Ontario approves construction of first-of-its-kind small modular reactor

June 12, 2025

On May 8, 2025, the Province of Ontario announced that it approved Ontario Power Generation's (OPG) plan to begin construction on the first of four small modular reactors (SMR) at the Darlington nuclear site.

The four SMRs are referred to collectively as the Darlington New Nuclear Project, or DNNP. OPG's budget for the DNNP, which includes site preparation, engineering and design work to date, as well as the construction of all four SMRs, is set at C$20.9 billion (US$15.2 billion). The Province's approval of construction of the DNNP follows the issuance of a decision of the Canadian Nuclear Safety Commission (the Commission) on April 4, 2025, which issued Canada's first regulatory approval to construct the first SMR of the DNNP.

The first SMR, which is located on the existing Darlington Nuclear site, consists of the existing Darlington Nuclear Generating Station[1] in Clarington, Ontario.[2] The 10-year Nuclear Power Reactor Construction Licence (the Licence) authorizes OPG to proceed with construction of one General Electric Hitachi Boiling Water Reactor X-300 (BWRX-300) and complete unfueled commissioning activities.[3] The Commission's issuance of the Licence was informed by an assessment of the Crown's constitutional duty to consult, and where appropriate, accommodate Indigenous interests. The Licence is valid until March 31, 2035.[4]

Nuclear Regulatory Framework

The development, production and use of nuclear energy in Canada is governed at the federal level under the *Nuclear Safety and Control Act* (NSCA),[5] which establishes the Commission.[6] The Commission's responsibilities include granting licenses for various nuclear-related activities.[7]

The BWRX-300 is a nuclear fission reactor, qualifying the DNNP as a Class IA nuclear facility under the *Class I Nuclear Facilities Regulations* (CINFR),[8] enacted under the NSCA.[9] The CINFR define the Class IA nuclear licensing requirements to include five distinct lifecycle phases – site preparation, construction, operation, decommissioning and abandonment,[10] all of which are contemplated in the scope of the DNNP.[11]

Status of the licensing process

The DNNP regulatory process began almost 19 years ago on Sept. 21, 2006, when OPG submitted a preliminary application for a licence to prepare the DNNP site for up to four Class IA nuclear reactors for a combined net output of 4800 MW electrical.[12] An updated site preparation licence application was submitted in September 2009.

As the technology had not yet been selected, OPG's Environmental Impact Statement (EIS) required for the DNNP's Environmental Assessment (EA) conducted under the *Canadian Environmental Assessment Act*[13] in 2011 used a plant parameter envelope (PPE) approach to examine the potential effects of several reactor technologies.[14] The Commission determined the BWRX-300 technology was not fundamentally different from the technologies considered in the course of the EA process and therefore, no updated EA under the *Impact Assessment Act* would be required. Following the EA, a Joint Review Panel, acting as a panel of the Commission, issued a 10-year site preparation licence to OPG for the DNNP on August 17, 2012. The site preparation licence was renewed for an additional ten years on Oct. 12, 2021.

The selection of the BWRX-300 reactor was announced in December of 2021 and OPG submitted its application for the licence on Oct.31, 2022.[15] As required under the EA's follow-up program and the DNNP site preparation licence, OPG conducted a review of the EIS to ensure that the conclusions in the EIS remained valid for the selected technology.[16] The Commission's staff (CNSC Staff) assessed OPG's EIS review and confirmed that the mitigation measures identified in the EA were adequate for the implementation of up to four BWRX-300 reactors.[17] On April 19, 2024, the Commission confirmed the assessments made by OPG and the CNSC Staff, determining that the "BWRX-300 is not fundamentally different from the technologies assessed in the [EA]" using the PPE approach "and a new EA is not required".

Notably, the Licence as proposed does not authorize "fuel loading, fuel-in commissioning, or operation of the BWRX-300 reactor."[18] This means additional approval from the Commission will be required prior to commencing the operational phase of the DNNP.

Summary of the decision

The Commission issued the Licence pursuant to the NSCA.[19] Following a multi-day public hearing, the Commission released its Record of Decision for OPG's *Application for a Licence to Construct one BWRX-300 Reactor at the Darlington New Nuclear Project Site* and concluded that the following statutory criteria for approval under the NSCA were satisfied:

a. OPG is qualified to carry on the activity authorized by the Licence; and
b. OPG will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations.[20]

As an agent of the Crown, the Commission acknowledged its obligation to uphold the honour of the Crown and fulfill its constitutional duty to consult and, where appropriate, accommodate. The Commission also recognized that its determination of the scope and

content of this duty must be informed by UNDRIP and Canada's *United Nations Declaration on the Rights of Indigenous Peoples Act* (the UNDA). The Commission ultimately concluded that its responsibility to uphold the honour of the Crown and fulfill its constitutional duty to consult had been satisfied with respect to its decision to issue the Licence.

