



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

# ***The Canadian Nuclear Renaissance***

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[nuclearsafety.gc.ca](http://nuclearsafety.gc.ca)



# 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](http://globeinvestor.com)



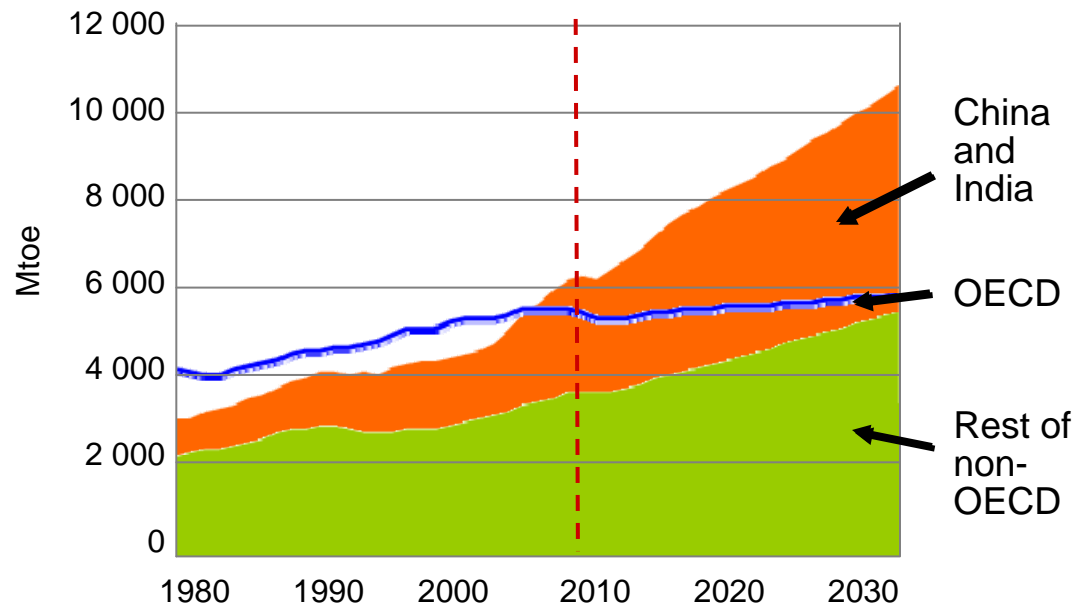
Source: [infomine.com](http://infomine.com)



# 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?***



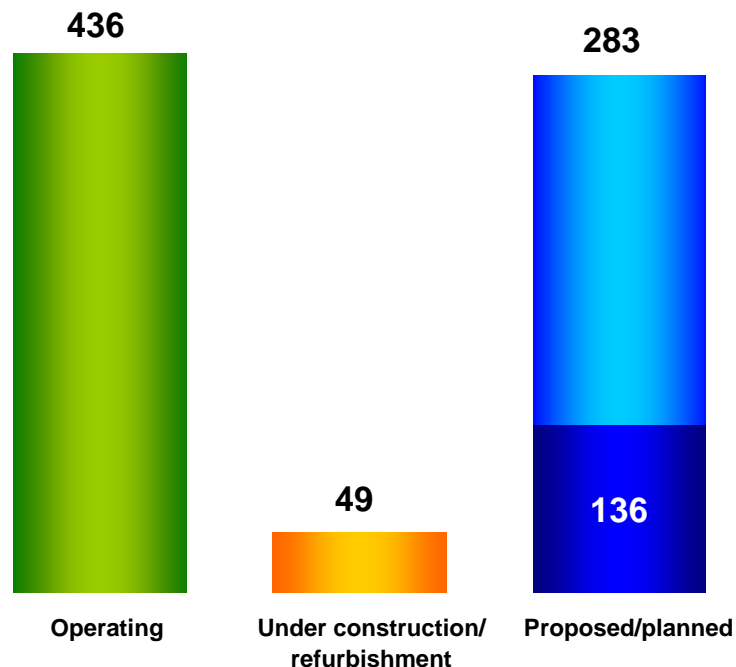
- Countries are rethinking their energy mixes
- Who doesn't like wind and solar??? ....but they require intensive land use and can be intermittent
- Nuclear is a low emissions form of electricity; good baseload, but intensive capital investment
- Costs comparisons are a dicey business
- IEA calls for 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?***



