Trends in CMM Project Development in Poland

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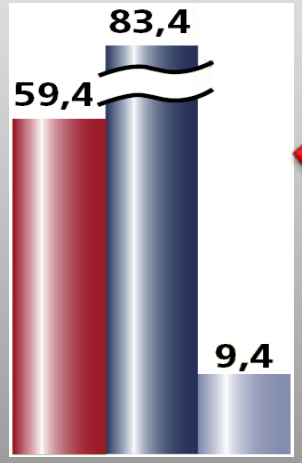
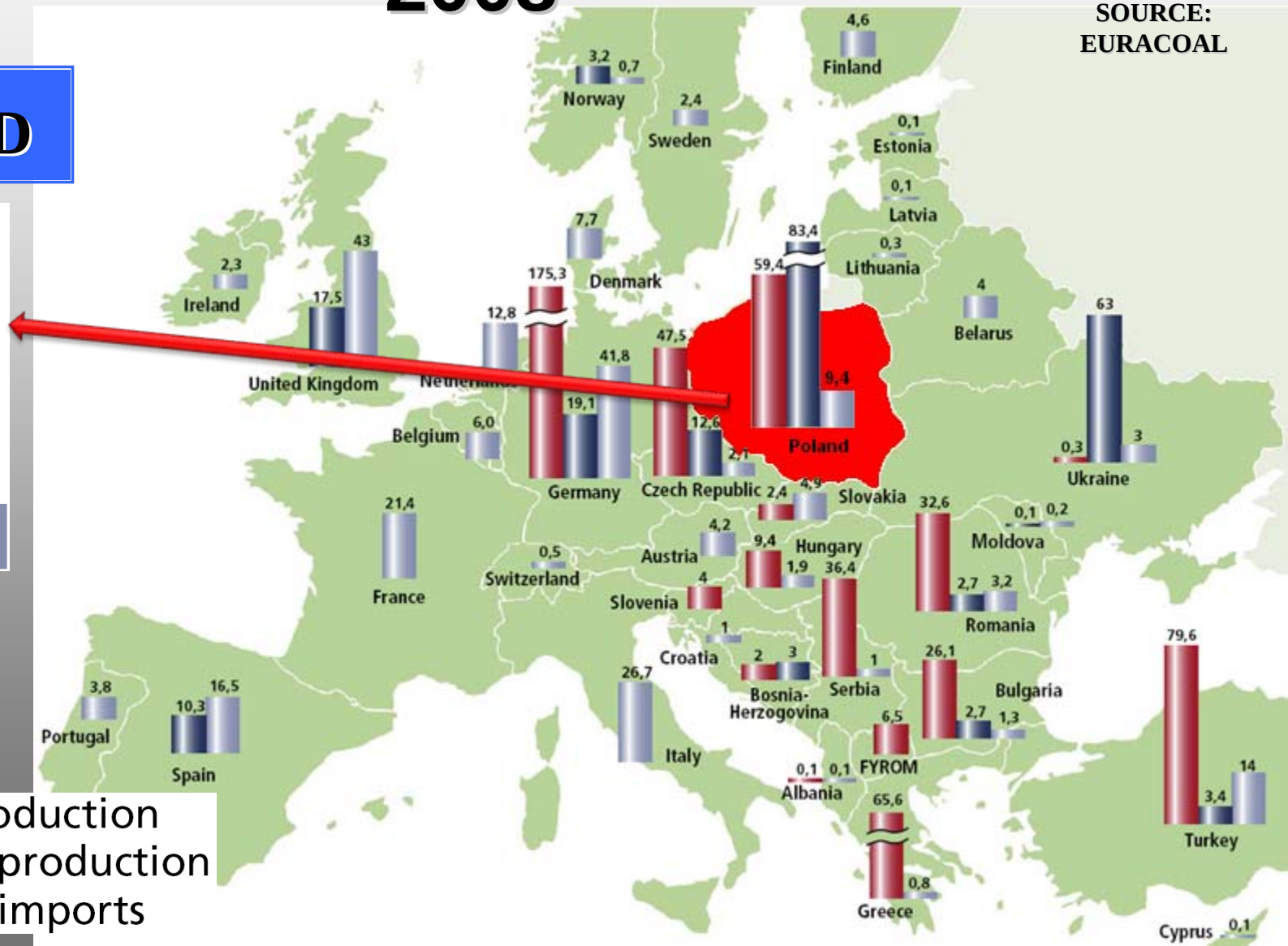
Lignite production, hard coal production and imports in Mt in 2008

GIG

SOURCE: EURACOAL

POLAND





Lignite production
Hard coal production
Hard coal imports

OUTLINE OF COAL AND METHANE RESOURCES IN POLAND

In Poland hard coal deposits are located in:

- the Upper Silesian Coal Basin (USCB),
- Lower Silesia Coal Basin (fully abandoned at present)
- Lublin Coal Basin (only one active mine).

Upper Silesian Coal Basin is expected to be a promising site for CMM recovery/utilization. The most gassy mines are located in south and south-west part of the coal basin.

