



Central Mining Institute, Katowice, Poland
Experimental Mine „Barbara”

UPDATE ON CMM ACTIVITIES IN POLAND

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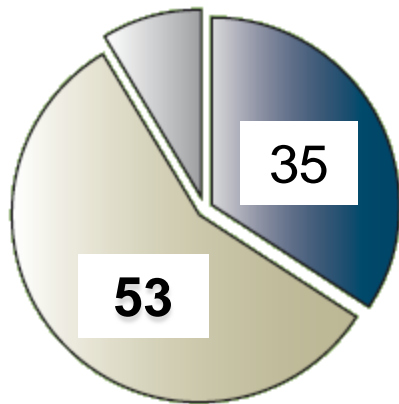
Vancouver, March 13th, 2013



The role of coal in power generation in Poland

SOURCE: EURACOAL

POLAND



**Coal's share
88%**

**EU 27
Coal's share 29 %**



Legend: Lignite (dark blue), Hard coal (tan), Other (grey)

Location of major Polish hard coal basins



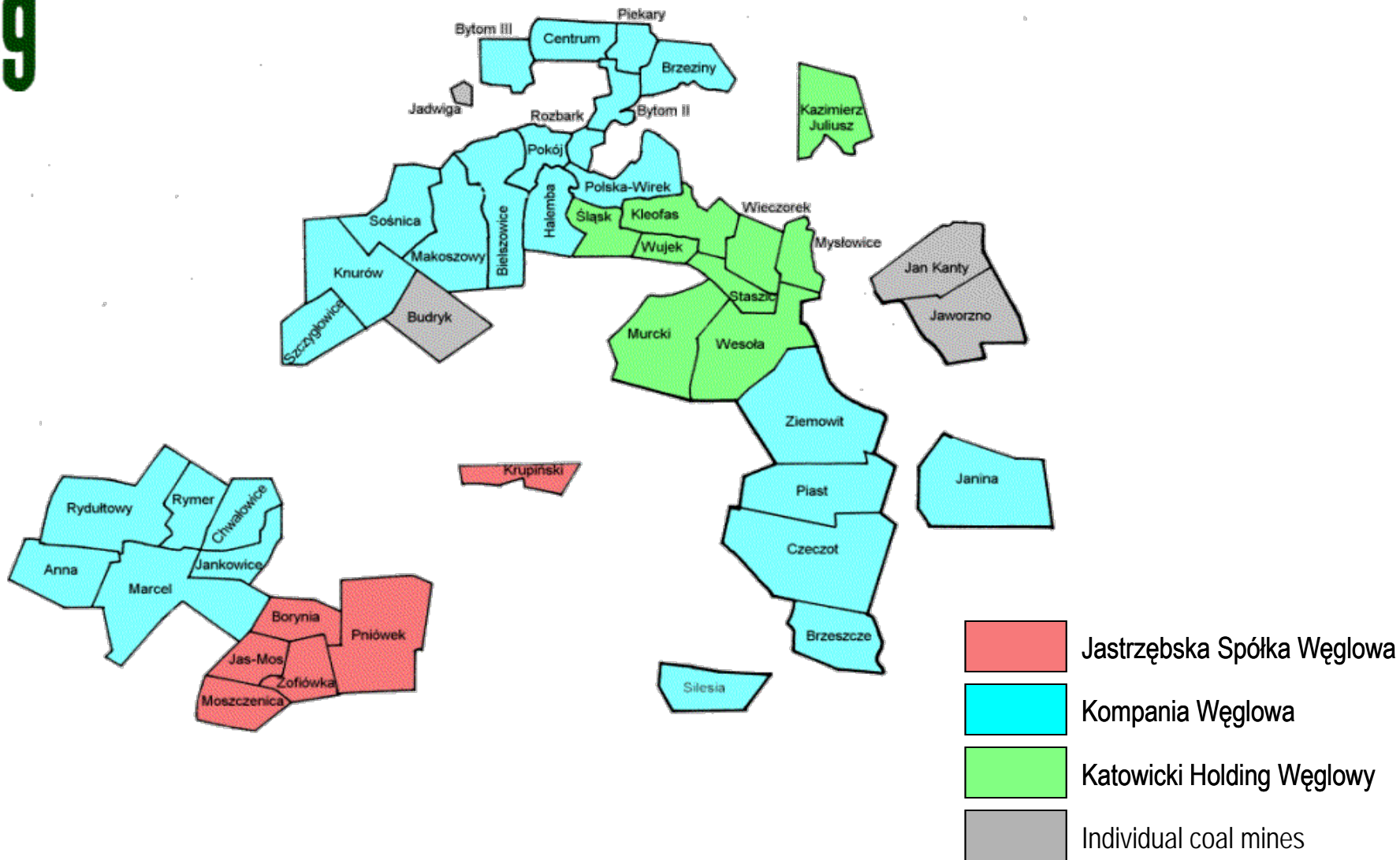
* completion of mining activities in 2000

