



G Ł Ó W N Y
I N S T Y T U T
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**DIRECTIONS OF IMPROVEMENT IN DEGASIFICATION EFFECTIVENESS
IN THE MINES OF JASTRZĘBSKA SPÓŁKA WĘGLOWA S.A.**

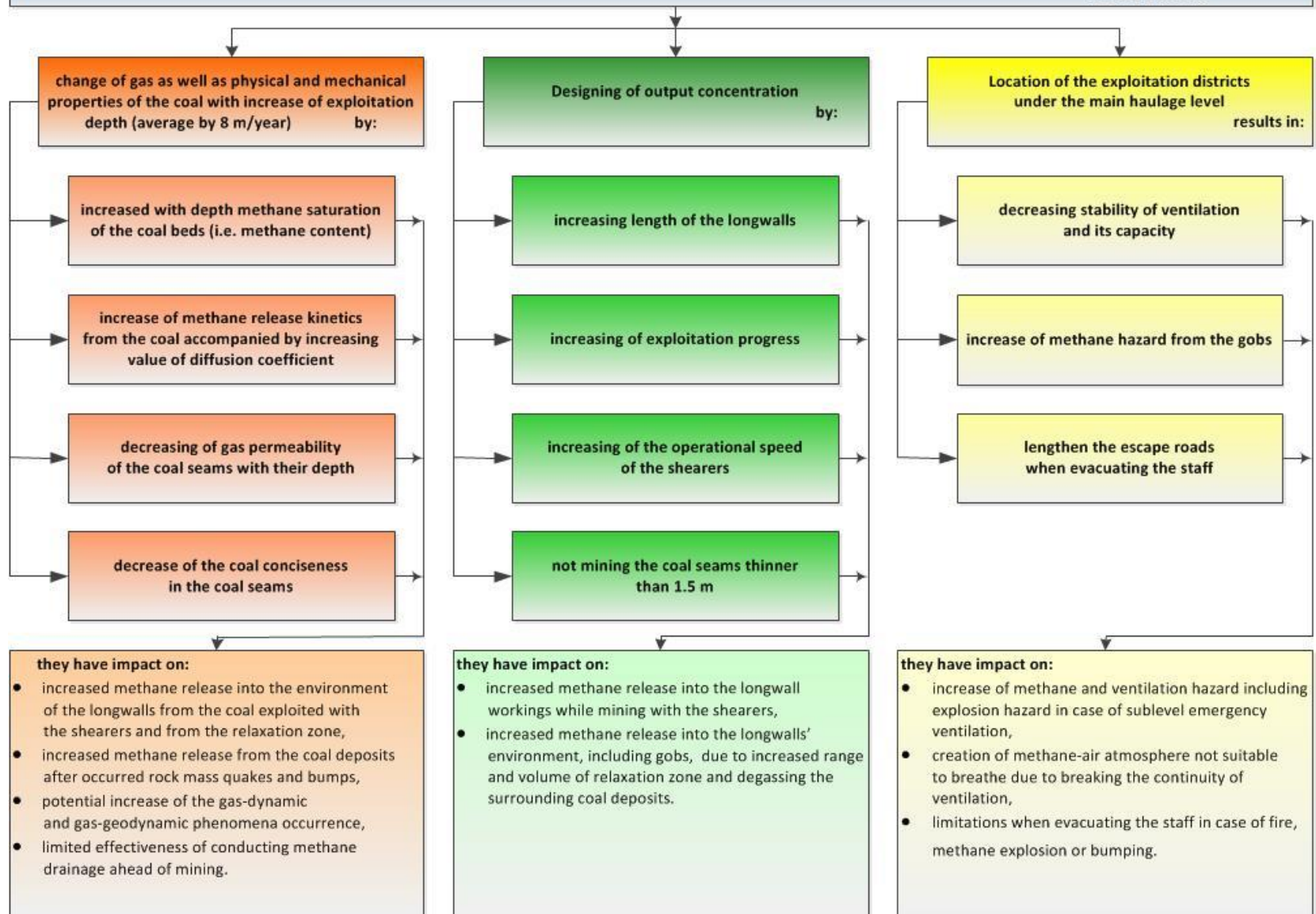
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Kraków, 28.09.2021 r.

