



RAFF and SUMAD Achievements International Conference Wrocław, Poland ,6-7.10.2022

Dr. Jacek Szczepinski
„Poltegor-Institute”
Director

Institute of Opencast Mining

About the Institute

Establishment	1991
Legal status	Research Institute
Regulatory	Ministry of State Assets
Employment	55 people



Our Mission

The Institute's mission is the development and implementation of innovative industrial technologies, processes, methods and technical solutions for purposes of surface mining and environment protection.



GEOLOGY, HYDROGEOLOGY I GEOTECHNICS

Resources and reserves estimation, modeling of deposits, groundwater control and groundwater flow modeling, engineering geology and geotechnics

OPENCAST MINING

Technology of lignite and raw materials production, comprehensive development and utilisation of mineral deposits



BASIC MACHINES AND TRANSPORTATION

Technology, design and research of mining machines, selection, construction and testing of high pressure hydraulic systems

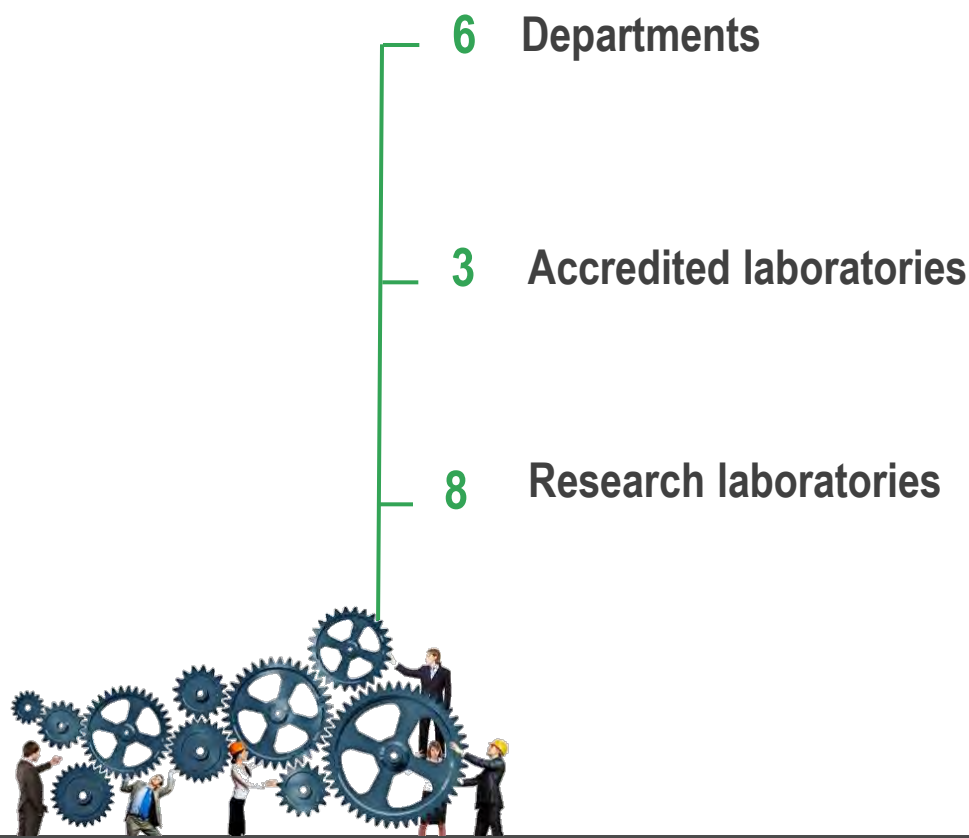
ENVIRONMENTAL PROTECTION AND GEOINFORMATION

Post-mining reclamation studies, environmental impact assessment, water quality testing, waste utilisation, collection and processing of spatial data, GIS



Institute of Opencast Mining

Institute structure



Institute of Opencast Mining

Area of expertise

- strategy of mining and mine operations planning;
- geomechanical analyses and stability evaluations for open pits and dumps;
- dewatering;
- machinery and auxiliary equipment;
- mining plans, prefeasibility and feasibility reports;
- post-mining reclamation plans and environmental protection;
- economic analyses.