2012 DATA

- ❖ **RESOURCES:**
67 900 Mt
- ❖ **BALANCED RESOURCES:**
43 201 Mt
- ❖ **COMERCIAL RESOURCES:**
6,09 Mt
- ❖ **EMPLOYMENT**
113 256
- ❖ **NUMBER OF MINES**
30
- ❖ **HARD COAL COMPANIES**
 - ❖ KOMPANIA WĘGLOWA
 - ❖ KATOWICKI HOLDING WĘGLOWY
 - ❖ JASTRZĘBSKA SPÓŁKA WĘGLOWA
 - ❖ POŁUDNIOWY KONCERN WĘGLOWY
 - ❖ LUBELSKI WĘGIEL BOGDANKA
- ❖ **OUTPUT**
79.2 mln tones



LOCATION OF THE HARD COAL MINES IN UPPER SILESIAN COAL BASIN





Upper Silesian Coal Basin :

Presently **30** operating hard coalmines including:

26 gassy coalmines

19 use drainage systems

14 utilise CMM



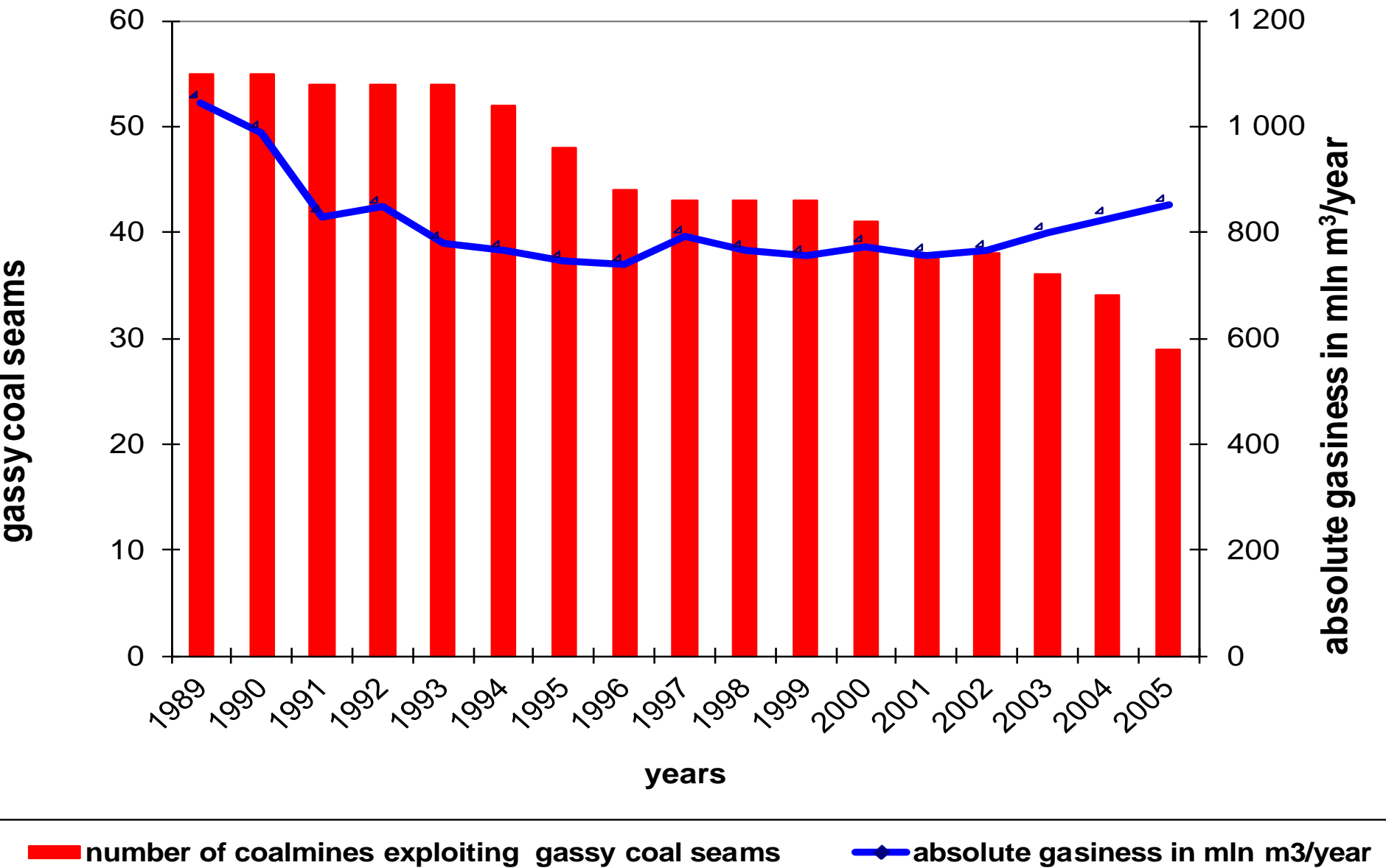
TOTAL ANNUAL HARD COAL & CMM PRODUCTION

Hard coal output: **79.2 mln Tones**

Total absolute gasiness: **828.8 mln m³**

