



We mine all the best

Methane Hazards and Advantages in Methane Utilization in Mines of Jastrzębska Coal Company

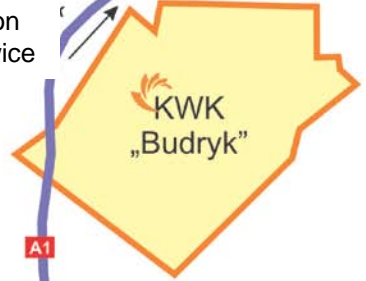
Andrzej TOR, PhD., Eng.

Antoni JAKUBÓW, PhD., Eng.

Content of the presentation

1. Introduction.
2. Methane hazard in the mines of Jastrzębska Coal Company.
3. Methane utilization in the mines of Jastrzębska Coal Company.
4. Opportunities for even better methane utilization.
5. Recapitulation and conclusions.

Direction to Katowice



A1



Direction to Katowice

81



Wodzisław Śląski

Żory



Mining areas of coal mines operated by Jastrzębska Coal Company

Direction to Gorzyczki



Direction to Wiśla

81



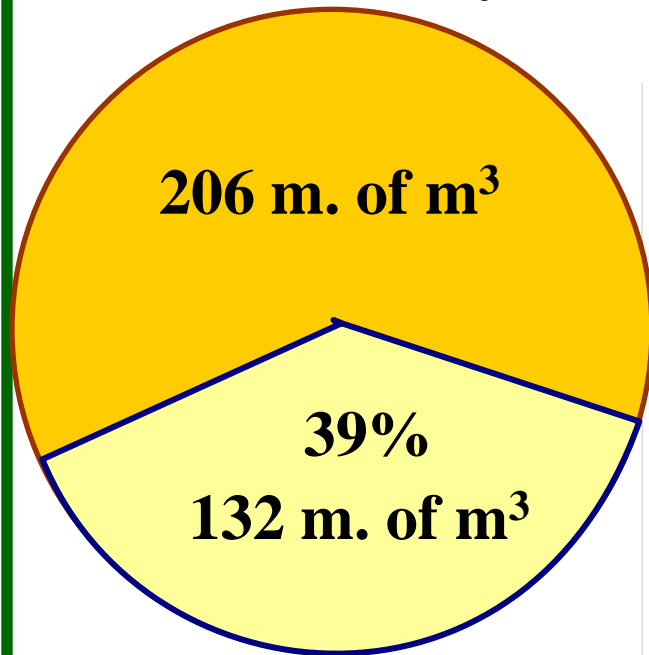
Current mining areas of coal mines operated by JSW

A1

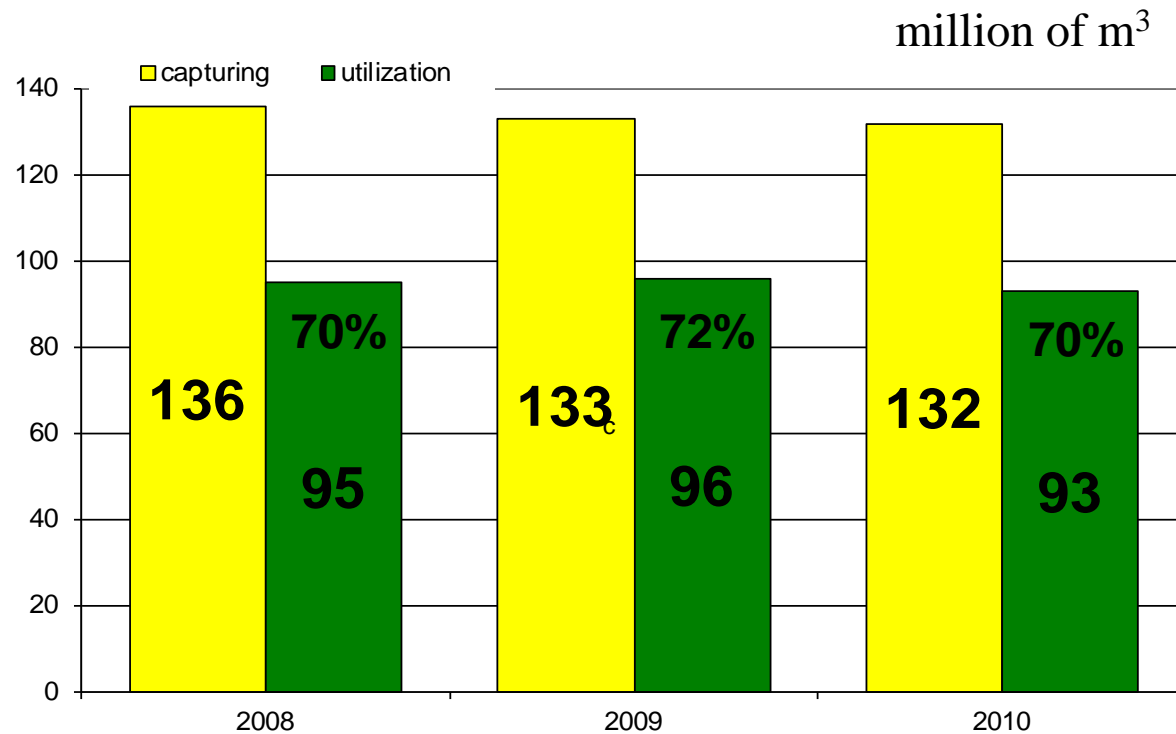
Capturing and utilization of methane at coal mines of JSW