Location of the most important lignite deposits in Poland



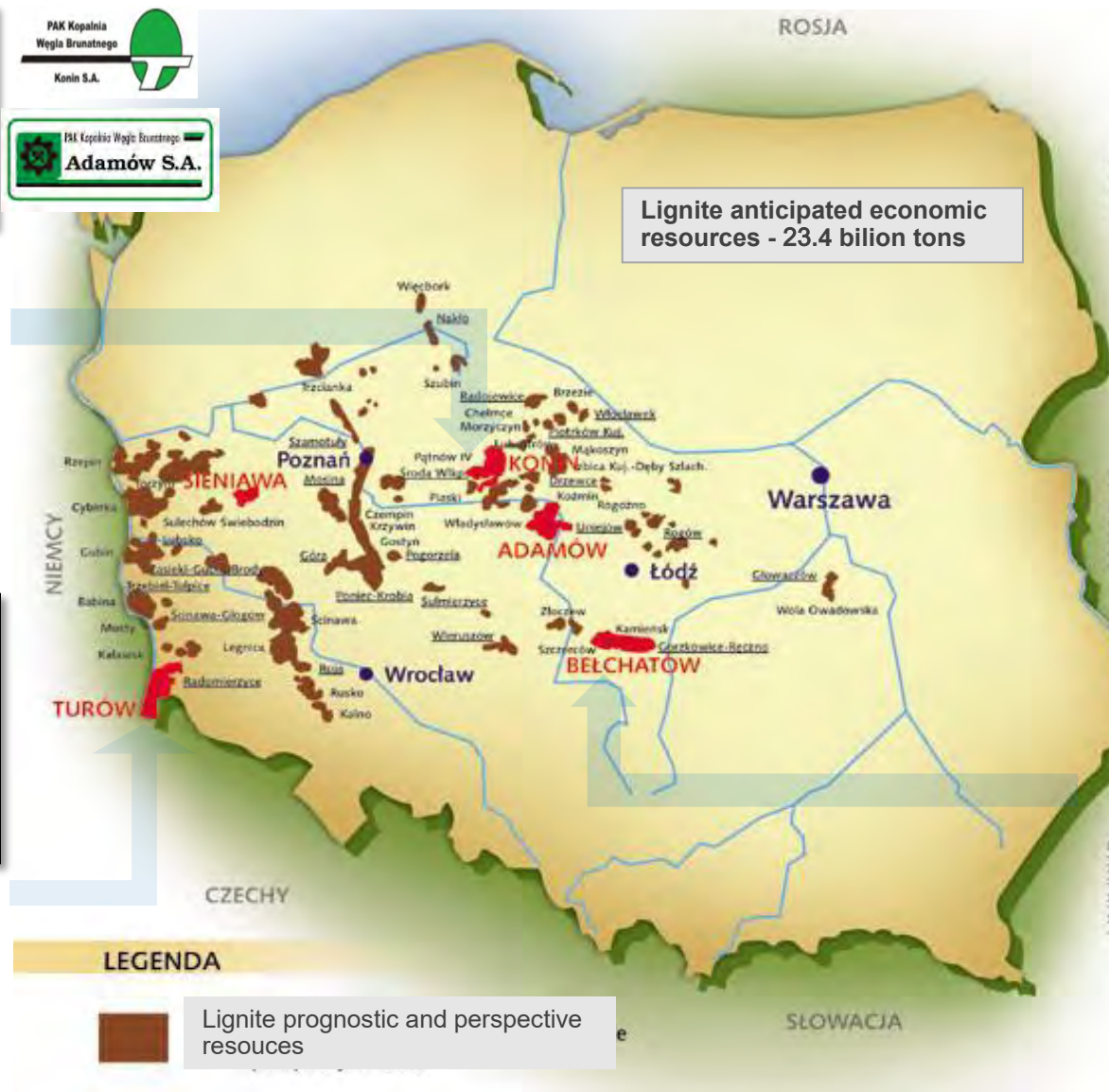
Energy Complex ZE PAK:

- Konin Lignite Mine
- Adamów Lignite Mine
- Lignite production – 5.0 mln Mg/year
- Energy generation - about 4 - 5 TWh,
- Completion of lignite production – 2030



Energy Complex Turów:

- Lignite production – 9.0 mln Mg/year
- Energy generation - about 8 - 9 TWh,
- Completion of lignite production – 2044



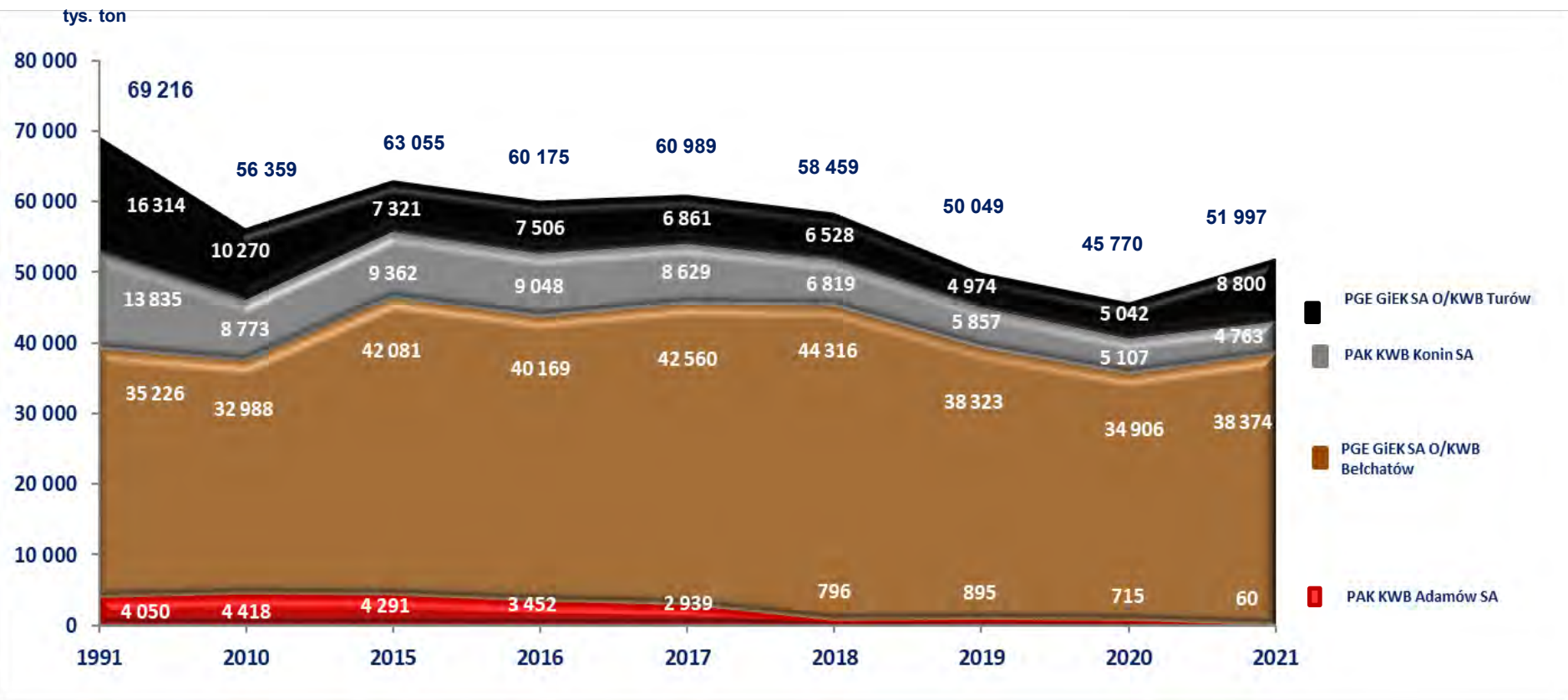
GIEK S.A.
Oddział Kopalnia Węgla Brunatnego Bełchatów



