The Economics of Nuclear Power

The following is part one of an eight part written debate regarding nuclear power generation

Published in the January 20, 2010 edition of the Mile Zero News and Banner Post

The Debaters

Duane Bratt is an Associate Professor in the Department of Policy Studies at Mount Royal University (Calgary, Alberta). He is also an Associate with the Centre for Military and Strategic Studies at the University of Calgary. In June-July 2003, he was a visiting professor at American University (Washington, DC). He was educated at the Universities of Windsor (BA 1991, MA 1992) and Alberta (Ph.D 1996). He teaches in the area of international relations and Canadian public policy, with specialties in the sub-fields of international organizations and Canadian foreign policy. His primary research interest is in the area of Canadian nuclear policy.

Pat McNamara has been an anti-nuclear activist since he discovered the elementary school his daughters attended was built on radioactive waste, with radon levels 125 higher than the allowable limit. He is currently finishing his second book on nuclear regulatory corruption and the incestuous relationship between the nuclear industry and the Canadian Nuclear Safety Commission. He resides in Weberville.

Pat McNamara opening statement

No reactor in Canada has ever been built on time and on budget. The last ones built at Darlington were $10 billion over budget and five years late. This led to the breakup of Ontario Hydro and the debasement of Ontario's credit rating which increased their cost of borrowing money.

Nothing has changed. The Olkiluoto reactor in Finland is 60% over budget and four years late. Point Lepreau's refurbishment is 100% over budget and taking twice as long. Bruce Power's refurbishment is a billion dollars over budget and 18 months behind schedule.

New reactor costs have soared. Ontario suspended its reactor program after AECL quoted $13 billion per reactor. Bruce Power's $3 billion estimate for each reactor is pure nonsense. Dr. Mark Cooper (Economics of Nuclear Reactors) says reactor costs quadrupled in the past ten years since the start of the "Nuclear Renaissance".

Of 26 reactor applications in America since 2007, nine have been cancelled and another ten delayed up to twenty years because of high costs. Bond-rating agencies are reducing the credit rating of utilities and companies planning to build reactors.

As nuclear reactors cannot be insured, taxpayers are responsible for all accident costs over $75 million. Sandia Laboratory estimated 50,000 deaths and $666 billion (2007 dollars) in damages from a worst-case nuclear accident. Homeowner insurance does not cover nuclear accidents.

Craig Severance (Business Risks and Costs of New Nuclear Power) estimates new nuclear generation at 25-30 cents/kwh or three times the amount Albertans pay.

CANDU reactor development cost taxpayers $30 billion in subsidies to AECL.

If reactors are built in Weberville, taxpayers will pay billions for transmission lines to Edmonton and increased infrastructure for Peace River.

The negative impact on surrounding farms, people, environment and quality of life is much harder to put a dollar figure on.

Duane Bratt opening statement

With costs in the billions, nuclear power plants are expensive to build with many of the costs occurring upfront. However, this is balanced by both the large amount of electricity that one reactor can produce and the lifetime service of a reactor (50-60 years). When these factors are included, nuclear power is cheaper than its major competitors: coal, oil, and natural gas-fired plants.

In recent years, there have been three specific developments that have enhanced the economic case in favour of nuclear power. First, only a small percentage of a reactor's operating costs are due to fuel prices. This means that nuclear power, unlike fossil fuel plants, is relatively immune to the volatility of fossil fuel prices that saw oil and natural gas prices skyrocket in the summer of 2008.

Second, there have been significant technical improvements that have increased reactor performance and electricity output.

Third, the economic advantages of nuclear power will become even more apparent when governments start to add a price to carbon emissions, either through a carbon tax or a cap and trade system. Already, both the Obama Administration and the Harper government are beginning to move in that direction

In the specific case of Alberta, it needs to be pointed out that the Alberta government, in its December 2009 nuclear announcement, emphasized that it will not be putting public money into nuclear power. In addition, Bruce Power, who is proposing building reactor in the Peace region, is a private sector firm that needs to produce profits for its shareholders. Bruce Power has consistently said that if the business case is not there, then it will not build. Therefore, the decision over whether nuclear power is economical using basic business principles of supply and demand and cost and price.

First rebuttal by Pat McNamara

Mr. Bratt's claim of reactors lasting 50 to 60 years is not attested to by history. The 40-year life-expectancy of the Pickering reactors was shredded when complete refurbishments were required after twelve years. The refurbishment of Pickering A1 and A4 were triple the estimated cost which led to the other two reactors being mothballed.

The improvements in reactor-output have not been due to technical improvements. The performance-rating of the nuclear fleet has been distorted because the permanently shut-down reactors have not been included in the calculations. The increase in electrical output is due to regulators allowing reactors to operate at 120% of their designed capacity.

