NATURAL RESOURCES CANADA - INVENTIVE BY NATURE

Historical Context of the Uranium Sector and Federal Policies

Presentation to the
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Government Jurisdiction over Uranium

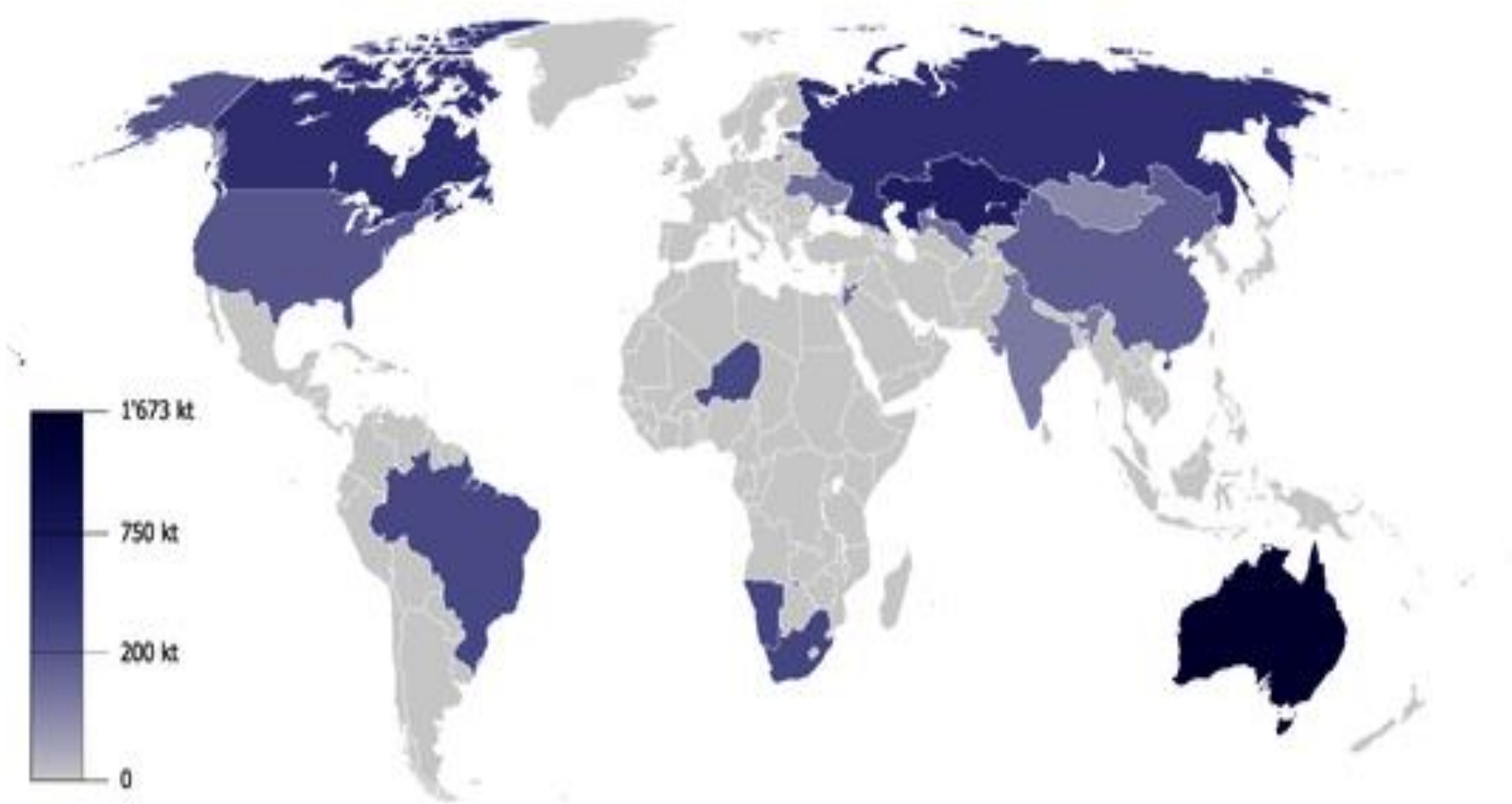
- Since 1930 – **All ten** Canadian provinces responsible for the sustainable use of mineral resources within their boundaries;
- Before 2003 – Federal government responsible for the sustainable use of mineral resources in the 3 territories; with the exception of Nunavut, responsibilities have **now** been transferred to the territorial governments [Yukon Territory (2003); Northwest Territories (2014)];
- Since 1946 – Federal jurisdiction under t*he Atomic Energy Control Act (AEC)* for **all provinces and territories**.
  - 1948: federal regulations on security aspects for uranium; provinces regulate health, safety and environmental aspects;
  - 1977: federal regulations on health, safety, environment for uranium.
  - 2000 - The *Nuclear Safety and Control Act* replaces the AEC Act.

