

BWRX-300 completes Phases 1 & 2 of Canadian pre-licensing review

Wednesday, 15 March 2023

The Canadian Nuclear Safety Commission has completed a combined Phases 1 and 2 vendor design review of GE Hitachi Nuclear Energy's BWRX-300 small modular reactor. The regulator said that no fundamental barriers to licensing were identified during the review.



A rendering of a plant based on the BWRX-300 (Image: GEH)

The VDR is an optional service provided by the CNSC to provide an assessment of a nuclear power plant design based on a vendor's reactor technology. It is not a

required part of the licensing process for a new nuclear power plant but aims to verify the acceptability of a design with respect to Canadian nuclear regulatory requirements and expectations, providing early feedback during the design process.

The CNSC entered into an agreement with GE Hitachi Nuclear Energy (GEH) on 11 December 2019, to conduct a combined Phases 1 and 2 pre-licensing VDR of the BWRX-300 reactor. The purpose of the combined Phases 1 and 2 VDR was to determine whether GEH understands CNSC regulatory requirements and the extent to which the reactor design meets those requirements. Phase 3 of the VDR allows the vendor to follow-up on certain aspects of Phase 2 findings by seeking more information from the CNSC about a Phase 2 topic and/or asking the CNSC to review activities taken by the vendor towards the reactor's design readiness, following the completion of Phase 2.

In 2020, GEH made its first submittal to the CNSC for its review of the BWRX-300 design. Since then, the company has made submittals addressing 19 VDR focus areas that included general plant description, control system and facilities, research and development, and design process.

During this three-year review, the CNSC examined more than 200 documents, attended technical presentations, participated in a week-long evaluation, and sent questions across the focus areas.

"CNSC staff concluded from this information that GEH understands and has correctly interpreted the intent of regulatory requirements for the design of nuclear power plants in Canada," CNSC said. "CNSC staff did not identify any fundamental barriers to licensing. However, the review did reveal some technical areas that need further development in order for GEH to better demonstrate adherence to CNSC requirements."

These include that additional information is needed on the sharing of components across defence lines; further detail is required on severe accident analysis and the corresponding engineered features credited for mitigation; more in-depth information supporting radiation protection, human factors, decommissioning, and

fire protection is needed in order for the CNSC to determine how these programmes will meet CNSC requirements; and it must be demonstrated that the BWRX-300 design meets the requirement for two separate, independent and diverse means of reactor shutdown, or else an alternative approach, with justification, is needed. The CNSC also said further information is needed on restricting radionuclide release during fuel handling activities; further information is needed on the protective measures for workers in the event of an out-of-core criticality accident; and a BWRX-300 safety analysis needs to be conducted in accordance with procedures, detailing the technical steps.

"The BWRX-300 is the first SMR technology to have completed two phases of the CNSC's VDR process," noted Sean Sexstone, Executive Vice President, Advanced Nuclear, GEH. "The successful completion of these phases and the feedback that we have received on our SMR design are important steps in the deployment of this technology."

The BWRX-300 is a 300 MWe water-cooled, natural circulation SMR with passive safety systems. It leverages the design and licensing basis of GEH's ESBWR boiling water reactor, which has been certified by the US Nuclear Regulatory Commission (NRC), and is the tenth evolution of GE's first boiling water reactor design.

The CNSC and NRC are collaborating on reviews of SMRs such as the BWRX-300 and last month the CNSC and Poland's National Atomic Energy Agency agreed to cooperate in the review of SMR technologies including the BWRX-300.