Energy Complex Bełchatów:

- Lignite production – 40.0 mln Mg/year
- Energy generation – About 34 - 36 TWh
- Completion of lignite production – 2038

Lignite production in Poland



Total lignite production in individual mines from the beginning of operations until 2021

PAK KWB Adamów S.A.
 216,7 mln ton

PGE GiEK SA O/KWB Belchatów
 1 362 mln ton

PAK KWB Konin S.A.
 640,8 mln ton

PGE GiEK SA O/KWB Turów
 945 mln ton

From the beginning of operation 3 164 mln tons of lignite
 have been exploited in Polish lignite mines

Źródło: PPWB

- 4600 open pits are under production;
- 300 mln tons of raw materials and 52 mln tons of lignite are extracted using opencast method;
- the total volume of open pits can be of dozen billions of cubic meters;
- in each year the volume of open pits is increasing by 120 millions of cubic meters.



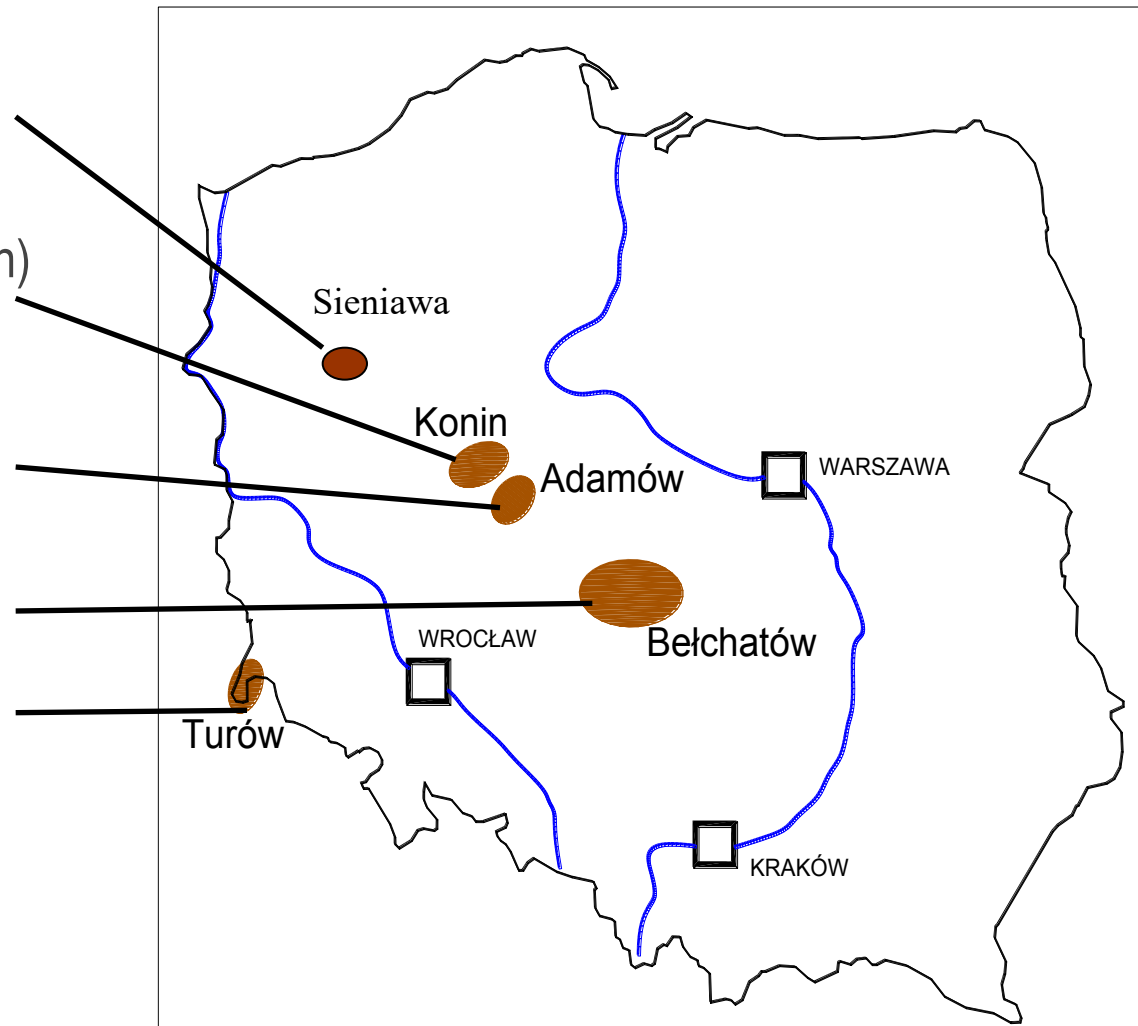
Sieniawa Lignite Mine
(1 open pit under operation)

Konin Lignite Mine
10 open pits (3 under operation)

Adamów Lignite Mine
4 open pits (0 under operation)

Bełchatów Lignite Mine
(2 open pits under operation)

Turów Lignite Mine
(1 open pit under operation)

