

Poland Coal Sector Update Global Methane Initiative Coal Subcommittee Meeting

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



Basic information

**GŁÓWNY INSTYTUT GÓRNICTWA
(GIG)**

**CENTRAL MINING
INSTITUTE**

is a scientific-development organization
combined
since the year 1945 with
the Upper Silesian extractive industry
and region



Where are we?

We are in the heart of Polish hard coal mining industry, namely in Upper Silesia, in Katowice



AREAS OF GIG's activities

Environmental engineering



Safety and certification



Mining and Geoengineering



Education



POLISH MINING INDUSTRY in brief

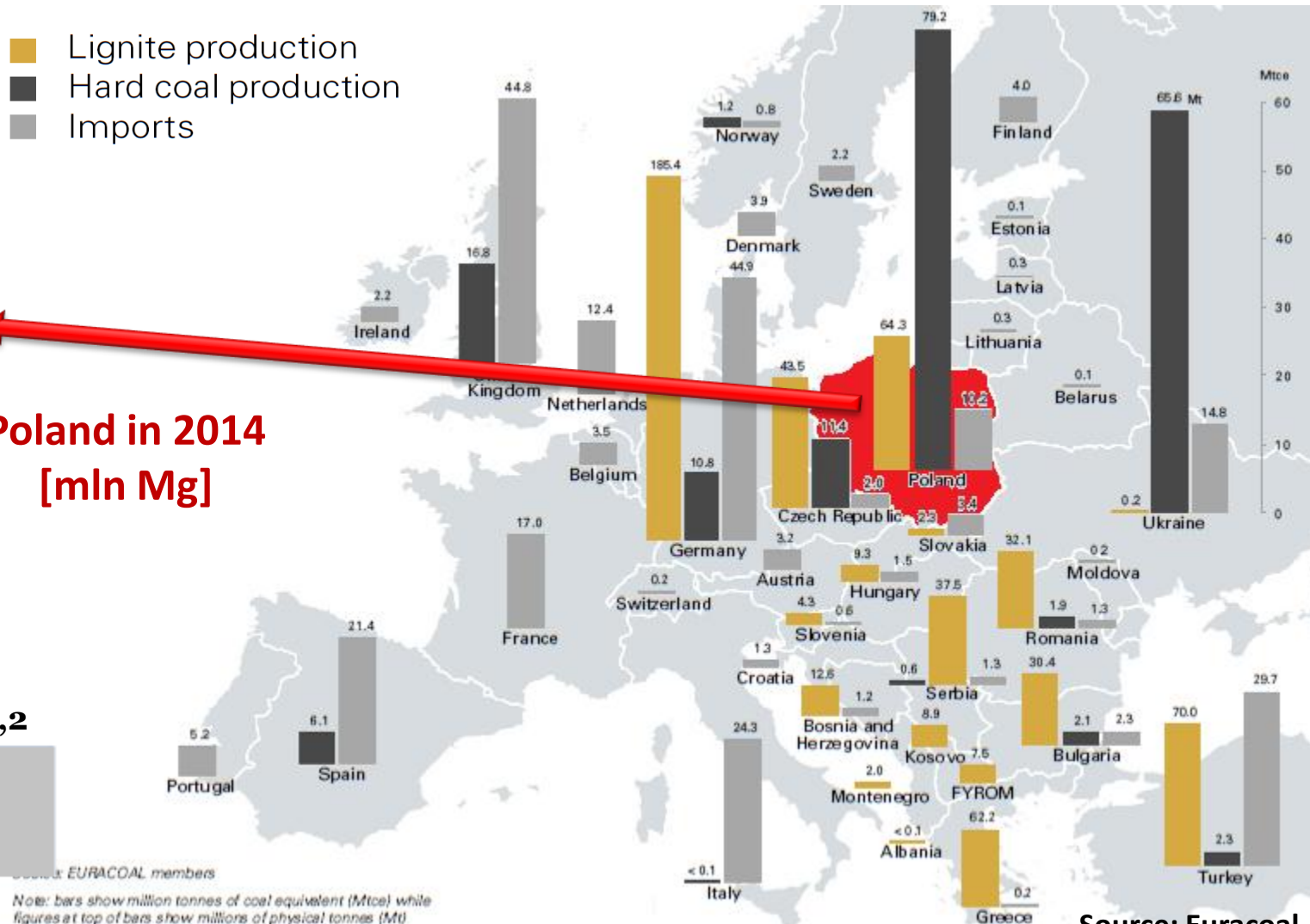


Coal in Europe and Poland

- Lignite production
- Hard coal production
- Imports



Poland in 2014
[mln Mg]



Source: EURACOAL members

Note: bars show million tonnes of coal equivalent (Mtce) while figures at top of bars show millions of physical tonnes (Mt)

Polish coal basins and reserves



- Resources: 56,220.48 Mt
- Economic resources: 3,573.69Mt
- Production – 72.2 Mt,
 - 59.2 Mt Steam coal,
 - 13.0 Mt Coking coal
- Number of hard coal mines – 30
- Hard coal companies:
 - Polska Grupa Górnicza
 - Katowicki Holding Węglowy
 - Jastrzębska Spółka Węglowa
 - Węglkoks Kraj Sp. z o.o.
 - Spółka Restrukturyzacji Kopalń S.A.
 - Tauron Wydobycie S.A.
 - Lubelski Węgiel Bogdanka
 - Others mines (Siltech, Eco-Plus, Silesia)
- Employment – about 85,000 workers

The coal seams are mined in conditions of natural hazards

Gas hazards

Fire hazard

Dust hazard

**Seismic and
rock burst hazard**

Water hazard

Climatic hazard

Radiation hazard

Such mining conditions negatively affect the costs of mining activity of Polish companies



Methane in Polish coal mines

Data for the end of 2015

- In 22 mines hard coal was extracted from methane seams – release of methane;
- In 3 mines hard coal was extracted from methane seams – without release of methane;
- Only 6 mines carried out coal extraction in no-methane seams;
- In 17 mines the drainage of the coal seams were carried out – by 20 surface and 7 underground methane removal plants



Origin of the International Centre of Excellence on Coal Mine Methane

- Methane accompanying the hard coal exploitation is extremely dangerous for the underground work environment and it is also one of the most active greenhouse gases.
- Methane drainage in underground excavations in Polish mines is conducted to ensure the safety of mining operations.
- Most of the drained methane is released to the atmosphere.