Location of major Polish mining basins

RESOURCES:

Hard coal – 60 020 Mt

Lignite – 18 161 Mt

Copper – 2 707 Mt

BALANCE RESERVES:

Hard coal – 43 201 Mt

Lignite – 13 562 Mt

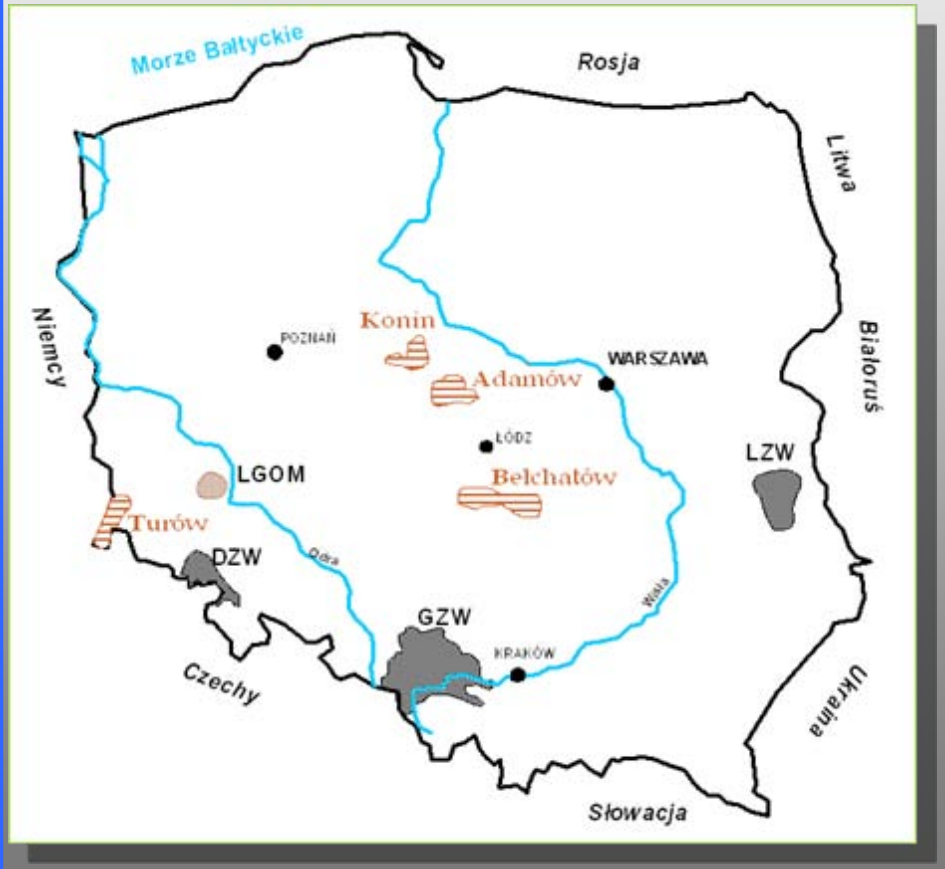
Copper – 1 818 Mt

COMERCIAL RESOURCES:

Hard coal – 4 338 Mt

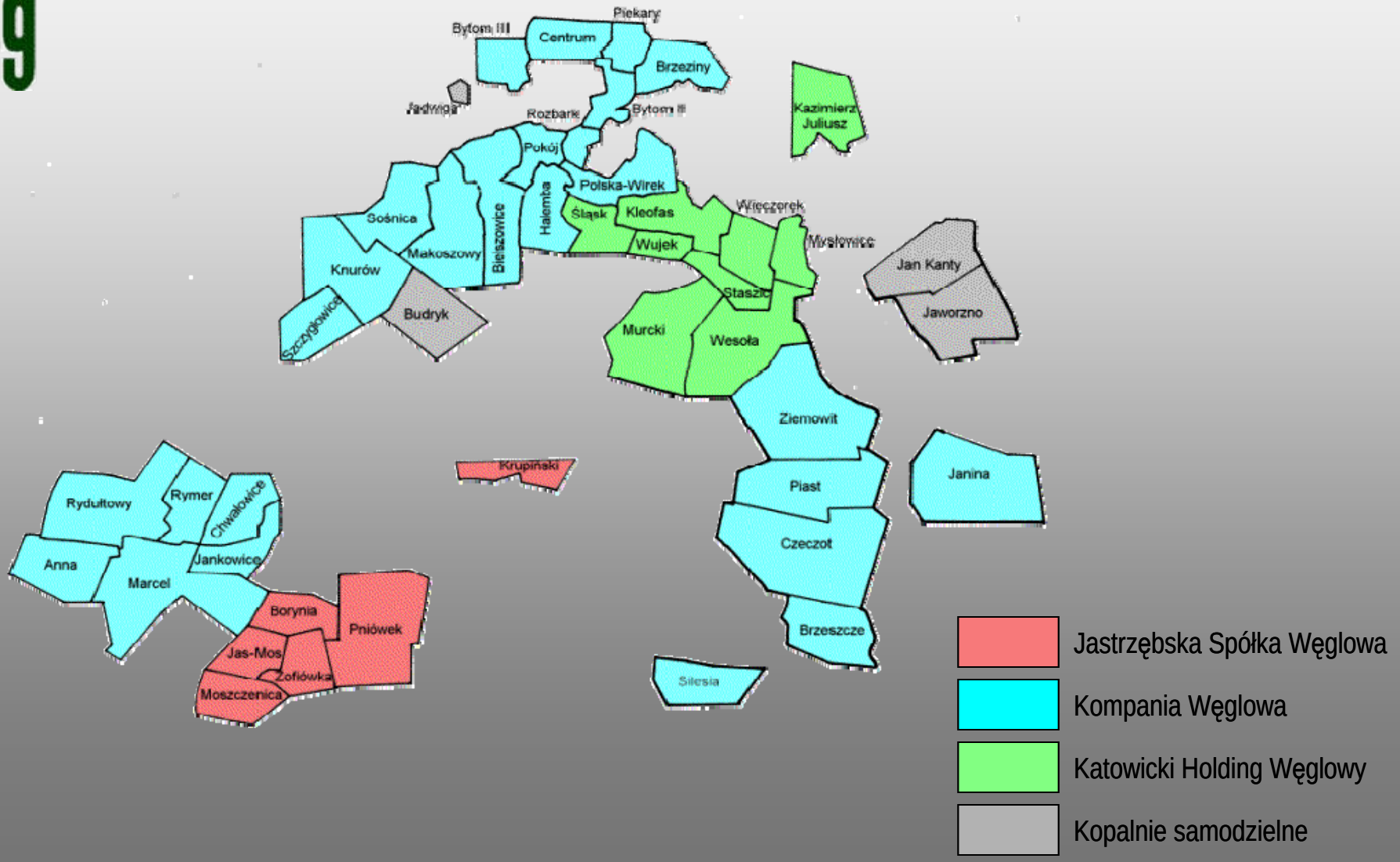
Lignite – 1 371 Mt

Copper – 1 195 Mt



Data on 31 December 2008

LOCATION OF THE HARD COAL MINES IN UPPER SILESIAN COAL BASIN



Upper Silesian Coal Basin :

Presently **30** operating hard coalmines including:

27 gassy coalmines

20 use drainage systems

14 utilise CMM

data for the end of 2008

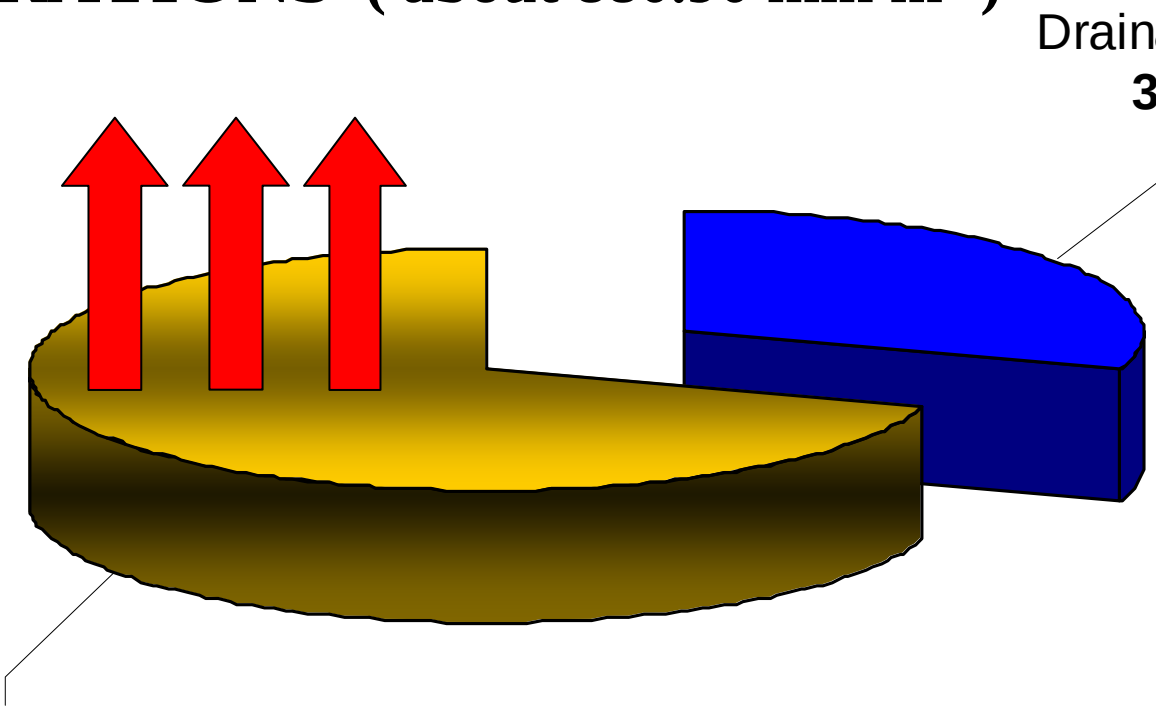
TOTAL ANNUAL HARD COAL & CMM PRODUCTION

Hard coal output: **83.4 mln Tonnes**

Total absolute gasiness: **880.90 mln m^3**

data for the end of 2008

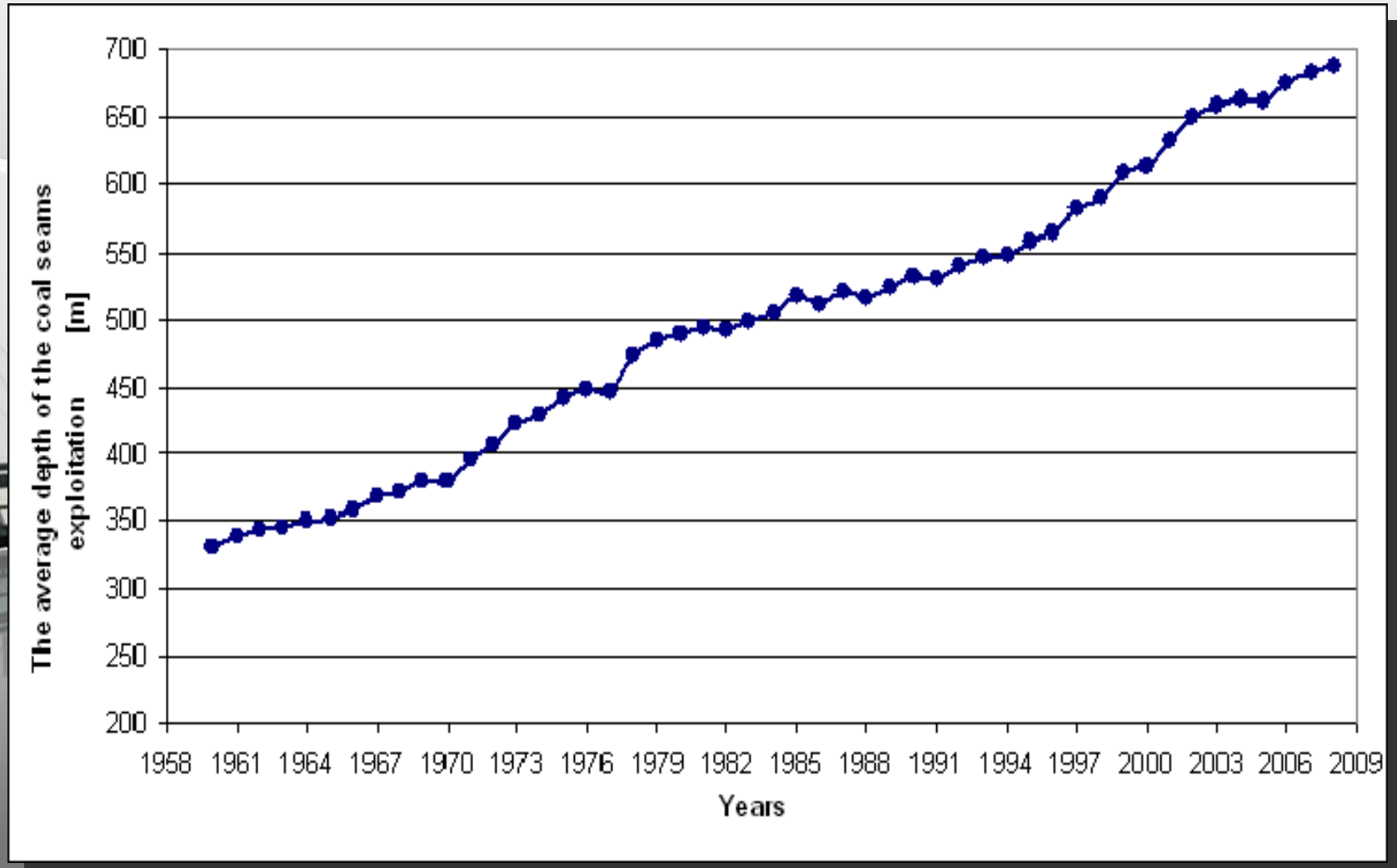
TOTAL GAS RELEASED DURING MINING OPERATIONS (about 880.90 mln m^3)