Natural Resources Canada

- Under *the Department of Natural Resources Act,* the department seeks to enhance the **responsible** development and use of Canada's natural resources;
- Under the *Nuclear Energy Act*, the Government of Canada may undertake research and investigations with respect to nuclear energy, including uranium mining;
- The Canadian Nuclear Safety Commission is Canada's independent nuclear regulator that reports to Parliament through the Minister and administers *the Nuclear Safety and Control Act*;
- Related federal legislation and policies:
  - The *Nuclear Liability Act,*
  - The *Nuclear Fuel Waste Act,*
  - The *Non-Resident Ownership Policy in the Uranium Mining Sector*,
  - Canada's *Nuclear Non-Proliferation Policy (*Foreign Affairs, International Trade)

Canada and the World: Uranium Resources

(World Nuclear Association-WNA)



Canada's Uranium Sector up to Post-WWII

- **1930s:**
  - Uranium ores mined in the Northwest Territories (NWT) to recover **radium** for medical treatments;
- **1940s:**
  - Policy to support war effort; ban on private mining; Gvt creates Eldorado Mining and Refining Limited;
  - In 1946, Parliament declares through the *Atomic Energy Control Act* that uranium mines were works or undertakings "for the general advantage of Canada", therefore subject to federal government control;
- **1950s:**
  - Post WWII, exploration accelerated after ban on private mining lifted, leading to discovery of uranium deposits in **Ontario** and **Saskatchewan**;
  - Commercial uranium production begins;
  - Canada strong supporter of creation of the United Nations **International Atomic Energy Agency;**

Start and Expansion of Canada's Civilian Nuclear Energy Program

- **1960s:**
  - U.S. military contracts end and downturn in uranium production;
  - In 1965, Government policy requires all uranium sales be for peaceful purposes;
  - **1968-1970: The Treaty on the Non-Proliferation of Nuclear Weapons**;
  - Development work for Canadian nuclear energy reactor technology;
- **1970s:**
  - Expansion of nuclear energy power program in Canada and abroad;
  - In parallel, **key federal uranium-related policies introduced:**
    - Nuclear Non-Proliferation Policy,
    - Non-Resident Ownership Policy in the Uranium Mining Sector,
    - Canada is a founding member of the Nuclear Suppliers Group.