The Licence includes standardized conditions, as well as four site-specific conditions recommended by CNSC Staff:

> *15.1. The licensee shall implement the mitigation measures proposed and commitments made during the Darlington Joint Review Panel process, including the applicable recommendations of the Darlington Joint Review Panel Report, in accordance with the Government of Canada response.*
> *15.2. The licensee shall implement and maintain an environmental assessment follow-up program.*
> *15.3. The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.*
> *15.4. The licensee shall conduct Indigenous engagement activities, specific to the DNNP, throughout the period of this licence.*[1]

The first two conditions, 15.1 and 15.2, impose ongoing environmental requirements and commitments. The third condition, 15.3, requires, as recommended by CNSC Staff, a staged approval process for construction activities, with approvals tied to three regulatory hold points (RHPs):

> RHP-1: Installation of the Reactor Building Foundation;
>
> RHP-2: Installation of the Reactor Pressure Vessel; and
>
> RHP-3: Fuel-Out Commissioning.[22]

Removal of each RHP is contingent on OPG meeting a set of prescribed information submission requirements to the satisfaction of CNSC Staff and the Commission, as further discussed below. The fourth condition, 15.4, requires Indigenous engagement activities to be conducted throughout the period of the Licence. We consider each of these conditions and RHPs below.

The Commission also approved OPG's financial guarantee of C$167.18 million in the form of a letter of credit as required under the NSCA to provide adequate funding for decommissioning.[23]

The Commission directed CNSC Staff with respect to the implementation of several commitments and accommodations regarding the consultation and accommodation of the interests of Indigenous communities with respect to the DNNP, as detailed previously.[24] Additionally, the Commission directed OPG to implement the commitments specified in section 2.0 of OPG's *DNNP Indigenous Engagement Report November 2023 to September 2024* (CMD 24-H1A).[25] Several of these commitments and their implementation are discussed in greater detail below.

Licence conditions 15.1 and 15.2 – Ongoing environmental requirements

The first two of the four site-specific licence conditions require OPG to implement environmental mitigation measures and implement and maintain a follow-up program:

> *15.1. The licensee shall implement the mitigation measures proposed and commitments made during the Darlington Joint Review Panel process, including the applicable recommendations of the Darlington Joint Review Panel Report, in accordance with the Government of Canada response.*
> *15.2. The licensee shall implement and maintain an environmental assessment follow-up program.*[26]

Licence condition 15.1 requires OPG to satisfy its commitments made under the EA process, which includes the relevant recommendations of the Joint Review Panel Environmental Assessment Report. As of June 2024, 38 of the Joint Review Panel's 66 recommendations falling under OPG's responsibility had been marked as closed by CNSC Staff.[27]

Follow-up monitoring activities required under licence condition 15.2 are intended to "verify the predictions made in the DNNP [EIS], confirm the effectiveness of mitigation measures, and provide assurance that regulatory criteria are being met."[28] As stated in the Record of Decision, the follow-up monitoring program will be made up of studies that supplement the site-wide environmental monitoring program in place for the Darlington Nuclear Generating Station.

Licence condition 15.3 - The RHPs

Licence condition 15.3 requires OPG to obtain the Commission's approval to release each of the three RHPs and proceed to the next phase of construction:

> *15.3. The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.*[29]

Authority for RHP release has been delegated by the Commission to the Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch of the CNSC Staff (EVP and CROO).[30] OPG must submit defined deliverables for each of the RHP's prescribed commitments to CNSC Staff for assessment against regulatory requirements. Where CNSC Staff determine that regulatory expectations have been met, they will recommend removal to the Commission or its delegate, the EVP and CROO. The Commission or the EVP and CROO retain discretion whether to lift the RHP.[31]

The requirements under the RHPs align with the Commission's existing safety and control oversight regime. All Canadian nuclear operators are evaluated against several categories of safety and control areas (SCAs) annually, as publicly reported in the yearly Regulatory Oversight Report for Nuclear Generating Stations. The RHPs comprise essential elements of the SCAs related to safety analysis and design.[32] As

such, the RHPs are intended to confirm compliance with regulatory requirements throughout construction and ensure that the Commission's outstanding design questions are answered prior to specific construction milestones.[33]

The first RHP (RHP-1) allows OPG to begin construction of the reactor building, internal civil structures and reactor building systems. The second and third RHPs (RHP-2 and RHP-3, respectively) permit installation of the reactor pressure vessel and full-scale fuel-out commissioning activities.

