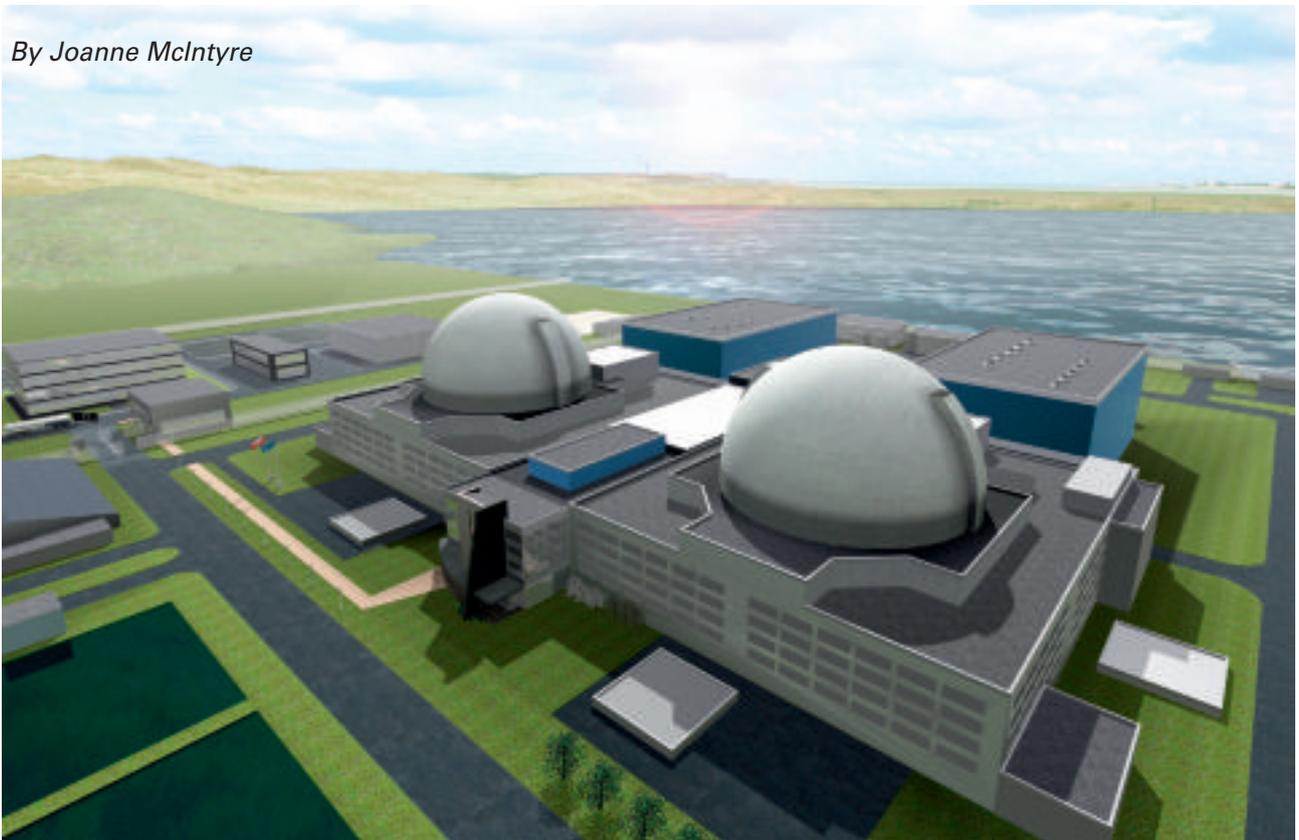


The Canadian nuclear industry: at a crossroads

CANDU reactor technology has been proven around the world so one would expect it to be claiming significant market share as the global renaissance accelerates. However the future success of the CANDU brand will depend on the successful restructuring of Atomic Energy of Canada Ltd and a decision to build the new Advanced CANDU Reactor on home turf. Dr Neil Alexander, President of the Organization of CANDU Industries (OCI), spoke to Focus on Nuclear about these challenges, the role of the OCI and why the clock is ticking for Canada's nuclear business.

