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TODD SMITH INTERVIEW

Hi, and welcome to GridTalk. Today we have with us Mr. Todd Smith who's the Energy Minister of Ontario, Canada, and he's here to talk about some amazing technology innovations north of the border that will be of a lot of interest in the United States.

Q: Hi, Minister Smith. How are you?

A: Hi, Marty. Great to join you and your GridTalk listeners today.

Q: Great, so let's jump right in. There is nowhere in the what we'll call the free world today that really has deployed smart modular reactors. I think China and Russia have dabbled in it; you may know where it's surfaced more than I, but why is Ontario going there and what do you think the rest of the world needs to pay attention to?

A: Yeah, we've been out talking a lot about the small modular reactor project that's currently underway. Construction and site

preparation is underway at the Darlington Nuclear site which is in Ontario Power Generation site which is just outside Toronto on Lake Ontario so about 45 minutes to an hour outside of the GTA, the Greater Toronto Area as we call it. Somebody had the foresight back in the '90s at Ontario Power Generation to get the regulators' approval for a new build; that would be the Canadian Nuclear Safety Commission, and get all of the environmental assessments done for a new build that, at the time, there was the thinking that we might continue to add large CANDU reactors at the site. We do have CANDU reactors operating there now which is a Canadian-made large nuclear reactor. There are four reactors on that site; they are about 850 megawatts each. Then, as we explored where nuclear was going we said this would be a great opportunity to look at small modular reactors and there was a process that was undertaken by OPG, Ontario Power Generation, and a lot of different criteria was measured over a number of months, over a year actually and the number of technologies was whittled down to a handful, and then by the end we felt very comfortable in moving forward with the technology we'd chosen which is a 300 megawatt boiling water reactor from GE Hitachi so we're partnering with U.S. Technologies on this and other U.S. and international partners to develop the first-of-the-kind SMR, small modular reactor, here in Ontario.

Q: So, there's a lot to dive into there but before we do, I'd like to set the stage and make sure our audience fully understands a few things. One is talk to us about the provincial ownership of the energy assets. I understand you own the generation and you have a mixed bag of public and private ownership.

A: Yeah, it's a unique grid, it's a unique setup. Ontario Power Generation is a Crown corporation; we are the shareholder of the Ontario Government and the people of Ontario own Ontario Power Generation. They operate two large nuclear facilities: Pickering Nuclear, Darlington Nuclear. They operate large hydroelectric facilities across the province from Niagara Falls in southwestern Ontario to many run-of-river hydroelectric facilities in the north. They operate some natural gas facilities as well so they provide about 50% of the province's power from the various generators that we have with Ontario Power Generation but we also have a very active market and there are companies bidding in and other jurisdictions bidding into our market all of the time which is run through our independent electricity system operator. And then the other big provider of electricity that we have in Ontario is actually the largest operating nuclear facility in the world and that's on the western side of our province on Lake Huron; it's called Bruce Power. They're pumping about 6,700

megawatts out of that facility every day so it's a big provider of electricity for our province too, about 30% that comes from that facility.

Q: So, we're doing something fairly unique here in our fourth year of our podcast. You are being tandem presented with Sandra Dykxhoorn at OPG; we talked to last week, and she said when I told her you were going to be on, ask him about the fact that Ontario has to double its grid in the near future. Talk to us about energy demand as you see it growing and then we'll just right into the nuclear solution.

A: Sure. We're a very fast-growing jurisdiction here in Ontario. There's been a lot of foreign direct investment particularly in the electric vehicle platforms. We're very fortunate in Ontario to have five major automakers that are building cars and trucks here in Ontario and almost all of them have now made commitments to build electric vehicles here in Ontario. As a result of that, we have three massive EV battery plant investments as well spread across the province that are going to be providing the batteries and big energy users. We have a couple of steel making facilities in our province that are moving away from coalfired production of steel to electric arc furnaces. When you consider the three electric vehicle battery plants and the two electric arc furnaces for green steelmaking,

that's going to increase our industrial load alone, just those five projects by upwards of 21%, so we are experiencing some pretty serious growth here not to mention population growth. We're anticipating another five million people to move into Ontario in the next 10 years. We've got about 16 million people here in Ontario now so we'll be upwards of 20 million people by the end of the decade. That's going to require a lot of electricity as well and so we asked the system operator to do a report on what it would take not only to power the investments that we're seeing but to also decarbonize the system, and it would be almost three times the number of electricity generation that we now have and nuclear being the backbone of our system, that's what we're looking forward to building out as we say, because we're limited to how much hydroelectric we can add also there is some opportunity, nuclear really is the answer to meeting our baseload needs.

