Trends in CMM Project Development in Poland

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

POLAND

Lignite production
Hard coal production
Hard coal imports
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.
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 m³

data for the end of 2008
TOTAL GAS RELEASED DURING MINING OPERATIONS (about 880.90 mln m³)

- Drainage gas: 30%
- Ventilation Air Methane (VAM): 70%
### Utilisation of drainage gas from hard coal mines in 2008

<table>
<thead>
<tr>
<th>Number</th>
<th>Coal mine</th>
<th>Gas collection</th>
<th>losses</th>
<th>Utilisation</th>
<th>Efficiency of utilisation</th>
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<td></td>
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<td>mln m³/year</td>
<td>mln m³/year</td>
<td>mln m³/year</td>
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<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>274.2</strong></td>
<td><strong>117.7</strong></td>
<td><strong>156.5</strong></td>
<td><strong>57.1</strong></td>
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</table>

*Methane captured in underground drainage stations was totally released to the ventilation air stream*
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

- **Y-axis (left):**
  - Number of coalmines exploiting gassy coal seams

- **Y-axis (right):**
  - Absolute gasiness in mln m³/year

- **X-axis (bottom):**
  - Years: 1989 to 2005

Legend:
- Red bars: Number of coalmines exploiting gassy coal seams
- Blue line: Absolute gasiness in mln m³/year
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

<table>
<thead>
<tr>
<th>Date</th>
<th>Coal mine</th>
<th>Number of accidents</th>
<th>Causes of the tragedy</th>
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<td>18.09. 2009</td>
<td>Wujek - Śląsk</td>
<td>19</td>
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</table>
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

Associated hazards:
- Methane hazard
- Rock burst hazard
- Fire hazard
- Climatic hazard
- Water hazard
- Dust explosion hazard
In Marklowice area in 1929 – the very first CBM capture. Totally 330 mln m³ CH₄ was produced with one well, with the quantity of 25 m³/min

„Silesia” coalmine – 4 wells were drilled, totally 6.5 mln m³ CH₄ was captured with the quantity of 7.6-3.0 m³/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 : - CH₄ 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 daughter company Spolka Energetyczna Jastrzębie S.A. (SEJ S.A.)

still big potential in:

Kompania Weglowa S.A. (KW S.A.)
Katowicki Holding Weglowy 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% CH₄ 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 – effective changes in Polish Legislation are urgently needed to classify energy coming from CMM as a green energy !!! still to come....
5. Considering **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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