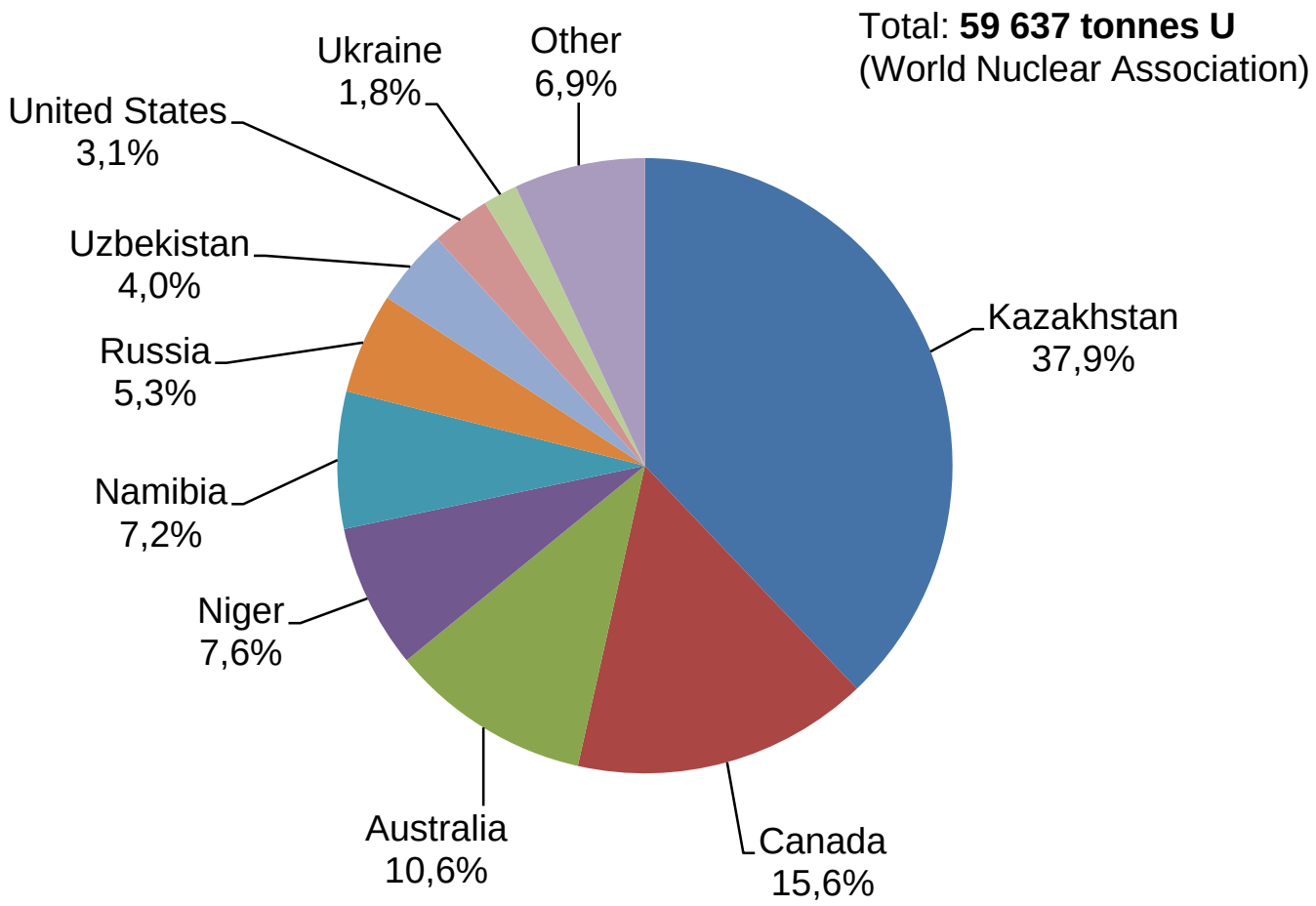
Rise in Uranium Production

- **1980s:**
  - Discoveries of **high-grade** uranium ore deposits in Saskatchewan;
  - In 1988, federal and SK-owned government uranium companies privatized and merged to form **Cameco Corporation,** now the world's second largest uranium producer.
- **1990s:**
  - Uranium production in Ontario ends, while attention focuses on high-grade ore uranium production in Saskatchewan.
- **2001:**
  - Expectation of nuclear renaissance, current rapid expansion of growth in certain Asian countries, *e.g.,* **China and India;**
- **2014:**
  - Canada now sells uranium to more than 45 customers in Canada**, the U.S., Asia, Europe and Latin America.**

Some Factors Influencing the Development of a Uranium Mining Sector

- Uranium demand, given energy needs and nuclear energy policies;
- Intensity of exploration activities and discovery of significant uranium deposits *(domestic or abroad);*
- Economic factors *(e.g., price of uranium, production costs);*
- Strategic objectives *(e.g., energy security, international relations, nuclear non-proliferation policies);*
- Other factors affecting the jurisdiction's political choice.