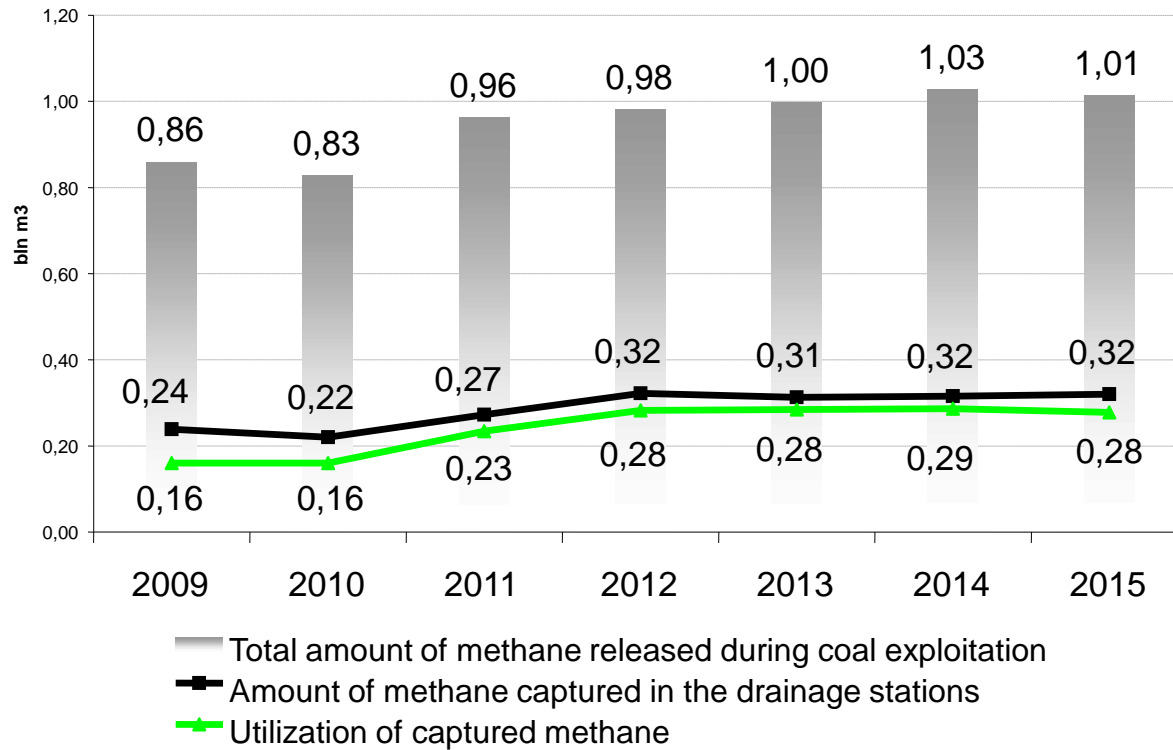
data for the end of 2011

Changes of absolute gasiness versus decrease of active gassy coalmines' number





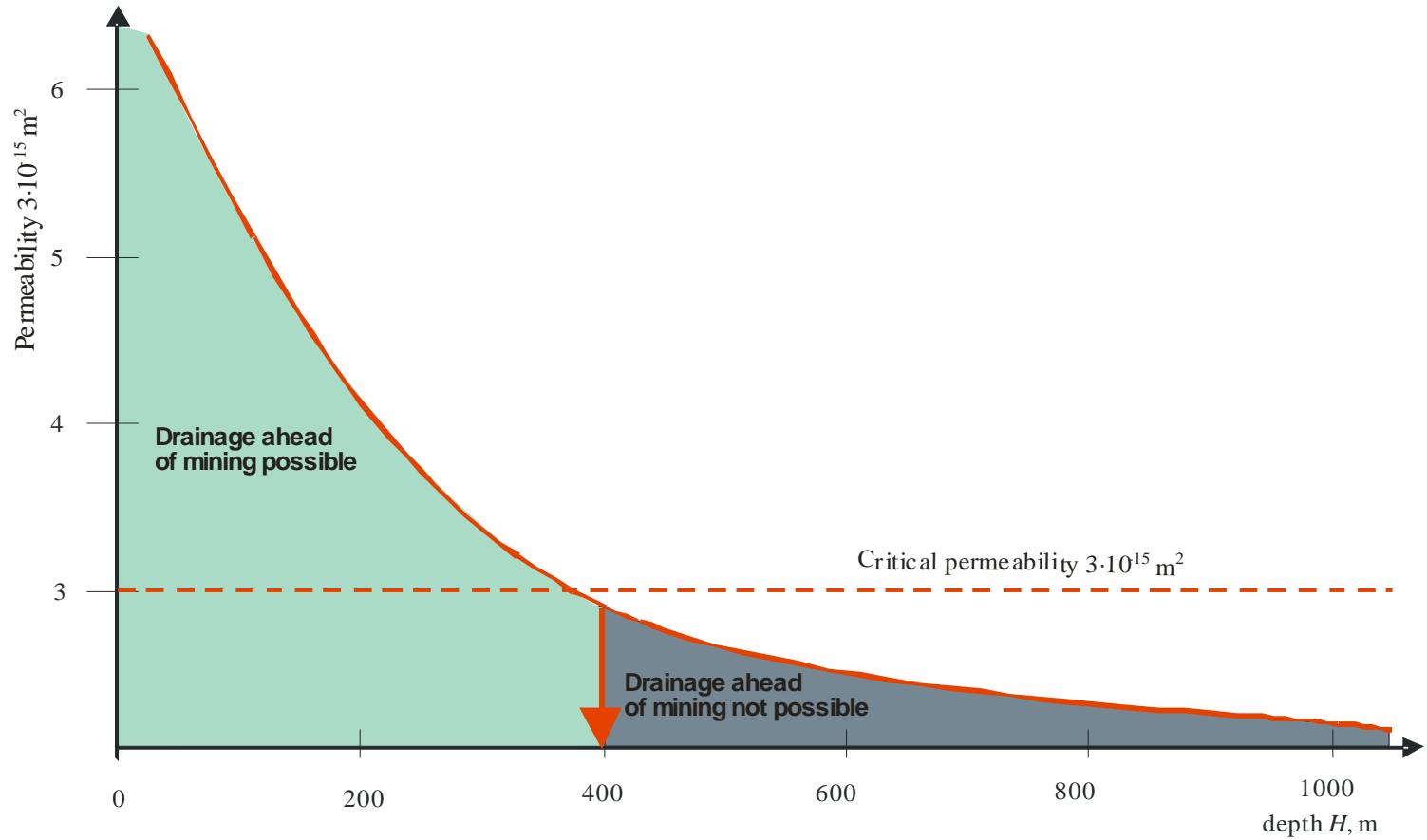
UTILIZATION OF METHANE



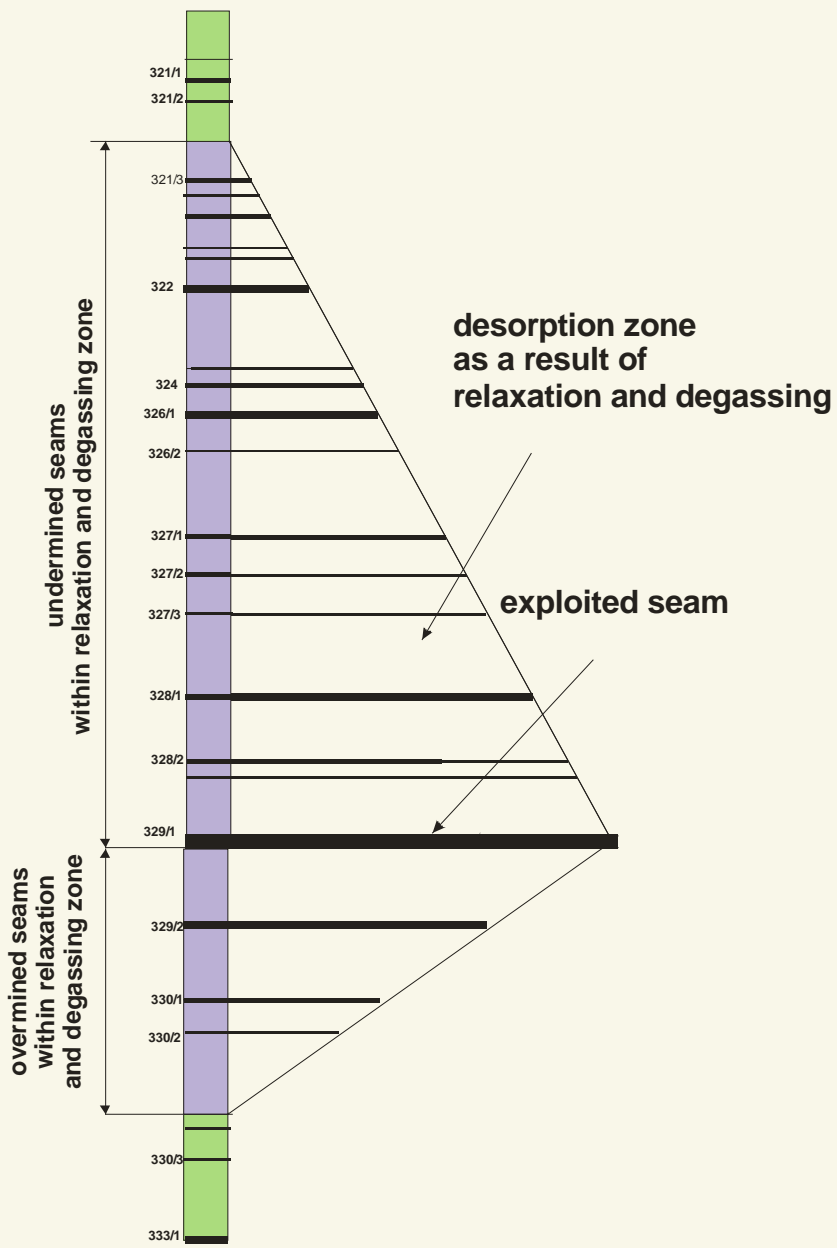


Methods of methane drainage in Poland:

- drainage of the coal seams ahead of mining (before exploitation),