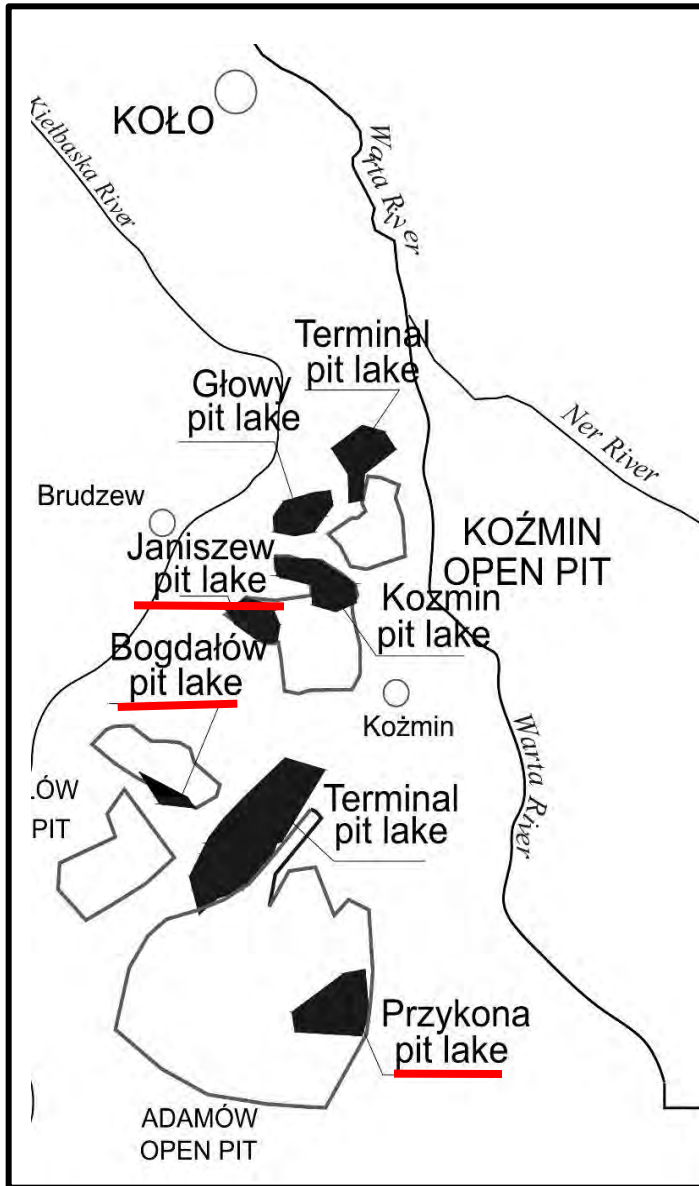


The total lignite output – 52 mln tons; 25 % share in power generation

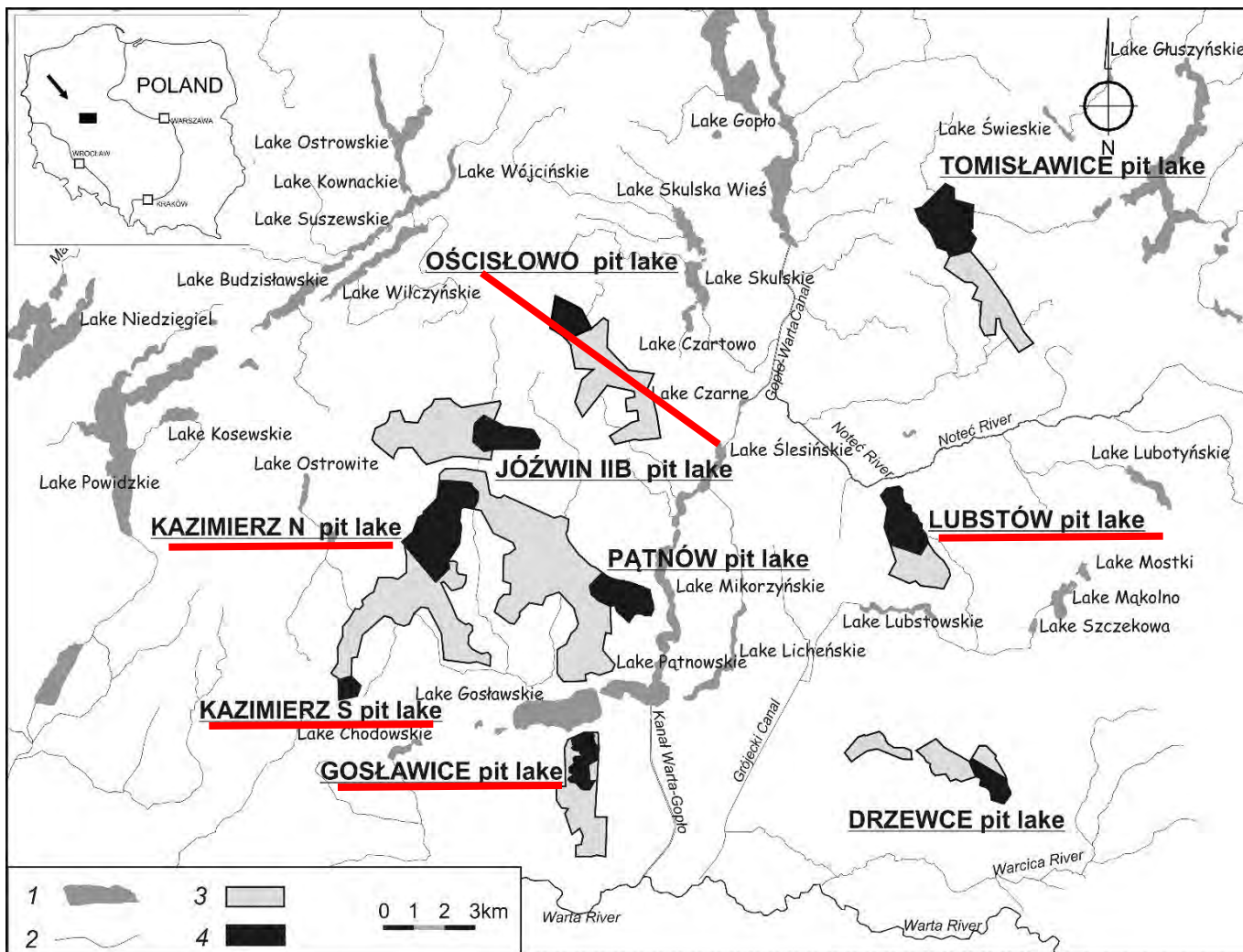
Water management at abandoned lignite open pits in Poland