Factors having impact on the increase of methane hazard in the exploitation areas

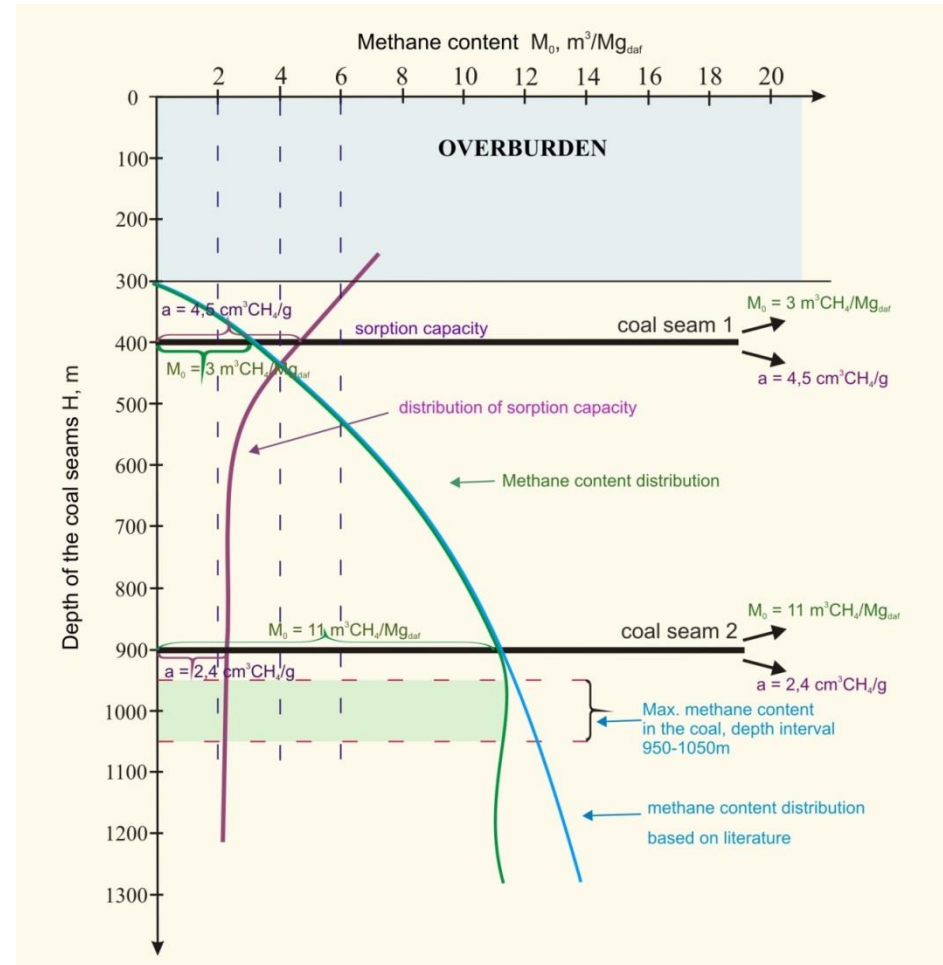
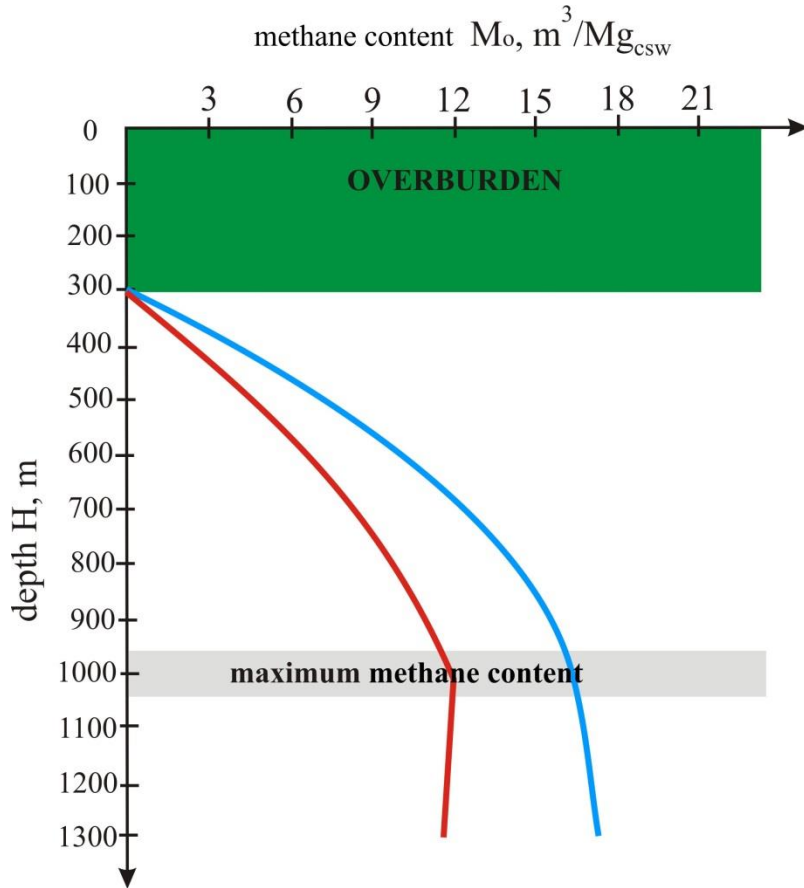
result from:



