



Nuclear Technology: A Canadian Strategy for Energy, Jobs and Innovation

In 2012, the Canadian Nuclear Association (CNA) engaged the Canadian Manufacturers & Exporters (CME) to update a study on national jobs and economic impacts sustained by Canada's nuclear industry. The work was carried out from April to November 2012 with cooperation and support from CNA member companies. CME applied its best methods with consistently conservative assumptions throughout the study.

The **2012 Study** [[Click here to download](#)] reveals that Canada's nuclear sector supports strategies to rebuild national strength in energy affordability, increase employment in goods-producing sectors, and improve our capacity in advanced manufacturing and innovation.

Study Highlights

Employment

The Canadian nuclear industry directly and indirectly employs 60,000 Canadians.

- 30,000 Canadians are employed directly by the industry – primarily in uranium mining and power generation operations. Areas such as nuclear medicine and research also support national employment.
- We also support 30,000 spin-off jobs. A spin-off job is defined as employment in a community or in other industries that is generated indirectly by the increase in population brought on by a particular project. These jobs can include jobs in the manufacturing, hospitality, human resources, or housing sectors.

National Economic Value

Current mining and plant operations, including refurbishment projects bring \$7.9 billion annually to the Canadian economy.

- This includes all aspects of operations such as employment, labour income, fuel cost, equipment, materials.

Constructing a new two-reactor plant at the Darlington Generating Station in Ontario projected to bring this total to \$12.7 billion for five years.

For example, new reactors at Darlington would require the following material, making this project a tremendous driver for Canada's manufacturing sectors.

- Approximately 400,000 cubic metres of concrete;
- 20,000 tonnes of steel;
- 700 kilometres of wiring;
- 70 kilometres of piping.

Emerging Technologies

Nuclear technologies continue to advance and new product designs are being commercialized, such as small modular reactors (SMRs).

Construction of a new nuclear plant in Canada based on a pair of SMRs would involve some \$1.2 billion in engineering and goods procurement, and about \$400 million in on-site labour.

Projected Employment Growth

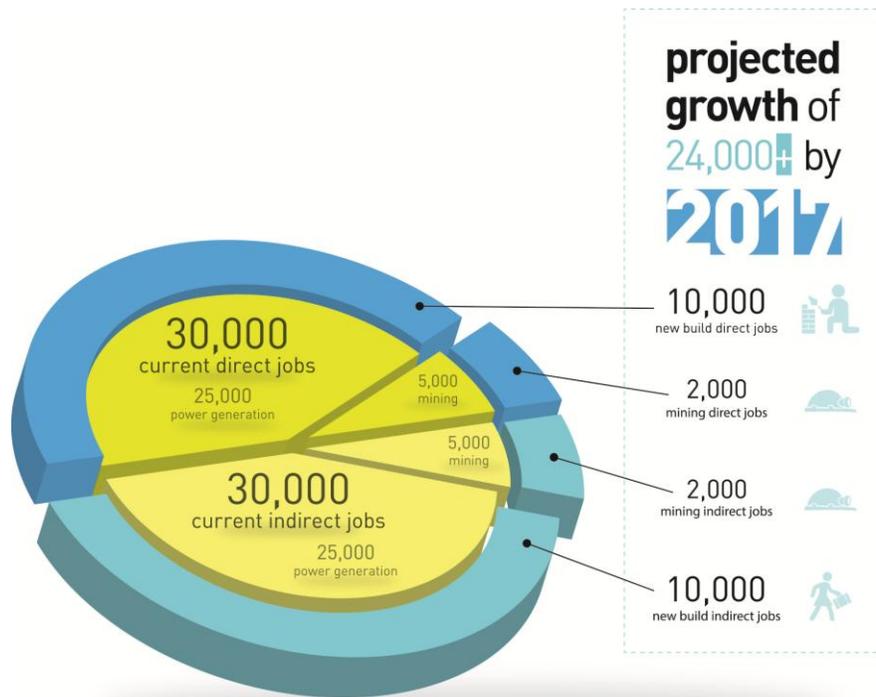
New investments in the nuclear industry will drive an estimated 40% growth in employment over the next five years. These plans include:

- Growth in northern Saskatchewan's uranium mining capacity;
- Mid-life refurbishment of ten more CANDU nuclear reactors at nuclear power plants over the coming eleven years;
- Proceeding with construction of two new CANDU reactors.

These investments – already written into Ontario's Long-Term Energy Plan (LTEP) and elsewhere – will deliver long-term affordable clean air power while yielding a conservatively projected 40 per cent growth over five years in Canada's highly paid, high-knowledge nuclear workforce.

- That's about 12,000 direct new jobs by 2017 and a similar number of spin-offs, totalling 24,000 jobs.

Building a new two-reactor power plant at Darlington will directly employ more than 10,000 people, and will support employment for over 10,000 others in Canada, for approximately a five-year period.



Assumptions, estimates, and ratio of impact on indirect jobs are all conservative. Based on investment plans for mine expansion and Ontario's Long Term Energy Plan. Source: Canadian Nuclear Association cna.ca

Canada's Uranium Operations

In 2009, Canada produced 20% of the world's uranium, second only to Kazakhstan.

In 2010, uranium exports totaled \$753 million. The largest export destinations for Canadian uranium were the United Kingdom and the United States.

Canadian uranium fuels 6% of electricity generated in the United States and 15% of generation in Canada.

Canada's uranium mines employ thousands of northerners and aboriginals, and the mining industry plans to double their output by 2017.

- Even if done with only 40 per cent more workers, that means at least 4,000 good, stable new jobs within five years – with huge benefits for Saskatchewan's northern communities.

CANDU Reactors

Twenty-nine commercial CANDU reactors have been built in seven countries.

A CANDU reactor built outside of Canada has major economic benefits here at home. The proportion of Canadian content is estimated at 69% in equipment, and 76% in engineering and procurement.

Building a pair of Enhanced CANDU 6 (EC6) reactors outside of Canada supports over 2200 person-years of direct, high-wage work and over \$2.5 billion in economic activity here in Canada.

Refurbishing Canada's CANDUs at mid-life is a very affordable option for minimal-carbon-emission electric power capacity, and it also drives good job growth.

Refurbishing just one reactor is estimated to generate 6,500 person-years of work, with average salaries of \$97,700 plus large investments in workforce development.

Ongoing operation of *each* one of these units – refurbishment or new build – subsequently employs about 640 full-time, highly skilled workers for 25 or 30 years.

Innovation

Research activities in Canada's nuclear industry support many other sectors in their research and commercialization activities.

Neutrons are used to probe materials to examine residual stresses in components, and advance our understanding of existing and new materials.

- This is fundamental to an advanced manufacturing sector: we must be able to formulate and improve the materials that make these products.

In the healthcare sector, nuclear technology not only provides medical isotopes and therapies for cancer diagnosis and treatment, but nuclear S&T also helps us design carriers for therapeutic agents that can target Alzheimer's disease and other serious ailments.

These, and many other areas of advanced research and innovation, are strengthened when we build up the complex of nuclear technologies and industries that drive nuclear science – and that are an integral part of Canada's national innovative capacity.



Careers

Our industry is a knowledge industry. It pays above-average salaries and makes large investments in workforce and community development.

Nuclear industry jobs are long-lasting (5 to 50 years) and pay an average of \$100,000 per year. Thousands of this industry's highly qualified personnel (HQP) – scientists, engineers, and operators -- earn over \$130,000 per year.

Nuclear academic programs are also part of a national science and innovation system, involving over 30 universities and six major research centres.