Lignite surface mining – majority of abandoned open pits are managed for water purposes; the water management is also expected in case of open pits with volume up to 1.4 bill. m³

Opencast mines	Deposit exploitation	Number of voids ¹	Area (km ²)	Volume (mln m ³)
Adamów	1964 - 2020	8	10.6	252
Konin	1946 - 2030	10	21.8	664
Bełchatów	1981 - 2036	2	32.5	2,422
Turów	1904 - 2044	1	17.0	1,220



Proposed location of post-mining lakes in the Konin Lignite Mine



1 – post-mining area, 2 – pit lake, 3 – natural lake, 4 – river and course

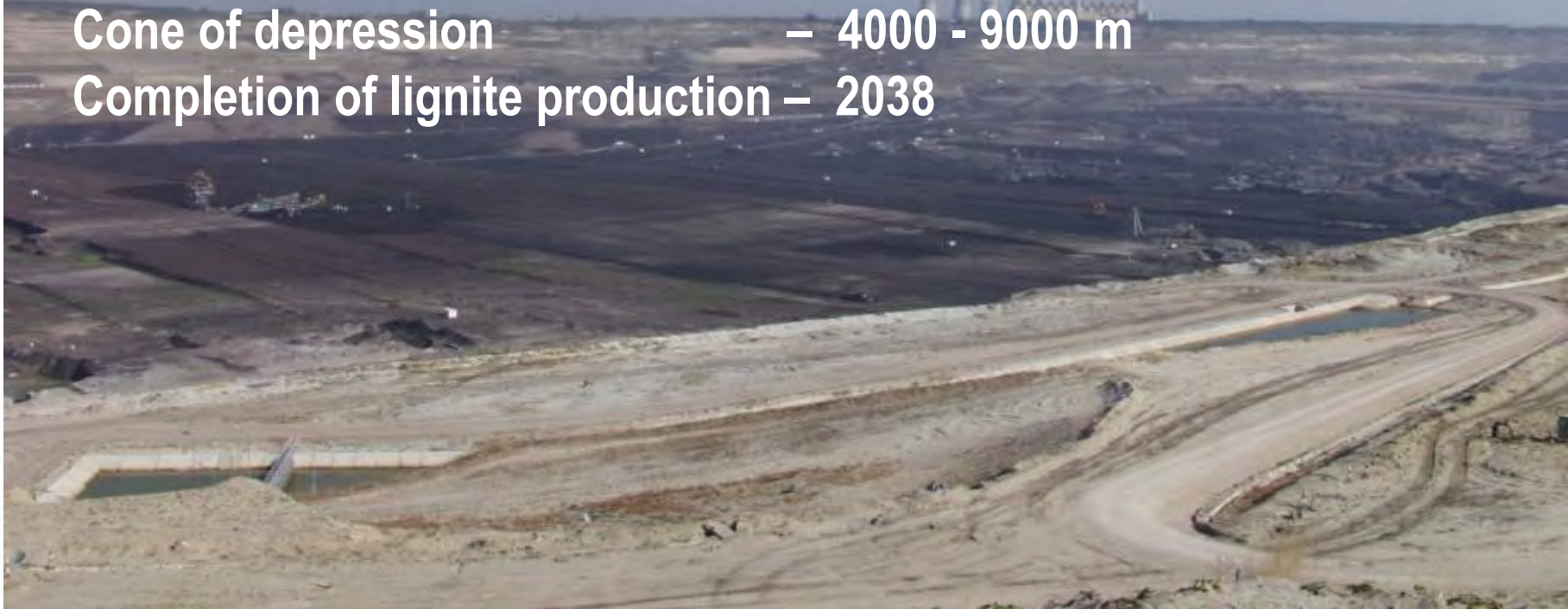
Post-mining lakes in the Konin area



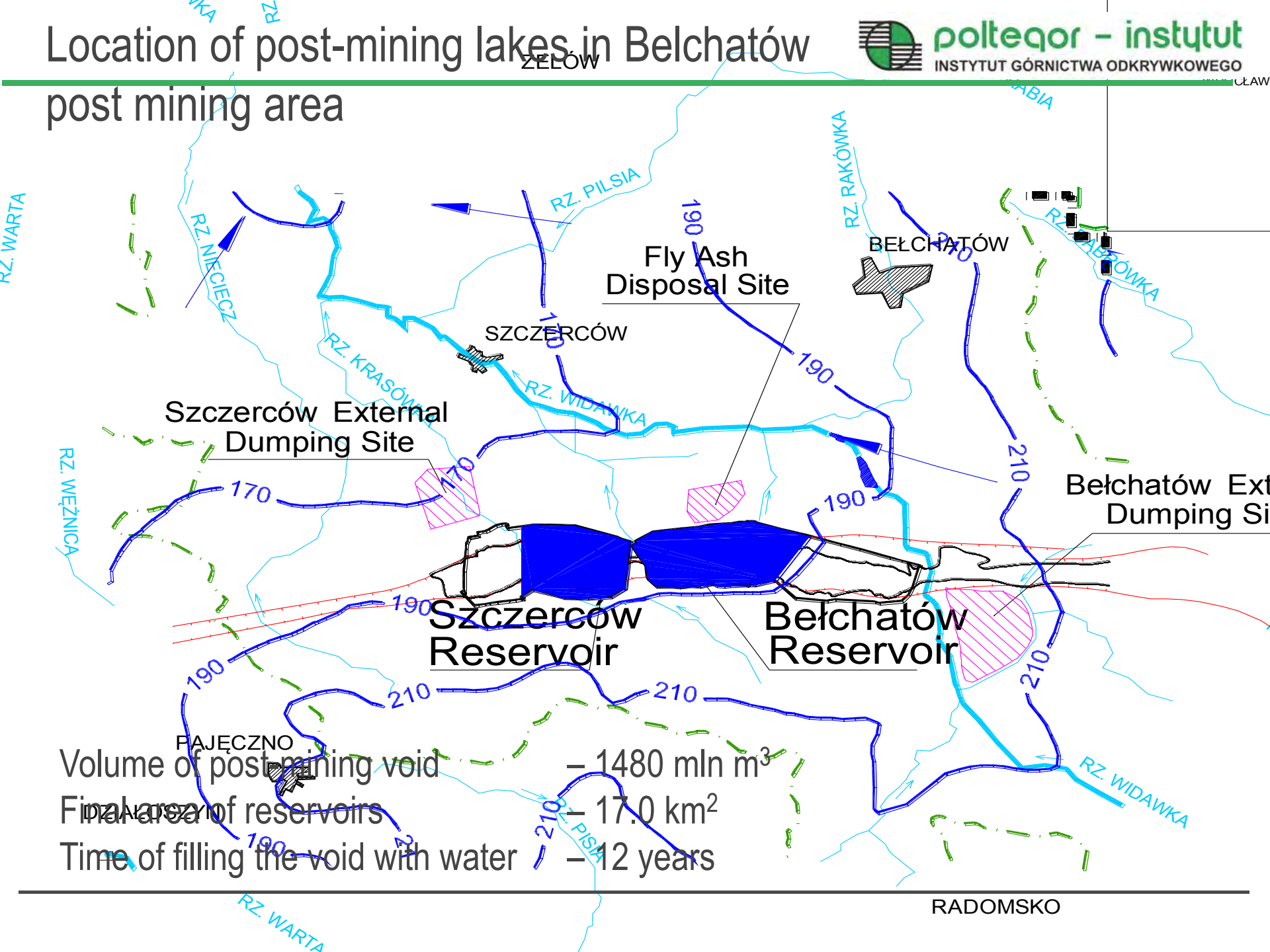
