

# OSGE

ORLEN SYNTHOS GREEN ENERGY

**JACEK DRÓZD**  
Vice-President of the  
Management Board

CET 2024  
September 18-20, 2024

**OSGE & BWRX-300  
MOST ADVANCED SMR  
PROJECT IN THE EU**

# About OSGE

Synthos Green Energy and ORLEN have established the JV – **ORLEN Synthos Green Energy** to deploy the BWRX-300 SMRs designed by GE Hitachi Nuclear Energy - a leading US nuclear company.

**VISION: GREEN ENERGY WALL**

Powering the development of sustainable energy generation using innovative nuclear technologies to ensure steady economic growth and a clean environment for our communities and the next generations.

**MISSION: NET ZERO NUCLEAR**

A leading role in deploying a fleet of Small Modular Reactors as an essential component of the efficient transition of energy generation towards Net Zero by 2050.



# BWRX-300 – a design that is tailor-made for CEE

BWRX300



## TECHNOLOGY PROVIDER

- US company with **70 years of experience** in nuclear power, 67 reactors operating in 10 countries. BWRX-300 is 10<sup>th</sup> generation boiling water reactor (BWR)
- History of delivering reactors projects on-time and on-budget
- Leverages existing supply chain and off-of-the-shelf components
- GE and HITACHI – large foreign investors in Poland, a basis for building a supply chain in Poland & the EU

## DESIGN

- BWRX-300 – III+ generation **reactor** based on proven technologies, including solutions licensed by the NRC (ESBWR)
- **Licensed GNF2 fuel** – no risk related to licensing process, security of supply, manufacturing in the US and Europe (Spain)
- Easier to license and deploy (both from perspective of local regulator and investor) than IV generation technology

## PROJECT MATURITY

- **The world's first BWRX-300 under deployment** in Canada (FOAK)
- The first BWRX-300 in the EU will be deployed in Poland (NOAK). It will draw on the Canadian reference plant experience, allowing more efficient implementation of the investment
- **BWRX-300 is based on currently available solutions** which do not need to be designed from scratch and certified

**Designed for electricity generation and industrial applications, including hydrogen production, desalination and district heating**



