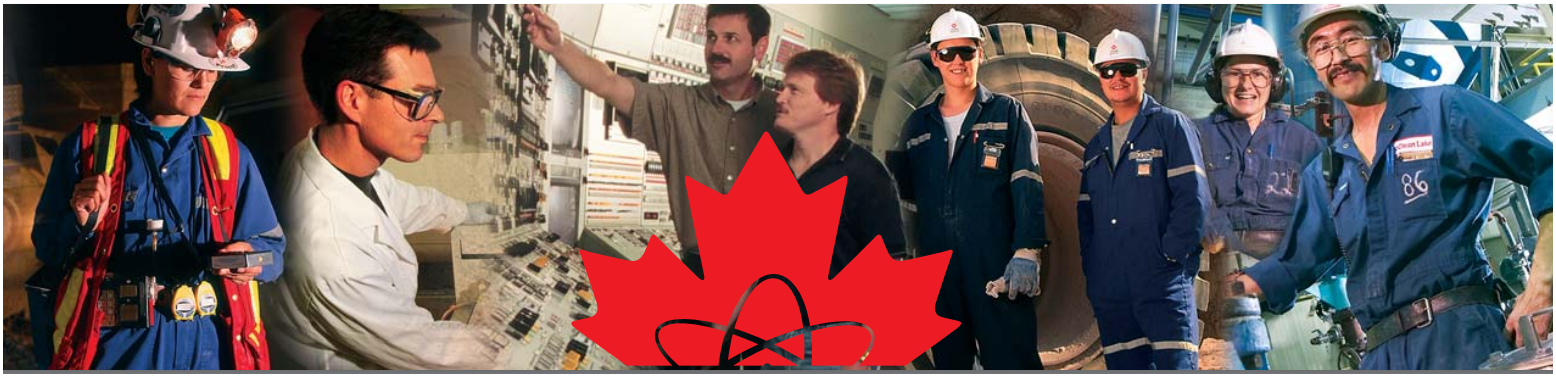

CANADIAN NUCLEAR
WORKERS' COUNCIL

Nuclear Energy & the Environment

Key Points

- Since 1972, Canada's CANDU nuclear technology has avoided the addition of 2.4 billion tonnes of carbon dioxide and 48.9 million tonnes of sulphur dioxide into the atmosphere.[1]
- The Canadian Nuclear Safety Commission (CNSC) regulates the use of nuclear energy and materials to protect health, safety, security and the environment.
- The CNSC assesses the environmental effects of all nuclear facilities and activities at every phase of their lifecycle.[2]
- The CNSC undertakes Environmental Assessments (EAs) in accordance with the *Canadian Environmental Assessment Act, 2012* or under the *Nuclear Safety and Control Act*. These EAs provide opportunities for the participation of the public and indigenous people and to address the impacts of nuclear activity on air, water, soil, plants, animals, human health, weather, seismic events and climate change.[3]
- The utility companies that operate nuclear facilities in Ontario and New Brunswick and the uranium mining operations in Saskatchewan are committed to minimizing the environmental footprint of their operations and to work with a broad range of partners to sustain and improve biodiversity. The Canadian Nuclear Workers Council shares and supports this commitment.

Background:

For over 45 years, Canada's CANDU reactors have been safely, reliably and cost effectively providing low carbon and low cost electricity to our homes and businesses. CANDU reactors and Canadian uranium exported to other countries such as China and India help those countries reduce their greenhouse gas (GHG) emissions and other air pollutants that cause smog.

Nuclear energy, like all forms of electricity production, has environmental benefits and impacts. Unlike other generation technologies, a comprehensive regulatory framework addresses the full life cycle impacts of nuclear generation including construction, operation, decommissioning and waste management. The biggest benefits of nuclear energy relate to air quality, climate change and land footprint, while low-level radioactive waste and used nuclear fuel are two radioactive wastes that must be safely and responsibly managed.

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[1] Power for the Future, Canadian Electricity Association, 2013
[2] Presentation, Michael Binder, President and CEO, CNSC, March 9, 2017
[3] Ibid

Air Quality:

Nuclear, wind, solar and hydroelectric generation are considered to be low-carbon sources of electricity as they emit almost no carbon or GHG emissions or other smog producing pollutants. However, wind and solar produce electricity only when the wind blows and the sun shines. Compared to baseload nuclear generation, wind and solar require backup from other sources more than 70 percent of the time. Typically, that back up is provided by natural gas generation or other GHG emitting sources.

Nuclear power plants do not emit particulate matter (PM), sulphur dioxide (SO2) or nitrogen oxide (NOx), while fossil fuelled generation, such as coal and natural gas do. Particulate matter results in hazy conditions in cities and, along with ozone, contributes to asthma and chronic bronchitis. Small or fine PM is believed to cause emphysema and lung cancer. SO2 causes acid rain and also worsens respiratory illnesses and heart diseases. NOx contributes to ground level ozone, which irritates and damages the lungs.[4]

Climate Change:

On a full power generation life cycle basis, all forms of electricity production emit some level of carbon dioxide (CO2) or other greenhouse gas emissions (GHG) even if they don't burn fossil fuels like coal or natural gas.

A 2014 Intergovernmental Panel on Climate Change report showed that nuclear power compares favourably with wind and hydroelectric power on lifetime carbon emissions. Natural gas generation emits 29 times as much carbon as nuclear power.

International and Canadian analyses undertaken by credible, independent experts and agencies indicate that nuclear power must play a critical role in fighting the global climate change challenge. These include the Union of Concerned Scientists, Nuclear Energy Agency of the Organization for Economic Co-Operation and Development, Canada's National Roundtable on the Environment and Economy and the Government of Canada's Mid-Century Long-Term Low-Greenhouse Gas Development Strategy.

Land Footprint:

Nuclear energy, including all aspects of production (e.g., mining and fuel fabrication) is the most land efficient form of electricity generation. For more information see the *Canadian Nuclear Factbook 2017, Nuclear and the Environment* at www.cna.ca.

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[4] www.eia.gov/energyexplained/print.cfm?page=electricity_environment

Low, Intermediate and High Waste:

Canada has safely managed used nuclear fuel and radioactive waste for more than four decades in accordance with the licencing and regulatory requirements of the Canadian Nuclear Safety Commission.

Nuclear wastes include used nuclear fuel, intermediate waste (used reactor components) and low-level waste (minimally radioactive waste such as: mop heads, rags, protective clothing etc.).

Currently, used fuel is safely and securely stored in water filled bays and dry storage containers at the nuclear station sites and is managed by the utilities that own the fuel. Low and intermediate nuclear waste is managed and stored at Ontario Power Generation's (OPG) Western Waste Management Facility located on the shores of Lake Huron near Kincardine. OPG has proposed a Deep Geologic Repository for the long-term management of low and intermediate waste.

The Government of Canada established a Nuclear Waste Management Organization (NWMO) in 2002. Based on best international practices in countries such as Sweden, Switzerland, Japan, Germany and the United Kingdom, the purpose of the NWMO is to find a long-term solution for used nuclear fuel. Producers of the used fuel contribute to trust funds that will ensure the long-term management of Canada's used nuclear fuel. In addition, a multinational research effort is underway to find ways to recycle used nuclear fuel in Canada's CANDU nuclear technology. CANDU technology is well-suited to the task of recycling used nuclear fuel.

Both the proposed DGR project and the long-term used fuel storage facility are subject to comprehensive technical and environmental assessments, extensive public consultation and finding and working with willing host communities.