

# “I am Personally Very Excited About Canadas’s Positioning as a Tier One Nuclear Power and also as a First Mover in Small Modular Reactors”

**Interview with John Gorman** | President & CEO of Canadian Nuclear Association



**John Gorman**

President & CEO of Canadian Nuclear Association

John Gorman is President & CEO of Canadian Nuclear Association, past President & CEO of the Canadian Solar Industries Association (CanSIA) and a Director on the board of the Energy Council of Canada (ECC). John served as Canada’s Designate to the International Energy Agency’s Executive Committee (PVPS) and was a Founder of the Canadian Council on Renewable Electricity (CanCORE). He’s using this experience to secure a leading role for nuclear energy at the heart of Canada’s energy transition. Before joining CanSIA, he was the Senior Vice President of Empower Energies, an innovative, global integrator of energy systems. He has served as a director on the boards of numerous community and corporate organizations, including one of the nation’s largest electric utilities. John has been recognized as one of Canada’s CLEAN50 and is the recipient of the “40 Under 40” business award for excellence in business practices. He was awarded the designation of Climate Project Ambassador by Nobel Laureate Al Gore in 2008.

**The Canadian Nuclear Association represents an established nuclear industry which has decades of experience with nuclear technology. Can you give us a short overview of the nuclear sector in Canada?**

Let me start by saying that Canada is in a quite unique situation in terms of having both a vibrant nuclear ecosystem that is being fueled by the refurbishments of existing plants in our largest province of Ontario and in turn that is being used as a platform to do all sorts of innovation in Small Modular Reactors but also in other areas like medical isotopes. So, the combination of these two things, the healthy nuclear ecosystem and the innovation that we have going on in Small Modular Reactors is positioning Canada to provide climate change

*Small Modular Reactors will help us continue that track record and help others.*

solutions, the decarbonization of very important sectors of our economy here in Canada and by extension the ability to be a first mover in helping other nations around the

world lower their GHGs. So, I am personally very excited about Canadas’s positioning as a tier one nuclear power and also as a first mover in Small Modular Reactors.

In terms of actual statistics, we are a tier one nation being in this business for more than sixty years, with a very respected regulator and a highly respected track record in terms of the efficient and safe operation of nuclear plants. We currently have 12 different SMR technologies being evaluated and going through the review and licensing process in Canada making us a world leader in terms of the number of technologies

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and the speed with which we are developing them. CANDU technology is deployed in seven countries around the world and is still very actively involved in existing markets and developing markets. A great example of that is Romania, where they are very likely going to refurbish

their two existing CANDU units and complete the construction of two additional units. So, Canada while being a smaller nation is a world leader in nuclear and we have accomplished some amazing things here from a climate perspective which I am eager to talk to you about and Small Modular Reactors will help us continue that track record and help others.

**You already mentioned the refurbishment programs. As I know of this is a quite unique feature, partially after long term shut downs. To understand this process, what determined the decisions about the refurbishment in both cases, i.e., the shut downs earlier and then the refurbishments and long-term operation later?**

This is an amazing story, that I hardly ever get asked about, so I am pleased to talk about it. Let me start with the punch line. Ontario, the largest province in Canada decided in the early 2000s to phase out all of our coal fired electricity. When we did that, coal fired electricity was providing about 25 % of Ontarios electricity, it was creating smog days and health problems and obviously emitting a lot of emissions. We replaced 89 % of that coal fired electricity by bringing back online two units that had been shut down. So, in the process we were able to retire coal very quickly and retiring coal in Ontario became and still is north Americas single largest carbon reduction initiative.

That’s the punch line. More specifically in 1997 Ontario Hydro, the utility, and the government made the decision to shut down two of our units because there was no demand for this electricity, there was a surplus. But by the

early 2000s supply had become tight, we needed more electricity and at the same time we made the decision to phase out coal fired electricity. We addressed both of those issues by restarting four units and subsequently made the decision to refurbish a number of our units. We are likely going to close down two of them in the mid-2020s but we will continue to operate the majority of the 18 units in Ontario. So, this is the story: surplus of generation in 1997 made the decision for shut downs, then as more generation was needed and the phase out of coal was decided we brought them back on and we undertook this refurbishment. At this moment the refurbishment is the single largest infrastructure project in Canada. It is a 26-billion-dollar refurbishment that is taking place over ten years and it is employing a lot of people and driving a lot of innovation.

***This brings me to a follow-up question: when I remember the discussions, we had in Germany about longer operation of nuclear power plants in 2009 and 2010 there was a fierce opposition of the green party and of environmental organizations. Were there discussions of that kind and organizations parties or movements opposed to the refurbishment of nuclear power plants in Canada?***

There are certainly detractors of nuclear power in Canada. We continue as an industry globally and in Canada to be exposed to that sort of stigma and misinformation and not fact-based attitudes towards nuclear. But at the end of the day Canada has an outstanding record in terms of the safe operation and managements of its fleet. Canadians recognize that we are a world leader in nuclear power and clearly in the end the arguments and support in favor of refurbishment outweighed the detractors. Our country is very large, there are ten different provinces which are responsible for their own electricity supply so it becomes a very regional discussion rather than a national discussion. This might be a key difference between Canada and Germany. There is one thing that we know for certain: the more people know about nuclear the more supportive they are. In the provinces where we do have nuclear power like New Brunswick or Ontario or in Saskatchewan where there are uranium operations, these regions are very comfortable with nuclear or at least much more supportive than other provinces.