THANK YOU FOR THE ATTENTION



Lignite production capacity	– 38 - 42 million tonnes/year
Overburden stripping	– 100 - 120 million m ³ /year
Open pit area	– 2 600 ha
Depth of open pit	– 280 m
Mine water inflow	– until 650 m ³ /min
Cone of depression	– 4000 - 9000 m
Completion of lignite production	– 2038



Location of post-mining lakes in Belchatów post mining area



Fly Ash Disposal Site

Szczerców External Dumping Site

Belchatów Ext. Dumping Site

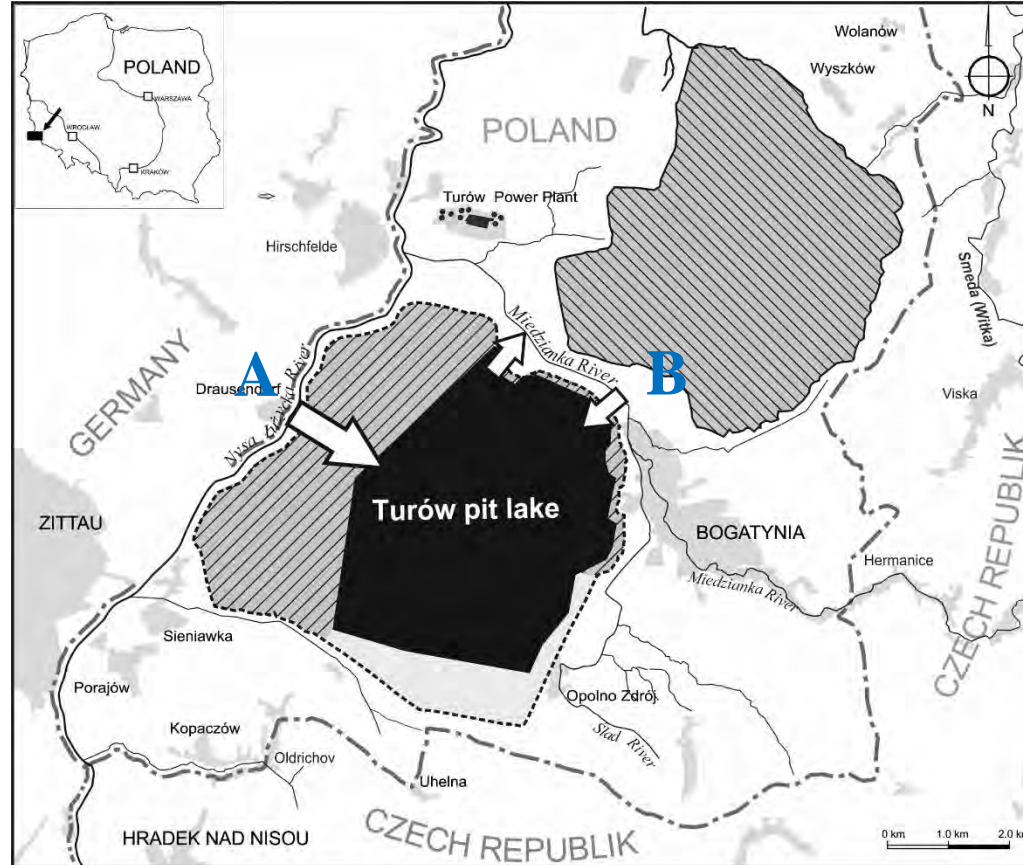
Szczerców Reservoir

Belchatów Reservoir

Volume of post-mining void – 1480 mln m³
Final area of reservoirs – 17.0 km²
Time of filling the void with water – 12 years