Factors influencing increase of methane hazard in the coal mines during the last 30 years

With increasing depth of deposits the following could be observed:

- increase of methane content in coal deposits,
- change of gas properties,
- change of physico-chemical properties.



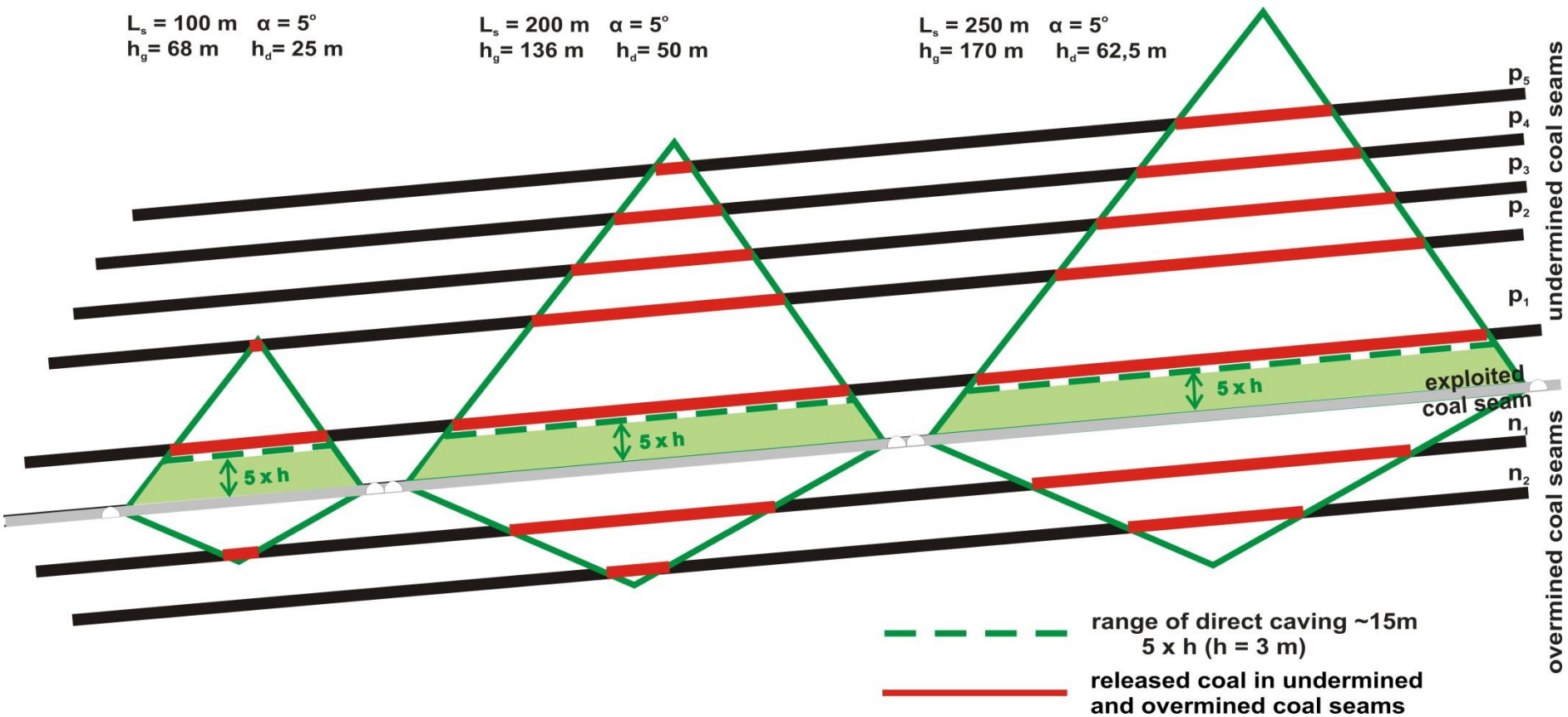
The increase in the concentration of coal exploitation took place through:

- designing and selecting longwalls of greater length,
- selecting coal seams of greater thickness (selective choice),
- increasing the intensity of exploitation (medium)

$L_s = 100 \text{ m}$ $\alpha = 5^\circ$
 $h_g = 68 \text{ m}$ $h_d = 25 \text{ m}$

$L_s = 200 \text{ m}$ $\alpha = 5^\circ$
 $h_g = 136 \text{ m}$ $h_d = 50 \text{ m}$

$L_s = 250 \text{ m}$ $\alpha = 5^\circ$
 $h_g = 170 \text{ m}$ $h_d = 62,5 \text{ m}$



--- range of direct caving ~15m
 $5 \times h$ ($h = 3 \text{ m}$)

— released coal in undermined
 and overmined coal seams

Consequences of conducting the exploitation deeper underground with simultaneous increase in concentration of the extraction are as follows:

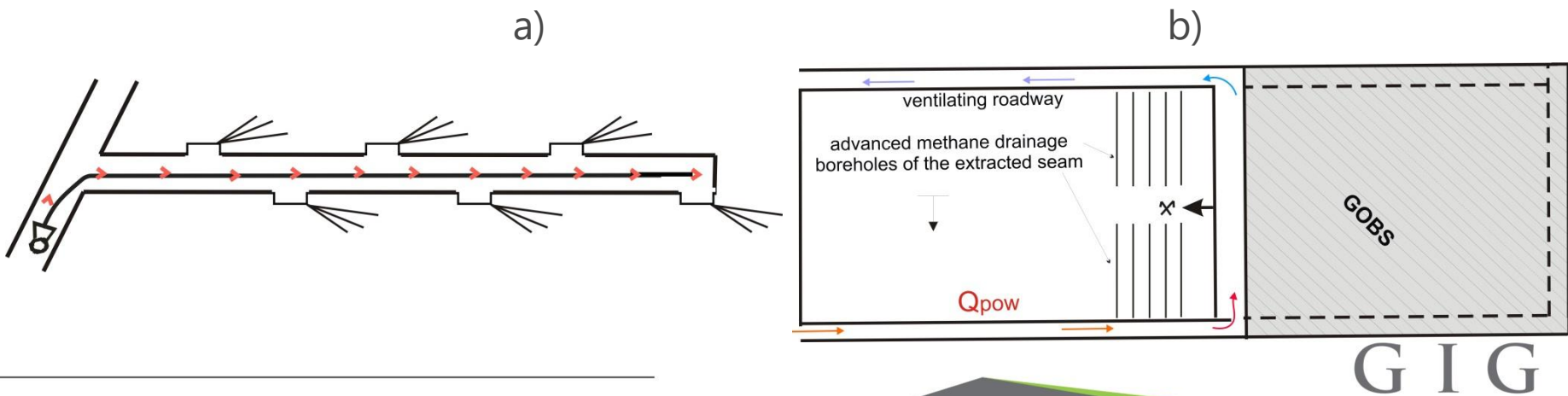
- growth in absolute methane-bearing capacity of the coal pannels by increasing the stream of methane released from the currently exploited coal seam between 20-40% of the total methane content,
- significant increase of absolute methane-bearing capacity of the coal pannel by methane release as a consequence of degassification of the currently undermined strata and overmined strata between 60-80% of absolute methane bearing capacity,