2010

Methane drained via the ventilation system



Methane drained via the drainage system



In 2010 the total amount of methane released in connection with mining operation amounted to 338 m. of m³

Form of methane occurrence in coal deposits

1. Sorbet methane physically or chemically bounded with coal .
2. Free methane present in pores and cracks of virgin rock and coal seams.

Basic methods of combating methane hazard

1. The proper ventilation system (adequate amount and velocity of airflow, proper distribution of airflow, elimination of air leakage from the ventilation system).
2. The effective system to monitor the ventilation parameters, in particular methane concentration.
3. The efficient methane drainage of rock mass.

Central control room of the methane system



Upgraded methane drainage station at the 'Pniówek' coal mine

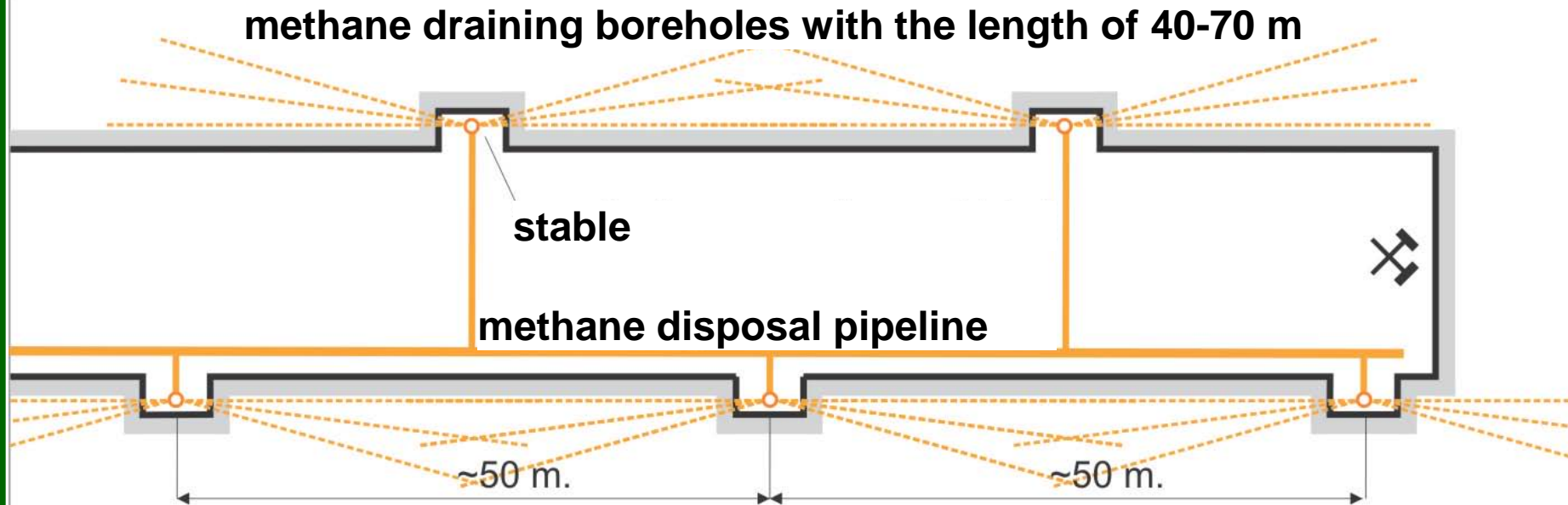


The methods for methane drainage from rock mass

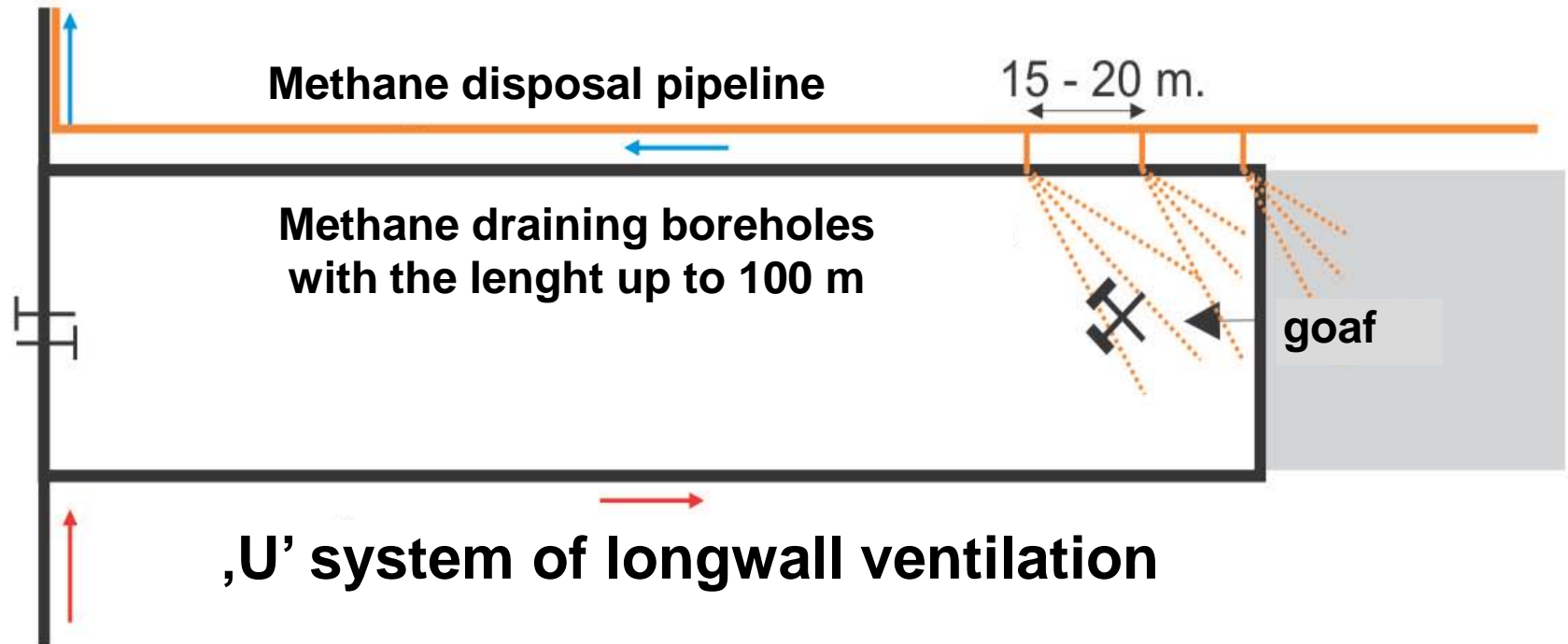
- methane drainage of development workings,
- advancing drainage, conducted before mining in unstressed rock mass,
- methane drainage during mining, conducted at the same time as coal seams are mined, where an original state of stresses was disturbed by mining,
- methane drainage from sealed goaf areas.