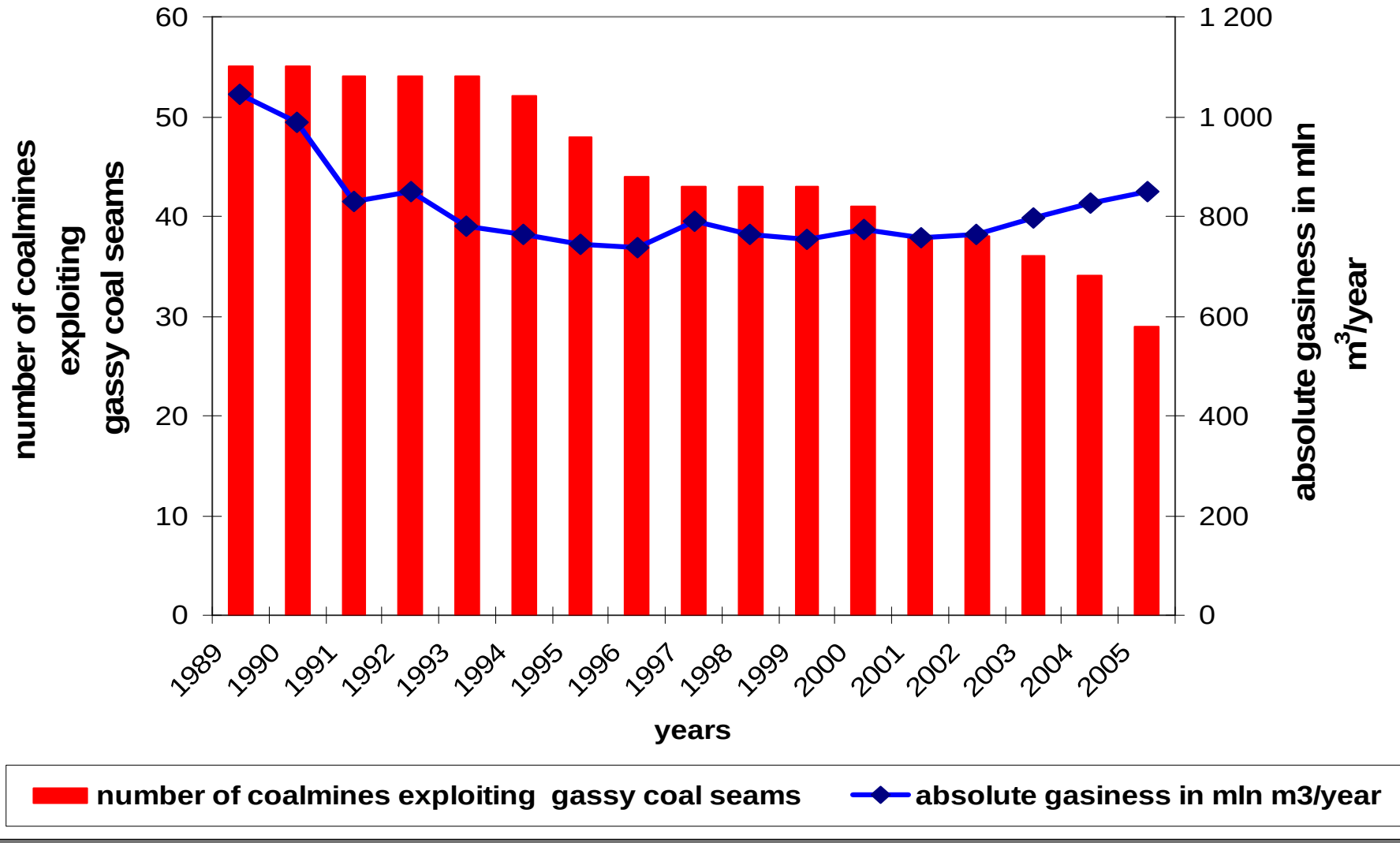
Utilisation of drainage gas from hard coal mines in 2008

Number	Coal mine	Gas collection	losses	Utilisation	Efficiency of utilisation
		mln m^3/year	mln m^3/year	mln m^3/year	%
1	Brzeszcze-Silesia	38.0	0.1	37.9	**99.7**
2	Zofiówka	17.0	0.5	16.5	**97.1**
3	Pniówek	44.1	5.1	39.0	**88.4**
4	Jas-Mos	9.3	1.2	8.1	**87.1**
5	Jankowice	11.0	2.6	8.4	**76.4**
6	Budryk	12.2	4.0	8.2	**67.2**
7	Halemba - Wirek	6.5	2.9	3.6	**55.4**
8	Mysłowice-Wesoła	10.2	4.6	5.6	**54.9**
9	Marcel	3.3	1.7	1.6	**48.5**
10	Borynia	6.6	3.8	2.8	**42.4**
11	Krupiński	52.7	31.6	21.1	**40.0**
12	Staszic	6.0	4.2	1.8	**30.0**
13	Bielszowice	6.9	5.0	1.9	**27.5**
14	Pokój	0.3	0.3	0.0	**0.0**
15	Sośnica - Makoszowy	17.2	17.2	0.0	**0.0**
16	Szczygłowice	17.4	17.4	0.0	**0.0**
17	Wujek	4.2	4.2	**Methane captured in underground drainage stations was totally released to the ventilation air stream**	
18	Rydułtowy - Anna	6.3	6.3		
19	Chwałowice	3.0	3.0		
20	Knurów	2.0	2.0		
TOTAL		**274.2**	**117.7**	**156,5**	**57,1**

Change of average depth of the coal seams exploitation in Poland in the years 1958 – 2009



