PNGS Community Advisory Council
Pickering Nuclear Information Centre
Tuesday, June 20, 2023
Highlights

Ontario Tech University
Jennifer Freeman and Francis Arnaldo spoke about Ontario Tech University and its proposal to add a *subcritical assembly* to its nuclear facilities. This is a type of reactor that is much smaller than power reactors and is designed for research, testing, training and teaching. The university plans for the reactor to be licensed and in operation by 2025 or 2026. Council members were excited to learn about the university and its plans.

Site Update
Jon Franke presented a site update. He noted that all six units at the site will be operating at full power to meet summer demand. He also talked about a licence application to extend operation of Units 5 – 8 to 2026 as well as a forthcoming report on the feasibility of refurbishing those units, which would extend their operation for another 30 years.

Small Modular Reactor Development at Darlington
Carol Gregoris presented a Darlington New Nuclear Project overview and update. Along with Cammie Cheng, Carol also talked the project's environmental impact statement (EIS) and how it was updated to account for the impact of the planned small modular reactor (SMR). Council members were very interested in the presentation and asked many questions.

Community Affairs Update
Analiese St. Aubin talked about recent and forthcoming OPG activities in the community. She talked about station tours by municipal politicians, OPG outreach to high school and elementary school classes, the summer Tuesdays on the Trail program, and other activities.

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CAC:
Denise Bacon
Craig Bamford
Frank Dempsey
Donna Fabbro
Pat Mattson
Sean McCullough
Cody Morrison
Peter Ottensmeyer
Rishita Peterson
Eric (Zhen) Qin
Helen Shamsipour
Dan Shire
John Simpson

Regrets:
Mary Gawen
Bill Houston
Tim Kellar
Tracy MacCharles
Tavis Nimmo
Khaled Turk

OPG:
Cammie Cheng
Jon Franke
Carol Gregoris
Analiese St. Aubin

Ontario Tech University
Francis Arnaldo
Jennifer Freeman

Hardy Stevenson and Associates:
Francis Gillis
Dave Hardy

Topic #1: Health and Safety Moment

Following a Land Acknowledgment, Site Vice President Jon Franke noted that tomorrow (June 21) is the first day of summer. With the hot and humid days coming, it is important to keep hydrating, keep cool and be aware of the risks of getting overheated.

He also noted that June 21 is National Indigenous Peoples Day. A celebration involving Indigenous dancing and drumming will take place outside the Pickering Nuclear Information Centre on Thursday, June 22. CAC members received an invitation to attend the celebration.

Topic #2: Review of Minutes

The CAC minutes of April 18, 2023 were approved without changes.

Topic #3: Ontario Tech University

Jennifer Freeman, Executive Director Research Services, and Francis Arnaldo, Biosafety and Radiation Safety Officer, spoke about enhancing hi-tech nuclear facilities at Ontario Tech University (Appendix 1).

Ontario Tech University is the brand name of the University of Ontario Institute of Technology, located in Oshawa. The university provides students a foundation in technology, the sciences and professional practice. Jennifer noted that Ontario Tech University's Department of Energy and Nuclear Engineering is the only undergraduate nuclear engineering program in Canada.

To enhance its hi-tech nuclear facilities, the university is proposing the addition of a subcritical assembly, a type of subcritical reactor that is much smaller than power reactors. (During normal reactor operations, criticality occurs when nuclear fuel sustains a fission chain reaction; such a chain reaction cannot be sustained in a subcritical reactor.) The primary purpose of a subcritical assembly is research, testing, training and teaching. It will play an important role in producing career-ready graduates for the nuclear industry. As well, it will support research for the nuclear industry as it delivers next generation solutions to global challenges.

Francis explained that a subcritical assembly is based on a very simple design:

- No meaningful power can be generated in a subcritical assembly; as a result, there is little to no fuel burnup.
- No measurable heat or pressure is generated; it does not need cooling systems.
- A self-sustaining fission chain reaction cannot occur in a subcritical assembly; as a result, emergency shutdown systems are not required.

- An external radioactive source is required for a subcritical assembly to work; when the radioactive source is removed from the unit, the fission chain reaction stops naturally; criticality is impossible.
- Can turn off the system like a light switch controlling a bulb.

Francis also talked about the elements and staffing of the university's nuclear facility complex, which is specifically designed to allow the safe and secure use of nuclear substances and radioactive devices for research and teaching.