- drainage during coal exploitation,
- drainage of goaves



Changes of coal seams' permeability with the depth



Share of methane from the exploited seams constitutes about 20-40% of total released methane

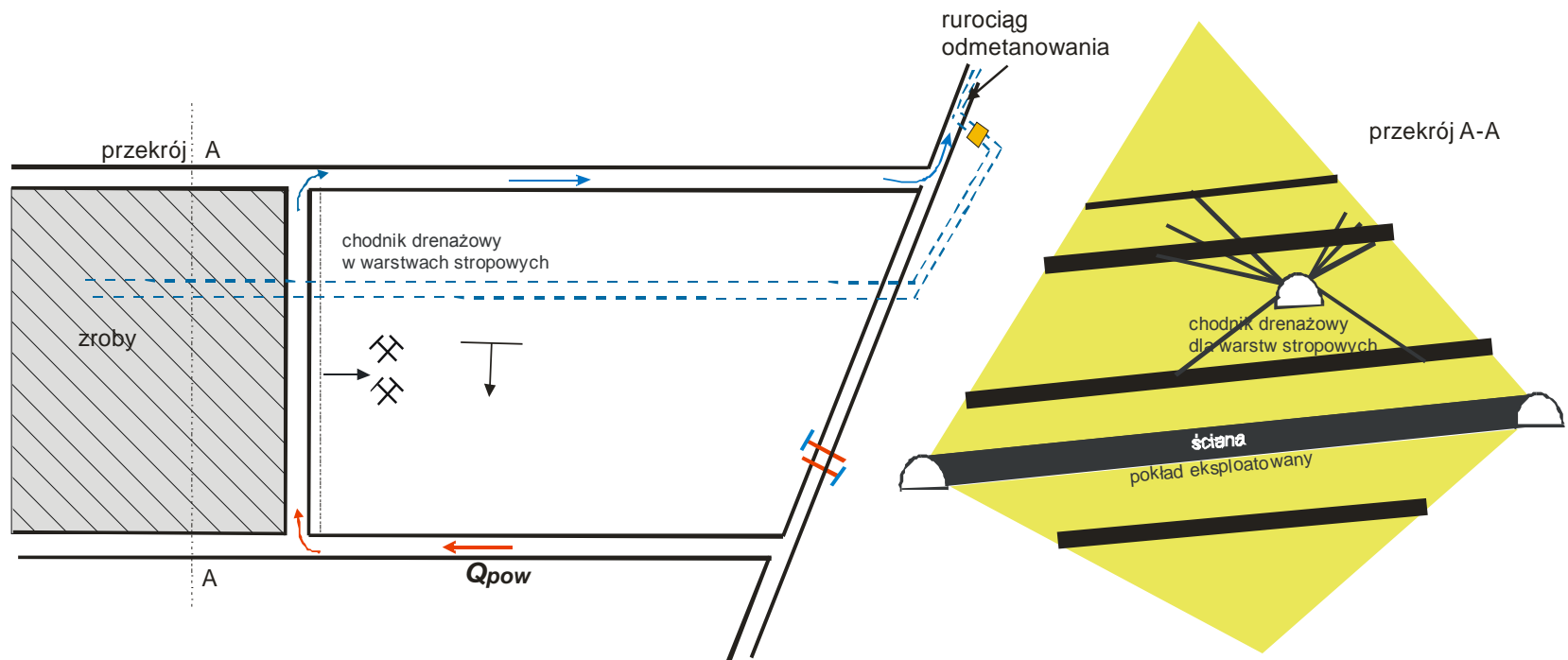
Zone of relaxation and degassing of coal seams underrmined and overmined by minig exploitation