The massive fraud uncovered in the past six months in Europe's carbon trading has collapsed prices and forced the Americans to re-evaluate the system's merits. Daniel Golding (Lloyd's of London) stated: "the potential collapse of the carbon credit market is one of the biggest risks facing investors in 2010 and beyond."

Contrary to Mr. Bratt's assertion, billions of dollars of public money will be used to pay for transmission lines and infrastructure upgrades to Peace River because of the reactors. This is a direct public subsidy to the nuclear industry.

Mr. Bratt's faith in Bruce Power's promises is not shared by this community. Their false claims of emission-free electricity, $3 billion reactors and renewable energy projects have destroyed their credibility. Bruce Power said they would not build reactors if the community didn't want them, but they haven't kept their word on that either.

First rebuttal by Duane Bratt

The Darlington reactors are often brought up as proof that nuclear power is uneconomical, but there were extenuating circumstances. There was political interference by the Ontario government which kept starting and stopping the project. This created obvious delays which translated into cost overruns. In addition, the early 1980s saw interest rates rising unprecedently to highs of 18-20%. With interest rates at that level, all types of projects would see their budgets inflated, not just nuclear reactors. Unanticipated additional interest charges caused about 70% of Darlington's cost increase and 40% of its total cost.

It is also not unusual for first-of-its-kind projects to have difficulties. However, as the experience with the CANDU-6 has shown (the last six reactor builds in Romania, China, and South Korea were built on-time and on-budget) these problems are ironed out with subsequent projects.

The delays in the United States can be attributed to the global financial crisis which limited access to credit across the entire economic spectrum. When credit starts to become more liquid again, then these major nuclear projects will return. Even though the US has been hit by the worst financial crisis since the 1930s, it is still proceeding with

new builds. Even the United Arab Emirates, hard hit by Dubai World asking for creditor relief, signed a contract for 4 reactors in December 2009. In countries least hit by the crisis (China, India, South Korea) there are dozens of new builds under construction or at advanced planning stages.

Second rebuttal by Pat McNamara

Dr. Bratt's excuses for the $10 billion price increase of Darlington illustrates the number of things that can and do go wrong to drive up the cost of reactors. Part of the problem stems from the industry low-balling original estimates to make the projects seem cost-effective. Bruce Power's currently walking that path, claiming reactors cost $3 billion each after Ontario was quoted $13 billion by AECL.

Once a project is underway, the financial backers have little choice but to continue. Unfortunately, taxpayers have been, and will be, the financial backers for every reactor built in Canada.

Darlington was not a first-of-its-kind reactor. There were 16 built before it.

The first Romanian reactor started in 1980 and four more in 1982. The project collapsed in 1989 for lack of funds. The first reactor was completed in 1996, the second in 2007. The other three were never finished.

The lack of transparency in China prevents any credible assessment of costs and schedule. The reactor-sale to Korea was tarnished when an AECL agent was jailed in 1994 for bribing the head of the Korean nuclear utility.

McLean's Magazine summarized the situation: "If we have to loan people money at subsidized interest rates to buy CANDU at prices below cost and then bribe them to do it, how great is the accomplishment?"

There's still no reactor being built in America 10 years after the start of the "Nuclear Renaissance". The renaissance is dead. Little but a flailing and desperate corpse is left.

Second rebuttal by Duane Bratt

Mr. McNamara wrote that the upgrading of Alberta's transmission system is a "direct public subsidy to the nuclear industry." In fact, transmission lines are used for all electricity sources: coal, hydro, gas, and wind. Moreover, transmission of electricity is paid for by the consumers (residential, industrial, agricultural, etc) not the government.

While Mr. McNamara is very fearful that the nuclear industry will be subsidized in Alberta – despite the repeated denials of the provincial government – he seems less concerned about other energy sources receiving public monies. The $2 billion on carbon capture and storage for the coal industry, the hundreds of millions for solar and wind

projects, and the anticipated reduction in oil & gas royalties through the new review launched by Energy Minister Liepert.

Coal and gas-fired plants have been more cost-effective in the past because they were not responsible for the costs of their waste, ie., emitting carbon dioxide into the atmosphere. Once they are forced to account for this environmental damage through a price on carbon, nuclear power will become the cheaper electricity alternative because it does not emit CO2.

Mr. McNamara has declared the nuclear reissuance dead. Tell that to the crews that are currently constructing over 50 reactors worldwide. Yes, construction has not yet started in the United States, but the regulatory and environment assessment process is going on, and specialized equipment like heavy forgings have been purchased. In Ontario, Quebec, and New Brunswick refurbishment projects are underway to extend the life of their existing reactors.