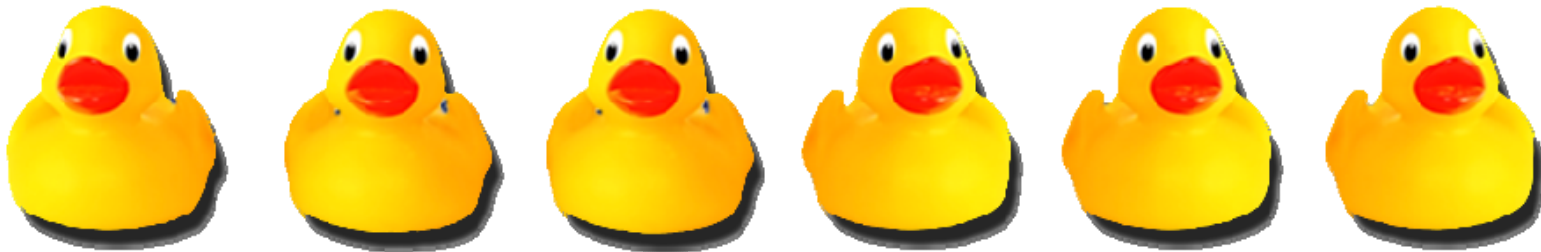
- **Bruce and Nanticoke New Builds (Ontario)**  
– Cancelled
- **Darlington New Build** – Suspended?
- **Darlington** – Life extension/refurbishment?
- **Pickering** – Refurbishment?
- **Point Lepreau 2** ..... ?
- **Saskatchewan New Build** .... ?
- **Alberta New Build** .... ?