Q: So, conventionally around the world there's a consensus growing, as much solar, as much wind as possible, let's bring on energy storage but nuclear has a big load to shoulder. The last piece of the nuclear puzzle I'd like you to talk about is, you've mentioned before the Darlington reactor, it's in the middle of a \$12.8 million dollar restoration. Talk about the extended life that's going to offer and then to jump into our core topic here.

Why has there been a decision to go with smaller units as opposed to stay with the big behemoths?

A: Yeah, sure so let me start by talking about the refurbishments as we call them that are underway at the Darlington reactors and the same process is underway right now, Marty, at Bruce Power as well with the CANDU reactors that we have there. Really happy to say that the \$12.8 billion dollar refurbishment project at Darlington because of the sharing of information between Bruce and OPG, keeping in mind they're somewhat competitors, but all wanting the nuclear sector to succeed and grow, they've been sharing information on best practices. They've been fully planning out, designing and engineering the refurbishments in advance and therefore they've been able to bring in these multi-billion-dollar infrastructure projects ahead of schedule and on budget, and I don't know about you but you don't hear a lot about infrastructure projects coming in ahead of schedule and on budget but we've been seeing that in the nuclear sector in Ontario which is policymakers here as government gives us a lot of comfort in moving forward with refurbishing and we're going to be refurbishing the Pickering Nuclear Generating Station as well; that's a very fresh announcement here in Ontario and we're moving forward on that refurbishment so we see the opportunity to take advantage of the

expertise that we have as a Tier 1 Nuclear Operator to bring in future projects ahead of schedule and on budget and at the same time you mentioned, Marty, building out our grid with wind and solar and battery storage, but we're also doing that here in Ontario. We're fortunate to have a very diverse supply mix in this province and so we've got the largest procurement of battery storage underway right now to better utilize the intermittent non-emitting resources that we have in the renewable sector as well. To answer your question about small modular reactors, why did we decide to go there? We believe in conversation with numerous partners that we've talked to around the world that this is actually the technology that will fit best into their unique circumstances as well. For instance, one of the partners on our small modular reactor project is Poland and a company called Synthos Green Energy out of Poland. Poland is using more coal in many jurisdictions around the world and has very polluted skies and air quality. They want to eliminate coal-fired generation and they have these coal plants strategically located across their country and the beauty of a 300-megawatt reactor is you can place it next to that coal plant that's operating now, the transmission already exists; it's there. You can shut down your coal plant one day, flip the switch and fire up the small modular reactor which is automating the next day and not have to worry about building

out infrastructure and using brown fuel properties so they're far more flexible and we're going to be building a large, too, but we're building out small and large here in Ontario.

Q: So, talk a little bit about the cost and the business proposition. Here in the United States, we had the Vogtle plant in the southeast run by Southern Power, southern company and they had cost overruns and delays. Do you think the smart technology will get away from that? Certainly, in terms of more Biden capital outlay upfront makes them more appealing. Do you just think the large plants are not going to be as popular going forward?

A: No, I think there's going to be room for large plants and small plants. I was down at Vogtle just last week actually with the folks from Westinghouse Nuclear and Southern Power; saw them in action on the VOGTLE plant that's currently operating and the new one that's about to begin operation in March. There's been a lot of lessons learned as there are with any nuclear project and I believe at Bruce for instance, we're talking about adding almost an additional five gigs at that site and I suspect that most of that five gigs that Bruce Power is looking to add will be large nuclear. They are also exploring the idea of having a mix of large and small on that site but at Darlington right now, we're looking at building not just one small modular reactor

there but four SMRs on that site making it 1.2 gigawatts of new generation there to be added to the grid that's baseload reliable power that we can count on, enough power for 1.2 million homes which we intend to build because of all of the population increase that we've been seeing here so there's room for big and small nuclear and I think different jurisdictions around the world will have a choice as to what technology works best in their given circumstances but certainly, the SMRs are scalable. I think what we've learned here in Ontario that the key to success on all of these projects and avoiding the cost overruns like you saw at Vogtle is don't start building until your design work is done. The folks at OPG, Ontario Power Generation, would tell you that. That's why we're doing all of the work upfront to ensure that on refurbishments we're doing the scoping, we're doing the engineering, we're doing the design work upfront before we actually start turning tools and putting shovels in the ground and we're taking that same approach to the SMR project; get the design done, make the estimate as accurate as possible before you actually start the work and because it's the delays from not being well-prepared and planning the project that are costing you money at the end of the day.

