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ORLEN Synthos Green Energy sp. z o.o. activities in the frame of nuclear safety assessment on the BWRX-300 Polish licensing path

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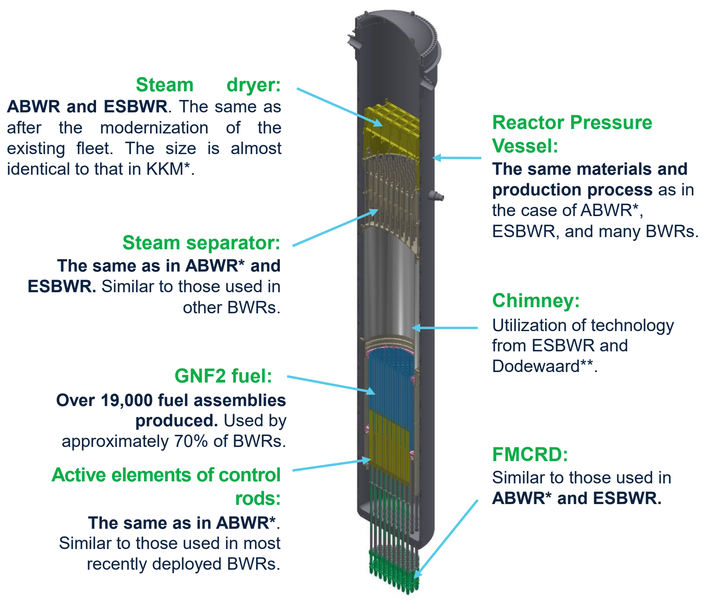
1. Introduction

ORLEN Synthos Green Energy sp. z o.o. (OSGE) plans to deploy BWRX-300 Small Modular Reactors (SMRs) in Poland, aiming to foster sustainable energy generation through innovative nuclear technologies.

OSGE's program seeks to:

- ensure steady economic growth and
- a clean environment for current and future generations.

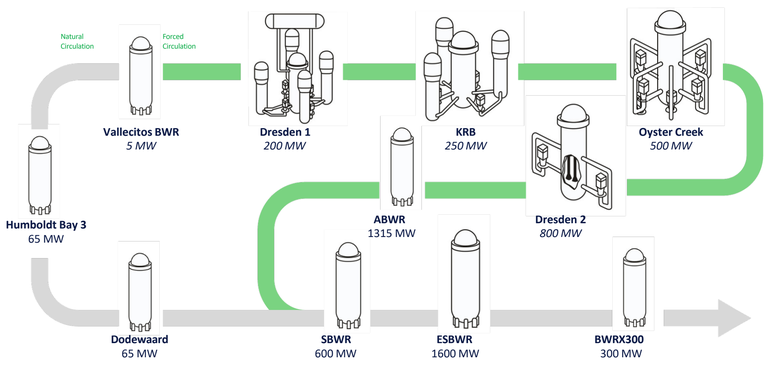
The organization's mission is to lead the deployment of SMRs as a crucial element in the transition to Net Zero by 2050.



** Kernkraftwerk Mühleberg (KKM): 355 MWe BWR/4 1972 - 2019*
*** Dodewaard: 58MWe, 1969 ~ 1997*

2. BWRX-300 Technology and Licensing in the World

BWRX-300 technology is a source of clean energy with zero CO_2 emission, that can be delivered at any time, in any weather from a facility not larger than a football pitch.



- a technology designed by a company - GE Hitachi Nuclear Energy
- almost 70 years of experience in the nuclear industry
- competence has been proven by operating 67 BWR reactors worldwide.

Canadian energy company Ontario Power Generation
- the world's first power plant with BWRX-300 technology.

U.S. utility – the Tennessee Valley Authority (TVA)
- future build of a BWRX-300 reactor in Clinch River, Tennessee.

LICENSING AROUND THE WORLD

On April 4, 2025, the Canadian regulator issued a License to Construct for the first of four BWRX-300 reactors planned by OPG near Toronto. The CNSC is collaborating with the NRC, on a joint assessment in the area of licensing the BWRX-300 technology.

GE Hitachi has submitted 7 License Topical Reports (LTRs) to the Nuclear Regulatory Commission (NRC) describing the differences between the BWRX-300 and the already licensed ESBWR reactor. This will accelerate the process of obtaining a construction permit for the reactor.

In January 2024, the reactor assessment procedure (Generic Design Assessment – GDA, evaluation of technology safety and the possibility of building the reactor in compliance with national regulations) began.

2. OSGE Nuclear Safety Assessment Activities

The activities carried out in the frame of Nuclear Safety Assessment are focused on the License to Construct (LTC) application support in its successful completion.

On November 14, 2024, a contract was ceremoniously signed between OSGE and Canada's Laurentis Energy Partners (OPG Group) for the preparation of the PSAR.
The contract was signed in the presence of Ontario's Minister of Energy and Electrification, Stephen Lecce, and the Canadian Ambassador to Poland, Catherine Godin.
A similar contract was also signed with GE Hitachi.

One of the actions is to prepare the key technical document a Preliminary Safety Analysis Report (PSAR).

- The PSAR demonstrates the adequacy of the design and results of the safety assessment.
- OSGE's PSAR format - in accordance with International Atomic Energy Agency (IAEA) Specific Safety Guide SSG-61,
- Includes Polish requirements on the content of the PSAR (Appendix 2 of the Regulation on Safety Analysis – Journal of Laws 2012 item 1043).

4. Activities supporting License to Construct

Currently, OSGE has finalized the prerequisites in the form of technical reports necessary for the proper preparation of the content of the PSAR document.
One of prerequisites was set of the Regulatory Framework Documents (RFDs), consisting of:

- the licensing basis for the content of each PSAR Chapter,
- applicable regulatory requirements,
- applicable regulatory guidance,
- and an outline for use in drafting the Chapter/Section.

5. Polish Regulatory Framework

Other type of prerequisites comprise of the set of the documents prepared by OSGE summarizing the methodologies and licensing topics understanding, namely the Polish Regulatory Framework.

The summary list technical reports regarding Nuclear Safety Assessment:

- Licensability and Application of Safety Goals,
- Deterministic Safety Analysis,
- Safety Classification of Structures, Systems and Components (SSCs),
- Deterministic Safety Analysis and
- Deterministic Acceptance criteria.