**ON THE ROAD TO  
A FLEET OF BWRX-300s  
IN POLAND**



**6**

**Approved sites:  
decisions in principle issued  
by the Ministry of Climate  
and Environment**

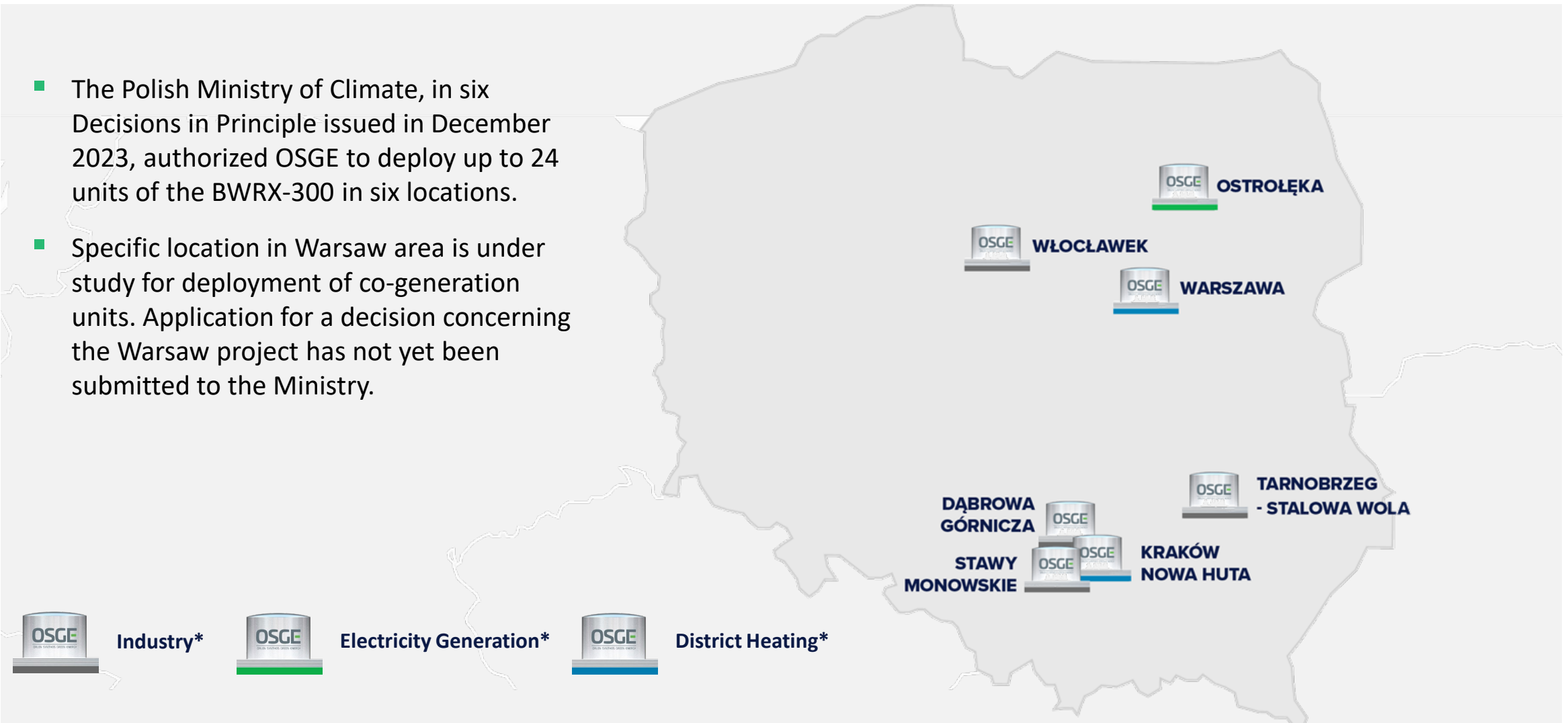
**3**

**Environmental assessment  
procedures initiated by the General  
Director of Environmental Protection.  
The first decision specifying the scope  
of the environmental report has been  
issued, and two more expected in  
coming weeks.**

**1**

**Prelicensing milestone:  
general opinion achieved  
from the President of  
the National Atomic  
Energy Agency**

- The Polish Ministry of Climate, in six Decisions in Principle issued in December 2023, authorized OSGE to deploy up to 24 units of the BWRX-300 in six locations.
- Specific location in Warsaw area is under study for deployment of co-generation units. Application for a decision concerning the Warsaw project has not yet been submitted to the Ministry.



\* Main application



# Most advanced projects: Stawy Monowskie



## STAWY MONOWSKIE

- Area: 70 ha
- Decision in principle for up to four units (max. 1300 MWe)
- Close to Synthos chemical plant - large demand for electricity and industry heat
- Potential for district heating application
- Possibility of replacing existing coal-fired power station (owned by Synthos)



# Most advanced projects: Włocławek



## WŁOCŁAWEK

- Area: 135 ha
- Decision in principle for up to four units (max. 1300 MWe), environmental conditions – potential up to six units
- Close to Anwil energy-intensive chemical plant (ORLEN Group) - large demand for electricity and industry heat
- Potential for district heating application



## General Opinion.

**May 2023.** The first general opinion in Poland has been issued by the President of the National Atomic Energy Agency (PAA) for the BWRX-300 SMR reactor. In the document received by OSGE, the Polish nuclear authority states the correctness of the BWRX-300 design assumptions with nuclear safety requirements.

The general opinion is a prelicensing process that determines whether the planned organizational and technical solutions meet the requirements of nuclear safety and radiological protection under Polish law.

## Environmental proceedings.

**June - August 2023.** The company submitted three applications to the General Director of Environmental Protection to issue the Environmental Decision for the construction of BWRX-300 at:

- **Stawy Monowskie;**
- **Włocławek;**
- **Ostrołęka.**

Proceedings in all three cases have been initiated by the formal decision of the environmental authority (GDOŚ).

**March 2024.** GDOŚ issued a decision specifying the scope of the environmental report for the construction of a small modular reactor (SMR) in Stawy Monowskie, Małopolska region. **This is the first such decision in the European Union.**



- **August 2023.** The General Director of Environmental Protection has initiated transboundary consultations related to the OSGE project in Stawy Monowskie in Southern Poland, where GEH BWRX-300 is going to be deployed.
- This is **the first transboundary consultation process for a small modular reactor (SMR) in Europe.**
- As a result of the application submitted by OSGE, GDOŚ recognizes that consultations with the Czech Republic and Slovakia are grounded. Austria has also expressed its willingness to participate in the consultations, which is allowed on the base of the Espoo Convention.
- Following further OSGE applications, transboundary consultations for **Ostrołęka** (Czech Republic, Slovakia, Belarus, Lithuania, Germany) and **Włocławek** (Czech Republic, Slovakia, Belarus, Germany) sites have been initiated.



