



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

The Canadian Nuclear Renaissance

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Outline



- Current Global Situation
- Introduction to the Canadian Nuclear Safety Commission (CNSC)
- Canada and the Nuclear Renaissance
- Canada's Readiness for the Renaissance
- New Build Licensing Framework
- International Initiatives
- Advanced CANDU Reactor (ACR)-1000
Case Study
- Medical Radioisotope Crisis
- Canada and the IARC Study
- Concluding Remarks



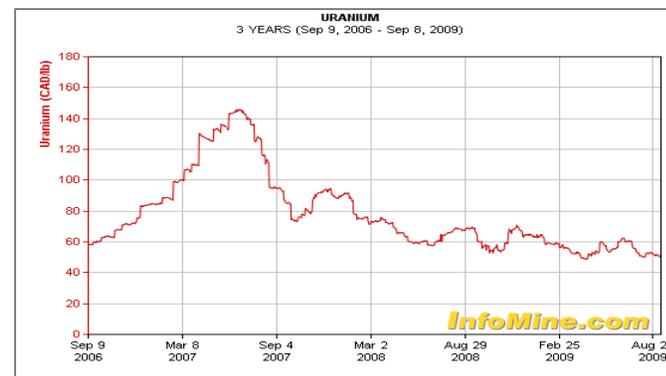
A Lot has Happened Last Year



- Markets collapsed and are recovering
- Crude oil and uranium prices in flux
- Wary investors
 - Challenge for large projects, including nuclear sector
 - New World Energy Report by the International Energy Agency (IEA): “Financing of new nuclear power plants has always been difficult and the financial crisis seems almost certain to have made it even more so”



Source: globeinvestor.com

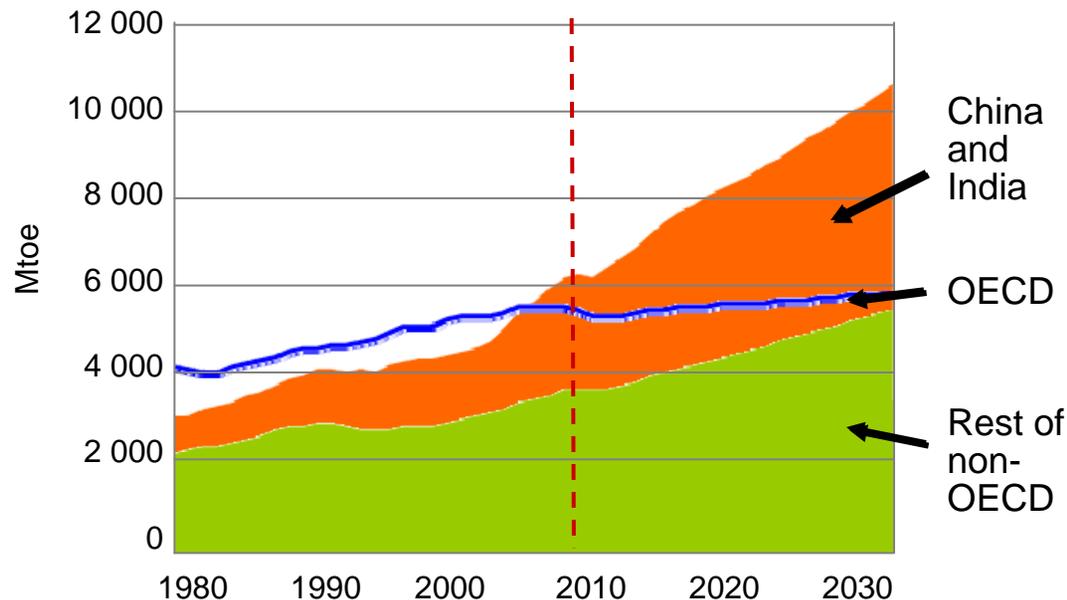


Source: infomine.com

Forecasting is not for the Faint of Heart



World primary energy demand



Source: IEA World Energy Outlook, 2009

National Energy Board (NEB)

- Energy demand growth slows from historic 1.6% to 0.7% per year
- Electricity generation increases 20.7% to 2020
- Nuclear at 14.5% by 2020

Source: National Energy Board, 2009
Reference Case Scenario: Canadian Energy Demand and Supply to 2020

Demand slump first since 1981 but with recovery primary energy demand 40% higher in 2030 than in 2007

Climate Change and Energy Demand...



- International pressure to reduce emissions footprint
- Drive to low-carbon economy
- Choices in mitigation
- Climate Change Summit in Copenhagen, December 2009

"...without a significant increase in nuclear power, the world will be unable to meet required greenhouse gas reduction targets."