***Nuclear technology is not just about nuclear power plants, there are also very important other sectors. One of them is isotope production for many purposes including medical ones. In 2018 a major production facility in Canada that was important globally, the NRU reactor, was taken out of production and important capacity was lost. How was it compensated for or was it compensated for?***

It has been compensated for in a very interesting way. Firstly, the NRU had to be taken down because it served its lifespan. But we continue to have radioisotope production in our existing conventional power reactors and in other research reactors as well as particle accelerators such as TRIUMF and Canadian Light Source in western Canada. Despite the end of operation of NRU, we still have other research reactors and particle accelerators that are fulfilling that need. However, it has also spurred real

innovation here in Canada using our existing CANDU reactors. So, what we are seeing is that our two largest operators, Bruce Power and Ontario Power Generation have partnered with companies in the private sectors such as BWXT and isoGEN to produce isotopes from conventional reactors. This is really fascinating. There is no need to interrupt the operation of the units in any way. Ontario Power Generation and BWXT are beginning to produce Molybdenum-99 at the Darlington Nuclear Association and Bruce Power, BWXT and Isogen similarly are beginning to produce Lutetium-177 for cancer therapy. At the same time, we continue to produce a large portion of the worlds supply of isotopes through our other assets. This includes more than 70 per cent of the global supply of Cobalt-60 and about 60 per cent of the world market for Iodine-129 is produced here as well. We have adapted and used innovation to replace the isotope production that was shut down.

***Let's get back to power, the major question for many countries nowadays given all the climate discussions and climate targets. What is the long-term perspective for nuclear power in Canada and how is it included in Canadian or provincial energy and climate strategies?***

The long-term perspective for nuclear power in Canada is extremely bright for the reasons we have already spoken about. The refurbishment of our CANDU power plants in Ontario is the largest infrastructure program in Canada. It is going to keep those plants operating well into the 2060s and they are providing 15 per cent of Canadas clean electricity and a healthy nuclear ecosystem that is the foundation for other work that we are doing in Small Modular Reactors and isotopes. With this very strong foundation of the refurbishments going on with a large work force and innovation we have become a first

mover in Small Modular Reactors. The government has started funding a number of the SMR-technologies that are under review and licensing and we expect to see more funding announcements in a short number of weeks coming. We also have an extraordinary level of coordination between government and industry and the provinces in the development and deployment of Small Modular Reactors. And this is quite exceptional and exciting: four of our provinces have signed a Memorandum of Understanding on the development and deployment of SMR. The federal government has come out and identified nuclear as being needed and essential for net zero in 2050, our national goal. So, we have both the federal government identifying nuclear as being essential to reaching net zero 2050 and four provinces and their utilities who have agreed on a business plan for the development and deployment of SMR in their regions. When you combine this with our very progressive regulator, the Canadian Nuclear Safety Commission, which is very well suited to evaluate and work with innovative technologies much more so than some of the very prescriptive regulators we see in other places, it really becomes a competitive advantage for us. In fact, when you look at Canadas commitment around climate change which is very aggressive with the objective

of net zero in 2050 where nuclear is acknowledged as a key element of that energy plan and we have both a long term set of operating assets producing 15 per cent of our

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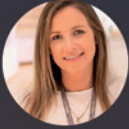
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**To realize the opportunities that exist with SMRs regulatory issues are quite important. They need certain adaptations compared to larger units and apparently this is working well in Canada as I can conclude from what you said. But is there also work going on to achieve some standardized regulations on SMR designs that are in the pipeline, are you cooperating with the US and the UK and maybe at some point with the European Union too because there probably soon will be an international market for this type of plants.**

You identified one of the most important issues here. Globally, to realize the benefits of SMR will need some standardization in terms of regulation. As you know this is a departure from a long history of nuclear power being a very nationally driven sector. Each country focused on a particular type of technology and set up a regulatory framework for this technology. Canada is a good example for this with its CANDU-technology. Of course, SMR depend on being mass produced and manufactured in manufacturing settings, making it more of a product and commodity. And because of their smaller size these units cannot afford the regulatory expense of needing to be certified in every country that they enter into. So, finding regulatory harmonization is key to SMR success going forward. What we have done here in Canada as the Canadian Nuclear Association is to begin working with our sister organization in the US, the NEI, and we have set up a

US-Canada regulatory task force that is looking at these issues. But more importantly our regulators, the CNSC here in Canada and the NRC in the United States have signed a Memorandum of Cooperation and they are working on regulatory harmonization. So, we recognized the need here in north America for this standardization. At the same time, we have reached out to the Nuclear Industry Association in the UK and we are working with them as do our governments on these same issues. We have now signed a Memorandum of Understanding with our counterpart in Europe, Foratom, and we will be talking about similar issues. But right now, the most developed push on this front is between Canada and the United States and has started with the UK and we hope to expand this to Europe as well.