## Decisions-in-principle

- **December 2023.** The Polish Ministry of Climate and Environment issued six decisions-in-principle approving the 6 sites for the construction of power plants based on GE Hitachi Nuclear Energy's BWRX-300 small modular reactor.
- A total of 24 BWRX-300 reactors can be deployed at the sites. The applications were submitted by OSGE's special purpose companies.
- The decisions were issued for projects in Ostrołęka, Włocławek, Stawy Monowskie, Dąbrowa Górnicza, Kraków (Nowa Huta) and Tarnobrzeg-Stalowa Wola.
- The decision-in-principle is the first step in the process of administrative permits for investments in nuclear power facilities in Poland that an investor may apply for. Obtaining it entitles OSGE to apply for a number of further administrative arrangements, such as a siting decision or construction license.





# SMRs in Poland? Bring it on!

A public opinion poll conducted by IBRiS in April and May of 2023, CAPI, +2,000 respondents

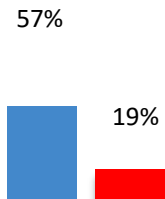
Nearly **60%** of Poles believe that the country needs to deploy SMRs, while only 15% of respondents do not see such a need

Additionally, according to the latest government polls, **90%** of citizens support the implementation of nuclear energy in Poland.

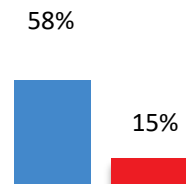
Support is even higher among citizens of most cities that have been selected as initial locations for such an investment.

The survey clearly shows that SMR technology should be developed to start the energy transition and be developed before the large nuclear program.

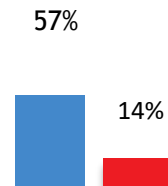
In your opinion, are modern nuclear power plants safe?



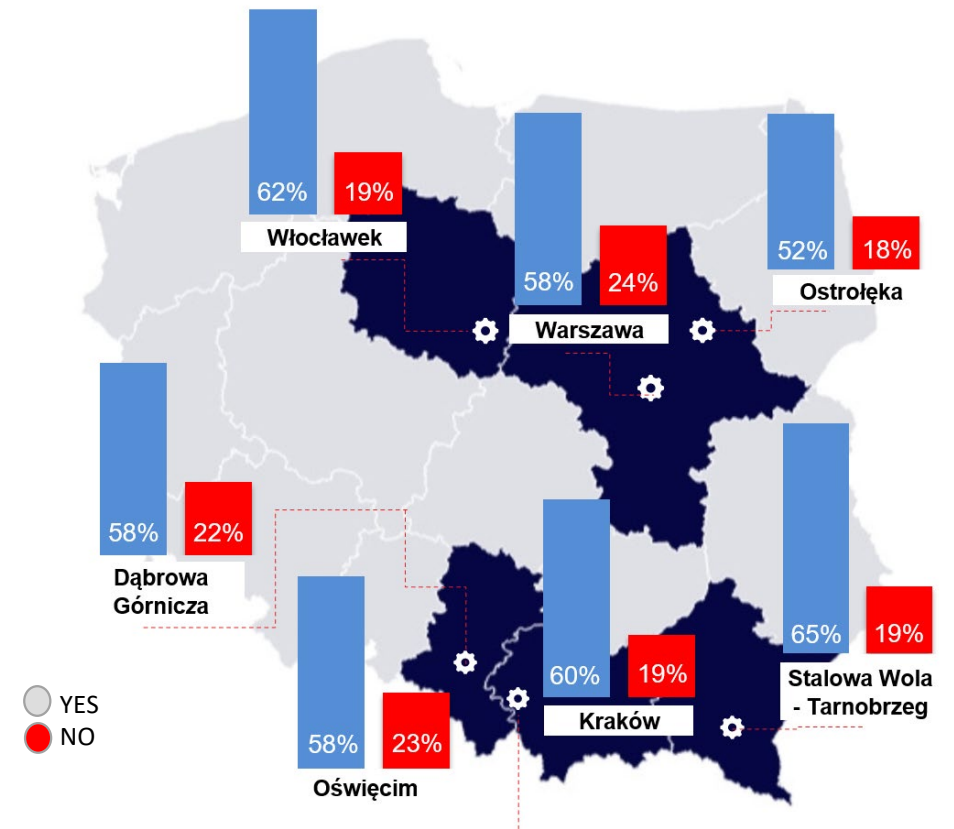
Do you think that Poland needs to build several smaller nuclear power plants in different locations?