Degassing of the longwall by the mean of drainage gallery located in the roof layers

In favorable conditions effectiveness even up to 70%-90%





Consequences:

- Increased gas hazard
- Drastically growing statistics of stopping coal exploitation

In more and more cases it is not coal mine management

but... **methane**

which is the critical factor determining coal output !



First feasibility study for cost effective methane degassing and capture ahead of mining operations to reduce methane emissions in Poland during mining

funded by US EPA grant



Technical feasibility	T1	Identification of coal seams to be the target of mining operations
	T2	Methane predictions for the planned mining operations
	T3	Design of CBM production and degassing system using surface-bored wells which include:
		<i>T3.1 data collection</i>
		<i>T3.2 determination of coal reservoir parameters</i>
		<i>T3.3 determination of coal seam continuity (depositional characteristics, structural features);</i>
		<i>T3.4 selection of appropriate drilling technology based on the US CBM experience;</i>
		<i>T3.5 preparation of CBM drilling, completion and production design;</i>
		<i>T3.6 determination of well locations and well spacing;</i>
	<i>T3.7 determination of production volumes using reservoir simulator</i>	
	<i>T3.8 determination of methane drainage effectiveness using reservoir modeling techniques;</i>	
	<i>T3.9 planning of produced water disposal</i>	
Economic analysis	T4	Estimation of methane emission reductions
	T5	Estimates of the CBM production implementation cost
	T6	Review of methane end-use strategies
		Calculating of net revenues and estimating of the CBM production project lifetime
	T7	Development of an economic model and calculating NPV and IRR
	T8	Converting estimated methane emission reductions to carbon credits
	T9	
	T10	Estimates of possible cost savings for the Pniowek coal
T11	Final economic analysis	
T12	Conclusions and recommendations	