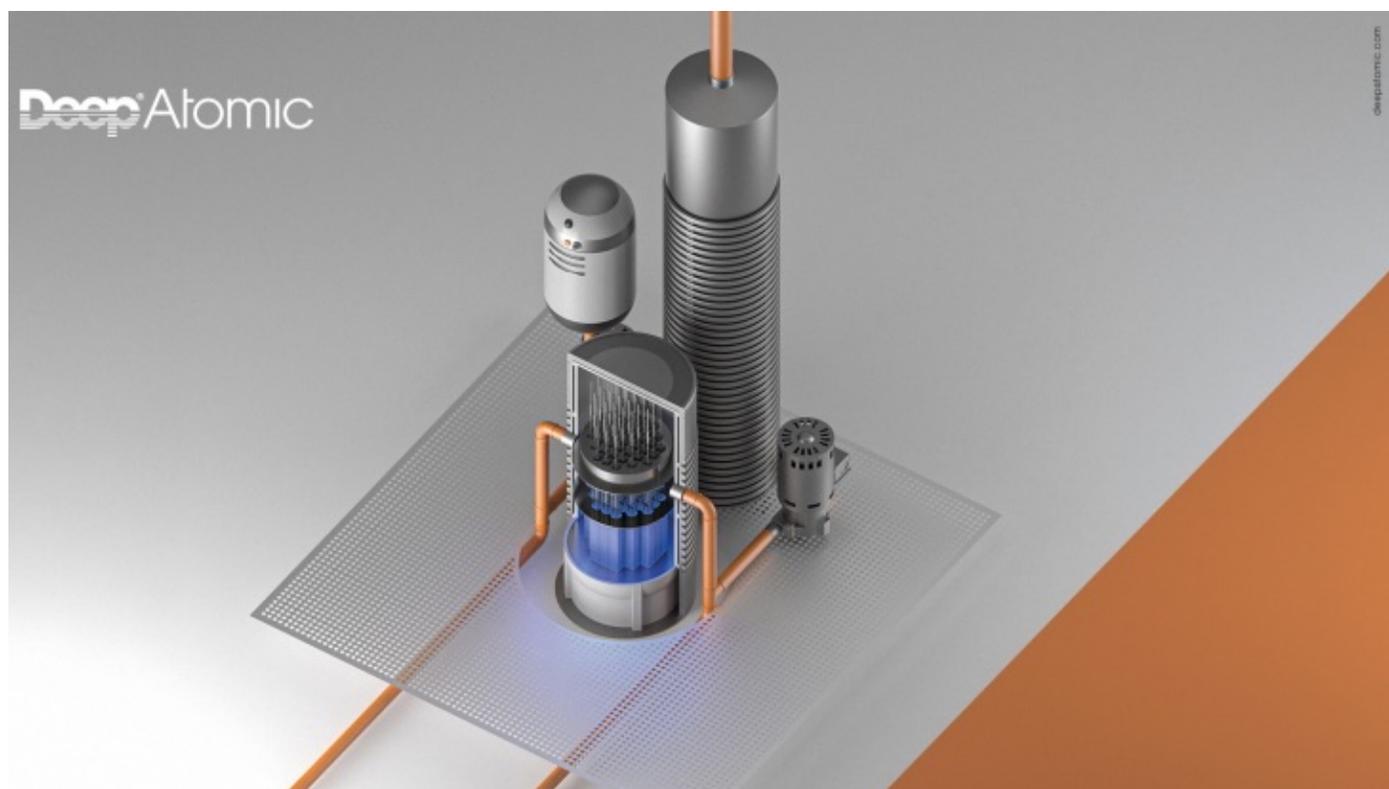
Last month, Estonia's Fermi Energia selected the BWRX-300 for potential deployment in the Baltic country by the early 2030s. It will now sign a project development and preliminary works contract with GEH.

In January, it was announced that GEH, Ontario Power Generation (OPG), SNC-Lavalin and Aecon have signed a contract for the deployment of a BWRX-300 SMR at OPG's Darlington site. In August last year, Tennessee Valley Authority began planning and preliminary licensing for potential deployment of a BWRX-300 at the Clinch River Site in Tennessee. Canada's SaskPower announced in June 2022 that it

selected the BWRX-300 for potential deployment in Saskatchewan in the mid-2030s.