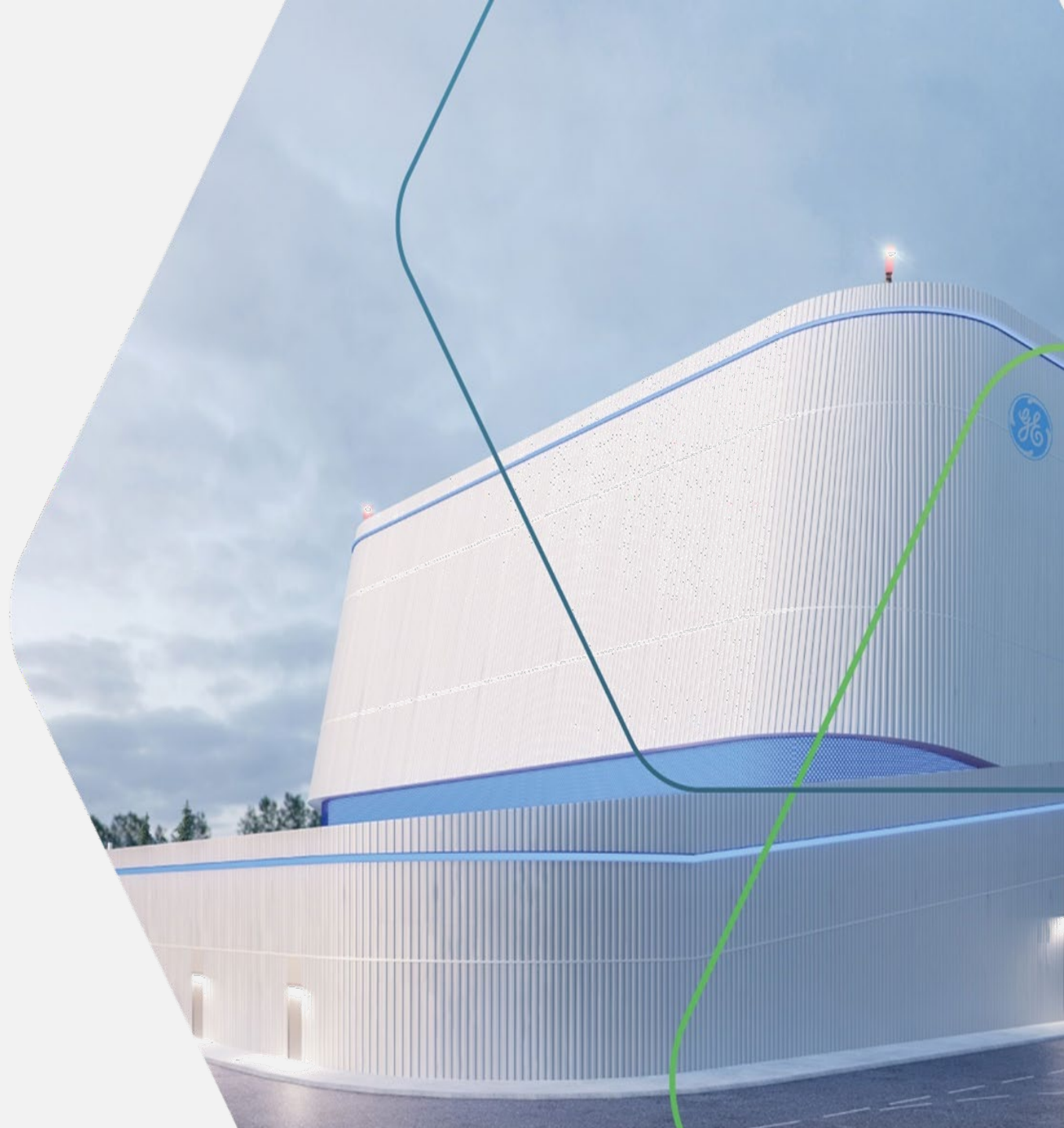
Poland should start energy transition with SMRs deployment so that they are built as soon as possible.



If you could pay less for energy, would you support SMR construction in your neighbourhood?



