

Benefits of nuclear energy

Nuclear energy provides many benefits, to our environment, to our health, and to our economy.

Clean, safe, economical electricity

- The most evident use of nuclear energy is the production of electricity by nuclear power plants.
- Nuclear power provides clean, safe, economical electricity. Canada's own CANDU nuclear power plants emit no carbon dioxide (CO₂), which is the major "greenhouse gas" affecting climate change, or sulphur dioxide (SO₂), or nitrous oxides (NO_x), which are the major contributors to air pollution, smog, and acid rain.
- CANDU power plants are very safe, with multiple independent safety systems to shut down the plant and maintain it safely in case of any malfunction or external event.
- CANDU plants use natural uranium as fuel, which is plentiful and economical. The relatively low cost of uranium means that nuclear power offers stable electricity costs over many years. In fact, a 100% increase in the price of uranium results in less than a 5% increase in the price of electricity.
- The waste from nuclear plants is relatively small and is totally managed. A 600 MW CANDU nuclear reactor produces only 20 cubic metres of used fuel bundles per year.
- Nuclear power is the most extensively regulated form of energy, having to meet very stringent safety and environmental requirements for all aspects, from mining to waste management.

Health benefits

- Every year, millions of lives around the world are saved through the use of nuclear medicine.
- Nuclear technology helps with early diagnosis and treatment, often preventing the need for surgery, and helping to lower medical costs.
- Canadian nuclear reactors currently produce about 85% of the world's cobalt-60, which has been used to treat cancer for more than 30 years.
- Thirty per cent of all disposable medical supplies used worldwide are sterilized using cobalt-60 produced in Canadian reactors.
- Canada is the world's major source of radioisotopes for medical diagnosis
- About 80% of the radioisotopes produced are exported, along with considerable equipment such as cancer therapy machines, irradiators, and various instrumentation for measurement and testing.

Environmental benefits

- Emissions from the electricity sector in Canada would have been twice as high over the last 30 years if Canada did not have its fleet of nuclear reactors.
- Nuclear power displaced close to 1.5 billion tonnes (1,500 megatonnes) of carbon dioxide over this period if coal had been used instead of nuclear.
- Since coal is the alternative to nuclear energy in CANDU-purchasing countries, each CANDU reactor in China, Korea, Romania, and Argentina avoids 5 million tonnes of CO₂ per year.

Agricultural benefits

- Radiation is an important tool for farmers in Canada and around the world, producing high-yield crops which are disease- and weather-resistant.
- Nuclear technology helps control insects and pests and improve health in domestic animals by early detection of diseases.

Economic benefits

Canada's nuclear industry contributes to many sectors of the economy, through:

- mining, milling, refining, and conversion of uranium;
- production of reactor fuel;
- manufacturing of equipment and providing services for nuclear power plants in Canada and abroad;
- production of radioactive isotopes for use in medicine, industry, and agriculture; and
- improved materials through nuclear-related research.

Canada's nuclear industry:

- employs about 30,000, mostly highly trained, persons in over 150 high-technology companies and organizations;
- indirectly creates a further 70,000 jobs in supplies and services;
- produces more than 30% of the world's uranium, most of which is exported;
- exports more than \$1 billion per year, half in uranium, half in goods and services;
- produces most of the world's radioisotopes for medical diagnosis;
- generates \$700 million each year in federal income and sales tax; and
- contributes almost \$6 billion annually to the GDP.

Uranium production

- Canada is the world's leading producer of uranium, accounting for over 30% of the total production. The uranium mined in Canada contains more energy than does all of our annual oil and natural gas production combined.
- Almost all of this is exported, with a value of approximately \$500 million per year. Much of the uranium is converted into uranium hexafluoride before being exported for enrichment in plants in the United States and Europe.
- All of the currently operating uranium mines are in Saskatchewan, which has the world's richest known deposits. A refinery and a conversion plant are located in Ontario.

Exports

- Nuclear supplies and services, along with aerospace, are the only advanced technologies where Canada is a net exporter.
- The export of CANDU reactors to Argentina, China, Romania, and South Korea has supported many well-paid jobs in Canadian manufacturing and engineering companies.
- Canadian suppliers of nuclear equipment have developed a significant export market. A prime example is the replacement of steam generators in U.S. power plants (nuclear and fossil).
- Over the past decade the export of nuclear power plants and services has earned more than \$5 billion, plus a similar amount from the export of uranium concentrates.

Research and development

- Research conducted within the nuclear program has contributed in many areas, such as improvements in materials, increased knowledge of living systems, new chemical processes, and advanced mining techniques.
- Canada has the most effective nuclear program in the Western world for electricity produced per research dollar spent.
- The federal government has invested close to \$6 billion in nuclear research since World War II, generating at least \$40 billion of economic benefit to Canada just in the value of electricity produced by CANDU nuclear power stations and the Canadian content of CANDU reactors sold abroad.
- The production and distribution of radioisotopes has generated millions of dollars of export sales, not counting the immeasurable benefit derived from their application in medical diagnosis and treatment.