By Joanne McIntyre



A graphical representation of the ACR 1000 reactor from AECL. Photo: Nuclear Energy Institute

The mandate of the OCI is to promote a healthy nuclear power industry in Canada, for the benefit of OCI members; these are the businesses in the supply chain to the Canadian nuclear industry. "Essentially this means people who have a base in Canada and are selling goods and services to the nuclear industry at home or abroad, whether that be for CANDU or other plants," explains Dr Alexander. "Our role is to promote the health

of the industry and help our member companies prosper. Five years ago our communication and outreach activities were low-key and focused mainly on creating networking opportunities because the industry was relatively static. However in the last two to three years nuclear energy has come to the forefront and become a very significant issue in Canada. We are now very active in educating politicians and stakeholders at all levels and trying to gain media

attention for some of the issues affecting our members."

Opportunities and challenges

The restructuring of Atomic Energy of Canada Ltd (AECL) - the owner of the CANDU reactor technology - by the Canadian government is the most serious issue facing the Canadian nuclear industry today. "The plan is to split the conventional research group away from the commercial arm, then to seek





Dr Neil Alexander, President of the OCI.

investors for the commercial activities of AECL. The commercial arm will own the CANDU technology so the future of CANDU very much depends upon the success of that restructuring. We believe that the restructuring is essential because AECL is not presently large enough or well enough capitalized to compete on a global scale with the other major nuclear vendors. Hopefully the process will conclude soon with an enthusiastic investor who recognizes the value of the technology and will ensure that it takes a significant share of the developing market for new reactors; we understand a number of significant international organizations have expressed interest and the government has started the legislative process to allow the investment to take place. Unfortunately AECL is undergoing restructuring just as the renaissance is taking off and countries are already starting to make decisions about which technology they want. Other large organizations have already dealt with their capitalization issues so we are playing catch up from a business point of view." A second, related challenge that the Canadian nuclear industry is facing is the need to demonstrate its new reactor technology, the Advanced CANDU reactor (ACR 1000). "The nuclear industry expects new reactors to be built in their home country first and because Ontario needed to acquire a new reactor, the stars seemed to be aligned for us. As Ontario has to demonstrate that it's buying the best value for money for its population they ran a competition between reactor vendors, with AECL ultimately submitting the best bid with the ACR technology demonstrating that it is competitive. However the Province suspended the plans on two grounds; firstly they did not like the total price,

and secondly they were concerned about the future of AECL and wanted its restructuring to be completed before they make a final decision."

"The situation today is that the federal government is moving forward with the AECL restructuring process while the provincial government is waiting to move forward with their acquisition process; but we need to coordinate their decisions to get both processes dealt with as quickly as possible so that we can build a reactor and demonstrate our own technology. Time is of the essence because we want to ride the crest of the nuclear renaissance wave rather than be left behind sitting in the cold water wondering why we didn't act sooner." Dr Alexander remains hopeful that both of these issues will be resolved within the year and that the construction of a new (Canadian) reactor in the Ontario Province will also be announced soon. Once the decision is made the reactor will be built on the Darlington site east of Toronto which has four operating reactors and was originally designed to accommodate eight. "The role of OCI is to help to move things forward; cajoling and encouraging is the best way to describe what we are doing now," smiles Dr Alexander. "We understand the challenges of both processes but we are trying to make people understand that we don't have a lot of time. The world is not waiting for us; we believe CANDU technology will be a strong contender in the renaissance but there are other technologies available. If we don't actively promote it so people understand the benefits of our technology they will choose other reactors. We are trying to make people understand the significance to Canada in terms of the job opportunities that the nuclear business brings and that we don't have a lot of time; we need to move forward as quickly as possible."