Release of RHP-1 requires OPG to submit additional information related to procurement and quality assurance standards for structures, systems and components that are important to safety; operating performance; detailed hazards analysis results; backfill verification and test activities related to the replacement of soil with non-liquifiable engineered backfill above the 80-metre elevation to mitigate any potential seismically-induced liquification hazard; seismic qualification and seismic-related design choices; qualification of the Transient Reactor Analysis Code GEH and the BWRX-300 stability analysis; severe accident analysis and reactor shutdown means; robustness analysis demonstrating that reactor facility can withstand "design-based threats, including malevolent acts"; updated fire protection system design information and assessments; the management of hazardous wastes; and security-related information.[34]

CNSC Staff's acceptance of OPG's predictive environmental risk assessment (PERA) is also required for clearance of RHP-1. The PERA covers the site preparation, construction, and operational phases of the DNNP.[35]

Release of RHP-2 requires OPG to submit additional information on the predicted occupational dose expected for nuclear energy workers (as they are defined under the NSCA) during the operational phase of the DNNP.[36]

Release of RHP-3 requires OPG to submit details of its program to train reactor workers.[37] Additional information on OPG's environmental protection program must also be submitted for the release of various RHPs.[38]

Licence Condition 15.4 – Ongoing Indigenous engagement activities

Licence condition 15.4 requires OPG to conduct ongoing, project-specific Indigenous engagement throughout the duration of the Licence:

> *15.4. The licensee shall conduct Indigenous engagement activities, specific to the DNNP, throughout the period of this licence.*[39]>

This condition was introduced in response to a request from the Michi Saagiig Nations of the Williams Treaties First Nations, comprising Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation, and Mississaugas of Scugog Island First Nation, for a regulatory mechanism to hold OPG accountable for its engagement and consultation commitments.[40]

In the Record of Decision, the Commission directed CNSC Staff to implement a range of related accommodations. These included the establishment of a formal oversight and

monitoring working group, involving OPG, CNSC Staff, and the Michi Saagiig Nations. This working group was presented in the Record of Decision as a forum for collaboration, and a means of tracking progress on commitments made by CNSC Staff and OPG to the Michi Saagiig Nations, and as an avenue to address issues, concerns, and mitigation measures necessary to safeguard the Nations' rights and interests.[41]

The Commission also directed CNSC Staff and OPG to collaborate with the Michi Saagiig Nations on the development of Indigenous Knowledge and cumulative effects studies,[42] and to support the updating of the Rights Impact Assessment (RIA) as new information becomes available during future licensing phases of the DNNP. In addition, the Commission endorsed support for a broader, territory-wide RIA undertaken with the Michi Saagiig Nations.[43]

The Commission further directed CNSC Staff and OPG to implement accommodations requiring regular and detailed reporting on engagement with the Michi Saagiig Nations. These reports are to address permitting processes, aquatic offsetting, and terrestrial restoration measures.[44] The Commission also expressed its expectation that OPG would continue to work with the Williams Treaty First Nations on the issue of jurisdiction of the Lake Ontario lakebed and the potential issuance of a land use easement.[45]

The Commission expressed its expectation that CNSC Staff will verify OPG's continued collaboration with the Michi Saagiig Nations on commitments made during the regulatory review process, including the review of international best practices for the management of used nuclear fuel.[46] The Commission also expressed its expectation that CNSC Staff will consult with the Michi Saagiig Nations during future licensing phases of the DNNP, striving to align with the principles of free, prior and informed consent, in line with the requirements of the UNDA with respect to radioactive waste management.[47]

Finally, the Commission acknowledged the Michi Saagiig Nations' request to have their perspectives meaningfully integrated into consultation, review, and decision-making processes for the DNNP and future nuclear projects. In response, it directed CNSC Staff to implement accommodations to support long-term collaboration with the Nations, including the incorporation of Indigenous Knowledge and cumulative effects studies into ongoing regulatory oversight and involvement in environmental monitoring activities at the DNNP.[48]

Conclusion

The issuance of Canada's first regulatory approval to construct a first of a kind SMR marks a critical regulatory milestone. The facility's licensee and owner, OPG, satisfied the Commission that it is qualified to build the facility and will take the necessary steps to protect the environment, human health and safety, and national security. The Commission also found that its constitutional duty to consult and where appropriate, accommodate Indigenous interests had been fulfilled. Notably, the inclusion of four site-specific licence conditions and three RHPs underscores that these obligations are ongoing and must be maintained throughout construction. While there remains significant work to be done, the Commission's approval unlocked the next stage of the DNNP.