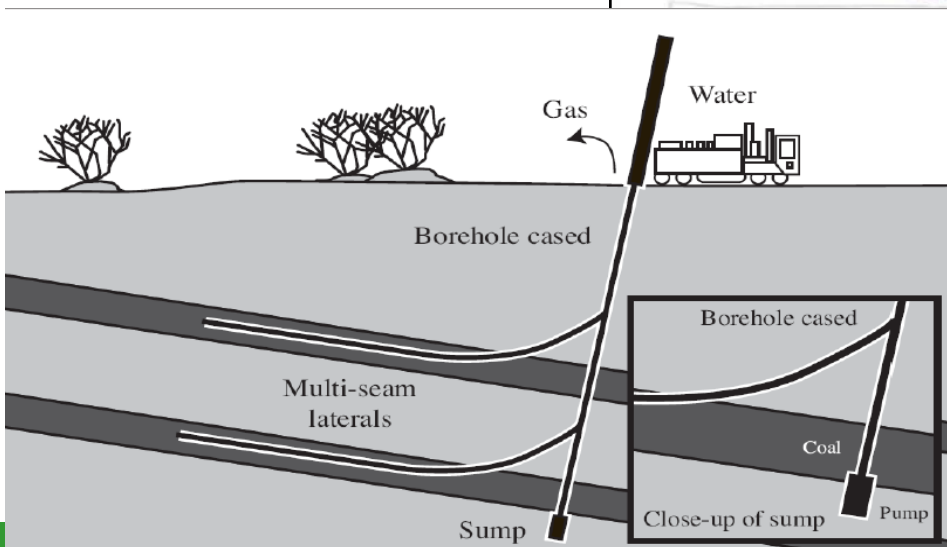
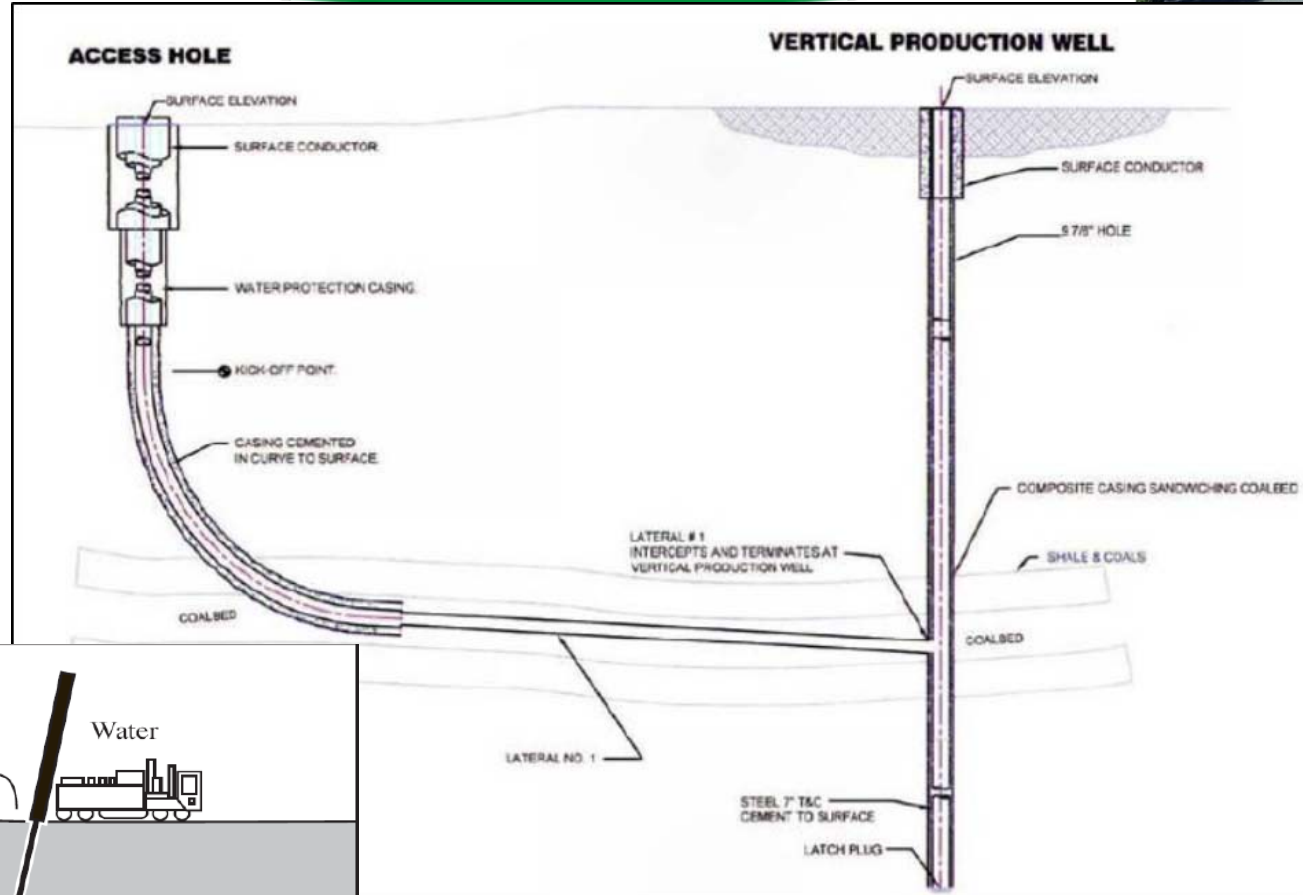


**Very first attempts of directional drilling
from the surface by DART Energy
in Gilowice (Upper Silesia Basin)
(underbalanced technique – no fracturing applied)**

Not very successful so far ...