***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.

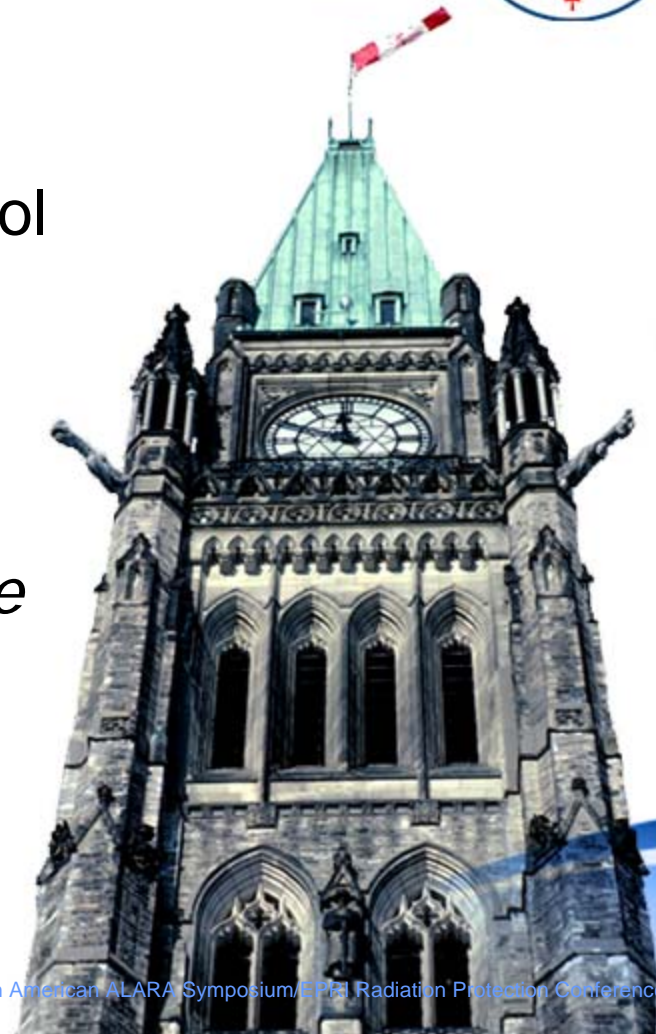


# ***Canadian Nuclear Safety Commission***



- 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...***



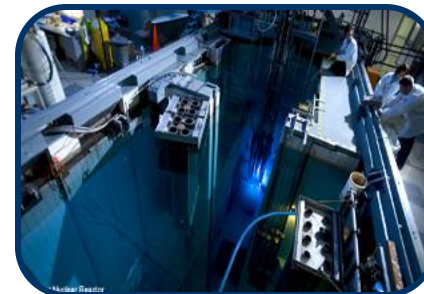
## **The fuel cycle**

- 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

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

Gentilly-2

Point Lepreau

Chalk River

HQ

Laval Eastern Regional Office

Bruce A & B

Darlington

Mississauga Southern  
Regional Office

Pickering