CANDU reactor technology

AECL have two significant reactor technologies on the market; the Advanced CANDU Reactor (ACR 1000) and the CANDU 6 series. "The ACR 1000 is a Generation III+ reactor which would be a direct competitor to Areva's EPR and Westinghouse's AP1000 technology. It's a mass market product which is design ready. The Enhanced CANDU 6 series is a niche product; it's a smaller reactor, appropriate for less sophisticated grids

and is a proven design which meets modern safety standards. Based on heavy water technology it's the only reactor that can use natural uranium as a fuel plus it has the flexibility to re-use spent light water reactor (LWR) fuel in a reshaped form. The Chinese are currently running a trial on their CANDU 6 series reactors to evaluate how successful that will be. The ability to run on spent LWR fuel provides significant benefits in terms of both fuel management and fuel cost because it reduces both the amount of fuel purchased and the amount of spent fuel produced. The expansion of that fuel flexibility could allow it to use thorium as a fuel, an option which is currently being evaluated. This means that countries that do not want to use enriched uranium can use an indigenously available fuel, and it also resolves concerns about the availability of uranium in the long term if the renaissance continues to grow as expected. The CANDU 6 reactors have been built by AECL around the world on time and at cost and are regularly rated in the top ten for reactor performance. These are two very solid products on offer from AECL."

Enhanced CANDU 6 success

On March 22 AECL announced that the first-ever fuel bundle to directly use recovered uranium from light water reactors was successfully placed in the Qinshan CANDU Unit 1 Pressurized Heavy Water Reactor (PHWR). NUE fuel is made by mixing recovered uranium from spent fuel of light water reactors with depleted uranium from enrichment plant tails.

"This commercial demonstration of NUE fuel is a first-of-a-kind advanced fuel collaborative effort...and highlights the beginning of the engineering application of CANDU advanced fuel cycles," stated AECL President and Chief Executive Officer, Hugh MacDiarmid. "It establishes CANDU's ability to utilize alternative fuel cycles and demonstrates the strong synergy between CANDU technology and light water reactor technology."

Ambitious plans

At the end of 2009 the OCI applied for Federal Development funding and although it wasn't successful, the organization will be trying again. "In Canada we have a very sophisticated and tightly knit supply chain capable of building and delivering significant reactor components," explains Dr Alexander. "Something I personally have been



driving for very hard is to promote the capabilities of Canadian companies to meet the requirements of the light water reactor market around the world. This is something quite new for us as historically the much of the Canadian nuclear industry has been focused on CANDUs. We wanted to have Federal funding to start promoting our nuclear supply chain globally. Although we didn't get the funding we will continue our activities and try to accelerate them by winning support from whatever bodies we can. We are now starting to work closely with the Ontario government which is beginning to show considerable interest in our industry."

In March 2010 a trade mission led by AECL and supported by the Ontario

Chamber of Commerce visited China with two aims; to promote Canadian reactor technology in China, and to identify opportunities to provide goods and services to light water reactors under construction or planned in China. "China already has a pair of CANDU 6 reactors so they are familiar with our technology. Our member companies met with other reactor vendors in China as well as Chinese organizations that want to provide nuclear goods and services but may not have the intellectual property they need. The mission has only just returned so we're keen to see how much interest is generated."

So what does Dr Alexander predict the future will hold for Canada? "If we get AECL restructured and demonstrate

the ACR 1000 soon, then in 20 years time, we will see a significant number of ACRs operating around the world. In parallel we'll see a domination of the niche market by the CANDU 6 series in countries that want to avoid enriched uranium or wish to use other fuels. The downside is that if we don't move quickly we run the risk of the world losing a very valuable technology."

About the OCI

Like many industry associations, the Organization of CANDU Industries is largely a 'virtual' organization with a staff of just two (Dr Alexander and Member Services Manager Ms Marina Oeyangen) powered by a very active volunteer board. "We have been staggeringly successful as an organization over the last couple of years; our membership has grown strongly and we've become involved in an increasing number of activities," says Dr Alexander. "The OCI currently has 165 member companies representing a nuclear industry work force of around 30,000 people. Members range from major international engineering companies such as SNC Lavalin Nuclear, AMEC Nuclear Safety Solutions and Hatch-Sargent & Lundy who are either based in or working out of Canada, to major construction companies like Aecon and fabricators like E.S. Fox. A large number of our members are small to medium sized enterprises providing a range of products, instrumentation and daily services to nuclear power plants."



The OCI Board of Directors.