**IT IS ESSENTIAL TO INCREASE
COMMERCIAL USE OF METHANE
AS AN ENERGY SOURCE.**

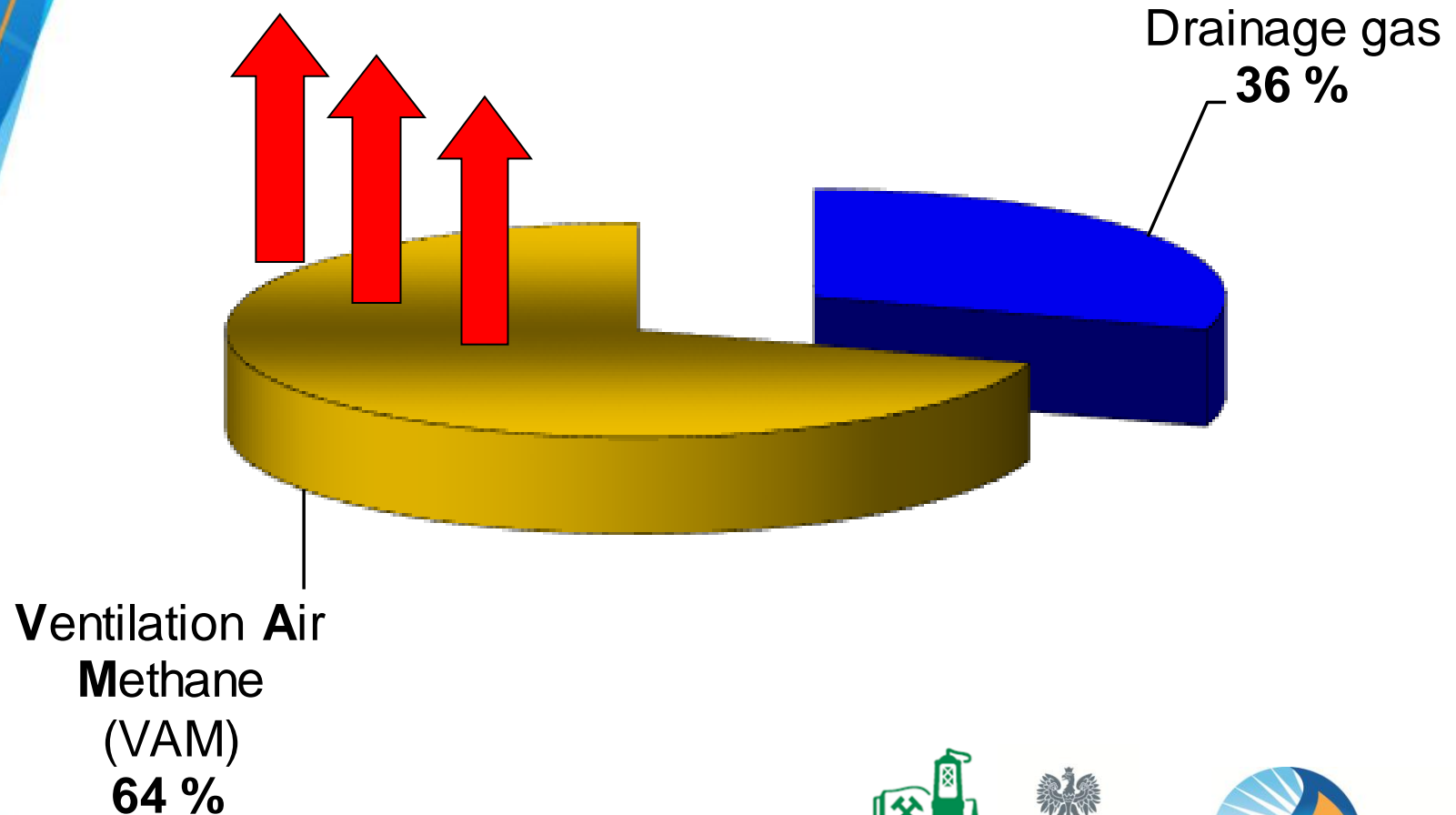


CBM/CMM potential in Poland

Specification	Year									
	2004	2006	2008	2010	2011	2012	2013	2014	2015	Trend
Absolute methane bearing capacity (mln m ³ /year)	825.9	870.3	880.9	834.9	828.8	828.2	847.8	891.2	933,02	↑
Methane drainage (mln m ³ /year)	217.2	289.5	274.2	255.9	250.2	266.7	276.6	321.1	338.97	↑
Amount of economically utilized methane (mln m ³ /year)	144.2	158.3	156.5	161.1	166.3	178.6	187.7	211.4	197.09	↓
Number of the hard coal mines	39	33	31	32	31	31	30	30	30	—
Hard coal output (mln tones)	99.5	94.3	83.6	76.1	75.5	79.2	76.5	72.5	72.2	↓

Total gas released during mining operations

(about 891.2 mln m³) 847.8 mln m³ in 2013



Methods of methane drainage in Poland:

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



Poland Coal Sector Update

- New trends in the energy sector

Support system for CBM & CMM in Poland

- ✓ Since March 11th, 2010 there is a support system for electricity produced from high efficiency cogeneration (Primary Energy Saving > 10%) from CBM and CMM.
- ✓ This system supports the efficient utilisation of CBM and CMM.
- ✓ According to the energy law records, this system, will be valid until the year 2018