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

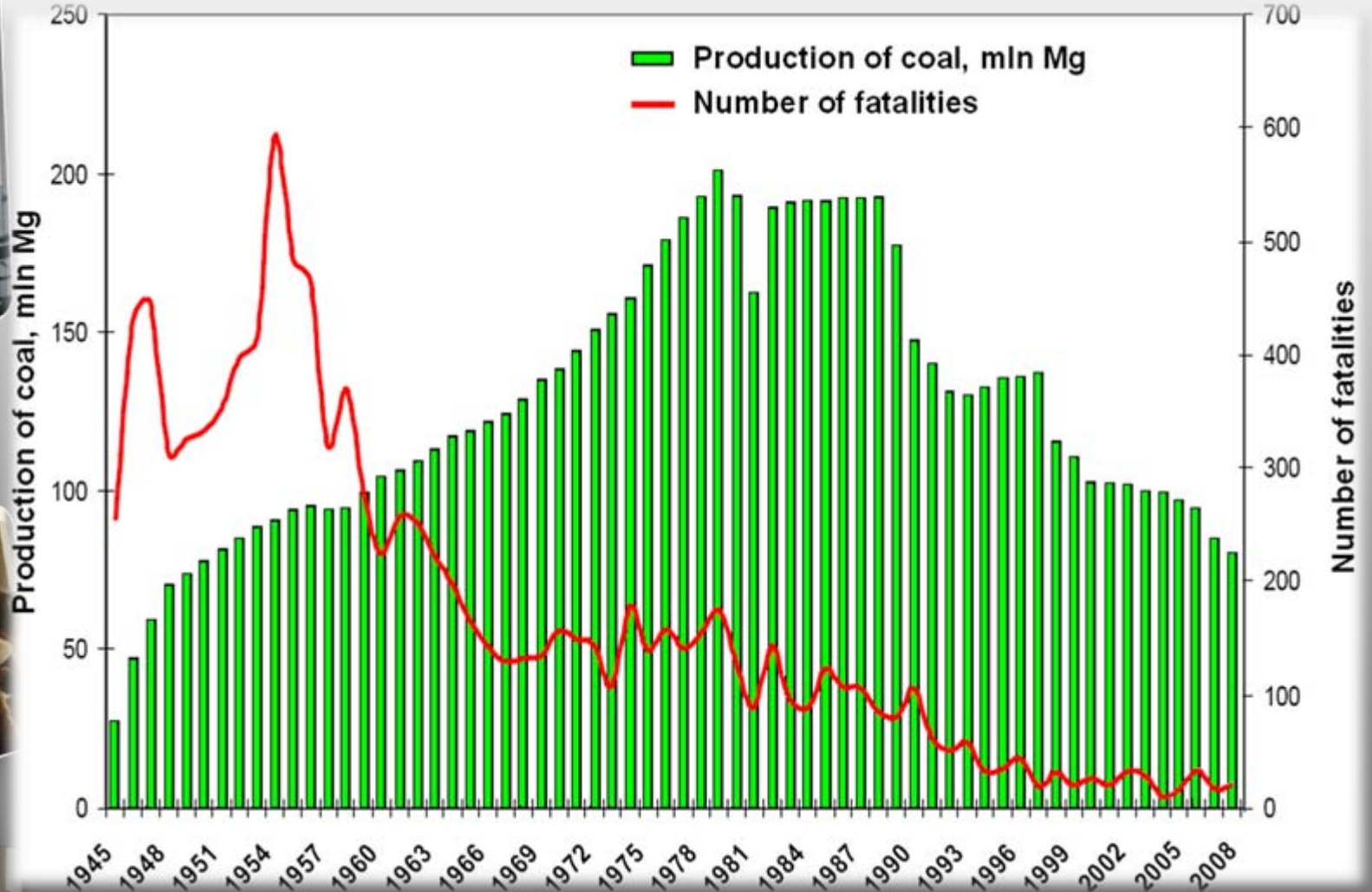


Changes of absolute gasiness versus decrease of active gassy coalmines' number

Since 1989 till now…

- Drop of number of gassy coalmines by **48%**
- Drop of absolute gasiness by **19%**