*The Honourable Jim Prentice, Minister of the Environment,
Speech to the Council for Clean and Reliable Energy, October 25, 2009*

...Will be Major Drivers in Energy Decisions

Can GHG Targets be Met Without Nuclear?



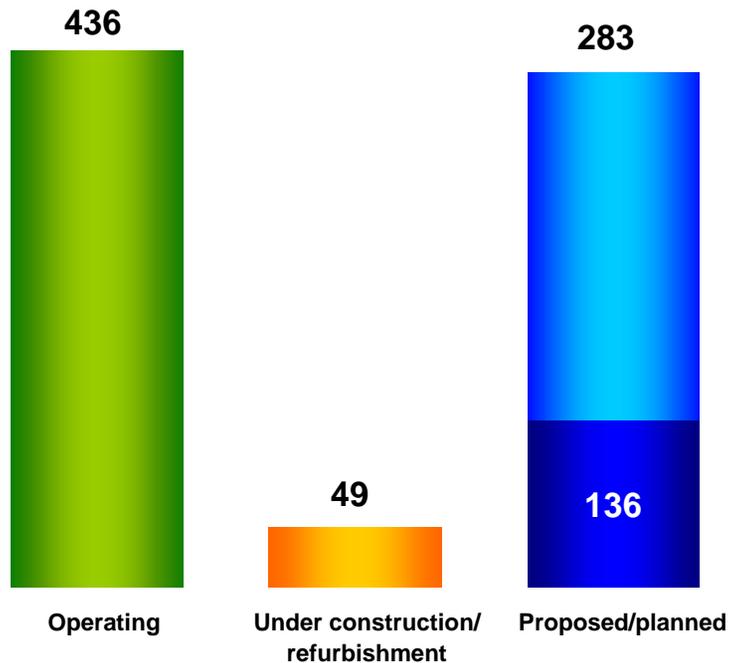
- Countries are rethinking their energy mixes
- Who doesn't like wind and solar???but they require intensive land use and can be intermittent
- Nuclear is a low emissions form of electricity; good baseload, but intensive capital investment
- Costs comparisons are a dicey business
- IEA calls for investments of \$125 billion in nuclear projects by 2020 and \$491 billion by 2030

That's not our Decision to Make...

Nuclear is Already Part of the Mix...



World Nuclear Power Reactors 2009



Some countries are rethinking traditional positions:

- Sweden, Italy, Germany

Others stepping up to climate change challenge with nuclear:

- China, South Korea, United Kingdom

Source: World Nuclear Association, *World Nuclear Power Reactors 2008-2009 and Uranium Requirements*, August 1, 2009

...Around the World

Canadian Power Reactor Projects Currently Underway



- Bruce A – Units 1 and 2 Restart
- Point Lepreau Refurbishment
 - Project is delayed; projected completion - January 2011
- Gentilly 2 Refurbishment
 - Scheduled to commence in 2011
- Darlington – New nuclear power plant
 - Joint Review Panel Appointed in October 2009

What's Happening with Canadian Uranium Mines and Mills...



Active projects

- Key Lake Mill
- McArthur River Mine
- Cigar Lake Mine
- Rabbit Lake Mine/Mill
- McClean Lake Mines/Mills
- Midwest Mine

In-progress Projects

- Kiggavik Project (Nunavut)
- Matoush (Quebec)
- Millennium Project (Saskatchewan)

Commitment to addressing legacy sites

- Beaverlodge and former Gunner and Lorado Mine Sites

... Supplying 25% of World Demand

and Waste Management....



Big issue at home

- Port Hope – Legacy clean-up
 - Committed to clean-up legacy waste
 - Hearing in August and licence issued in October 2009
- Deep Geological Repository
 - Preparation of EIS and studies continue
 - Joint Review Panel projected for early 2011

And abroad

- Yucca Mountain?
- Finland, Sweden, Germany and France
 - Work underway for low and intermediate level and high level waste



... Contained and Controlled

Future of Canada's Nuclear Renaissance?