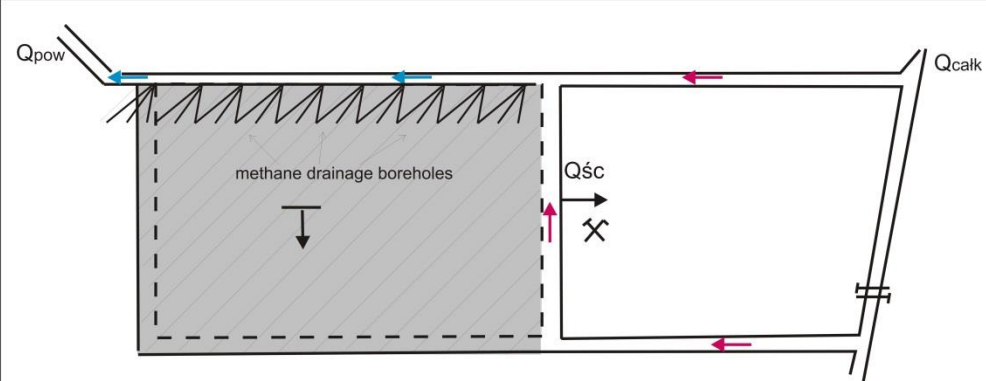
The main source of methane release in the exploited longwalls are released undermined and overmined seams located in the exploitation strata release zone.

Decrease in the methane inflow by degasification influences safety conditions in the workings near the coal panel.

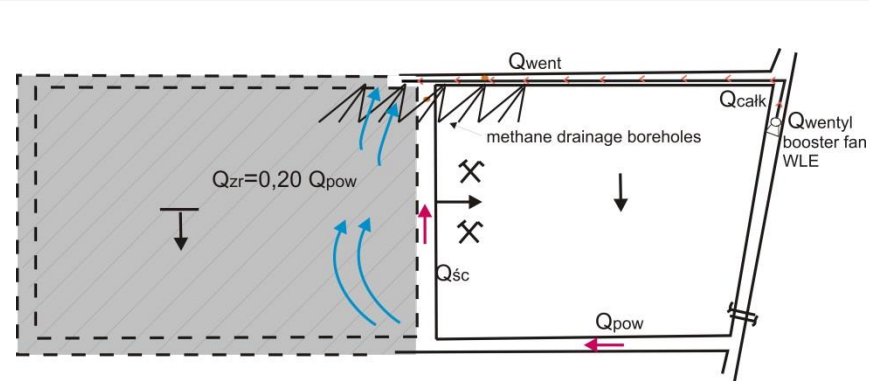
Degassing of the coal beds in Polish hard coals mines of JSW S.A.

- advanced methane drainage from the drilled galleries, mainly in the seams with rock outburst and gas hazards,
- advanced methane drainage of the coal panels led from the underground workings,
- exploitation degasification with classical methods,
- exploitation degasification based on overlaying drainage by the ventilation roadway,
- degasification by directional drilling.