**BUILDING  
PARTNERSHIPS &  
ALLIANCES**

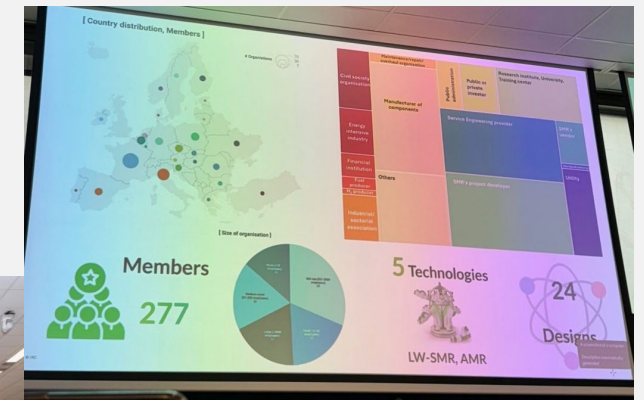


# The European Commission supports SMRs



- **February 6, 2024.** The European Commission published a declaration of support for small modular reactors, recognizing SMRs as support for the EU's decarbonization efforts.
- **The European Industry Alliance on SMRs** has been established to facilitate the deployment of the first reactors by early 2030s.
- The alliance is expected to facilitate stakeholder cooperation within EU and accelerate the deployment of SMRs. It aims to ensure a strong EU supply chain, including a skilled workforce as well.
- **277 entities** from almost all EU member states have signed up for the alliance's work.
- The EC announced to present a “roadmap for SMRs” in Q1 2025.

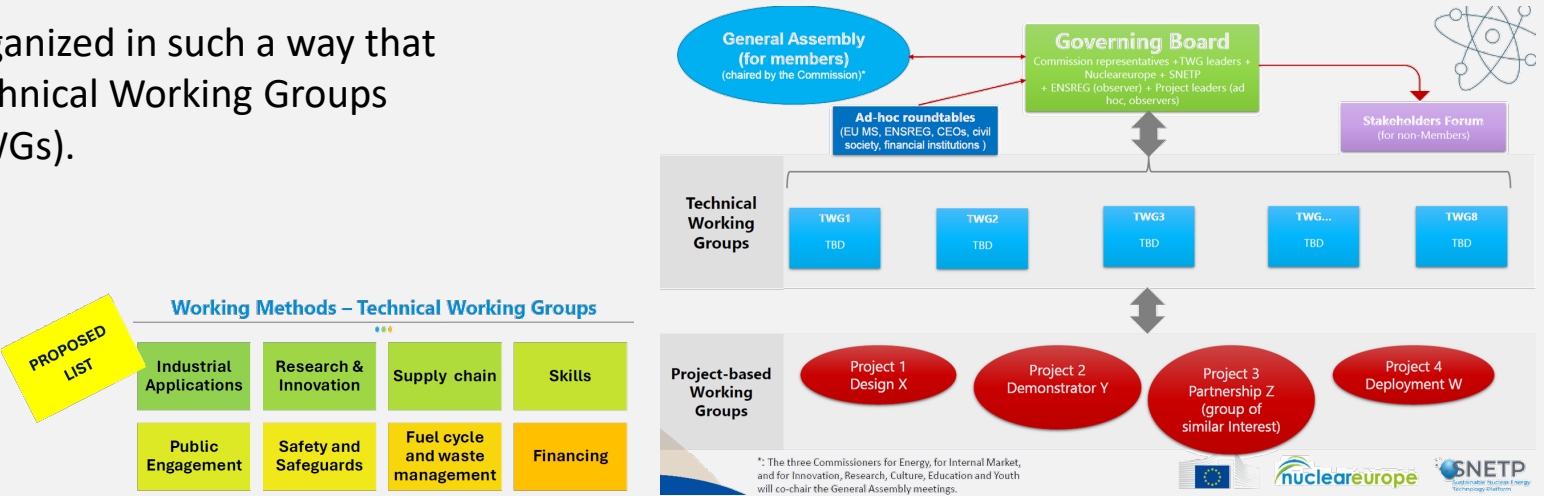
“We have decided to establish an industrial alliance for small modular nuclear reactors to facilitate the deployment of the first units by 2030 in countries that choose to do so.”  
Kadri Simson, the EU Commissioner for Energy





# OSGE: one of the key entities within the European Industry Alliance on SMRs

- The European Industry Alliance on SMRs** is organized in such a way that it operates at the operational level through Technical Working Groups (TWGs) and Project-based Working Groups (PWGs).
- OSGE has representatives in almost all TWGs**, with the exception of two that are dedicated to technology suppliers, where the company's partner, GE-Hitachi, is represented.
- An OSGE representative holds the Vice-Chair position** in one of the key TWGs, TWG5: Public Engagement.
- OSGE submitted a proposal to establish a PWG focused on the BWRX-300 technology.**
- OSGE leads this PWG**, which includes 17 other entities from 10 EU member states and Norway, with additional organizations currently applying.
- Confirmation of the PWG's establishment** is expected in October of this year.



