

Ontario Energy Networks – 17 November 2014

Remarks

Recently Kevin Lynch, former Clerk of the Privy Council and currently Vice-Chairman of the BMO Financial Group, wrote a piece in the Globe & Mail calling for a national dialogue on “diversification of our energy markets and the national interest.”

With the United States moving toward energy self-sufficiency and security, Lynch was talking about the need for Canada to diversify its oil and gas exports to new markets overseas. To do so in practice, he says, requires enormous investments and complex planning in transportation capacity. Hence the appeal to national interest. As he noted: “Without creating a shared sense of our energy future, it will be difficult to align all the actors and interests.”

Do we have a “shared sense of our energy future”? Or would it break down into provincial pieces? Does it depend on where you sit geographically or what energy sector you represent? It’s a good question.

To speak of Canada’s energy resources is to count our blessings. Oil, natural gas, hydro, nuclear, coal, wind, solar, biomass, wood. The term “energy mix” cannot even begin to convey such a rich bounty of energy potential across the land. Our energy endowment is a huge asset for Canadians.

However, if we are to contend that it is in the national interest to gain access to energy resources, convert them to economic use, and get them to market, then we have to do more than just state the case. If we are to have a “shared sense of our energy future”, then we have to show how our energy resources are strategic assets – in terms of Canada’s economy as well as in the daily lives of Canadians.

Each energy industry can speak separately to this imperative. I will focus on Canada’s nuclear industry.

My contention is that it is in Canada’s national interest to have a nuclear industry and technology. Let me explain why.

Nuclear technology delivers value to Canadian in many forms. Low-carbon, base-load electricity. Advanced engineering and materials science. Imaging technologies. Better medical diagnosis and treatment. Economic growth. High-skill, long-lasting jobs. Technological and operational innovation that keeps Canada at the forefront in the knowledge economy.

The value brought by the industry to Canadians is, unfortunately, not well understood by the public. The response is usually “I didn’t know that” when the value is itemized and translated into daily life. We don’t do a good job in translating that value into dollars and cents or putting a price to those aspects of our quality of life that we owe to nuclear technologies broadly speaking.

The nuclear industry takes natural uranium from Canada's mines and fabricates fuel for extremely low-carbon electricity generation. It is an industry that designs, constructs and operates safe nuclear reactors. It assures quality of advanced materials. It produces isotopes for cancer and heart diagnostics and treatment. Cobalt-60 for sterilization of medical products and devices.

It brings food safety through irradiation. Its R&D innovations have led to entrepreneurial spin-offs, including commercial products for household use and everyday safety – like fluorescent signage. It includes precision manufacturing for building, maintaining and refurbishing research and power reactors. And the highly skilled trades and craft labour that build and run them safely. It even includes non-destructive testing of oil and gas pipelines for possible defects and leakages.

The nuclear industry is also part of the national interest because of its geographical breadth. Its science and technology assets are spread across the country.

The TRIUMF particle physics laboratory in Vancouver; the Canadian Light Source and the Fedoruk Centre for Nuclear Innovation in Saskatoon; radiochemical labs in a plethora of hospitals across the country; research reactors at the Universities of Alberta and Saskatchewan, at Ontario's McMaster University and Royal Military College, at École Polytechnique at the Université de Montréal; the incredible complex of knowledge and talent at the Canadian Nuclear

Laboratories – formerly AECL-CRL – in Chalk River, Ontario; private laboratory and testing outfits like Stern Labs and Kinectrics; innovative spin-off companies like Isowater or BubbleTech; power generation in New Brunswick; university research in Newfoundland.

How else does it bring value to Canadians?

Nuclear power generation is clean – virtually emissions-free, standing in sharp contrast to fossil-fuel generating sources. This was recently confirmed by Hatch Engineering, a respected Canadian firm with international energy interests. Hatch undertook a life-cycle analysis of emissions from 3 power generation sources: nuclear, gas-fired, and wind (backed by natural gas combined cycle).

The study concluded that the range of GHG and nitrogen oxide emissions for natural gas – as well as a mix of natural gas and wind power – is, in every case, significantly higher than those produced by nuclear power.

As wind is an intermittent source of energy, it needs a back-up source, usually gas-fired generation. The ratio is usually taken as 20/80 – 20% wind power, backed by 80% natural gas combined cycle. According to the study, emissions from this mix can be more directly compared to those emitted by natural gas on its own. These latter, as we know, are about half as high as coal's – and considerably higher than nuclear's.

This is the reality of natural gas as a fossil fuel. Of course, Ontario should have a diverse mix of power generation sources. But let's also be aware of the life-cycle emissions that each source brings into the supply mix.

There's another value we should recognize.