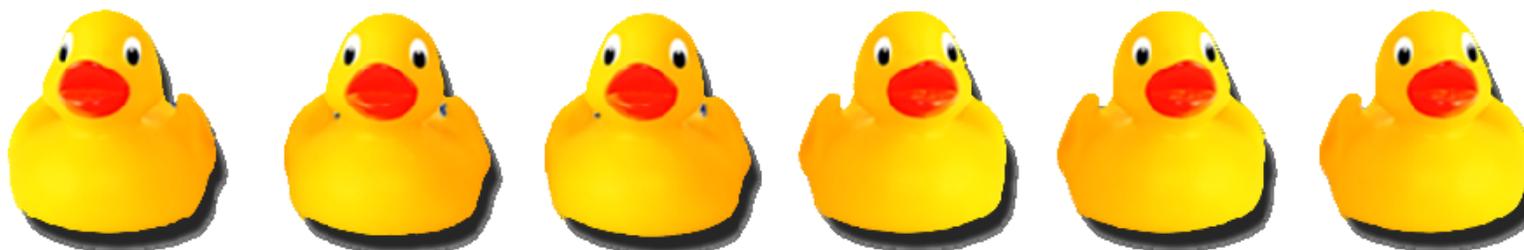
- **Bruce and Nanticoke New Builds (Ontario)**
– Cancelled
- **Darlington New Build** – Suspended?
- **Darlington** – Life extension/refurbishment?
- **Pickering** – Refurbishment?
- **Point Lepreau 2** ?
- **Saskatchewan New Build** ?
- **Alberta New Build** ?

This is still on the fence . . .

So...what's my point?



We have to be ready to respond to whatever the future brings!



Commitment from Government



“[The Government of Canada] will ensure that Canada’s regulatory framework is ready to respond should the provinces choose to advance new nuclear projects.”

Source: 2008 Speech from the Throne

“Nuclear power [is] set to play an increasingly important role in balancing the need for power with a desire to reduce greenhouse gas emissions.”

*The Honourable Lisa Raitt, Minister of Natural Resources,
Natural Resource Committee, November 2, 2009*



Clear Directions and Expectations

Our Mission is Clear



To protect the **health, safety** and **security** of persons and the **environment**; and to respect Canada's **international commitments** on the peaceful use of nuclear energy.



Canadian Nuclear Safety Commission



- Established May 2000 under the *Nuclear Safety and Control Act*
- Replaced the Atomic Energy Control Board of the 1946 *Atomic Energy Control Act*

Canada's Independent Nuclear Regulator - 63 Years of Experience



Nuclear Safety and Control Act (2000)



- Modern legislation
- Establishes the Canadian Nuclear Safety Commission to regulate the use of nuclear energy and materials to:
 - protect the health, safety and security of persons and the environment;
 - respect Canada's international commitments on the peaceful use of nuclear energy; and
 - disseminate objective information

Regulatory Philosophy

Licensees responsible for the protection of health, safety, security, and the environment and respecting Canada's international commitments

CNSC responsible for regulating licensees, assessing whether licensees are compliant with the NSCA, regulations, and international obligations

Nuclear Regulation is a Federal Responsibility

CNSC Regulates Facilities and Activities...



The fuel cycle

- Uranium mines and mills
- Uranium fuel fabricators and processing
- Nuclear power plants
- Waste management facilities



Other facilities and activities

- Nuclear substance processing
- Industrial and medical applications of nuclear substances
- Research and educational facilities
- Export/import of controlled nuclear substances, equipment and technology



The Commission



- Quasi-judicial administrative tribunal
- Commissioners are independent
- Commission hearings are public and Webcast
- Supported by a Secretariat and independent legal services



Transparent Decision-Making

Scientific, Technical, Professional



Responsible for:

- Implementing decisions of the Commission
- Licensing and verifying compliance
- Environmental assessments
- Regulatory guidance
- Advising on regulatory policy
- Engaging public and Aboriginal groups



Staff Located Across Canada



Staff: ~ 850
Resources: \$150 m

Licensees: 2,050
Licences: 3,300

Calgary
Western Regional Office

Saskatoon
Uranium Mills and Mines
Division Regional Office

Gentilly-2

Point Lepreau

HQ in Ottawa
5 site offices at power reactors
1 site office at Chalk River
4 regional offices