Q: So, talk a little bit about the unique situation in Ontario. What you're talking about is get the design work upfront, get the

regulatory approvals streamlined. The U.S. tried to do that. They spent the last decade to try to get the RNC to standardize designs, approve them to try to avoid the red tape of cost overruns, the change of designs once the project was underway that characterized the industry in the '70s, '80s, and '90s earlier on. You've been a member of the Parliament in the province for about a dozen years. You call yourself progressive conservative. You've got a system up there that is kind of is like Americans would be familiar with TVA and Bonneville where there's public ownership of the asset at least to a large extent. Is it a more harmonious system than in the United States where it's much more adversarial to get things approved, designed. Do you think you've got a winning way in Ontario that other jurisdictions in the United States may want to look at?

A: Yeah, I think so and I've had the opportunity over the last number of years to get to know Jeff Lyash from Tennessee Valley Authority, TVA. He used to be the CEO here at Ontario Power Generation before he headed back to the U.S. and I was visiting with him just last week in Nashville at their headquarters there. It's a different world here in Ontario politically for sure and in Canada; it's not always harmonious I think is the word you used, Marty. We do have jurisdiction in the provinces like Ontario when it comes to planning and building out energy

infrastructure. Every now and then the federal government likes to stick their nose into provincial jurisdiction and sometimes you have to punch them in the nose to get them out of your business but we've taken a much more collaborative approach here in Ontario in trying to work with our federal government which is a liberal government and they're trying to meet certain targets when it comes to Net Zero by 2050 in those types of targets, and really, our conversations have been centered around okay, if you want to hit Net Zero targets by 2050, there's only one possible way that you're going to be able to do that and that's by adding nuclear to our system. It's baseload power, it's there when you need it, it's there and able to be relied on 365 days a year or in 2024's case, 366 days a year and it's just reliable baseload power, so the federal government has bought in and they're actually supporting the projects that we have going in Ontario right now and across Canada with tax incentives to match the Inflation Reduction Act south of the border. Our Canada Infrastructure Bank is also invested in the small modular reactor project with about a billion dollars in support and we hope we'll see future installments from the Canada Infrastructure Bank as well. They're supporting our regulators, the CNSC, the Canada Nuclear Safety Commission, in building a framework for siting SMRs so that there isn't a different framework in each province

or maybe in each jurisdiction around the world and the CNSC has been a real leader amongst regulators internationally in taking the lead position on ensuring that. There are going to be unique circumstances in each country or province or state where SMRs go but overall, the framework will look the same no matter where you are, which makes the small modular reactor and modular being the key, we're able to produce these SMRs en masse and send them down to TVA in Knoxville or Clinch River where number two is expected to go, or Saskatchewan to help them shutoff their coalfired facilities, or in Poland where they're look at adding potentially dozens of these SMRs to help them get off coal and to have the energy security that they're looking for in the face of Russian aggression there.

Q: Minister, I'd like you to get philosophical with us for a second. Ever since the nuclear problems in Japan from the tidal wave there was concern in the United States and it's slowed down in the adoption of nuclear power, and there's been a long-term concern in some quarters about the United States not ultimately solving the waste depository issue. You have a background in communications. You're professionally a radio journalist and know about communication challenges. How has Canada gone about and obviously Canada's a complex entity; there's government, there's industry, but how has Canada faced the nuclear challenge and do

you think Canada has frankly more sophisticated nuanced acceptance of nuclear than the United States can muster at this time?

A: Yeah, I can't speak too much about the United States and how their people are...

Q: Take the luxury.

A: I'll try. Canada and not in every province; it varies across the country here too, Marty. For instance, Québec is not really as openminded to exploring the idea of nuclear power even though they get power sent to them from our province, from our nuclear facilities all the time to support them in the wintertime when they need the power. They're not too anxious about having new nuclear being built in Québec, but in many other places across our country, support for nuclear is very high. We've had nuclear providing electricity here in Canada for over 50 years and doing it safely, employing thousands of people; 76,000 people work in it.