Long term program for CMM is needed



G I G



MINISTERSTWO
GOSPODARKI



Global
Methane Initiative

CMM/CBM projects outlook

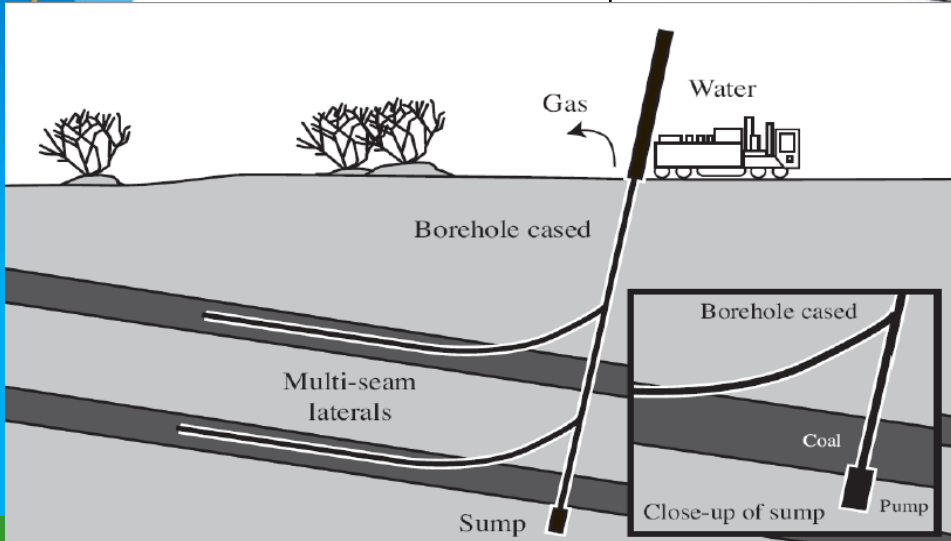
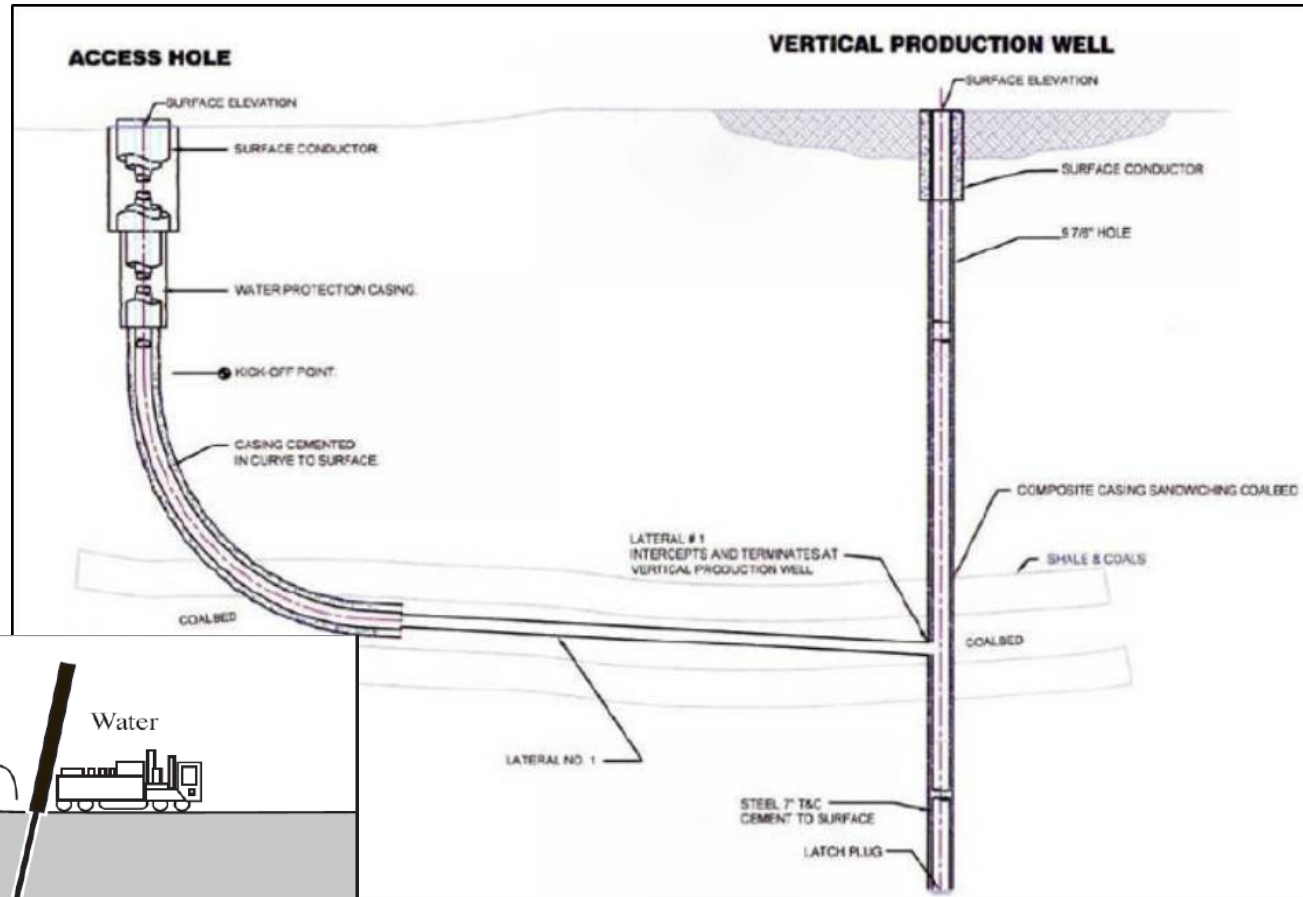
- Approaches to overcoming challenges
 - Legislation and regulation
 - Policies and incentives
 - Energy pricing reform
 - Capacity building
 - **2020 EU Regulations (drastic increase of penalties !)**
 - **Technology transfer (need for effective surface and underground directional drilling technology)**
 - **Training and workshops (surface and underground directional drilling technology)**
 - **Polish Geological Law (after latest modifications) classifies CBM exploratory works similar like shale gas operations....**
 - Agreements and/or partnerships
- Polish mining sector is open for cooperation and investors**