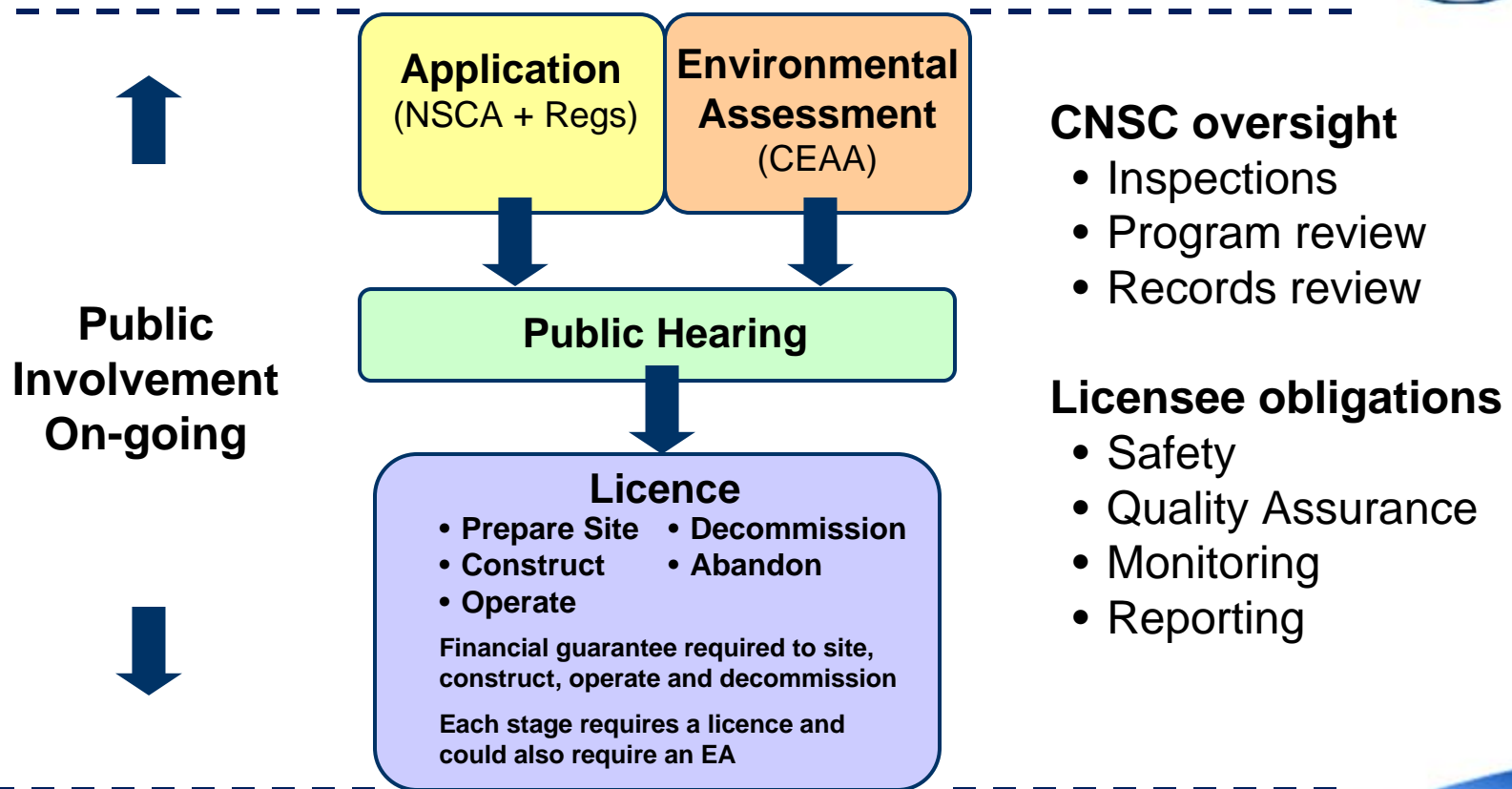
# ***Regulatory Structure***



## **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!***

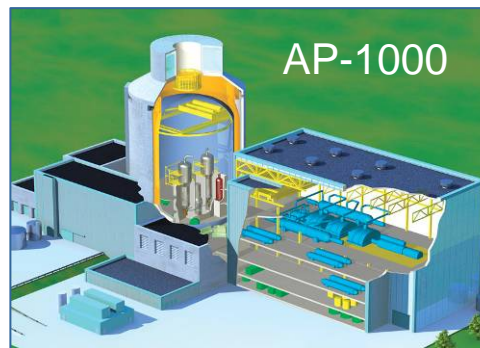


# ***Renaissance: CNSC's Readiness?***



## **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*

**[nuclearsafety.gc.ca](http://nuclearsafety.gc.ca)**

# ***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.

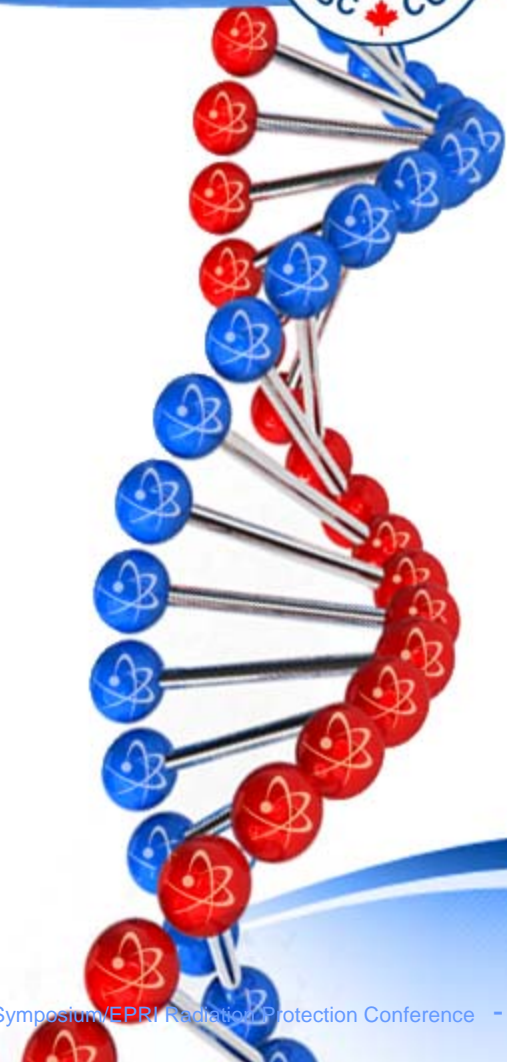
# ***Concluding Remarks***



- 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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