### BWRX-300 Project Working Group members

<ul style="list-style-type: none"> <li> <b>OSGE</b> (Poland)</li> <li>(the remaining companies in alphabetical order)</li> <li> <b>AIC S.A.</b> (Poland)</li> <li> <b>Bouygues Travaux Publics</b> (France)</li> <li> <b>Fermi Energia</b> (Estonia)</li> <li> <b>HELEN</b> (Finland),</li> <li> <b>Kärnfull Next</b> (Sweden)</li> <li> <b>Orange Hills Energy*</b> (The Netherlands)</li> <li> <b>Synthos Green Energy</b> (Poland)</li> <li> <b>Vattenfall AB</b> (Sweden)</li> </ul>	<ul style="list-style-type: none"> <li> <b>GE-Hitachi Nuclear Energy International branch in Poland</b> (Poland)</li> <li> <b>Blue Bird Energy</b> (Bulgaria)</li> <li> <b>CNPSA**</b> (Romania)</li> <li> <b>Equipos Nucleares S.A. (ENSA)</b> (Spain)</li> <li> <b>GENUSA*</b> (Spain)</li> <li> <b>Hitachi Europe branch in Poland</b> (Poland)</li> <li> <b>Norsk Kjekraft</b> (Norway)</li> <li> <b>ORLEN</b> (Poland)</li> <li> <b>ÚJV Řež</b> (Czech Republic)</li> </ul>
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# Technology Collaboration Agreement - TCA



**March, 2023, Washington D.C.** OSGE's shareholder - Synthos Green Energy signed an agreement with TVA, OPG and GEH for the design of a BWRX-300. The company, together with its partners, will invest \$400 million in the development of the GEH BWRX-300 technology.

Through a technology collaboration agreement that was announced today in Washington, D.C., OPG, TVA and SGE will invest in the development of the BWRX-300 standard design and detailed design for key components, including reactor pressure vessel and internals.

For the first time ever, a Polish company has become party to an agreement for a design for nuclear power plant, while being given an opportunity to actively participate in the design process.

The collaboration and additional funding will ensure that the standard design is deployable in different parts of the world and in multiple jurisdictions.

GEH leads the project.



# Project PHOENIX



- OSGE has been selected to the Project Phoenix – program launched by **the U.S. Department of State**.
- The U.S. Department of State program is aimed at supporting the energy transition process in Central Europe, specifically the construction of small modular reactors in place of coal-fired power plants.
- The selection of the beneficiaries was announced this September at the Three Seas Initiative (3SI) in Bucharest by John Kerry, the U.S. Special Presidential Envoy for Climate. Today, the official launch of the program is taking place in the Slovak capital. Alongside OSGE, support will be provided to entities from Slovakia and Romania: Slovenske Elektrarne and Nuclearelectrica.



JENSEN HUGHES

- In case of OSGE, the project will include preparation of feasibility studies and other supporting activities aimed at the selection of location with coal-fired power plant is currently located.
- OSGE's partners in the project are American companies selected by the Department of State: **Excel Services** and **Jensen Hughes**.



# Benefiting the Canadian experience



- **28th of June, 2024.** Signing of cooperation agreements with Aecon and AtkinsRéalis, the companies delivering the world's first BWRX-300 unit in Canada, and a four-party agreement with GE Hitachi, Aecon and AtkinsRéalis.
- Agreements have been signed in Warsaw, witnessed by the Honourable **Mary Ng** - Minister of Export Promotion, International Trade and Economic Development of Canada and H.E. **Catherine Godin** - Ambassador of Canada to the Republic of Poland.
- The concluded agreements and cooperation will provide OSGE with the engineering expertise and construction know-how necessary to develop and build a target model of cooperation with the prospective contractors.
- The results of the work will be used by OSGE for the preparation of such studies as:
  - i) application for a construction license (CLA),
  - ii) preliminary safety report (PSAR),
  - iii) environmental impact report,
  - iv) site plan.