Chalk River

HQ

Laval Eastern Regional Office

Bruce A & B

Darlington

Mississauga Southern
Regional Office

Pickering

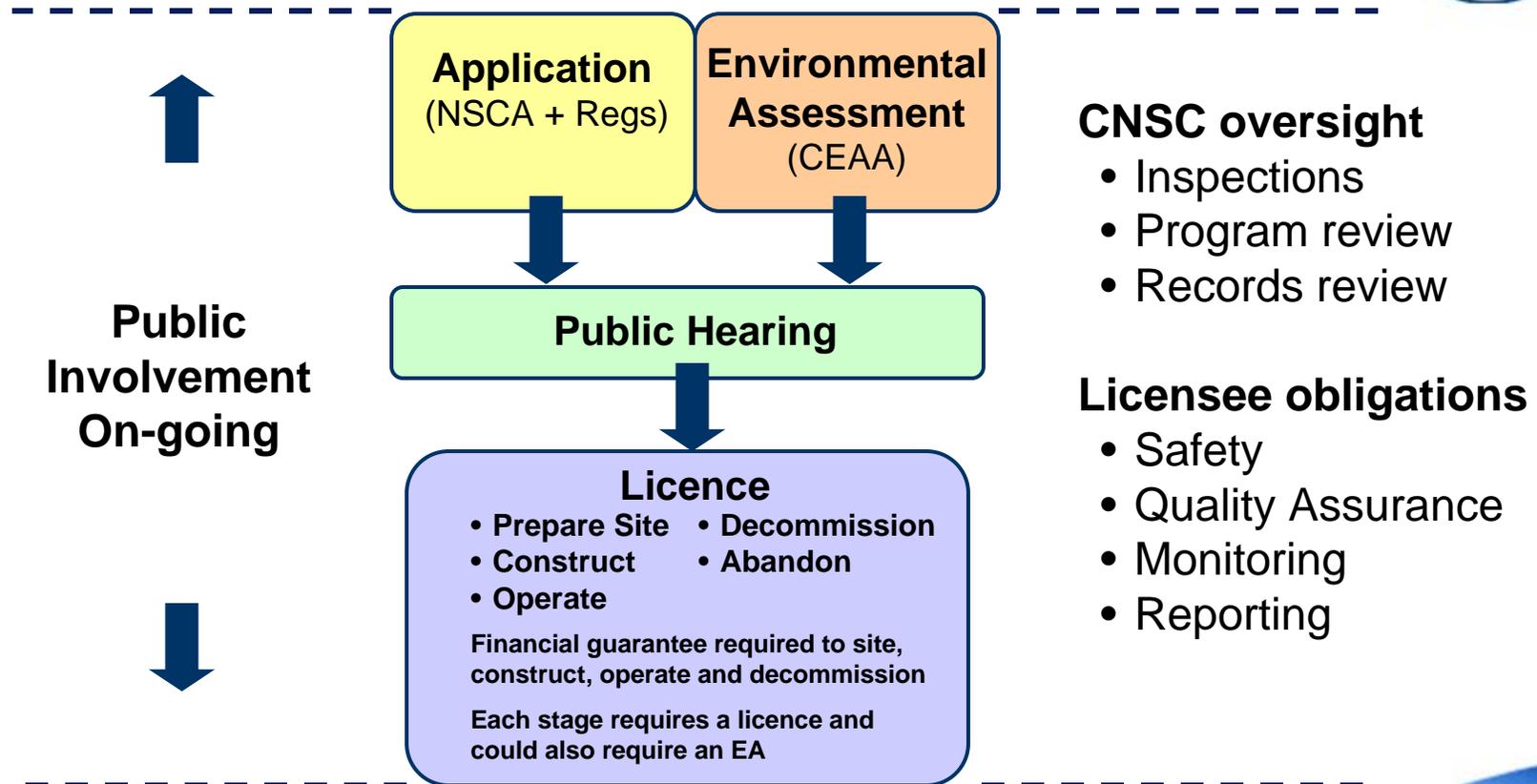
Regulatory Structure



The Canadian Nuclear Safety Commission (CNSC) is an effective and independent regulator

- Open, clear and transparent regime and process
- Works in partnership with other government departments, cooperates internationally and operates in an open and transparent fashion
- Utilizes modern legislation, standards and guides and incorporates IAEA guidance
- Has a comprehensive system for licensing and compliance, including requirements for communication and financial guarantees

Licensing Process for Major Facilities



Working to be the Best Nuclear Regulator in the World



- Commitment to ongoing improvements
- Clarity of requirements
- Capacity for action
- Communications



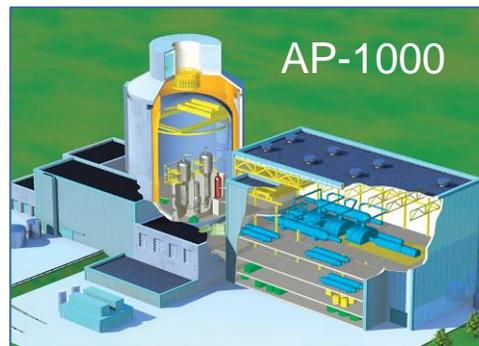
***IAEA Integrated Regulatory Review Service
Mission Confirms We're on Track!***

Renaissance: CNSC's Readiness?



