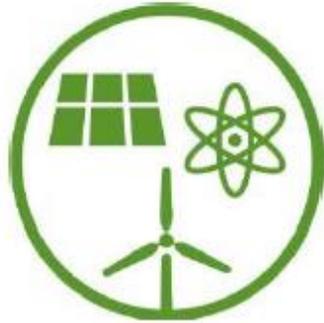


Energy Policy of Poland until 2040 (EPP2040)

Decarbonizing energy intensive industries through nuclear energy in Poland

Dr Józef Sobolewski
National Centre for Nuclear Research

The energy transition will be based on three pillars



I pillar Just transition	II filar Zero-emission energy system	III filar Good air quality
Transformation of coal regions Reduction of energy poverty New industries related to renewable energy and nuclear energy	Offshore wind energy Nuclear energy Local and civic energy	Heating transformation Transport electrification House with Climate

*EEP2040 approved
by Polish
government
February 2nd, 2021*

Key elements of EPP2040 /1

Energy transformation taking into account electricity self-sufficiency

Increase in the share of RES in all sectors and technologies. In 2030, the share of renewable energy in gross final energy consumption will be at least 23%

- not less than 32% in electricity (mainly wind and PV)
- 28% in heating (increase by 1.1 pp per year)
- 14% in transport (with a large contribution of electromobility)

Installed capacity of offshore wind energy will reach:
approx. 5.9 GW in 2030
and up to 11 GW in 2040

There will be a significant increase in installed **photovoltaic** capacity
approx. 5-7 GW in 2030
approx. 10-16 GW in 2040

In 2030, the share of coal in electricity production will not exceed 56%

The reduction in the use of coal in the economy will take place in a manner ensuring a **just transition**

Energy efficiency will increase – for 2030, a target of 23% reduction of primary energy consumption (compared to PRIMES2007 projection)

TSOe and DSOe investment programs will be focused on the development of renewable energy sources, **active consumers** and local balancing

In 2033, the first power unit of a **nuclear power plant** will be launched, with a capacity of approx. 1-1.6 GW.

Subsequent units will be implemented every 2-3 years, and the entire nuclear program involves the construction of 6 units.



Key elements of EPP2040 /2

By 2040, heating needs of all households will be covered by system heat and by zero or low-emission individual sources

Natural gas will be a bridge fuel in the energy transformation

In 2030, the gas network will be able to transport a mixture containing approx. 10% of decarbonized gases

The infrastructure of natural gas, crude oil and liquid fuels will be expanded, and the diversification of supply directions will be ensured

A number of activities will be aimed at improving air quality, including:

- development of district heating (4-fold increase in the number of effective heating systems by 2030)
- low-emission direction of transformation of individual sources
 - (heat pumps, electric heating)
 - moving away from burning coal in households in cities by 2030, in rural areas by 2040, maintaining the possibility of using smokeless fuel until 2040
 - increasing the energy efficiency of buildings
- development of low-emission transport, in particular aiming at zero-emission public transport by 2030 in cities of over 100,000 residents

By 2030, GHG emissions will be reduced by approx. 30% compared to 1990.

Reduction of the phenomenon of energy poverty to the level of max. 6% of households

The most anticipated development of energy technologies and R&D investments includes:

- energy storage technologies
- smart metering and energy management systems
 - electromobility and alternative fuels
- hydrogen technologies



Polish Nuclear Power Programme



Target

To build 6-9 GWe of installed nuclear power capacity based on large, proven PWR type reactors for electricity generation.

Rationales

Energy security:

Diversification of fuel base in electricity generation sector.

Replacement of old coal-fired power plants with zero-emission dispatchable sources.

Protection of environment and climate:

Significant role of nuclear energy in efforts to prevent climate change.

Nuclear energy is a Polish solution to achieve EU climate and energy policy goals.

All electricity generation technologies have pros and cons for environment. Energy mix with RES only is unachievable and unrealistic. Mix without NPP means RES and fossils.

Economic benefits:

Stable price over long period of time

Can include district heating and hydrogen production (electrolysis).