Methane drainage methods being applied at coal mines of JSW

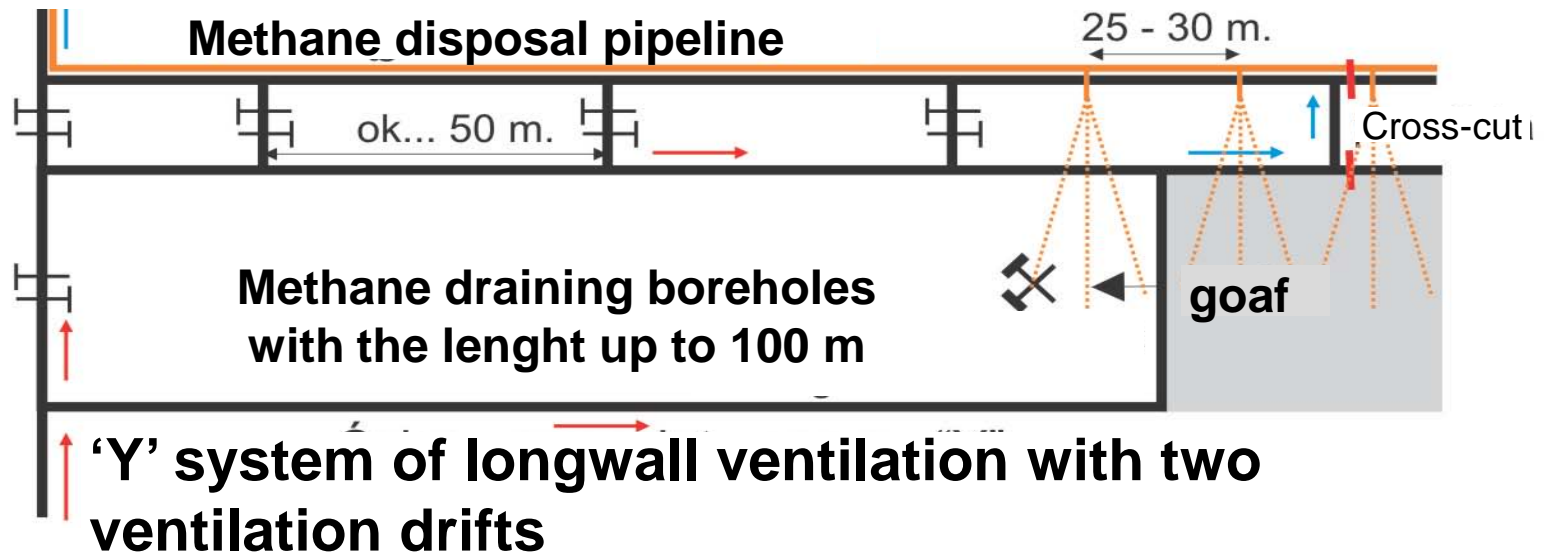
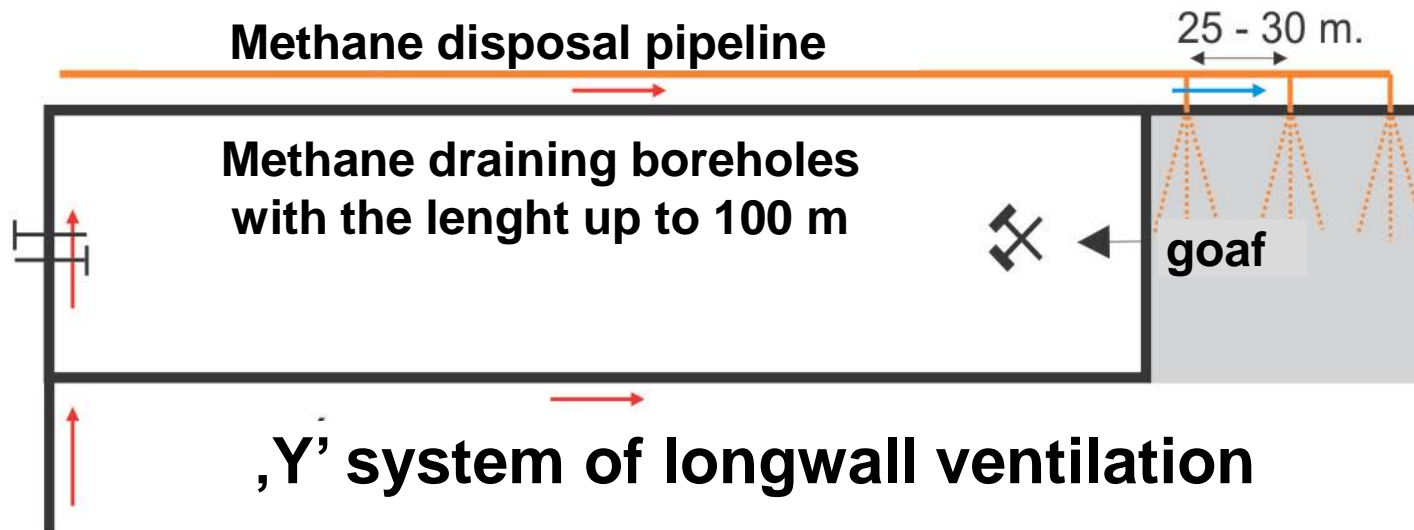
Methane drainage of development workings