Mine lake in the Turów post mining area



Volume of post-mining void	– 1480 mln m ³
Final area of reservoirs	– 17.0 km ²
Time of filling the void with water	– 12 years

Water management of abandoned open pits in the Adamów lignite mine

Open pit	Completion of lignite production	Pit lake	Area (ha)	Volume (thousands m ³)
Bogdałów	1991	Bogdałów	10.8	0.6
Władysławów	2011	Terminal	103	20.4
Koźmin	2017	Janiszew	59.6	4.1
		Koźmin	108.5	6.1
		Głowy	64.5	17.7
		Terminal	116.1	34.1
Adamów	2020	Przykona	139.7	7.3
		Terminal	462	161.7

The total area of post-mining lakes will be 10,6 km² and the volume of 252 million m³.

Water management of abandoned open pits in the Konin Lignite Mine

Open pit	Completion of lignite production	Area (ha)	Volume (thousands m ³)
Morzysław	1953	2,5	20
Niesłusz	1961	18,5	148
Gosławice	1974	32,5	390
Pątnów	2000	346	83.5
Kazimierz Południe	1997	100	3
Lubstów	2010	475	144
Kazimierz Północ	2011	360	190
Józwin IIB	2020	420	147.2
Drzewce	2020	125	12.5
Tomisławice	2030	300	83.2
Ościsłowo (TBD)	2037	300	84.0

The total area of post-mining lakes will be 21,8 km² and the volume of 664 mil. m³.



Confederation of Polish Lignite Producers

Location of the most important lignite deposits in Poland



KONIN:

- Production ~ 4,8 mln tons/year
- Drzewce and Tomiśławice Lignite Fields
- Completion of lignite production ~2030/2024



ADAMÓW:

- Completion of lignite production in 2021 r.



LEGENDA

Złóża węgla brunatnego (zasoby geologiczne udokumentowane i perspektywiczne)



GIEK S.A.
Oddział Kopalnia Węgla Brunatnego Turów

TURÓW:

- Lignite production from 1947
- Production 8,8 mln tons/year
- Completion of lignite production ~2044



GIEK S.A.
Oddział Kopalnia Węgla Brunatnego Bełchatów

BEŁCHATÓW:

- Production 28 mln tons/year
- Lignite production in Bełchatow and Szczerców fields
- Completion of lignite production ~2036

Institute of Opencast Mining

Research and development

Mining

Geology and Environmental Protection

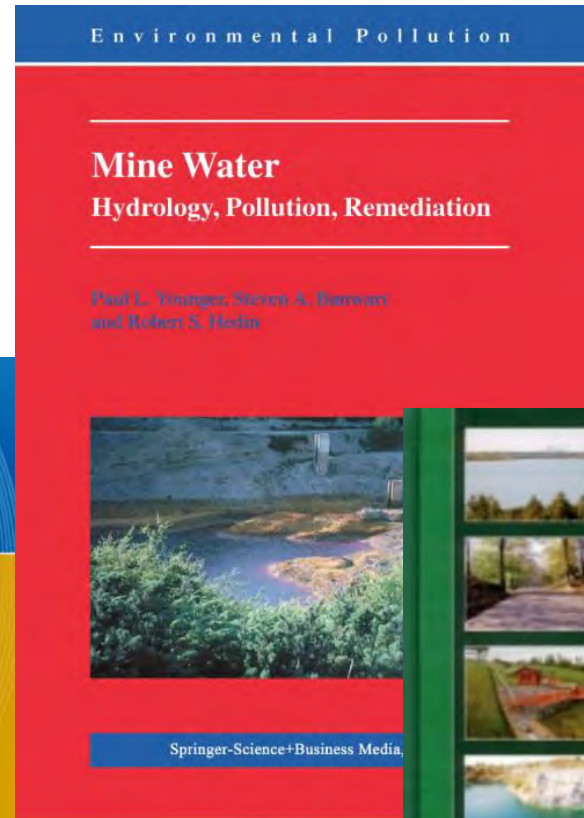
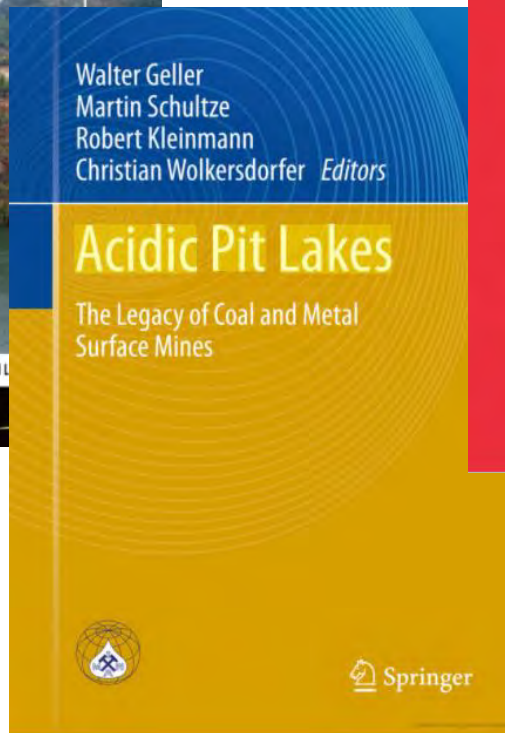
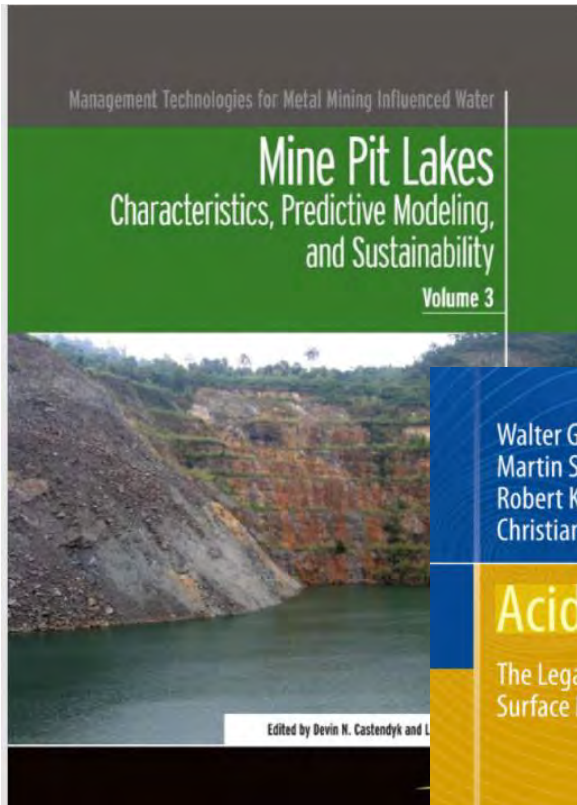
Hydrogeology and Water Protection