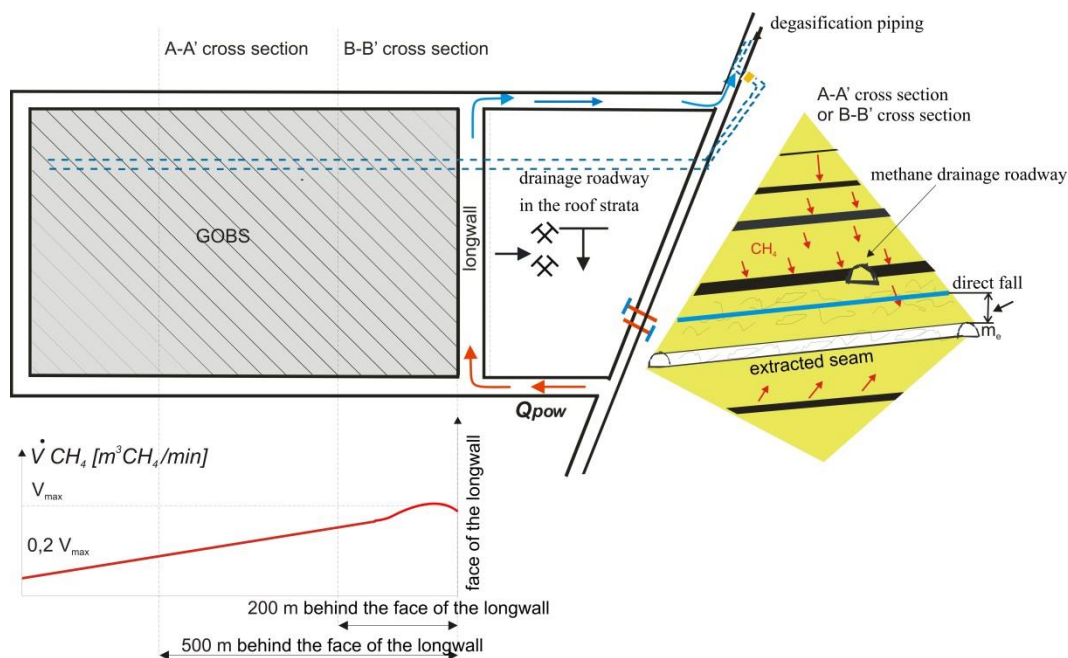




Y-type longwall ventilation system
Degasification effectiveness 50%



U- type longwall ventilation system
Degasification effectiveness 40%



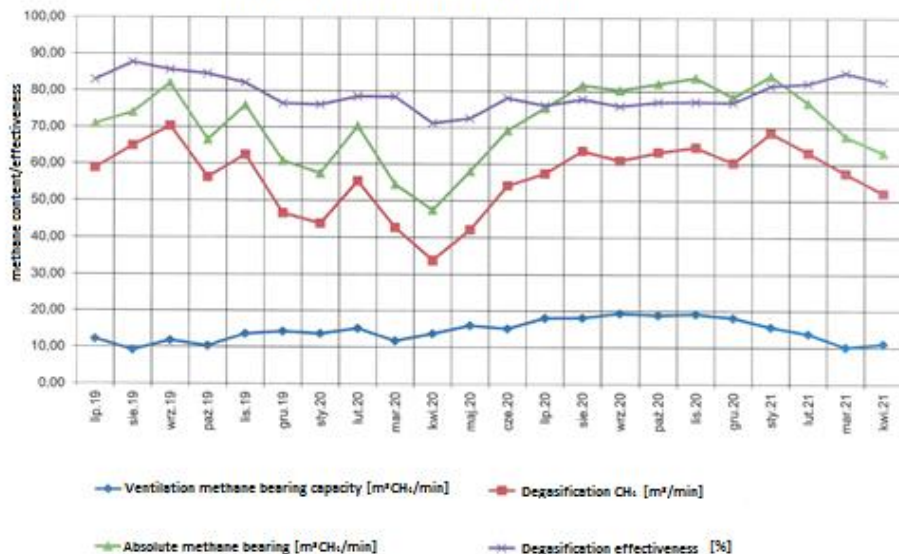
Exploitation degasification based on the overlying drainage
Degasification effectiveness 80%

Are there any conditions to safely operate on the longwall ventilated by the U-type along coal face system using classical exploitation degasification with absolute methane-bearing capacity between 40-100 m³CH₄/min.