Hard coal production and number of fatalities during the years 1945 – 2008

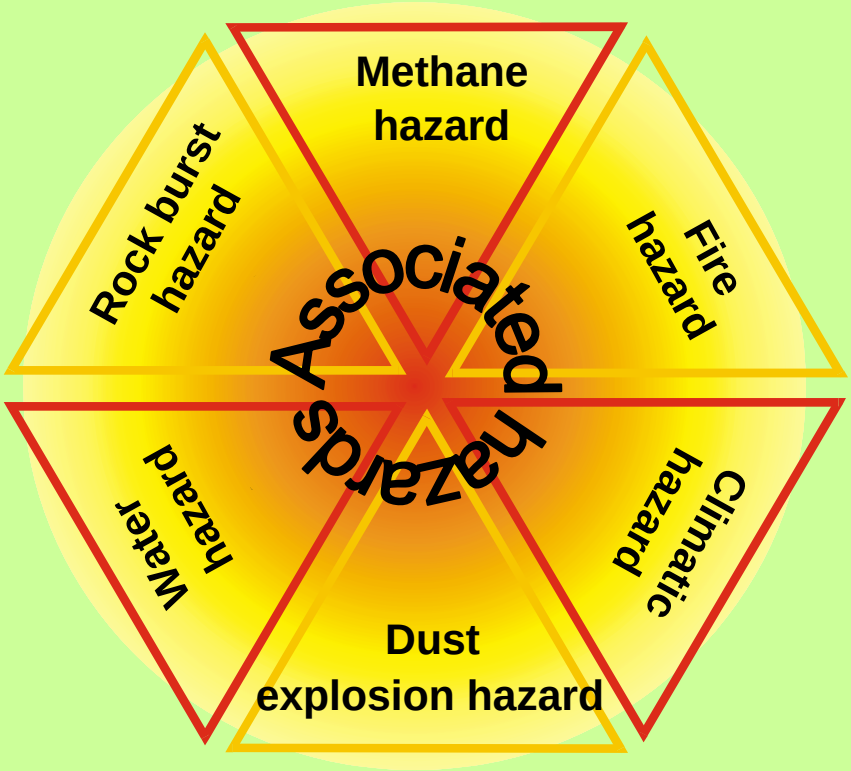


Mining catastrophes in the years 1970 – 2009

Date	Coal mine	Number of accidents		Causes of the tragedy
		Fatal	Other	
23.03.1971	Rokitnica	10	-	Rock burst
28.06.1974	Silesia	34	-	**Coal – dust and methane explosion**
07.09.1976	Nowa Ruda	17	-	Outburst of gases and rocks
10.10.1979	Dymitrow	35	5	Coal – dust explosion
30.10.1979	Silesia	22	15	Fire
28.11.1982	Dymitrow	20	9	Fire
22.12.1985	Wałbrzych	18	1	**Methane explosion**
04.02.1987	Mysłowice	19	27	**Coal – dust and methane explosion**
10.01.1990	Halemba	19	20	**Methane ignition**
17.09.1993	Miechowice	6	2	Rock burst
16.12.1996	Bielszowice	5	7	**Rock burst and methane explosion**
06.02. 2002	Jas-Mos	10	2	Coal – dust explosion
23.03. 2002	Rydułtowy	3	7	**Rock burst and methane explosion, fire**
07.11. 2003	Sośnica	3	7	**Methane explosion**
22.11 .2005	Zofiówka	3	5	**Outbursts of methane**
27.07. 2006	Pokój	4	6	Rock burst
21.11. 2006	Halemba	23	-	**Methane and coal – dust explosion**
04.06. 2008	Borynia	6	12	**Methane ignition and explosion**
18.09.2009	Wujek - Śląsk	19	34	**Methane ignition and explosion**

Principal natural hazards in the underground work environment

- Gas hazard
- Fire hazard
- Dust hazard
- Seismic and rock burst hazard
- Water hazard
- Climatic hazard
- Radiation hazard



Some history of degasification….

In Marklowice area in 1929 – the very first CBM capture. Totally 330 mln m^3 CH_4 was produced with one well, with the quantity of 25 m^3/min

„Silesia" coalmine – 4 wells were drilled, totally 6.5 mln m^3 CH_4 was captured with the quantity of 7.6-3.0 m^3/min

In 1990-1996 – CBM activities of many foreign companies mainly from USA and GB e.g. : **Mc Kenzie**, **AMOCO, TEXACO, Mc Cormick, Cee Bee Natural Gas Inc.** and domestic e.g.: **METANEL S.A.** and **POLTEX-METHANE**. Task : - CH_4 exploitation from the coal beds - method: drilling the vertical wells from the surface.

Low permeability of Polish coals resulted in stopping the operations and withdrawal from further activities .

Another hope when implementing new Directional Drilling Technologies ???

Companies:

Poltex-Methane,

New Millennium Resources Poland,

EurEnergy

still in Silesia region….

Assistance needed !

especially Technology !

Investors !

Low gas permeability of Polish coals: about 1 mD and even lower incline towards drainage operations from underground excavations – Polish precursor **„Silesia" coalmine in 1956.**

At present **regular drainage** is being conducted in **20** coalmines, **18** of them have gas drainage stations (**14** on the surface and **4** underground).