# BENEFITS FROM DEPLOYMENT of SMRs



# BWRX-300's impact on Polish economy (KPMG report)



## Gross added value

The analysis of gross added value allowed to determine contribution to the goods and services production process in the Polish economy. The investment phase followed by 60 years of the BWRX-300 operational phase will possibly generate over 24 billion Polish Zloty (PLN) gross added value (discounted).



## Wages and salaries

In the entire timeframe, an operating BWRX-300 reactor will possibly generate over 3 billion PLN of wages and salaries.



## Employment

Deployment and operation of one unit of the BWRX-300 reactor could potentially generate accordingly over 2700 i 730 new workplaces in Poland, maintained annually.



## Taxes

BWRX-300 reactor's operation could possibly generate a good impact on tax incomes, especially for local governments.

### Investment phase

**Over 3,2 billion PLN**

Gross added value during the whole phase

**Over 1,2 billion PLN**

Wages and salaries during the whole phase

**Up to 2700 workplaces each year of investment phase**

### BWRX-300 reactor's operational phase

**Almost 750 billion PLN**

Average annual impact on gross added value

**Over 73 billion PLN**

Average annual impact on wages and salaries

**Over 730 workplaces maintained annually**

**Over 23 billion PLN**

Potential annual income for local government

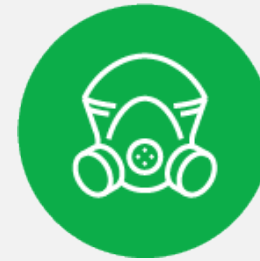


# Environmental benefits resulting from BWRX-300 deployment

A single BWRX-300 over 60 years avoids <sup>1)</sup>:



**175 mln**  
tons of CO<sub>2</sub> <sup>2)</sup> emissions



**0,32 mln / 0,28 mln / 0,75 mln**  
tons of SO<sub>x</sub> / NO<sub>x</sub> / PM<sup>2)</sup> emissions



**65 mln**  
tons of coal



**1,7 mln km**  
rail transport of coal

1) KPMG report, 2023

2) Source: UNECE Carbon Neutrality in the UNECE Region, 2022

**BUILDING UP  
OPERATIONAL  
READINESS**





# European Training Centre

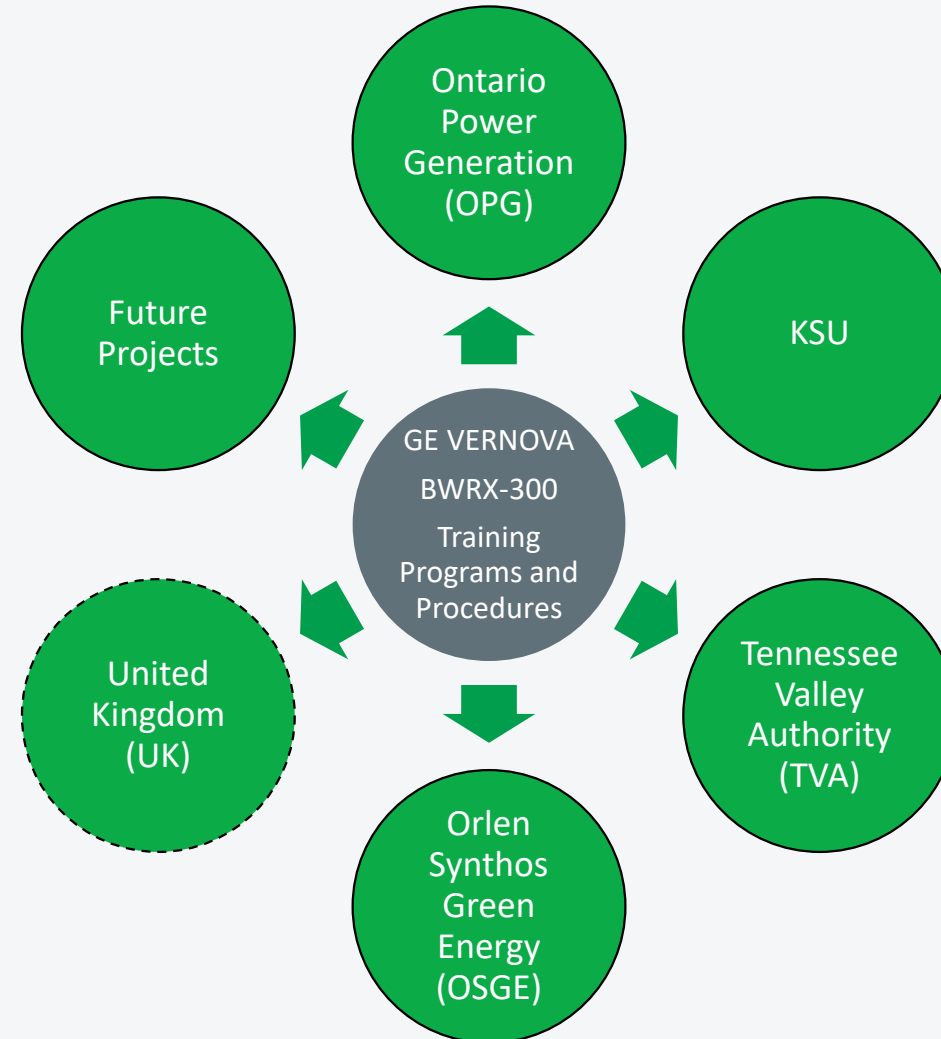


- 1 European Training Center for BWRX-300
- 2 Public Outreach and Education
- 3 Nuclear Power School for New to Nuclear
- 4 Operator and Technician Licensing/Certification/Continuous Training
- 5 Centralized Fleet Service Center
- 6 Refueling Outage and Tooling Training Center

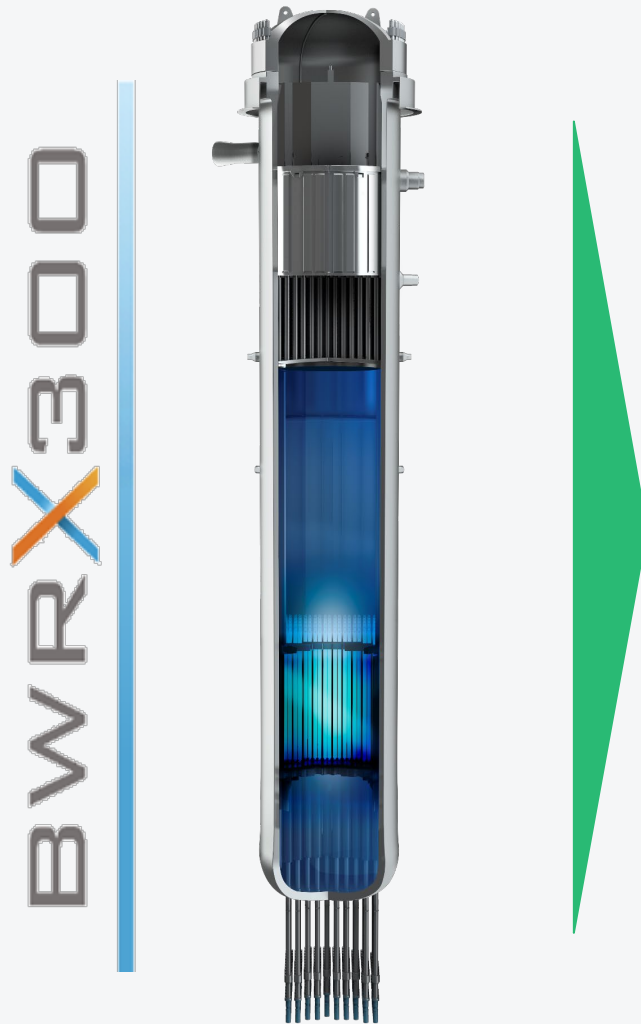


# BWRX-300 Global Training Program

- Training Programs for Operations, Maintenance, Radiation Protection, Chemistry, and Engineering must meet the requirements of multiple Nuclear Regulators (highest common numerator).
- The associated Analyses, Design, and Development of these Training Programs and the basic Ops & Maint Procedure Sets are part of Standard Plant Design.
- Regional/Local changes will be necessary to accommodate language and regulatory requirements.



# Final conclusions



**US TECHNOLOGY** 

**US-EU NUCLEAR ISLAND**  

**POLISH-EUROPEAN CONVENTIONAL ISLAND AND SUPPLY CHAIN**  

**US-CANADIAN PROJECT FOOTPRINT TRACKS**  

**HUGE POTENTIAL FOR SWEDEN-POLAND COOPERATION**  



# OSGE

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