Methane drainage from longwalls



Efficiency of methane drainage – 20% ÷ 40%



Efficiency of methane drainage – 50% ÷ 70%

Structure of methane capturing in 2010

● longwalls	60.8 m. m ³
● goaf areas	66.8 m. m ³
● development workings	4.4 m. m ³

TOTAL **132.0 m. m³**



***Efficiency of methane drainage at coal mines of JSW
amounted to 39%.***

The methane hazard is closely associated with hazard of methane and rock outbursts that also exists at the „Pniówek” and „Borynia-Zofiówka” coal mines.

Besides the previously discussed methods, other preventive measures are also applied:

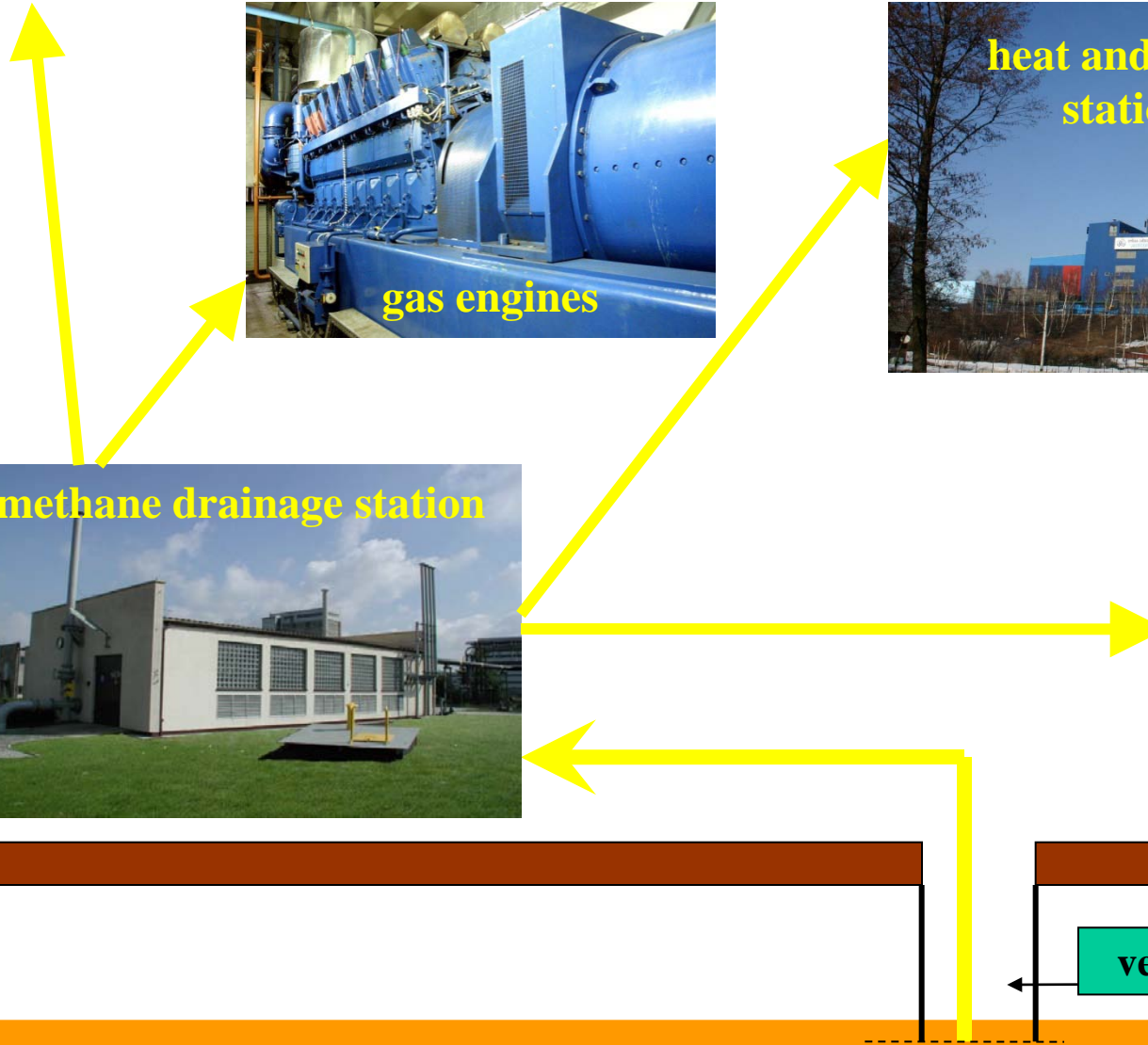
- recognition of rock mass by means of advancing drilling,
- elimination of the mining personnel from the hazardous areas.