As you know, the International Panel on Climate Change has recently issued a new report about the extent of the challenge facing us on global warming. Canada's record on reducing carbon emissions is, let us say, undistinguished. Some would judge it more harshly. Many point to the oil and gas industry as the main source of Canada's high GHG emissions, especially the oil sands. A national perspective would show that Canada's emissions record would be worse without nuclear power. This is due largely to Ontario's use of nuclear power, plus hydro, and other provinces' use of hydro. The end of coal-fired generation in Ontario has also helped to reduce Canada's overall carbon emissions.

However, what is often unrecognized is the fact that the low-emissions jurisdictions like Ontario have given more carbon head-room to Canada's oil and gas industry. Our national climate change record is thus better than it would be – thanks to the nuclear industry and Ontario's nuclear generating stations. The more this is recognized, the more we have the possibility of a shared energy future.

One more area of value: Canada's foreign policy.

Canada is a leader in nuclear technology. This leadership has given us strategic advantage in global security issues.

We have influence in international negotiations on nuclear non-proliferation, safety and security—because we own an impressive nuclear technology, underpinned by key strategic assets, such as the National Research Universal reactor and AECL–Canadian National Laboratories expertise and reputation.

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Nuclear safety is in Canada's national interest, whether at home or abroad. Canada is at the forefront of efforts to push international safety standards higher, thereby reducing the risk of nuclear accidents.

Other countries listen to Canada when we address issues like Iran and North Korea; when we speak about nuclear security, regulation or verification. Our efforts diplomatically to ensure Canada's security and safety are given credibility thanks to having a world-class nuclear industry and expertise.

Moreover, there are considerable opportunities in new nuclear energy markets – as shown last week in the announcement by Candu Energy of its partnership with China in developing advanced fuel CANDU reactor technology.

Such commercial deals are not just a matter of don't just imply a vendor-buyer relationship. They imply a commitment between two countries on a matter of strategic importance – in this case, the use of Canadian nuclear technology for China's energy needs. This makes it a relationship of strategic

importance to Canada's foreign and economic policy. We should not overlook this.

Let me turn now to the Nuclear Leadership Forum

Over the past 2 years, more than 30 CEOs have developed a shared vision of how they see the nuclear industry, now and in future, along with greater alignment of purpose and action to help realize this vision.

This exercise, called the "Nuclear Leadership Forum", identified 5 areas essential to the industry's continued strength. They are skills; project delivery; innovation; integrated waste management; and international market opportunities. Each one of these five areas has an action team to take its work forward.

Let's start with skills. Canada has a world-class nuclear technology, because of the skills of the people who have designed, built and operated this technology and because of the skills of those who have regulated it. The result is an impressive safety records over decades.

Recently the Canadian Nuclear Safety Commission concluded that no fatalities related to radiation safety have EVER occurred in the Canadian nuclear industry. How many industrial activities of any kind – let alone of nuclear's scale and complexity – have this kind of record?

Retaining such skills and knowledge, and carrying them into the future, is fundamental to preserving Canada's technological edge. The industry knows this. Which is why the Nuclear

Leadership Forum is taking steps to ensure the next generation of skilled professionals and work force will be trained, ready, and available to take over.

This is the nuclear industry's contribution to Canada's knowledge economy. It's something increasingly recognized by governments -- federal and provincial. The precision work, the no-tolerance-for errors, the use of robotics, the mitigation of risk, the digitization of energy – these are skills vital to skills to the economic world in which we live.

This takes me to the next area—project delivery. Nuclear is a quality-driven industry. Keeping power-generating reactors doing what they're supposed to be doing – year in, year out – over a 60-70 year time span requires one life-extending refurbishment for each reactor during that time. This is project management at a very high and demanding level.

Successful delivery of these projects guarantees that long life. It therefore guarantees that the capital cost of a plant is amortized over a very long period. Which is why nuclear has high capital costs, yet produces very affordable power.

Understanding this requires lifting one's view beyond day-to-day spot markets.

Recently there have been discussions between Ontario and Quebec on a broader, renewed relationship on a range of policy issues – including greater collaboration on energy. This approach is something we welcome. Both premiers should be commended for their leadership.

Ontario's Long-Term Energy Plan balances a number of supply considerations. Our nuclear base-load, over the long term, supported by the refurbishments at Bruce and Darlington, will provide price stability, low-cost energy and good economic growth. This stable, affordable – and clean – supply is the backbone of our system and economy. Greater engagement with Quebec can be part of our broader energy portfolio, and does not conflict with the role of nuclear in the province.

Refurbished nuclear is a winning formula for Ontario as one of the leading clean energy jurisdictions in North America. Thanks to the combination of nuclear and hydro, more than 75% of Ontario's electricity generation is virtually emissions-free. Substituting natural gas for nuclear would undercut this reputation and the efforts by Ontarians to achieve it.

Nuclear power helped make Ontario a manufacturing powerhouse. That is why we're acting through the Leadership Forum to ensure that our project delivery matches the same quality standards that we insist upon throughout our industry.

Turning to waste management, there are several things to keep in mind.

Does the technology exist to manage safely and securely the types of radioactive waste products that come from nuclear reactors? The answer is a definite yes. The industry knows how to handle the waste without dangerous leakages and with ample detection and alert systems to back this up.