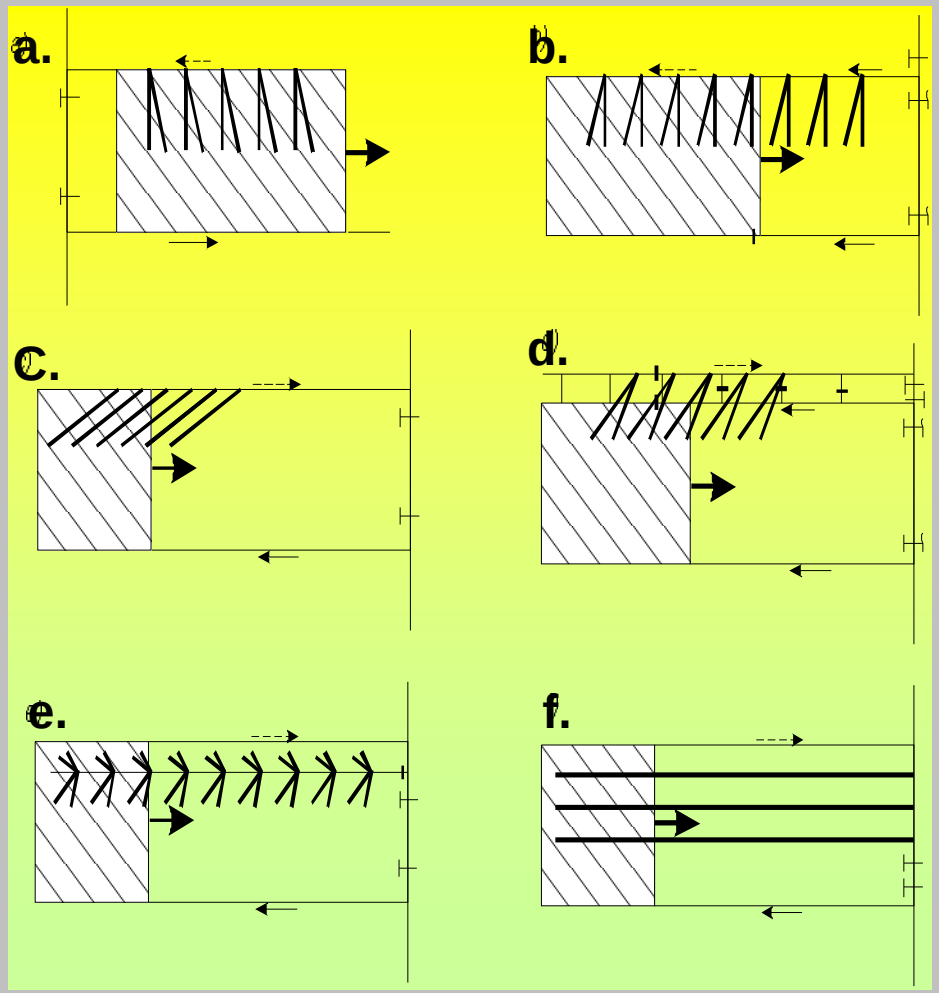
Efficiency of methane drainage with the underground methods **depends on mining and geological conditions and applied technology of drainage :**

- drainage conducted from the development works,

- exploitation drainage in the neighbourhood of coal faces – the most effective,

METHANE DRAINAGE FROM UNDERGROUND WORKINGS

Layout of drainage holes in the area of the longwall working



a - **advancing longwall,** effectiveness up to **50%,**

b - **retreating longwall with maintenance of the tail gate in the goaf** effectiveness up to **40÷50%,**

c - **retreating longwall with liquidation of tail gate,** effectiveness ca**. 20÷30%,**

d - **retreating longwall with two ventilation headings,** effectiveness ca. **40%,**

e - **methane drainage using a drainage heading,** effectiveness ca. **70÷80%,**

f - **methane drainage by means of directional holes,** effectiveness ca. **70%.**

Typical utilization of methane gas captured by the underground drainage systems in the coalmines :

- In the drying rooms with the gas burners to dry the coal after the floating process in the coal washing plants,

- In the water boilers with the gas burners to produce hot water in the coalmines' bathrooms and for the heating purposes,

- In the gas engines to produce electricity, heat and cool.

The most advanced

in drainage gas utilization in Poland is

Jastrzebska Spolka Weglowa S.A. (JSW S.A.)

(Jastrzebska Coal Company Inc)

with its daugther company **Spolka Energetyczna Jastrzębie S.A. (SEJ S.A.)**

still big potential in:

Kompania **W**eglowa **S.A. (KW S.A.)**

Katowicki **H**olding **W**eglowy **S.A. (KHW S.A.)**

Achievements and potential in poster session

Considering that almost 70% of methane released during mining operations is being vented to the atmosphere

GREEN LIGHT
for VAM technology !

The main obstacle:

0.75% CH_4 admissible in ventilation air

EPA assistance:

grant

for Ventilation Air Methane potential

Feasibility Study of 10 coal mines

from Upper Silesian Coal Basin

Active 85 years' role of CMI in solving all methane related problems of Polish and foreign coal mines both from scientific and practical point of view…

Active participation of CMI in M2M platform

UNECE Ad hoc Group of Experts on CMM utilization

Conclusions

1. Utilizing CMM in the industrial facilities is considered as a pro-ecological activity as it helps to mitigate methane emissions to the atmosphere, and by the reduction of burning the coal it eliminates also sulphur emission, benzo-α-pirens, CO2 , CO but ... **It also generates Carbon Credits which could help closing the economics of the projects !**
2. No more doubts for the Coal Mines' Management, that methane gas coming from the drainage stations is valuable fuel, which can be effectively used for industrial purposes and improve their economical results (minimize exploitation costs) !

3. Increase of methane capture with the new technologies improves safety conditions underground, lowering significantly methane hazard

4. **In order to stimulate development of CMM utilization projects – <u>effective</u> changes in Polish Legislation are urgently needed to classify energy coming from CMM as a green energy !!! still to come….**

5. Considring low permeability of Polish (most European coal basins) **an effective implementation of directional drilling** technologies is needed, which **could help in drainage methane from the coal panels ahead of mining**.

6. Considering that about 70% of methane gas released during mining operations is being released to the atmosphere
   Every possible effort should be made to implement VAM technologies utilizing it on the industrial scale !

THANK YOU FOR YOUR ATTENTION !

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