Planned projects

- ✓ **Polish Oil and Gas Company (CBM):**
methane drainage ahead of mining using
Surface directional drilling well at „Gilowice site”
- ✓ Specific conditions:
 - poor permeability,
 - high strength of coal,
 - poor recovery of methane
- ✓ Fracturing to be implemented!



Toe intersection



GIG support activities

- R&D in Central Mining Institute in Katowice to assist CMM recovery
Tests to increase permeability of hard coals:
- Hydro fracturing & new blasting materials
- Borehole mining



GIG cooperation with UNECE and US EPA

- 10 years' effective cooperation with UNECE group of experts GMI and US EPA
- US EPA grant to establish Polish VAM resources (years: 2008-2011; 250,000 USD)
- US EPA grants to define Drainage ahead of mining using surface directional drilling (years: 2009-2011; 340,000 USD)
- International Center of Excellence on CMM effect of above effective cooperation (**within last year PGNiG SA, PIG joined ICE-CMM, INiG is going to join. PGG, KHW, JSW Weglokoks and Tauron are invited...**)



Conclusions – potential

- **23.7%** of total methane released during mining is being utilized
- Drop in drainage methane utilization: **67.8%** (in 2013) **down to 65.8%** (in 2014)
- Still venting to the atmosphere drainage gas - last year: **110 mln m³ – ready resource to utilize !**
- **679.8 mln m³ VAM (including a.m. 110mln m³ is ready to manage (subject study ?)**



Conclusions

- **Shale gas - long way ahead – vs CMM**
– resource ready to utilize !
- **Smaller depth and strength**
- **Easier fracturing...**
- **Smaller investment**
- **Guaranty of local utilization**
(gas, el. & thermal energy)
- **New jobs!**
- **Environmental benefits**



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