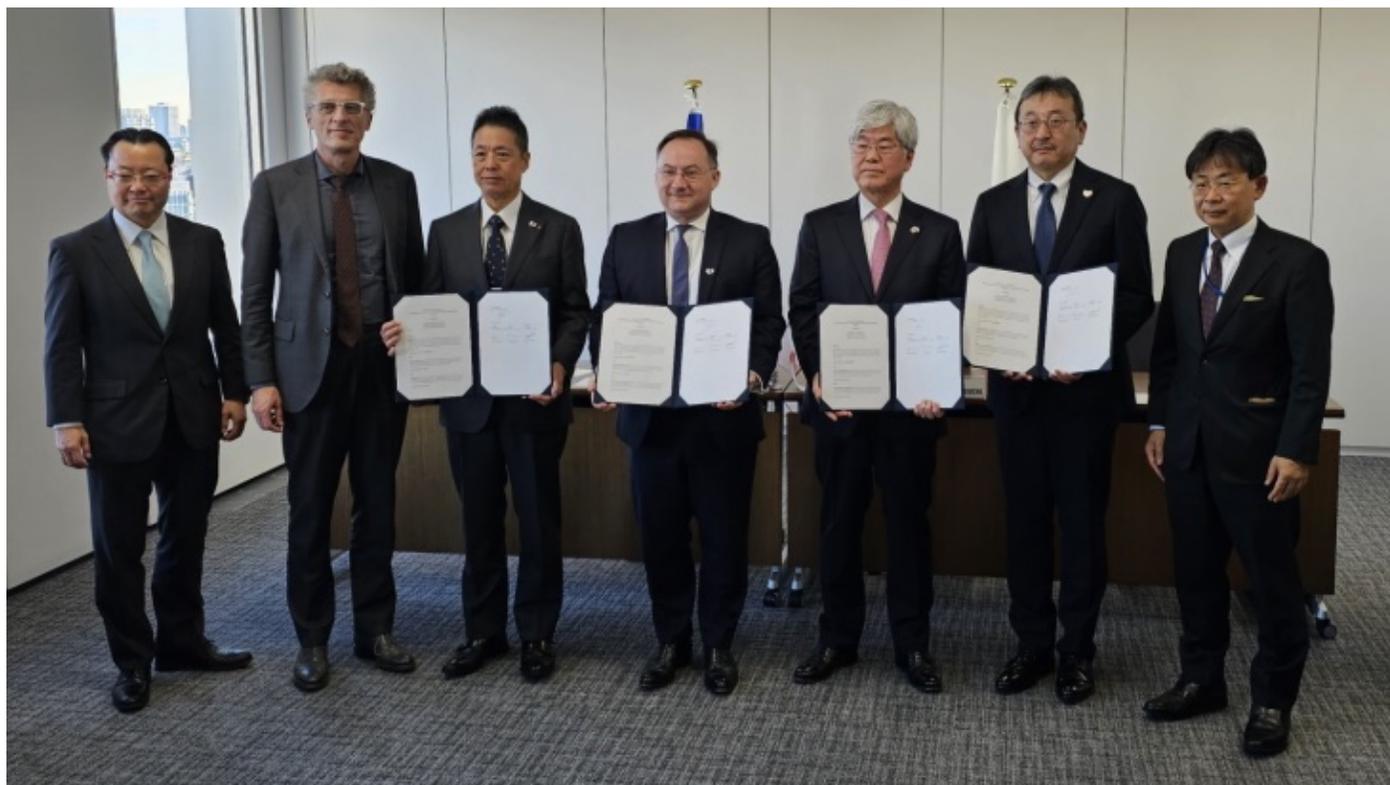


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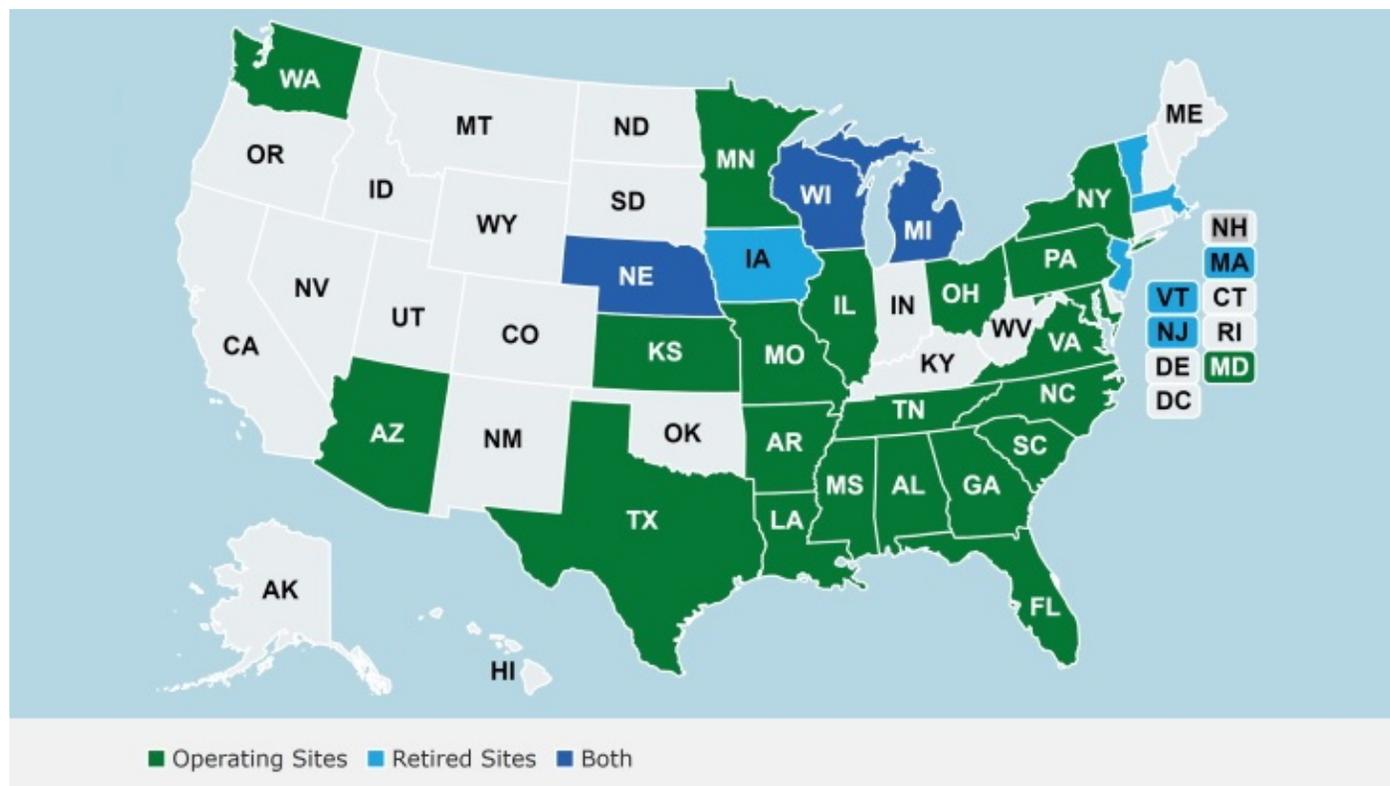
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