The regulatory environment for nuclear energy in Canada is highly complex, with strict requirements on environmental protection, Indigenous consultation, safety and national security. As investment in nuclear energy grows both in Canada and globally, the system of regulatory requirements will continue to develop. The recent approval of Canada's first SMR project underscores the growing opportunities in the nuclear sector while also emphasizing the need for careful, strategic advice to manage complex regulatory processes and Indigenous consultation requirements.

BLG has extensive experience navigating and advising on the energy and nuclear industries in Canada. If you would like to explore how these developments may affect your organization or your projects, please contact any of the key personnel listed below.

Footnotes

[1] The existing Darlington Nuclear Generating Station has four Canada Deuterium Uranium (CANDU) reactors, a tritium removal facility, and a waste management facility.

[2] CNSC Record of Decision (DEC 24-H3), *Application for a Licence to Construct one BWRX-300 Reactor at the Darlington New Nuclear Project Site*, April 4, 2025 (the Record of Decision), at para 1.

[3] Record of Decision, at para 14. Paragraph 14 states that "*[t]he proposed LTC would authorize OPG to complete site preparation activities, to construct a single BWRX-300 powerblock, to construct supporting infrastructure for up to four BWRX-300 units, and to complete commissioning activities with no fuel in the reactor core (fuel-out commissioning) for the single constructed BWRX-300 unit."* It is not clear if the Licence authorizes all proposed activities.

[4] Record of Decision, at para 15.

[5] S.C. 1997, c. 9.

[6] NSCA, at s. 8.

[7] NSCA, at ss. 24 and 26.

[8] SOR/2000-204.

[9] CINFR, at s. 1.

[10] CINFR, at ss. 5-8.

[11] Record of Decision, at para 2.

[12] Record of Decision, at para 27.

[13] S.C. 1992, c. 37.

[14] Record of Decision, at para 28. See CMD 24-H3 for the EIS.

[15] OPG, *DNNP Application for a Licence to Construct a Reactor Facility*, October 2022. See also Record of Decision, at para 29.

[16] CMD 24-H2: *Determination for Ontario Power generation (OPG), Inc. Darlington New Nuclear Project (DNNP)*, One-Part Public Hearing, Scheduled for: January 2024, Submitted by: CNSC Staff, signed September 18, 2023 (CMD 24-H2), at s. 1.3.1, online (last accessed April 27, 2025). See OPG submission, NK054-REP-07730-00055, *Darlington New Nuclear Project Report for the Review of the Environmental Impact Statement for Small Modular Reactor BWRX-300*, revision 0, dated October 5, 2022. See CMD 24-H3 for the EIS.
Record of Decision, at para 485.

[17] CMD 24-H2, at s. 4.

[18] Record of Decision, at para 14.

[19] NSCA, at s. 24.

[20] NSCA, at s. 24(4).

[21] Record of Decision, at para 485.

[22] Record of Decision, at para 17.

[23] Record of Decision, at paras 20, 465, 469.

[24] Record of Decision, at para 21. See CMD 23-H3.F and *CNSC staff's Indigenous Consultation Report for the Darlington New Nuclear Project Licence to Construct Application*.

[25] Record of Decision, at para 22.

[26] Record of Decision, at para 485.

[27] Record of Decision, at para 35.

[28] Record of Decision, at para 236. See CMD 24-H3 for the EIS.

[29] Record of Decision, at para 485.

[30] Record of Decision, at para 18.

[31] Record of Decision, at paras 493, 495, 496, 500.

[32] Record of Decision, at paras 36, 310.

[33] Record of Decision, at para 152.

[34] Record of Decision, at paras 65, 97, 112, 119, 121, 135, 141, 177-178, 180, 261, 279, and 294.

[35] Record of Decision, at paras 225, 228.

[36] Record of Decision, at para 202.

[37] Record of Decision, at para 82.

[38] Record of Decision, at para 222.

[39] Record of Decision, at para 485.

[40] Record of Decision, at para 16.

[41] Record of Decision, at paras 389-392.

[42] Record of Decision, at para 399.

[43] Record of Decision, at para 406.

[44] Record of Decision, at para 418.

[45] Record of Decision, at para 417.

[46] Record of Decision, at para 422.

[47] Record of Decision, at para 423.

[48] Record of Decision, at para 433.

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