What about the environmental footprint of the waste? First, waste products from nuclear power generation do not get emitted into the atmosphere – unlike some other energy sources. In fact the waste is very compact and stays on the generating site. In short, we keep the waste; prevent it from entering the atmosphere, soil or water; and take responsibility for it.

Second, the size of footprint is very small. Storage of fuel waste is limited geographically to the seven sites in Canada at which waste is produced. Compared with other sources of energy – where thousands of hectares are used for extraction or generating purposes – the environmental footprint of waste from nuclear energy is miniscule.

Third, the management of nuclear waste is highly regulated. In fact, the regulations imposed on nuclear waste could assist in the management of common toxic chemicals which never decay and exist in landfill sites found in many jurisdictions in Canada, often close to populated centres.

But a guiding principle for the nuclear industry and the Nuclear Leadership Forum is that we can always do more. That is why we are seeking an integrated strategy that brings together everyone involved in managing nuclear waste – to see how we can push the bar higher in ensuring long-term safety

Turning to innovation. Most energy industries involve a lot of natural resources with some science and engineering. The nuclear industry involves some natural resources – and a lot of science and engineering.

But in nuclear science and engineering, it's time for some stock-taking. The Nuclear Leadership Forum sees that industry has to take the lead in setting the agenda. In fact, the federal government has asked us to come forward with ideas.

As in other areas, the NLF is responding to the challenge. The action team on innovation is now bringing together a wide range of players in Canada specializing in four major technology segments:

- CANDU reactor technology
- Other kinds of nuclear energy, including advanced and small modular reactors
- Manufacturing applications of nuclear technology, such as in materials science
- And health applications – where nuclear technologies and techniques are used for medical imaging and treatment, agri-food, and sterilization.

The goal is to keep Canada at the forefront in quality of life by making the most of our nuclear science and engineering assets.

Keeping Canada a Tier One Nuclear Nation is not just an empty slogan. We have earned that title through decades of innovative products and applications that contribute to a better life for Canadians. It's time Canadians recognized the extent and importance of this contribution. That, too, is an objective of the Nuclear Leadership Forum.

The fifth area is international.

Our CEOs understand that long-term viability of the industry means going outside the Canadian market and securing overseas customers. That is why the NLF is working on ways and means to expose the companies of Canada's nuclear supply chain to such new possibilities. In some cases, this will be assisted by federal government support, since provision of nuclear materials and technology must be preceded by government-negotiated nuclear cooperation agreements.

Canadian expertise can be capitalized upon abroad in other ways. For example: in the best practices exercised by Cameco Corporation in uranium mining. And in the operational and regulatory leadership that is internationally recognized by various specialized bodies in the world nuclear industry. Tim Gitzel of Cameco, Duncan Hawthorne of Bruce Power, Tom Mitchell of OPG, Michael Binder of the Canadian Nuclear Safety Commission, Bob Walker of AECL-Canadian Nuclear Laboratories – they and other Canadians put the Canadian brand of nuclear industry and its regulation out in the world for all to see. They help to show the way to safe and secure nuclear energy globally.

Let me conclude.

Nuclear, like other energy industries, is evidence-based. It is built on technology and engineering. And, like other energy industries, we rely on this basis in communicating with the public, in establishing regulations for safety, and in environmental protec

tion.

When we stay evidence-based, good decisions are made, including good public policy decisions. This way, we can contribute to overcoming the “multiple licensing challenge” that Kevin Lynch has identified.

The challenge, he said, is: “to align commercial licence (a project must make economic sense) with social licence (a project must make public sense) with policy licence (a project must make policy and regulatory sense) and with innovation licence (a project must use technology that has the public trust as a problem solver).

Our technologies must therefore be problem-solvers. If not, we cannot appeal to the national interest. If not, we cannot contribute to overcoming the multiple licensing challenges that confront us today and surely await us tomorrow.

So let me re-cap.

If we want GHG reductions – then nuclear technology in power generation provides a solution.

If we want long-term reliable base-load electricity for all seasons – then nuclear technology delivers it.

If we want energy independence and security, Canada’s nuclear industry can contribute. If we want a skilled workforce in an advanced knowledge economy, nuclear has it.

If we want the health and safety of the public to be protected, then tough industry regulations built on science and hard

evidence is the best way to ensure this. And the nuclear industry is fully supportive.

If we want influence internationally on issue of nuclear safety, security and non-proliferation – then having a viable, Canadian-developed nuclear technology gives us that.

Finally, if we wish to create – in Lynch’s words – “a shared sense of our energy future”, then we can all take inspiration from the Nuclear Leadership Forum.

Namely:

Engage everyone; adopt a long-term view; decide where you’re going – not in your industry silo, but in the context of the country’s future; identify what you’re going to most need in order to get there; and start working in that direction – for your industry and for all of us in Canada.

Thank you.