

# NUCLEAR *facts*

## *Economic impacts of Canada's nuclear industry*

Canada's nuclear industry is a major part of our nation's economy. It contributes to our energy security, and it is an important answer to the problems of climate change and air pollution. But does the nuclear industry make a positive and substantial economic contribution to the country?



*Cameco uranium mine in McArthur River in Saskatchewan. Most of its production is exported.*



*The first of two calandrias, shipped from its Canadian manufacturing site at Tracy, Quebec for the Qinshan nuclear station in China.*



To answer this question, the Canadian Nuclear Association (CNA) engaged the Canadian Energy Research Institute (CERI) to conduct a study on the nuclear industry's contributions to the Canadian economy. CERI released its final report in June 2008. Below is a summary of the report's findings.

### **Canadian nuclear development**

Critical to any nuclear industry is the availability of uranium. Canada holds large reserves of the world's highest-grade uranium. All mining is now taking place at three sites in northern Saskatchewan. Each year, approximately 10 percent of the uranium mined is used domestically, while the rest is exported.

The Canadian nuclear industry began in 1945 when nuclear fission was controlled for the first time in a reactor at Chalk River, Ontario. Chalk River has been central to the industry ever since. CANDU reactors were first developed there, and it was also at Chalk River that radioisotopes were developed for medical applications. There are currently eight research reactors operating in Canada. At Chalk River are the National Research Universal reactor, one of the largest (135 megawatts) and most versatile research reactors in the world; as well as the Zero Energy Deuterium test reactor. There are also six other small reactors at McMaster University, École Polytechnique de Montréal, Dalhousie University, University of Alberta, Saskatchewan Research Council, and the Royal Military College.

The Chalk River facilities are operated by Atomic Energy of Canada Limited (AECL), a crown corporation involved in all aspects of the industry — from research and development, to facility maintenance, waste management, and CANDU operations and sales. The university reactors operate mainly to test for chemical concentrations in materials, and to provide commercial services, teaching, and training.

Canada has 22 CANDU reactors, two of which are in a safe shutdown state prior to eventual decommissioning. Twenty are in the province of Ontario, with one in New Brunswick, and another in Quebec. Annual electricity generation is about 85 terawatt-hours (TWh), making Canada the seventh largest generator of nuclear power. Nuclear meets about 15 percent of Canada's electricity needs.

Since 1996, AECL has delivered seven new CANDU reactors to other nations (three to South Korea, two to China, and two to Romania), contributing to the very high rate of power generation growth in these countries. As of 2009, there are no reactors currently being built in Canada, although Ontario has selected a site for up to four new nuclear reactors at the Darlington nuclear station. Other provinces such as Alberta, New Brunswick and Saskatchewan are also reviewing the possibility of building new nuclear stations. Nuclear reactors are being, and have been, refurbished in Ontario and New Brunswick.

## The nuclear industry's economic impact on the Canadian economy

The nuclear industry has had considerable impact on the Canadian economy from construction of nuclear reactors, electricity generation, export of reactors, and export of uranium. The impacts are on Gross Domestic Product (GDP), employment, and government revenue.

In 2001, CERI collected investment data on two 720 MW-capacity CANDU 6 reactors (for a total capacity of 1,440 MW) to assess the economic impact of reactor construction, electricity generation from power plants, and the export of nuclear reactors. These data were updated to 2005 dollars for this study.



Ontario Power Generation's Darlington nuclear station in Clarington, Ontario.

The following table shows the contributions to the Canadian economy from the export of two CANDU 6 reactors:

### Estimates for two 720 MW CANDU 6 Nuclear Reactors, 2005

Total cost of two CANDU 6 reactors	\$3.742 billion
GDP generated by investment in two CANDU 6 reactors	\$5.973 billion
GDP generated by export of two CANDU 6 reactors	\$1.03 billion
Employment created by construction of two CANDU 6 reactors	80,233 person-years*
Employment created by export of two CANDU 6 reactors	17,039 person-years*
Government revenue from construction of two CANDU 6 reactors	\$1.604 billion
Government revenue from export of two CANDU 6 reactors	\$260 million

CERI also compiled the economic contribution of Canadian nuclear-generated electricity and uranium exports. To gauge the economic impact of uranium mining and milling, CERI used information available for the gross value of Canada's uranium exports in 2005.

### Canadian Nuclear Industry Economic Contribution Totals, 2005

Value of Canadian nuclear energy sold	\$4.988 billion
GDP generated by Canadian nuclear power plant operation	\$6.303 billion
GDP generated by Canadian export of uranium	\$381 million
Employment created in Canada by nuclear power plant operation	66,694 jobs*
Employment created in Canada by export of uranium	4,898 jobs*
Government revenues from Canadian nuclear power plant operations	\$1.417 billion
Government revenues from Canadian export of uranium	\$100 million

\* Note that employment figures in each table above refer to direct and indirect employment created.

The CERI study clearly shows that the economic impact of the Canadian nuclear industry – exports of Canadian nuclear reactors and uranium as well as production of electricity in Canada – are very significant and positive for Canadian employment, government revenues and the gross domestic product of the country.

The full CERI report is available on the CNA website ([www.cna.ca](http://www.cna.ca)) under Studies and Reports.

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