Absolute methane-bearing capacity	Effectiveness of classical degasification	Ventilation methane bearing capacity	Effectiveness of methane degasification based on drainage	Ventilation methane bearing capacity
m ³ CH ₄ /min	%	m ³ CH ₄ /min	%	m ³ CH ₄ /min
40	40	24	70	12
60		36		18
80		48		24
100		60		30
- Does not follow the regulations- ventilation methane bearing capacity of 20 m ³ CH ₄ /min				

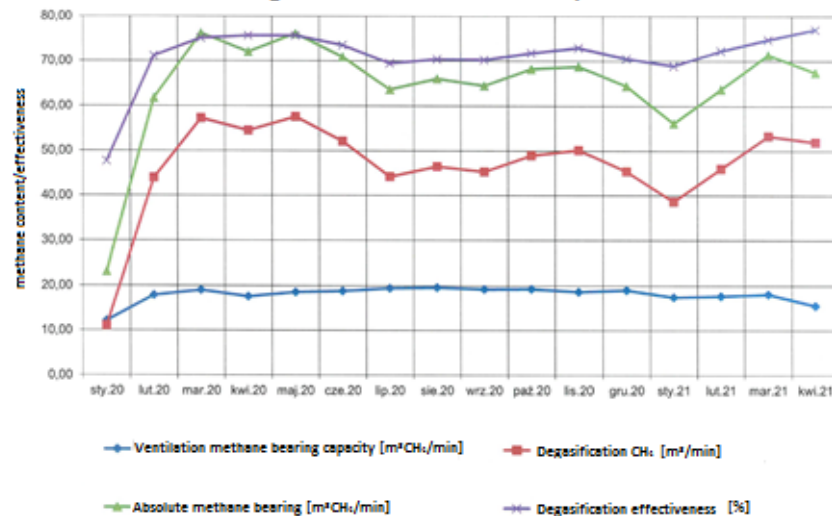
Conducted degasification based on overlaying strata drainage in the seams 405/1 and 407/3 at JSW S.A. KWK „Knurów-Szczygłowice”

Longwall No XVI in the seam 405/1



Absolute methane bearing capacity and effectiveness of degasification based on the overlaying drainage (ventilation roadway) in the coal panel no. XVI in the seam 405/1 from 07.2019 to 04.2021

Longwall No XVI in the seam 407/3



Absolute methane bearing capacity and effectiveness of methane drainage in the coal panel no. XVI in the seam 407/3 from 01.2020 to 04.2021

CONCLUSIONS

1. The possibility of **advanced methane drainage of the exploited seam's parcel by the longwalls should be subject of careful methane hazard management in the Polish coal mines.**
2. In conditions of forecasted absolute methane bearing capacity of the coal panels over $40 \text{ m}^3\text{CH}_4/\text{min}$ and U-type ventilation system it should be considered to design a methane drainage roadway (ventilation roadway) or a proper choice of daily longwall run not to exceed the ventilation methane capacity for the longwall of $20 \text{ m}^3\text{CH}_4/\text{min}$.
3. To limit the ventilation absolute methane bearing capacity in the JSW S.A. coal mines it is necessary to:
 - successively introduce degasification technologies that provide with greater effectiveness based on overlying drainage,
 - develop individual assumptions for the JSW S.A. mines as for the new methane retention and capture strategies from the isolated post-exploitation gobs and dividing them into gobs dependent and independent of the longwall area.
 - development of the algorithms to control the capture of methane retained in the independent gobs.

Thank you for your attention

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