Jennifer noted that there are many steps ahead as the university prepares to apply to the Canadian Nuclear Safety Commission for a licence for the subcritical assembly. There will be a lot of scrutiny from the CNSC, she said.

Francis remarked that a subcritical assembly will allow for a lot more hands-on experience than would be possible with an in-power reactor.

More information on the subcritical assembly project is available at: https://ontariotechu.ca/subcritical

Jennifer and Francis responded to Council questions:

- *How do you handle the fuel?*
  Jennifer: We use natural uranium and have procedures for handling it safely. (Because uranium decays by alpha particles, external exposure to uranium is not as dangerous as exposure to other radioactive elements, because the skin will block the alpha particles.)

- *When do you expect to get a licence for the subcritical assembly?*
  Jennifer: Obtaining a CNSC licence is a lengthy process. We expect to get a licence and have the subcritical assembly in operation by 2025 or 2026.

- *Do subcritical assemblies represent a new direction in nuclear education?*
  Francis: No, subcritical assemblies have been around for a while.

- *Do you integrate findings from the social sciences?*
  Jennifer: Yes. For example, there is a joint project on information and disinformation involving social science and engineering departments. We also have a research centre that brings the findings of social sciences and hard sciences together.

- *Does the discussion of SMRs at the university include fuel recycling?*
  Jennifer: Exploration of fuel recycling is in its very early stages.
  Francis: Our nuclear fuel laboratories are not currently funded for research in this area.
  Jennifer: But you can reach out through email for more information on Ontario Tech University's involvement in this area.

Topic #4: Site Update

Jon Franke presented a site update:

- The last maintenance outage of Unit 4 is now being completed. So, all six units (1, 4, 5, 6, 7 and 8) will be operating at full power to meet summer demand.

- Last September, the Government of Ontario asked OPG to consider extending the operation of Units 5 – 8 to cover an anticipated shortfall of electricity supply in the summer of 2026. On Friday, June 16, OPG submitted a licence amendment application to the CNSC to operate Units 5 – 8 to the end of December 2026. An OPG safety review concluded that Units 5 – 8 are fit for service through 2026. We anticipate an opportunity for public engagement next spring.

- The Government of Ontario has also asked OPG to look into the possibility of refurbishing Units 5 – 8, which would extend operation of these units for another 30 years. An OPG team is currently evaluating the feasibility of such a large project. It would mean replacing all fuel channels and other major tasks. The team will also look at ways to get more megawatts of power from the four units. The evaluation will go to the Board of Directors some time in August. There is no timeline for the province's response, but we anticipate it will come in the fall.

- This fall, Pickering Nuclear will undergo a "mid-term" World Association of Nuclear Operators (WANO) review. The last visit was October 2021. Every two years, WANO conducts a major evaluation of the site.

A Council member asked about the current status of refurbishment of the four units at Darlington Nuclear. Jon noted that refurbishment of Darlington Unit 2 was completed in June 2020. Units 1 and 3 are currently in refurbishment, with Unit 3 expected to be back on line this summer.

Jon congratulated CAC member Craig Bamford on receiving a City of Pickering Civic Award at a recent ceremony. Jon asked Craig to say a few words on receiving the Environment Award.

Craig said that the ceremony was a most enjoyable experience. He was involved in planning the Pickering waterfront from 1997 to the time of the publication of the Waterfront 2001 Report. As well, he was involved in planning tourism projects at the bottom of Liverpool Road. He is looking forward to new projects.

Topic #5: Community Feedback

Council Facilitator Dave Hardy asked CAC members what they are hearing from the community.

A member had seen the 2020 Japanese movie, Fukushima 50, about the 2011 tsunami. Among the comments she heard were questions about the interconnectedness of units at a nuclear plant. In an emergency situation at Pickering, if Unit 1 goes, does Unit 4 go a day later?

Jon said that Pickering is absolutely prepared for emergencies. He noted that the wave of water in Fukushima destroyed all the back-up diesel generators at the plant. Workers desperately tried to cool the reactors without backup power. At Pickering, Jon said, the plant has more ways to make back-up electricity than he has ever seen. The plant also has ways to bring in generators from other locations.

Another Council member remarked that there would be tremendous value in OPG making the movie available. He also remarked that Fukushima wasn't a nuclear incident at all. Twenty thousand died due to the tsunami. The other member said that 12 people at Fukushima died from radiation.

