 5 minutes for an 'elevator pitch' of their research (powerpoint slides not necessary).

Questions moderated by: **Jean Koclas**, Ecole Polytechnique, Montreal

2:30 Coffee

3:00 Session 7 (cont): Opportunities for research collaborations. Participants with active research programmes have maximum of 5 minutes for an ‘elevator pitch’ of their research.

Questions moderated by: **Rick Holt**, Queens University

4:00 The way forward. **Paul Howarth**, Head of Group Science and Skills Strategy, BNFL

4:30 Close

### **Appendix 3: Nuclear Power in the UK – Fact sheet for the UK-Canada nuclear skills workshop (March 2006)**

The UK Government's policy on new nuclear build was set out in the 2003 Energy White Paper: **there are no proposals to build new nuclear power stations but the UK is keeping the option open.** The Energy Review, [www.dti.gov.uk/energy/review/](http://www.dti.gov.uk/energy/review/) which was launched by the Prime Minister on 29<sup>th</sup> November 2005, will review all the options including nuclear power, fossil fuel generation and renewable energy technologies.

Nuclear power currently provides about 20% of UK electricity needs. There are 23 reactors on twelve sites, eleven of which are currently expected to close in the next 20 years. If there is no new build, and no extension to the operational lifetimes of existing plants, it is expected that the contribution of nuclear power to the UK energy mix will fall to 17% by 2010 and 7% by 2020. The UK civil nuclear industry employs about 54,000 people directly, plus about 54,000 to 106,000 indirectly.

The UK is part of **ITER**, [www.iter.org](http://www.iter.org) the International Thermonuclear Experimental Reactor, the fusion research reactor being developed by the EU, China, Japan, Korea, Russia and the USA to be built in Cadarache, France.

The **Nuclear Decommissioning Authority** (NDA) [www.nda.gov.uk](http://www.nda.gov.uk) was set up in April 2005 to take responsibility for the UK's civil nuclear legacy and ensure that the 20 sites under their ownership are decommissioned and cleaned up safely. These sites, representing about 85% of the UK's civil nuclear liabilities, were previously operated by BNFL and UKAEA (UK Atomic Energy Authority) (British Energy owns the other power stations). The NDA estimates £56 billion will need to be spent cleaning up the sites over 25 years.

The **Committee on Radioactive Waste Management** (CoWRM) [www.cowrm.org.uk](http://www.cowrm.org.uk) was appointed by government in March 2003 to review the options for managing radioactive waste for which there is no agreed long-term solution. They are due to report by Summer 2006.

#### **Major UK nuclear skills initiatives**

- The **Dalton Nuclear Institute** [www.eps.manchester.ac.uk/dalton/](http://www.eps.manchester.ac.uk/dalton/) at the University of Manchester was launched in July 2005. It aims to lead in co-ordinating nuclear science and engineering research across the UK.
- **Keeping the Nuclear Option Open** (KNOO), a £6.5 million initiative by EPSRC (Engineering and Physical Sciences Research Council) [www.epsrc.ac.uk](http://www.epsrc.ac.uk), BNFL (British Nuclear Fuels plc) [www.bnfl.com](http://www.bnfl.com) and partners for research and education in nuclear engineering. Roger Grimes at Imperial College is Principal Investigator for KNOO.
- **Cogent Skills Sector Council** [www.cogent-ssc.com](http://www.cogent-ssc.com) is tasked with ensuring education and training meets nuclear employers current and future needs.

UK is participating in the **Generation IV International Forum** to develop the next generation of fission reactors. £5 million per year funding from DTI covering years 2006/7 and 2007/8. <http://www.gen-4.org/index.html>

#### **Appendix 4: Nuclear power in Canada – Fact sheet for the UK-Canada nuclear skills workshop (March 2006)**

Canada's current nuclear power generation is concentrated in Ontario which has 20 reactors, the 16 in service providing about 50% of the Province's electricity. Quebec and New Brunswick each have one reactor. Overall nuclear power provides about 15% of Canada's electricity (the majority of Canada's energy is hydropower). The industry employs about 21,000 people directly and 10,000 indirectly.

Canada is the world's largest producer of uranium with about one third of world production coming from Saskatchewan mines.

In December 2005 the Ontario Power Authority [www.powerauthority.on.ca](http://www.powerauthority.on.ca) released its **Supply Mix Recommendations** to the Ontario Government. The OPA recommended that nuclear should continue to provide 50% of Ontario's electricity up to 2025, a proposal that would necessitate refurbishment of existing power stations and new build. The Ontario Government has not yet responded to the report.

Natural Resources Canada oversees nuclear power in Canada with responsibility for the crown corporations **Atomic Energy of Canada Limited (AECL)** [www.aecl.ca](http://www.aecl.ca) and the **Canadian Nuclear Safety Commission (CNSC)** [www.nuclearsafety.gc.ca](http://www.nuclearsafety.gc.ca). AECL's commercial operations include reactor development, design and construction of CANada Deuterium Uranium (CANDU) nuclear power plants, and provision of reactor services and technical support to CANDU reactors worldwide.

Canada's **Nuclear Waste Management Organisation, NWMO** [www.nwmo.ca](http://www.nwmo.ca), was set up in 2002 to investigate and develop an approach to the long-term management of nuclear fuel, which they did via a massive process of public consultation. The report, released in November 2005, recommended "Adaptive Phased Management" of nuclear waste, combining the interim shallow storage of waste, followed by the use of deep geological repositories with continuous monitoring of the used fuel and the potential to retrieve fuel from storage.

#### **Canadian skills initiatives**

- The **University Network of Excellence in Nuclear Engineering (UNENE)** [www.unene.ca](http://www.unene.ca) is an alliance of universities, nuclear power utilities, research and regulatory agencies established in 2002 to develop nuclear education and research and development capability. UNENE has established new nuclear professorships in six Ontario universities as well as offering a course based master's programme in nuclear engineering.
- The **University of Ontario Institute of Technology (UOIT)** [www.uoit.ca](http://www.uoit.ca) has set up a new school of Energy Systems and Nuclear Science in 2003. The first 50 graduates from nuclear related degree programmes are expected in 2007.
- Perhaps because the Canadian industry is more focussed on operations than decommissioning, skills programmes in Canada tend to be industry led through apprenticeships and training schemes rather than government led.