Conveyor Belts and its Exploitation

Sustainable Development and International Cooperation



Pit Lakes – state of the art





The Polish Energy Policy until 2040



Fair transformation, parallel construction, zero emission energy system and good air quality are the three main elements of Poland's energy policy project until 2040



The first pillar of the project, i.e. just transition, assumes that PLN 60 billion will be allocated from EU funds over the next 10 years to regions where the economy depends on the extraction of fossil fuels.



The second pillar of the PEP project is the creation of a parallel to the existing, zero-emission energy system within 20 years. By 2040, at a cost of approx. PLN 130 billion, approx. 8-11 GW of offshore wind capacity is to be built, and - with expenditure of PLN 150 billion - nuclear units with a target capacity of approx. 6-9 GW



The third pillar of energy policy concerns good air quality. The draft provides for the resignation of coal as a heating source in individual heating. A separate component of the policy is to disseminate zero-emission patterns and standards in new housing under the slogan "House with climate". Transport is to undergo further electrification.



Lignite in PEP 2040

SPECIFIC OBJECTIVE 1.

Optimal use of own energy resources

The demand for lignite will be covered by domestic resources, close to the place of use. Due to their strategic nature, the prospective deposits (Złoczew and Ościsłowo) will be secured, however, their exploitation will depend on the investors' decisions. The prices of CO₂ emission allowances, environmental conditions and the development of new technologies will play a key role in their management.

Research and development activities should be focused on searching for innovations aimed at reducing the environmental burden resulting from coal mining and new solutions contributing to low-emission, effective and flexible use of the raw material (e.g. gasification, liquid fuels).



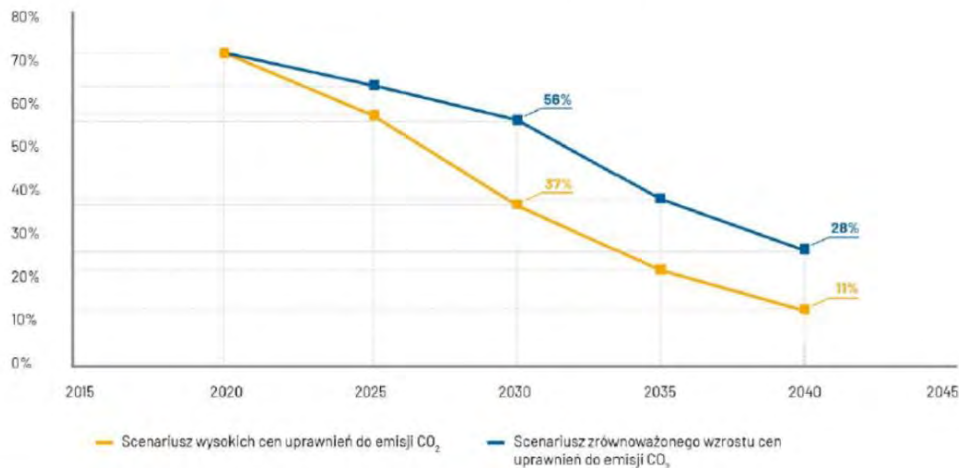
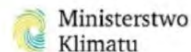
A new draft of the Polish Energy Policy until 2040



A new draft of the Polish Energy Policy until 2040 assumed that :

- **in 10 years, the share of coal will be 37,5 – 56%**
- **by 2040, the share of coal in the energy consumption structure may drop to 11-28%, depending on whether the CO2 emission allowances will be cheap or expensive.**

The share of coal in electricity generation until 2040 (prognosis)



The transformation of the Polish energy sector will be fair and European funds worth PLN 60 billion will be mobilized to finance it.

- nie więcej niż 56% węgla w wytwarzaniu energii elektrycznej w 2030 r.
- co najmniej 23% OZE w końcowym zużyciu energii brutto w 2030 r.
- wdrożenie energetyki jądrowej w 2033 r.
- ograniczenie emisji GHG o 30% do 2030 r. (w stosunku do 1990 r.)
- zmniejszenie zużycia energii pierwotnej 23% do 2030 r. (w stosunku do prognoz zużycia z 2007 r.)

- The thickness of lignite occurring in 1 to 3 seams (Neogen age) is from 5 to 60 m,
- The overburden thickness (Neogen and Quaternary age) consisting of clays and sands is from 30 to 300 m,
- The floor depth of seams varies from 40 to 300 m,
- All deposits are below the natural groundwater table,
- Annual precipitation varies from 500 to 700 mm/year.