Jon commented that it would be worth checking that claim. Unlike Fukushima, he added, there were radiation deaths at Chernobyl.

Topic #6: Small Modular Reactor Development at Darlington

Carol Gregoris, Project Director Darlington New Nuclear Project (DNNP), presented a project overview and update. Along with Cammie Cheng, Senior Manager Environment Health and Safety, Carol also presented a review of OPG's Environmental Impact Statement for the project (Appendix 2).

The DNNP is now focused on a small modular reactor (SMR) to be located just east of the Darlington station.

Carol noted that the original Environmental Assessment (EA) was presented in 2009, when four CANDU reactors (Darlington B) were planned for the site. In August 2012, the CNSC issued a Power Reactor Site Preparation Licence to OPG. But plans for Darlington B were cancelled when a lack of demand for that much power was forecast.

OPG kept the Site Preparation Licence, however, and started to evaluate SMRs. Over time, it was realized that climate change could be addressed by electrification, which would entail a significant increase in demand.

There are many different types of SMRs, e.g. for industrial uses, but OPG is focused on grid-sized SMRs. In 2020, OPG announced that it had chosen the technology for its

SMR technology, the GE Hitachi BWRX-300, which stands for Boiling Water Reactor with a capacity of 300 megawatts electrical (MWe). The “X” indicates that this is the 10th generation of the technology, the most advanced and simplest of the designs created. The footprint of this SMR (the unit and surrounding land) will be the size of a football field, located in the southwest corner of the DNNP site near the existing Darlington Waste Management Facility. Ultimately four SMRs are planned for the project.

As indicated in the title of the technology (small modular reactor) a lot of equipment involved is modular, so a lot of the assembly occurs off site, including the building itself.

Carol laid out the new nuclear licensing roadmap for Darlington. A Site Preparation Licence Renewal was issued in 2021. In 2022, site preparation activities began, and OPG submitted a Licence to Construct application.

Following CNSC public hearings, it is anticipated that the Licence to Construct will be issued in 2024.

There will also be CNSC public hearings in 2028, following which a Licence to Operate is anticipated. Construction is scheduled to be completed in 2028 with commercial operation to begin in 2029.

Environmental Assessment and Commitments

In 2009, OPG submitted to the CNSC an Environmental Impact Statement (EIS) summarizing the results of the Environmental Assessment of the new nuclear project. Following a Joint Review Panel assessment, the CNSC issued a Power Reactor Site Preparation Licence in 2012. As noted above, this licence was renewed in 2021.

OPG had committed to reviewing the EIS once a technology for the SMR was selected, to ensure that the results of the EIS remain valid.

Cammie Cheng talked about the EIS Review, which considers the environmental impact of deploying up to four BWRX-300 SMRs at the Darlington site.

Cammie summarized the EIS Review Report. Key points:

- BWRX-300 deployment has a smaller footprint—smaller in physical size and electrical power.
- Construction requires reduced workforce, on-site traffic, excavation of soil and rock.
- Opportunity to retain on-site ponds, wetlands, vegetation habitats and shoreline habitats.
- BWRX-300 deployment utilizes once-through lake water cooling; cooling tower structures considered as options in the original EIS no longer apply.
- BWRX-300 will be operated such that no radiological liquid effluent is released during normal operation of the facility.
- The BWRX-300 will require less marine and shoreline works.

- No permanent effect to groundwater flow, which will return to natural levels after construction.
- Environmental effects expected to be less than those assessed in the EIS.
- EA follow-up and monitoring program remains suitable for BWRX-300 deployment.

Cammie also presented a photo of an artificial bank swallow habitat set up on the Pickering Nuclear site. The structure is designed for nesting of these migratory birds (slide 19 in Appendix 2). OPG is very excited that this third attempt at a nesting structure seems to be working very well.

Cammie also noted OPG's ongoing outreach to a broad audience of stakeholders and the public to ensure they are well informed about the Darlington New Nuclear Project, including the EIS review.

Carol, Cammie and Jon responded to Council questions:

- *How many fuel bundles are placed in the BWRX-300?*
  Carol: About 240. Every two years about one-third of the bundles are replaced. Their storage is very similar to that of used bundles from the current reactors.

- *What amount of land is required for a 300-megawatt reactor?*
  Jon: The SMR footprint outperforms other types of generator. The BWRX-300 footprint is equal to the of one windmill. Forty-five windmills would be needed to match the output of the BWRX-300.