***Updated
Programme
approved by Polish
government
October 2nd, 2020***

Key elements of nuclear power implementation.



Model (ownership relations):

Project company (51% State's Treasury, 49% Strategic co-investor connected with technology supplier). One technology for all NPP's.

Technology (reason for large PWR's):

The most extensive experience in construction and operation of NPP. No history of important radiological accidents. Common knowledge of PWR technology by Regulators. More options for NPP siting due to smaller emergency zone. Competitive supplier market.

Location: one in North and one in Central of Poland

Schedule:

2021 – 2022 selection of technology for NPP, obtaining of an environmental and siting decision for NPP1, signing an agreement with the vendor of technology and EPC contractor

2026 – obtaining of a construction permit and start of the construction NPP1, for NPP2 in 2032

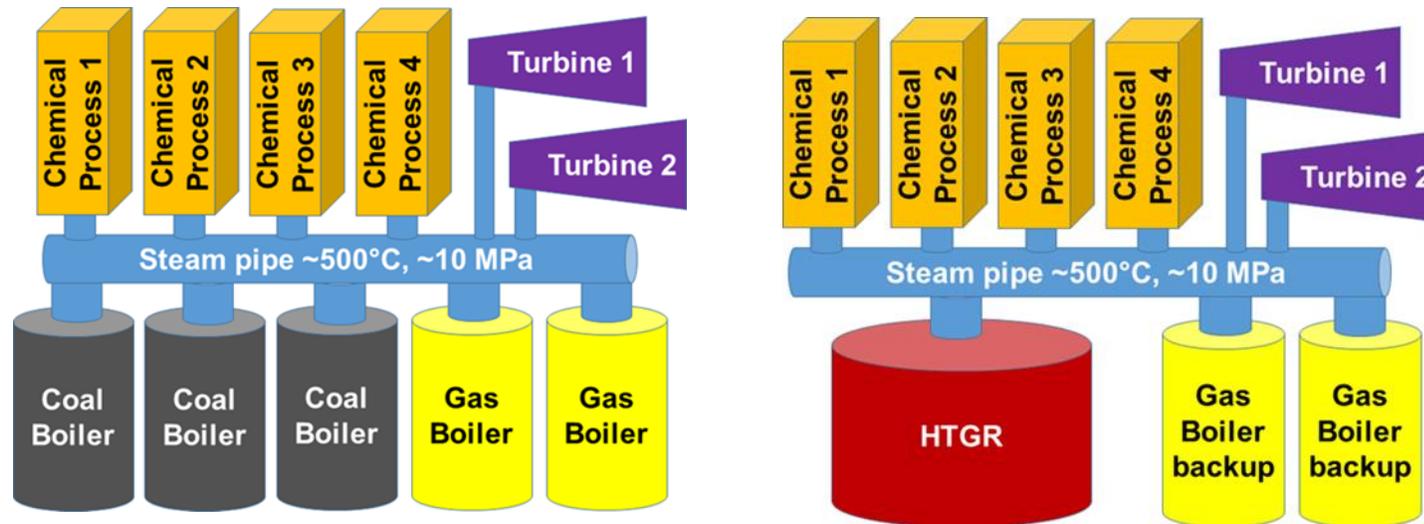
2033 – the issuance of an operating license by the Regulator and the commissioning of the first reactor of NPP1

2035 - 2043 every 2 years – the issuance of an operating license and the commissioning of further 2 reactors at NPP1 and 3 reactors at NPP2.