Toe intersection





Very first attempts to start drainage by directional drilling from the underground galleries

Purchase of the equipment

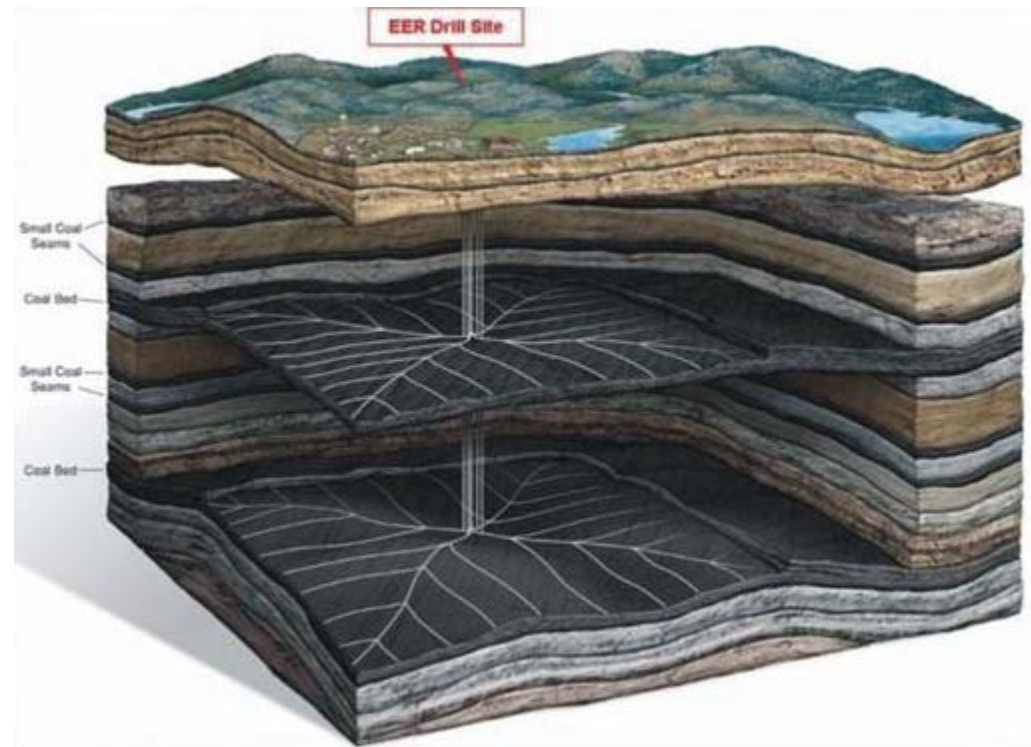
Very first feasibility studies to degassify individual coal panels

Looks pretty promising so far ...

Decisions by the investors must be made.



Model of designed exploratory „pinnate” well by:
Polish Geological Institute
Polish Ministry of Environment
and National Environmental Fund
in 2013-2014





Latest news...

Kompania Weglowa S.A. – the largest hard coal producer in Poland signed the consortium agreement with **Central Mining Institute of Katowice**

to perform the feasibility study verifying technical and economical efficiency of **Production the Electricity and Cold from VAM** in „Brzeszcze mine”

Opportunity template during Methane Expo ...



Apart from the questions to be answered by the feasibility studies miners often ask:

Is there a real chance for degassing the coal seams in Upper Silesian Coal Basin by drainage ahead of mining ?

If it is feasible what will be the volumetric decrease of methane desorbing during coal exploitation to the environment of the longwall ?

What will be the impact of methane captured by drainage ahead of mining on minimizing gas hazard during coal exploitation when converting into reduced absolute gasiness of longwall environment ?



Is it possible to drill directional wells in the deposit characterized by the high faulting zones or/and high seismicity ?

What will be the situation in the zones with high seismicity after the quake ? Will the wells be cut off, what will happen with their patency and flow of drainage methane ?



Chances for the hard coal mines in Poland

- 1) Drainage of the rock mass by capturing methane from the relaxed zones over and under exploited longwall (conventional drainage, most efficient drainage galleries or directional wells in the future ?),**
- 2) Capturing of methane desorbing to the isolated goaves – still does not solve the problem of gas hazard in the longwalls,**
- 3) In case of elaborating new technology suitable for Polish mining conditions – capturing of methane from the coal pannel meant for the exploitation.**



Conclusions / Challenges for Polish CMM and CBM

- Only 30% from 828.8 mln m³ of methane released during mining operations is being captured by drainage systems.
- Only about 70% of drainage gas is being utilized...
- The supporting system for the **high cogeneration energy** is not able to stimulate **more efficient utilisation of CMM !**
- **New incentives are needed – production of electricity from CMM ?**
- **70%** of methane released during mining operations is being vented to the atmosphere; **VAM projects are needed !**



Thank you for your attention



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