Methane utilization

Drying plant of flotation concentrate at the 'Krupiński' coal mine



ventilation shaft

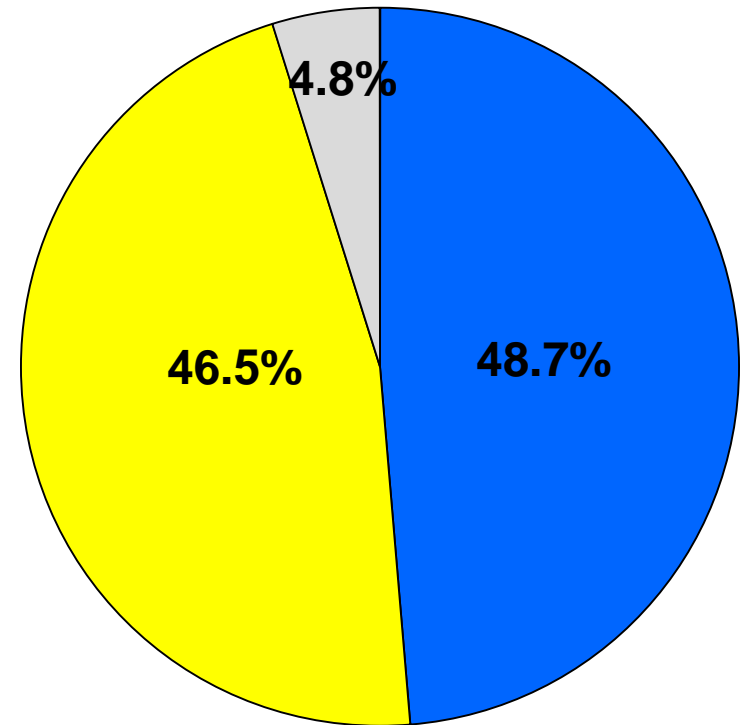


Utilization structure of captured methane

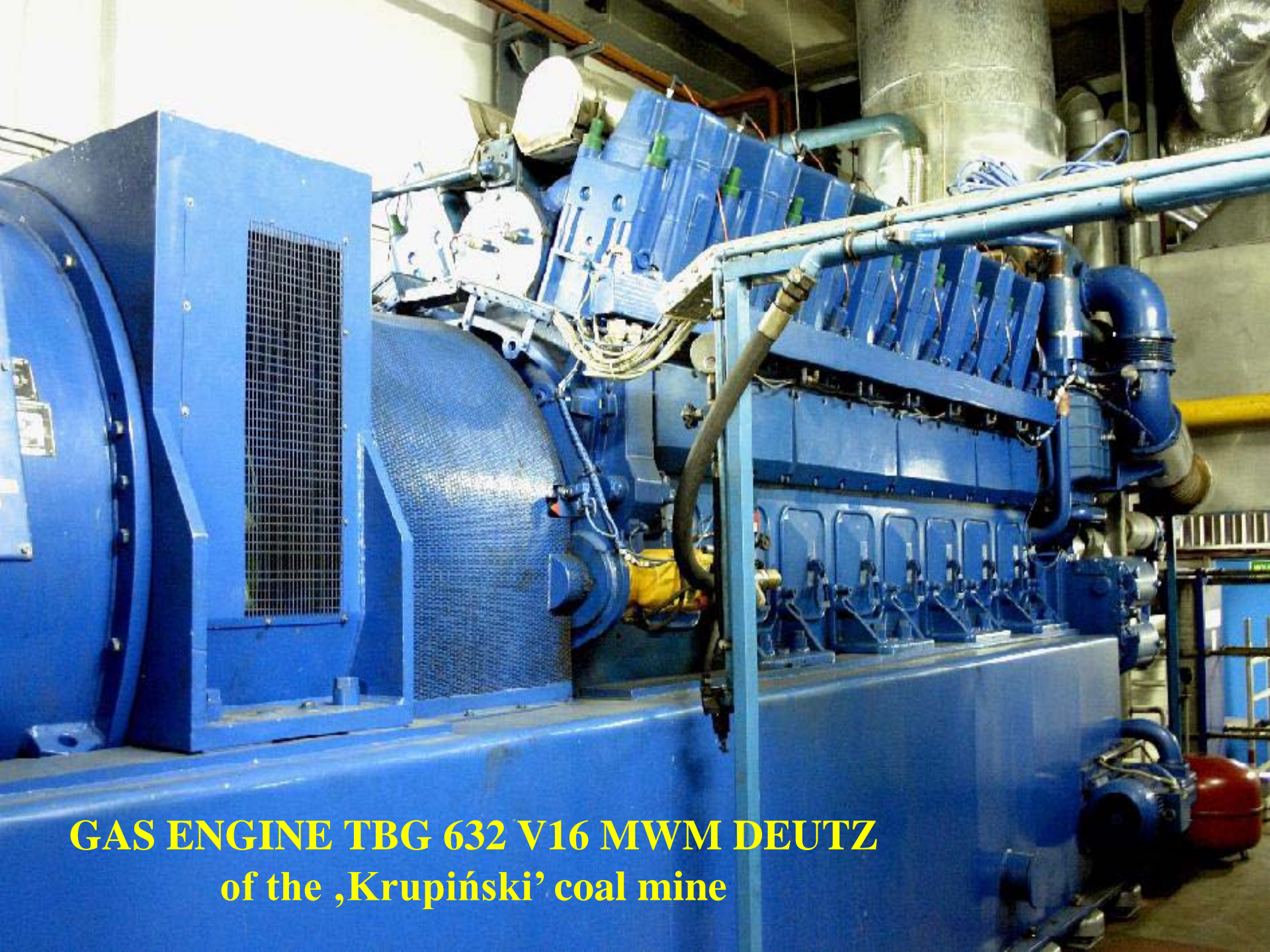
Year 2010

m. m³

Gas engines	45.2
Heat and power stations	43.2
Drying plant of flotation concentrate	4.5
<hr/>	
TOTAL	92.9



■ gas engines ■ heat and power stations □ drying plant of flotation concentrate



**GAS ENGINE TBG 632 V16 MWM DEUTZ
of the ,Krupiński' coal mine**



**reception of heat from
gas engines at the
'Pniówek' coal mine**

Plans and projects of the Jastrzębska Coal Company for incoming years with respect to methane drainage and methane utilization

- ❖ **efficiency enhancement of methane drainage,**
- ❖ **implementation of advancing drainage under favorable geological conditions,**
- ❖ **Construction of 4 new cogeneration systems based on gas engines,**
- ❖ **Use of methane surplus from coal mines for the CNG (gas compression) and LNG (gas liquefaction),**

Plans and projects of the Jastrzębska Coal Company for incoming years with respect to methane drainage and methane utilization

- ❖ **Commissioning of a semi-industrial system for methane utilization from exhausted ventilation air, the project shall be launched in collaboration with a consortium of universities.**

Jastrzębska Coal Company anticipates that from 2014 nearly all (95%) the captured methane shall be entirely utilized.

Recapitulation & Conclusions

1. All mines of Jastrzębska Coal Company suffer from very high methane hazard, which at the same time is the most crucial natural hazard in this area. The most gassy coal mine is „Pniówek”.
2. The existing methane hazard at mines of JSW forces the need to have methane drained. Consequently, parameters of the ventilation air can be kept below the permissible thresholds and methane and air mixture with gas concentration of 50% ÷ 70% is drained.

Recapitulation & Conclusions

3. Jastrzębska Coal Company uses the following methods to utilize methane captured by means of the drainage system:
 - supplying gas engines of cogeneration power plants,
 - combustion in gas boilers and in boilers of power generating plants,
 - utilizing in drying systems for floatation concentrate installed at coal preparation plants.

Recapitulation & Conclusions

4. Owing to utilization of methane, JSW is able to cover 22% of the own demand for electric power, 79% of the demand for heat and 100% of the demand for cooling energy at 'Pniówek' coal mine.
5. JSW is going to enhance efficiency of methane drainage and implement advancing drainage under favorable geological conditions.
6. From 2014, JSW anticipates to utilize nearly all (95 %) the drained gas owing to construction of 4 new cogeneration plants and forwarding methane surplus from coal mines to CNG and LNG technologies.



Thank you for your attention