Q: That's ditto the United States, I mean, that's true in the United States but public perceptions are different or it sounds like or is it just Ontario you think that's a pocket of nuclear support?

A: No, I can tell you just in polling that's been done in places like Alberta in the west and Saskatchewan out west as

well, support is very, very high for nuclear and they're actually partnering with us on the small nuclear reactor project. Those are jurisdictions that also realize that we need energy and this technology will help them in the oilsands for instance where we are producing gas and natural gas ethically and then we should be sending it around the world, but that's another bone of contention with our federal government because we're not getting that ethically-produced LNG to tidewater so we can send it around the world to help jurisdictions that want to get off coal do it by using LNG; that's a whole other story. I guess what I was trying to get at is these are jurisdictions in provinces that are focused on Canadian energy and so they're supportive of this idea, and it's also going to help them with some of the technologies that are being deployed now in the SMR space be able to drive down their emissions at the refineries and places like the oilsands and so it's a really positive story to tell and I think the other part of it that doesn't get told enough and is unique to our CANDU reactors that we have in Canada is we're able to produce medical isotopes for nuclear medicine from our reactors and medical isotopes are used to treat various forms of cancer. Cobalt-60 is one of those isotopes that's used to sterilize medical equipment and Canada is a leader in that. It's Russia that's actually is the world's leader right now but

there's a lot of countries out there that don't want to do business with Russia at this time so Canada is really poised to be a nuclear medicine superpower and they're looking to us for those types of isotopes now so that's another part of the story that we like to tell here in Canada because it is unique to our CANDU reactors.

Q: Take a minute as a government official; I'm sure you would like to bask in the glory of your province. You're a first mover on small modular reactors. You talk excitedly about Poland for example that you might have something here that the world really needs to get with climate change in a rapid order. Do you see Ontario and OPG exporting this technology to the United States and around the world? Are you going to be pushing that?

A: Yeah, and that's been actually part of my role for the last 2½ years. I had no idea that when I took on the role as Minister of Energy, I'd be racking up the airmiles like I have and telling the story about our leadership on small modular reactors and Canada's position as a Tier 1 nuclear nation. We had the governor of Indiana here a couple of weeks ago and Eric Holcomb took a tour of our nuclear plant and as I told him as I would to anybody from the home of the Indy 500, Canada's in the pole position when it comes to small modular reactor deployment not just across North America but around the world, and we've had interest from

so many countries that are in the shadow of that Russian aggression that are looking for that energy security and energy autonomy and they're looking to trusted allies like Canada and the United States who are working together on this SMR project with the potential to deploy them to countries like Poland and Estonia and the Czech Republic and Romania and many other places across not just eastern Europe but around the world that are looking for an answer to reducing emissions but are also looking for that type of energy security.

Q: Minister, when will these SMRs be completed and functioning and when will you be able to show the world what you have done?

A: Well, the site preparation work is already underway. The plan is to have the design work done later this year have shovels in the ground in 2025 and then have this SMR producing emissions, free reliable electricity on our grid by early 2029. We expect to have all of the fuel worked out and ready to go and loaded into the machine by 2028 and then producing that electricity early in 2029.

Q: For those of us who have tracked the nuclear energy for decades, that's remarkable, speedy, and efficient. Tell me who around the world is beating a path to your door to learn more?

A: Well, countries all around the world are talking to us. Places like Australia even though the governing party there isn't

necessarily anxious to add nuclear to their mix. The opposition party sure is and we've had numerous visits from Australia; I mentioned Poland is already a partner on the project and they're anxious. The folks in Estonia have already chosen the same technology. We believe that the United Kingdom is going to choose our SMR from GE Hitachi is one of their chosen technologies for SMR deployment but I had the opportunity in the fall of 2022 right after the Russian invasion of Ukraine and emergency European Union energy leaders were meeting in Prague in the Czech Republic in that October period and had the opportunity to meet with many of them that are looking at the type of energy that may come from this small modular reactor in the not-too-distant future and how they can access this technology that is going to be the first that is going to be deployed in the western world so I often say, the world is watching what is happening here in little old Ontario and I believe that much of the world actually is keeping a very close eye on the development of this technology which will be the first in the western world to deploy electricity from a small modular reactor.

Q: Thank you, Minister. We've been talking to Minister Todd Smith, Energy Minister of Ontario, Canada. It's been a pleasure to talk to you and we really want to stay connected and follow this story as it develops.

A: Anytime, Marty. Happy to talk to you.

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