**Is this the major aspect of the MoU with Foratom or are there other objectives too?**

There are other objectives as well. Firstly, the nuclear cooperation between Canada and Europe goes back for decades and specifically Canadian CANDU reactors have been in service in Romania for nearly thirty years. So, this MoU at the highest level addresses the need for greater dialogue and the exploration of the role of nuclear in effective environmental stewardship and a subtext to that would be this work that we have to do in rationalizing regulation around SMR. But the MoU has essentially three components to it: one is around advocacy and trying to advocate for more explicit inclusion for nuclear energy in Canada and the EU and that includes the idea of sustainable finance, taxonomy which I know that the European Union is grappling with right now. The second point is that we

want to support innovation, particularly in SMR and advanced reactors which is something we flagged in the MoU and the regulatory work also falls into that. And we also want to find initiatives where we can work together to promote nuclear as a clean source of electricity that is needed for climate goals.

But what I wanted to say about this idea of taxonomy and that nuclear is clean and the importance of that: the nuclear industry in Canada like in other nations has had to work very hard with stake holders and policy makers to explicitly acknowledge nuclear power as clean energy and we have succeeded in that in Canada. So, recently just before Christmas the federal government explicitly identified nuclear as clean and essential to net zero 2050. And for us this has been important as we see in this increasingly carbon constrained world all of the policies and funding programs are increasingly directed toward clean technologies. We worked very hard for that and I am hoping that we can share some of the experiences and lessons that we learned here in Canada around this issue with Europe through our collaboration with Foratom.

***A last time back to the SMR projects: How far advanced are the projects trying to demonstrate the feasibility of new kinds of reactor designs?***

SMR are going to enter the market in Canada much sooner than people expect. Our largest utility, Ontario Power Generation, has announced that it will be net zero by 2040. But as part of that it will connect its first SMR at its Darlington Facility in 2028. SaskPower, Saskatchewan Power, is working in partnership with them to roll out multiple units in Saskatchewan with the same technology right on the heels with OPG. And we have other technologies, including very small reactor technologies, that are projecting that they will be in the market even sooner, by 2026. There is an amazing story here about the application of very small reactors in a number of Canadas most important sectors. The market demand in Canada for very small reactors is about 5.3 billion Dollars between 2030 and 2040. And much of that market demand is in the mining industry using SMRs for their high temperature heat, to generate electricity but also to produce hydrogen. Many of these SMRs are going to be used in heavy industry like cement and steel, fertilizer production, in the oil sands, which is such an important part of our economy. These SMRs are going to be used to generate high temperature steam to clean up the extraction process for oil and gas.

So, Canada is not only a first mover in SMRs but it has a set of industries that are able to take advantage of the unique capabilities of SMRs while decarbonizing those sectors and ensuring that Canadas natural resource sector and the materials that we produce are going to be competitive in this increasingly carbon constrained world. It is really a beautiful dynamic that we have here in Canada of being able to develop a handful of SMR technologies that are going to be tailor made to address the particular GHG reduction issues in our industries. And our hope of course is that we will be able to use those technologies to help other nations decarbonize their heavy industries and natural resource sectors so that we can contribute to the world moving to a low carbon economy.

***And finally, I want to come to nuclear waste management. What are Canadas plans for waste management?***

Readers of atw surely will know that the nuclear industry is a very responsible manager of nuclear waste and that the facts on spent fuel are actually quite a positive story. We are the only energy generating sector that is entirely responsible for the all of the byproducts that it produces and we prepay for its safe management and storage. We don't emit pollution to the environment and we produce so little spent fuel because uranium is so power dense. We have been operating for 60 years providing 15 per cent of the nations electricity and we barely fill up a few hockey rings to the floor boards with spent fuel. It is exceptionally well managed, no one has ever been harmed, let alone killed by spent fuel. If you look at our entire life cycle from uranium mining to storing the spent fuel and all of our byproducts, we have the lowest carbon footprint of any electricity generating source, only wind is comparable. We have an amazing story to tell on that front that people don't understand.

But we also recognize that we need a permanent solution for storing the waste. We have been managing the waste exceptionally well to this point but especially in Canada where we are extending the life of our nuclear plants for another 40 years and because of the advent of SMR we need a permanent storage for the waste. So, there are currently two communities, two land-locked areas that have been short listed for a deep geological repository, South Bruce in southern Ontario and Ignace in north-western Ontario and we have a nuclear waste management organization that is overseeing the site selection for this area. We are going to follow the example of Finland here which is on track to have their DGR by 2023 and we are going to continue managing our spent fuel until that deep geological repository is completed. Another thing that we are excited about is that a number of the technologies that are reviewed and hopefully licensed here in Canada will also be reusing the spent fuel from the CANDU reactors as their fuel which adds some additional avenues for properly storing or using the spent fuel.

Interviewer



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