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Seismic and

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engineering data

Introduction

Current climate policy in UE foresees a significant decrease of CO_2 emission to the environment. The Polish power sector, which is based mainly on combustion of fossil fuel, of which more than 70% is hard coal and lignite faces the great challenge of energy transformation.

Hydropower;

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ASSESSMENT OF THE SITE
POTENTIALLY SELECTED
FOR THE NPP SITTINGGeological-Data in hydrogeologicalD

al	Data on hydrogeolog
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ta on external	Data on hazards	Data on population	Diagnosis of	
and natural	induced by human	density and area	bedrock	
hazards	activity	infrastructure	geology	

conditions



Fig. 1. Structure of electric power production in Poland in June 2023.

One of the possible decarbonization paths is the <u>coal-to-nuclear transformation</u>, in which it is proposed to replace the coal-fired unit with a nuclear unit in the same location.

The aim of the research

The poster presents results from preliminary site assessment for potential implementation of such a solution for the case of Polish coal systems. The possibility of using generation III nuclear reactors as well as generation IV reactors was considered. <u>Nuclear safety related issues of the coal-to-nuclear transition</u> are crucial for its successful implementation. For this reason, an extended analysis of the coal-to-nuclear process has been performed in terms of its safety.



Fig. 3. Components of the site assessment potentially selected for the NPP siting specified by Polish legal regulations.

Tab. 1. Lists of parameters identified for each of safety area.

No	Area of analyses	Criteria and its weight for III and IV gen reactors
1.	Formal requirements and recommendations imposed by international and national organizations on the process of designing and operating nuclear power systems	 Mechanical parameters of soils (5/5); Occurrence of natural seismic activity (5/5); Occurrence of floods or inundations potentially threatening the safety of the nuclear facility in the area of the location (5/5); The presence of mineral deposits in the region or the location of a mine or mining activity in the last 60 years (5/5); Occurrence of a military facility or military restricted area (5/5); Occurrence of a facility that may affect the nuclear facility chemically, biologically or mechanically (5/5); The presence of a water facility within the meaning of the Act of July 18 2001 - Water Law (5/5); Occurrence of a civil airport at a distance of less than 10 km from a nuclear facility (5/5); Occurrence of naturally and culturally protected areas (2/2).
2.	The applied solutions of the security systems of the reactor itself, the heat cycle of the steam turbine and the auxiliary infrastructure.	 Number of security systems (5/5); Cooling systems redundancy (4/4); Access to local water sources sufficient to cool the nuclear facility (4/2); Consequences of a severe reactor accident (2/2); The degree of technology advancement (4/2).
3.	Potential nuclear threats to the personnel of the nuclear reactor unit and local population.	 Population density (5/4); The degree of development of communication infrastructure (3/3); Hydrogeological conditions (3/2); Windiness of the region where the nuclear facility is located (3/2).
4.	Management of spent nuclear fuel and radioactive waste.	 Availability of RW management technology (4/4); Availability of SF management technology (4/4); Quantity of SF and RW (3/3);

Formal requirements and recommendations imposed by international and national organizations on the process of designing and operating nuclear power systems

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Fig. 2. List of aspects being analysed in the project.



Fig. 4. Results of the assessment of the coal blocks considering site-specific parameters.

In addition to nuclear safety analyses, technical analyses were also conducted. The entire research allowed for the determination the strengths and weaknesses of the potential Coal-to-Nuclear investment and can serve as a guide for decision-makers as to whether and to what extent nuclear energy can be developed in places of existing coal units.

As a result of these analyses, key criteria were identified that may be an obstacle to modernization in the locations of currently operating coal-fired units.

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