- *How many homes will the SMR power?*
  Carol: 300,000 homes.

- *At current rates of domestic usage and export, Canada is going to run out of uranium in 20 years. Other technologies, which use fuel much more efficiently than the BWRX-300, should be considered in the future.*

- *Is the artificial nesting habitat set up at the Pickering Nuclear site protected from vandalism?*
  Carol: It is within the plant fence line and protected in that way.

- *Might other birds go into that habitat?*
  Cammie: No, it is designed specifically for these birds. Certainly, I haven't heard of any other birds attempting to nest there.

- *You said that SMR construction will not affect shoreline habitat for bank swallows?*
  Cammie: Yes, residual shoreline effects from vibration and changes to groundwater flow are anticipated to be minor. At specific times, for example breeding time, measures will be taken to ensure no impact on the birds.

- *Is the artificial habitat at risk from foxes?*
  Cammie: The height of the structure prevents fox invasion.

- *Are there any environmental threats to the structure?*
  Cammie: There are air quality monitors in place during construction and during SMR operation.

- *Are there any seismic effects from operations at nearby St. Mary's Cement?*
  Cammie: I believe OPG is coordinating with St. Mary's to address this issue.

- *Will the SMR be re-using any fuel?*
  Carol: Nuclear waste was part of the Environmental Impact Statement review. Only a very small amount of used fuel would be available for re-use at this point. The nuclear plant at Point Lepreau in New Brunswick is currently involved in researching the potential for re-using fuel. But re-using fuel will become important in the long term as research and development advances. Interestingly, the public is now focused on the nuclear waste issue rather than safety.

- *Will the SMR be producing isotopes for medical and other uses?*
  Carol: We are not planning for isotope harvesting in the SMR right now, but potentially that could become part of the operation.

- *I was surprised to hear of the possibility of four new reactors at Darlington.*
  Carol: We now have regulatory approval to prepare the site for only one reactor. But we would ultimately want four SMRs in place to meet forecast demand. The Independent Electricity System Operator has published a report on various scenarios going forward, e.g., a significant increase in the number of electric cars (https://www.ieso.ca/en/Learn/The-Evolving-Grid/Securing-New-Energy-Supply).

Topic #7: Community Affairs Update

Analiese St. Aubin, Manager Corporate Relations, talked about recent and forthcoming OPG activities in the community.

Tours and presentations:

- On May 10, OPG attended a Whitby Rotary Club meeting and presented to approximately 50 members.
- On various dates in late May, Whitby Mayor Eizabeth Roy as well as municipal Councillors from Toronto and the Agincourt area toured the station.
- On June 2, high school students visited the station and were very excited to hear about careers in the nuclear industry.
- As part of the Pickering Bring Back the Salmon program, two grade 5/6 classes were involved in the release of 99 Atlantic salmon in Duffins Creek.

- On June 9, OPG presented an energy program to 60 Grade 1 students. Among the activities was a group reading of George's Energy Advantage, a children's book on nuclear energy.

Other updates:

- The Pickering Nuclear Information Centre opened again to the public at the end of May. A lot of members of the public have visited the centre through the last couple of weeks.

- Tuesdays on the Trail 2023: Pickering and Darlington Nuclear Corporate Relations welcomes families to attend a two-hour program on select Tuesdays in July and August at Centennial Park (Pickering) in the morning and the Darlington Waterfront Trail (the Darlington Lower Soccer Fields) in the afternoon. Weekly registration will be offered through www.opg.com.

- The latest issue of Neighbours was delivered about a month ago. The issue included a special insert about Pickering Nuclear.

Topic #8: Closing Remarks

Council Facilitator Dave Hardy noted that the next CAC meeting will be on Tuesday, Sept 19. Topics will include the annual Environmental Monitoring Program and Groundwater Monitoring Program reports. Council members should not hesitate to contact Dave with questions or concerns over the summer.

A Council member said he was happy to hear that Canada's finance minister Chrystia Freeland has announced tax credits for recycled fuel. Jon remarked that OPG will be eager to take advantage of that.

Jon thanked CAC members for their time this evening and for their comments and questions. He asked members, if they learn anything about community questions or concerns about OPG, to please let him know.

Next Meeting

Pickering Nuclear Information Centre
Tuesday, Sept. 19, 2023
4 pm – 7 pm