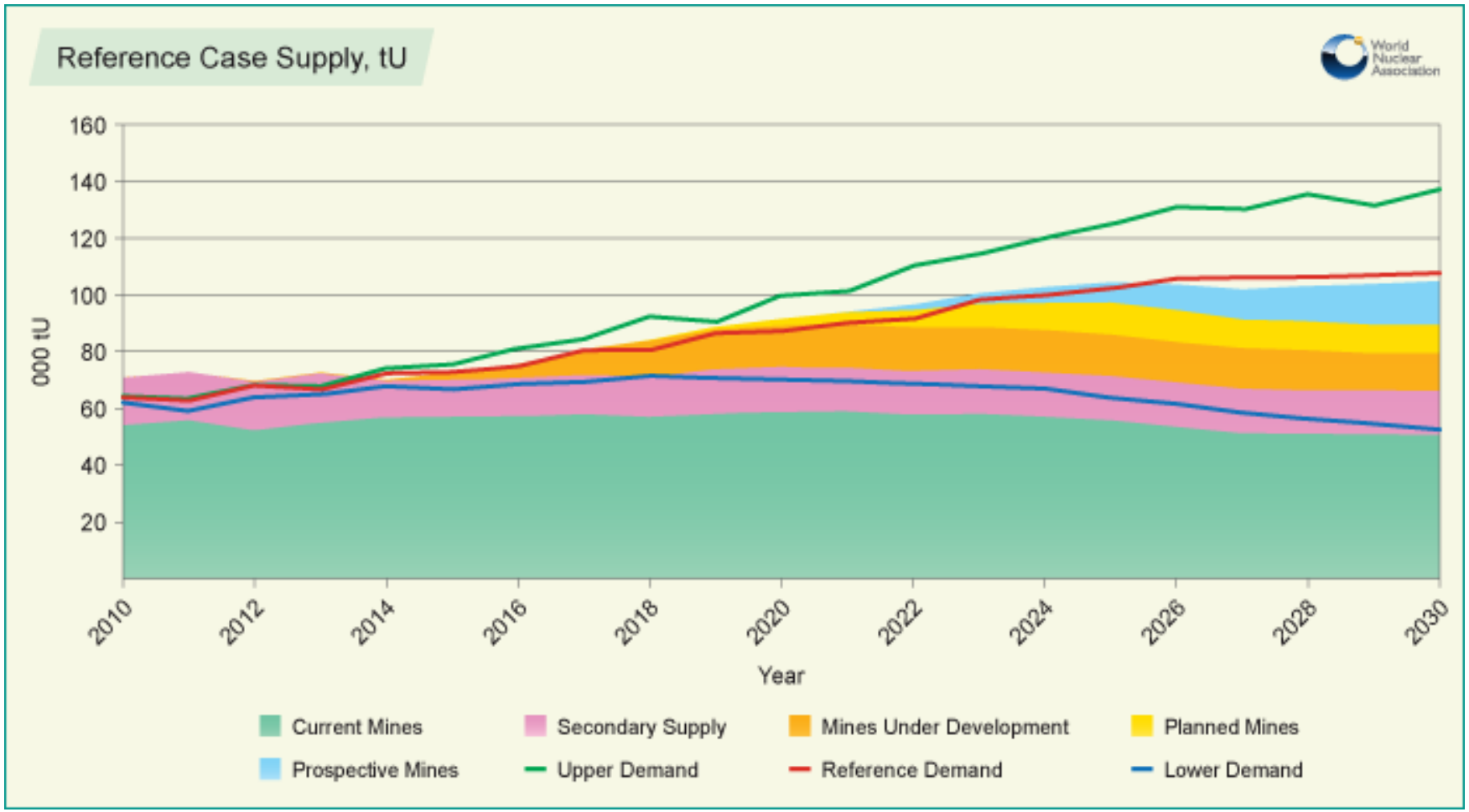
2013 World Uranium Production



Current Uranium Requirements (WNA)

- **Top** four uranium consuming countries (70% of world consumption): United States – 34%; France – 16%; China – 11%; Russia – 9%;
- **65 000 tonnes** of uranium per year is now required to fuel the world's current fleet of nuclear power plants (about **60 000 tonnes** is now produced annually by mining);
- Additional uranium is provided by secondary supplies (government stockpiles, reprocessing);
- Until 2013, an additional secondary supply of **7 500 tU** per year was provided by a U.S.-Russia agreement to dismantle nuclear weapons;
- To meet current uranium demand, **new mines** will be needed, given the reduced availability of secondary supplies and to replace mines which close when their resources are depleted.

World Uranium Requirements (WNA, 2009)



Future Uranium Requirements (Redbook, 2011)

The UN International Atomic Energy Agency and the OECD Nuclear Energy Agency estimate that:

- World nuclear power production will grow by up to **80%** by 2030;
- Annual uranium requirements in 2030 will be more than **100 000 tonnes** of uranium per year;
- **New mines** will be needed to supply this increased demand;
- Uranium prices are expected to rise as demand increases;
- With increased prices, more uranium deposits will become economic.

Uranium Production in Canada (NRCan)

- Canada was the world's largest producer of uranium until **2009** when Kazakhstan became the world's largest producer;
- Canada has **9%** of the world's uranium resources, most of which is contained in high-grade ore deposits;
- About **85%** of Canada's uranium is exported for nuclear energy throughout the world, the remainder in Canada's nuclear reactors;
- In 2013, Canada produced **9 332 tonnes** of uranium, ranking second in the world with **15.6%** of total production;
- Total production value in 2013 was **$1.2 billion**, 5th largest among the value of metals mined in Canada.

Canadian Uranium Mines

Canada's **current** uranium production is from **three** underground mines in northern Saskatchewan:

- The McArthur River Mine is the **world's largest** uranium mine, producing 13% of world production in 2013;
- The Cigar Lake mine will be the **world's second largest** uranium mine when in full production;
- The Rabbit Lake is the world's **12th** largest uranium mine. The mine began production in 1975; it is one of the world's longest operating uranium mines.

With respect to **new mines** for future uranium requirements, the next presentation by NRCan will provide an overview of Canada's uranium resources.