New Builds

- Design Reviews
- Staff Review Guides
- Implementation of Joint Review Panel



Renaissance: Licensing Framework



- Integration of EA and licensing processes
- Parallel processes for licence applications
- Regulatory framework
 - **RD337**, *Design of New Nuclear Power Plants*
 - **RD346**, *Site Evaluation for New Nuclear Power Plants*
 - **RD360**, *Life Extension of Nuclear Power Plants*
 - **INFO-0756**, *Licensing Process for New Nuclear Power Plants in Canada*
 - **INFO-0759**, *Licensing Process for New Uranium Mines and Mills in Canada*

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CNSC is Active Internationally...



CNSC has a longstanding history of international cooperation

- Bilateral and multilateral relationships with regulators in CANDU and non-CANDU countries

...and the same is true for new builds

- International Atomic Energy Agency Standards
- Multinational Design Evaluation Program
- Bilateral arrangements for effective and efficient design reviews
- Leverage experience of non-CANDU regulators and share experiences

ACR-1000 Case Study



- Pre-project review of the approach to ALARA was conducted for the ACR-1000
- CNSC staff expects a robust ALARA approach be implemented in the design of any new reactor
- A design that is not ALARA would constitute a fundamental barrier to licensing

The Medical Isotope Story...



NRU shutdowns

CNSC responses:

- Talisman *Lessons Learned Report*
- Re-licensing and re-start protocols

Government of Canada responses:

- Nuclear Energy Agency international workshop and taskforce
- Canada/U.S. working group
- Expert review panel on medical isotope production



...A Fragile Supply Chain

Canada and the IARC Study



- In 2005, the International Agency for Research on Cancer (IARC) published a study of 15 countries' nuclear energy workers.
- Canada's risk estimate for cancer differed from the other 15 countries.

IARC Study: What has Canada Done?



- A study of Canadian nuclear energy workers (Zablotska et al, 2004) was published the year prior to the IARC-15 country study.
- A detailed review of the Canadian data has been performed.
- Errors were suspected in the transfer of data to the National Dose Registry (NDR).

IARC Study: Path forward



- CNSC has been re-analyzing the records since 2005 to better understand the situation.
- There remains considerable uncertainty in the quality of certain components of the data for the period 1956-1965.
- The CNSC will continue to investigate to determine the reasons for the 1956-1965 anomaly.

Concluding Remarks

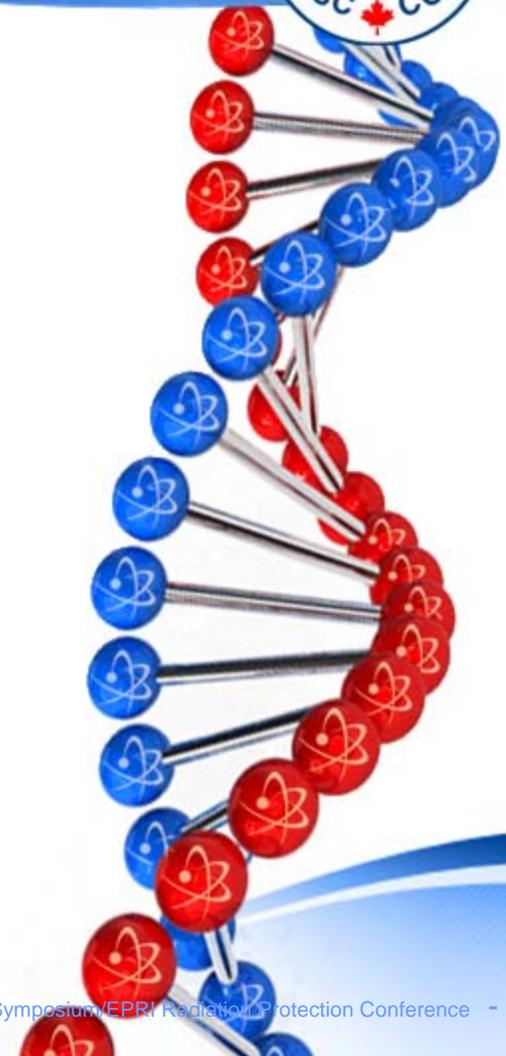


- The nuclear renaissance in Canada is real and already underway.
- The CNSC has made a substantial investment to prepare for the renaissance.

CNSC will not Compromise Safety...



***It's in our
DNA!***





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Canada 