Advanced nuclear technologies in Poland – new opportunities for climate change mitigation

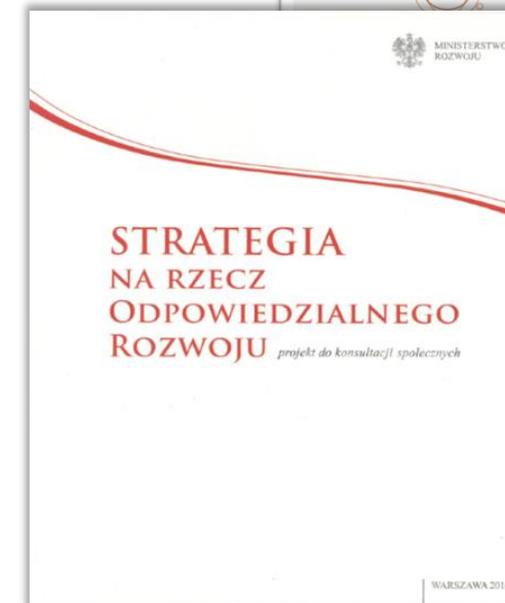
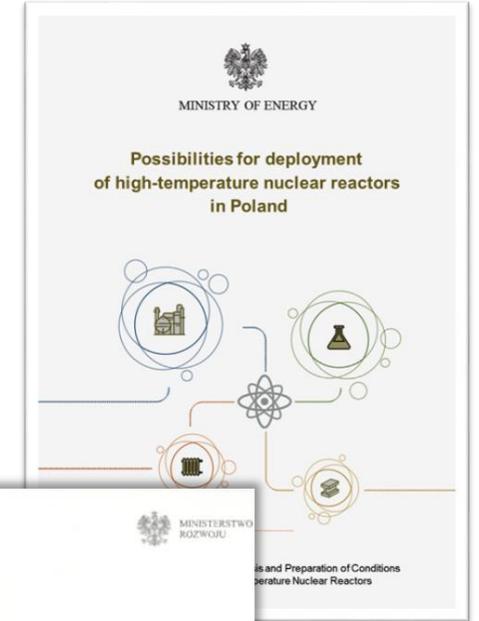
Primary target for HTGR is Polish heat market. Today 100% heat market is dominated by fossil fuels; mostly coal in district heating and coal and gas in industry heat generation. 13 largest chemical plants need 6500 MW of heat at $T=400-550^{\circ}\text{C}$.

Secondary target is the hydrogen production.



Status of nuclear cogeneration activities

- Minister of Energy appointed Committee for deployment of high-temperature nuclear reactors in Poland in July 2016. Report with results of the Committee's works published in January 2018. Minister accepted the report, took note that deployment of HTGR reactors in Poland is desirable and requested Ministry to prepare further steps.
- Strategy for Responsible Development - the governmental program for Polish economic development - adopted in February 2017, contain e.g.: Deployment of HTR for industrial heat production. The project for this action is: Nuclear cogeneration – preparation for construction of the first HTR of 200-350 MWth supplying technological heat for industrial installation.



Status of nuclear cogeneration activities

- The NOMATEN Center of Excellence has received 7 years (2018-2025) of joint financial support (€37M) from the Foundation for Polish Science (FNP) and the European Commission. NOMATEN focus on the studies and development of novel materials, specifically those designed to work under harsh conditions – radiation, high temperatures and corrosive environments.
- In 2019 Ministry of Entrepreneurship and Technology (now Ministry of Development) qualified HTR in the list of National Smart Specializations. This opens a way for NCNR to conduct research in this field with aid from the EU funds, among other things.
- In frame of national strategy program GOSPOSTRATEG the National Centre for Research and Development accepted the grant of about \$5M for joint project of MoE, NCNR and INChT for preparation of law, organization and technical instruments to deploy the HTR reactors in years 2019 - 2022.

Status of nuclear cogeneration activities

What next with HTGR in Poland:

- We have running project connected to HTGR: GOSPOSTRATEG-HTR.
- National Centre of Nuclear Research is gaining knowledge on HTGR technology by strengthening collaboration with Japan Atomic Energy Agency.
- We have also interest from Polish industry (case of Synthos), but most of them hold distance due to long development work and lack of positive signals from EU.
- We will start soon the first phase of EUTHER program (design and construction of small experimental HTGR, being also the technology demonstrator). The implementation will base on national finance sources.

5th Workshop on Attaining Carbon Neutrality
What does it take to create a carbon neutral energy intensive industry in the UNECE region?
14 April 2021

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through nuclear energy in Poland

Thank you