Central Mining Institute,
Experimental Mine „Barbara"

GŁÓWNY INSTYTUT GÓRNICTWA

Overview of Ventilation Characteristics, Practices, and Regulations in Poland

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Location of major Polish coal basins

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Absolute methane bearing capacity, methane drainage, amount of economically utilized methane and coal production output in Polish hard coal mines in the years 2007-2017

Specification	Year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Absolute methane bearing capacity (mln m^3/year)	**878.9**	**880.9**	**855.7**	**834.9**	**828.8**	**828.2**	**847.8**	**891.2**	**933.0**	**933.8**	**948.5**
Methane drainage (mln m^3/year)	**268.8**	**274.2**	**259.8**	**255.9**	**250.2**	**266.7**	**276.6**	**321.1**	**339**	**342.1**	**337**
Amount of economically utilized methane (mln m^3/year)	**165.7**	**156.5**	**159.5**	**161.1**	**166.3**	**178.6**	**187.7**	**211.4**	**197.1**	**195**	**212**
Number of the hard coal mines	**31**	**31**	**31**	**32**	**31**	**31**	**30**	**30**	**31**	**23**	**23**
Hard coal output (mln tones)	**87.4**	**83.6**	**77.3**	**76.1**	**75.5**	**79.2**	**76.5**	**72.5**	**72.2**	**70.4**	**65.5**

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THE POLISH MINING LAW

ACT of 9 June 2011, Geological and Mining Law

and two main executive acts of this act related to ventilation:

- Regulation of the Minister of the Environment of 29 January 2013 on natural hazards in mining plants
- Regulation of the Minister of Energy of 23 November 2016 on detailed requirements for the operation of underground mining plants

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CATEGORIES OF METHANE HAZARD IN POLAND

- Ist methane hazard category - *0.1 to 2.5 m^3/Mg (daf)*
- IInd methane hazard category - *2.5 to 4.5 m^3/Mg (daf)*
- IIIrd methane hazard category - *4.5 to 8.0 m^3/Mg (daf)*
- IVth methane hazard category - *>8.0 m^3/Mg (daf) or if there was sudden outflow of methane or outburst of methane and rocks*

WORKINGS IN METHANE FIELDS IN UNDERGROUND COAL MINES CAN BE CLASSIFIED:

- to the endangered with methane explosion (degree "a"), if the concentration of methane in the ventilation air above 0.5% are excluded,
- to „b”degree of methane explosion hazard if in normal ventilation conditions the concentration of methane in air higher than 1% is excluded,
- to „c” degree of methane explosion hazard, if in normal ventilation conditions the concentration of methane in air can be higher than 1%.

PRINCIPLES OF CLASSIFYING WORKINGS IN METHANE FIELDS IN UNDERGROUND COAL-MINING TO THE DEGREES OF METHANE EXPLOSION HAZARD

Instruction No. 18 issued by the Central Mining Institute

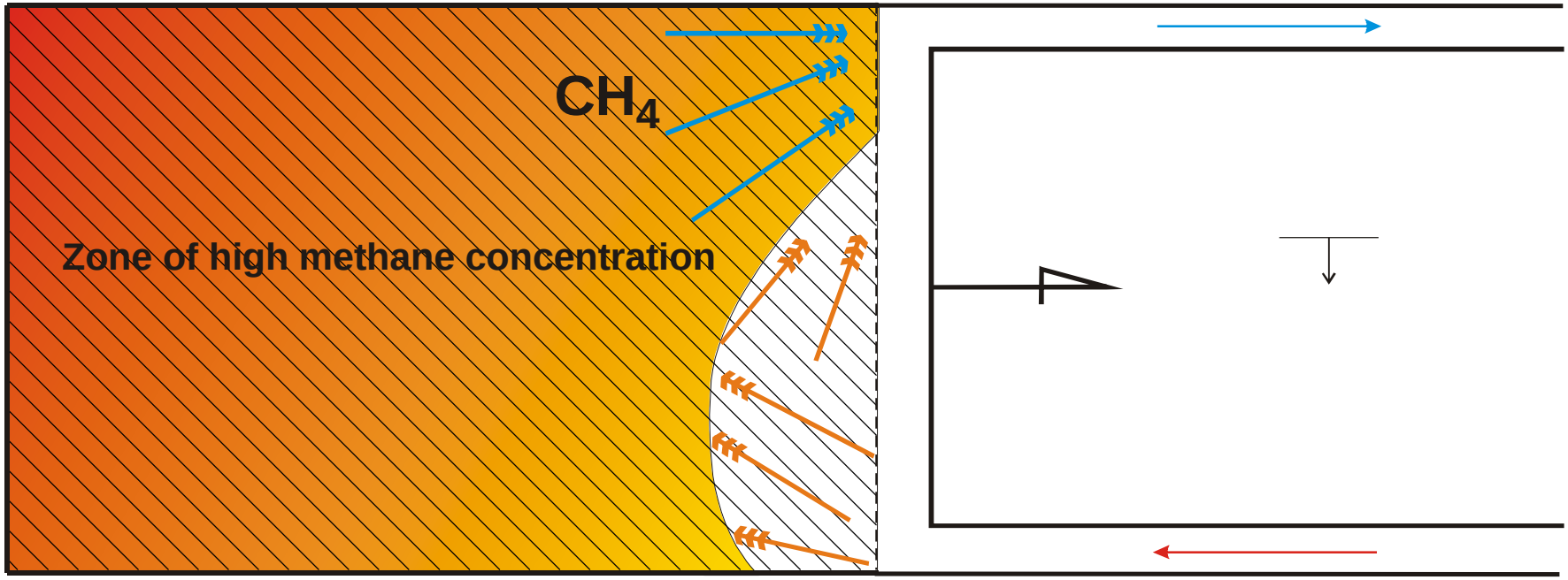
Methane prevention for the longwalls:

- Selection of the proper ventilation system for the longwall
- Ensuring the required air volumes in the area of the longwall
- Methane hazard monitoring system
- Effective actions to combat the methane accumulations in the places of possible initiation of ignition or explosion
- Technology of methane drainage of the longwall environment

Methane hazard monitoring

- Measurements of methane concentration (automatic and individual)
- Measurement of methane concentration in the methane drainage pipelines
- Measurement of air flow speed in the workings
- State of closure of ventilation dams, that affects the ventilation conditions, as well as changes in the distribution of aerodynamic potentials in the environment of longwalls

Ventilation of the longwall in "U" type system with an indication of the migration directions of air and methane in the gobs

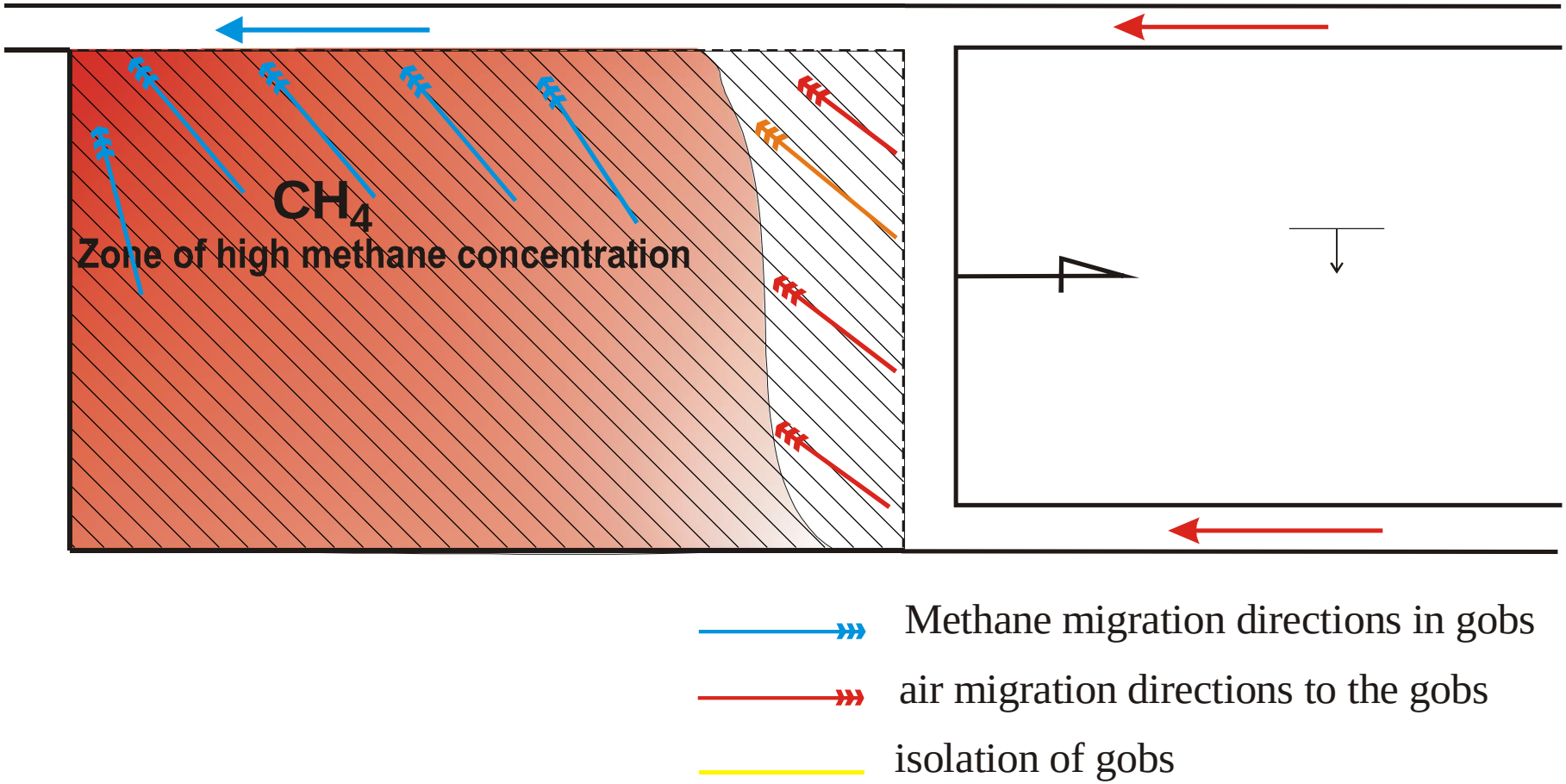


Methane migration directions in gobs

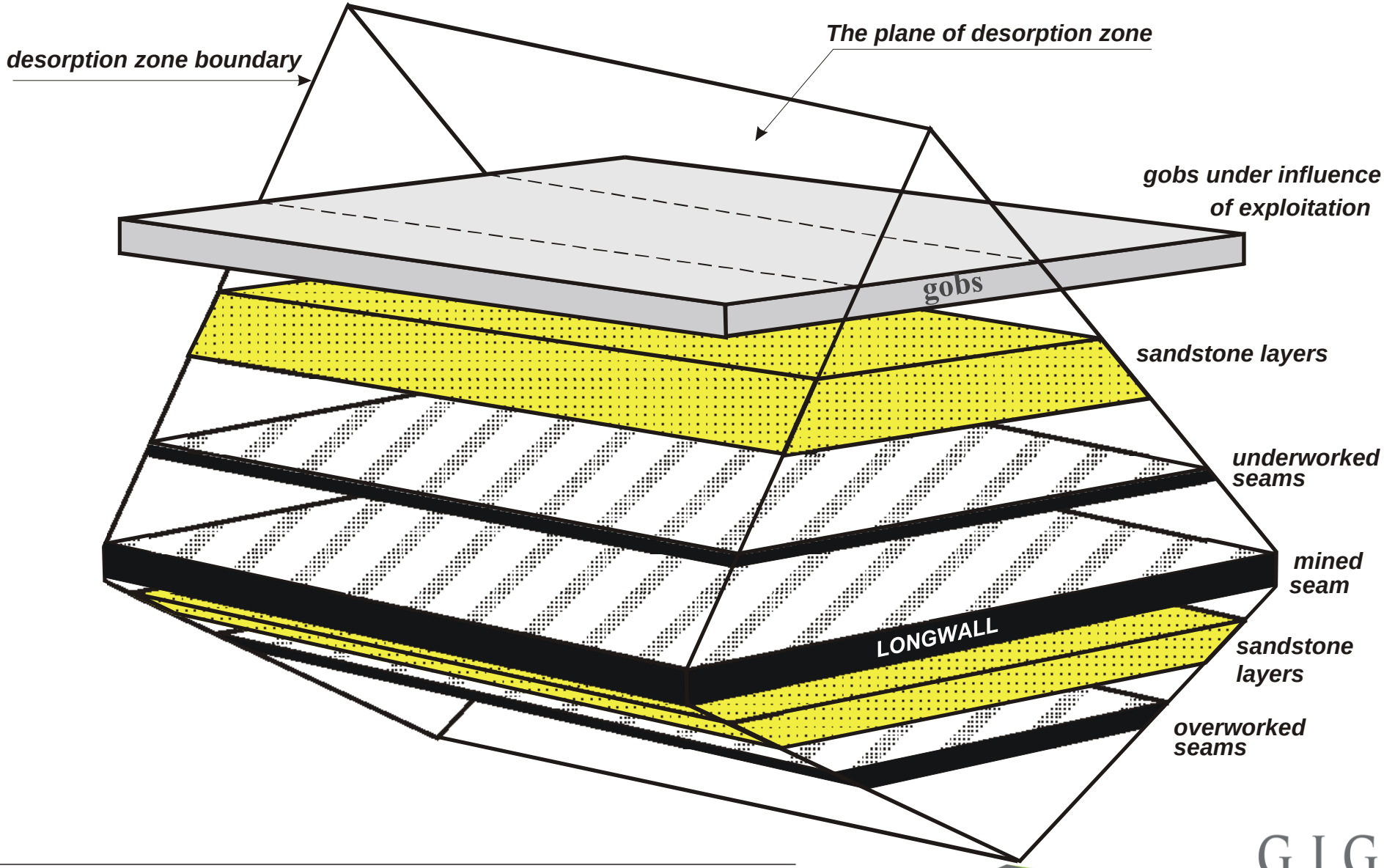
air migration directions to the gobs

isolation of gobs

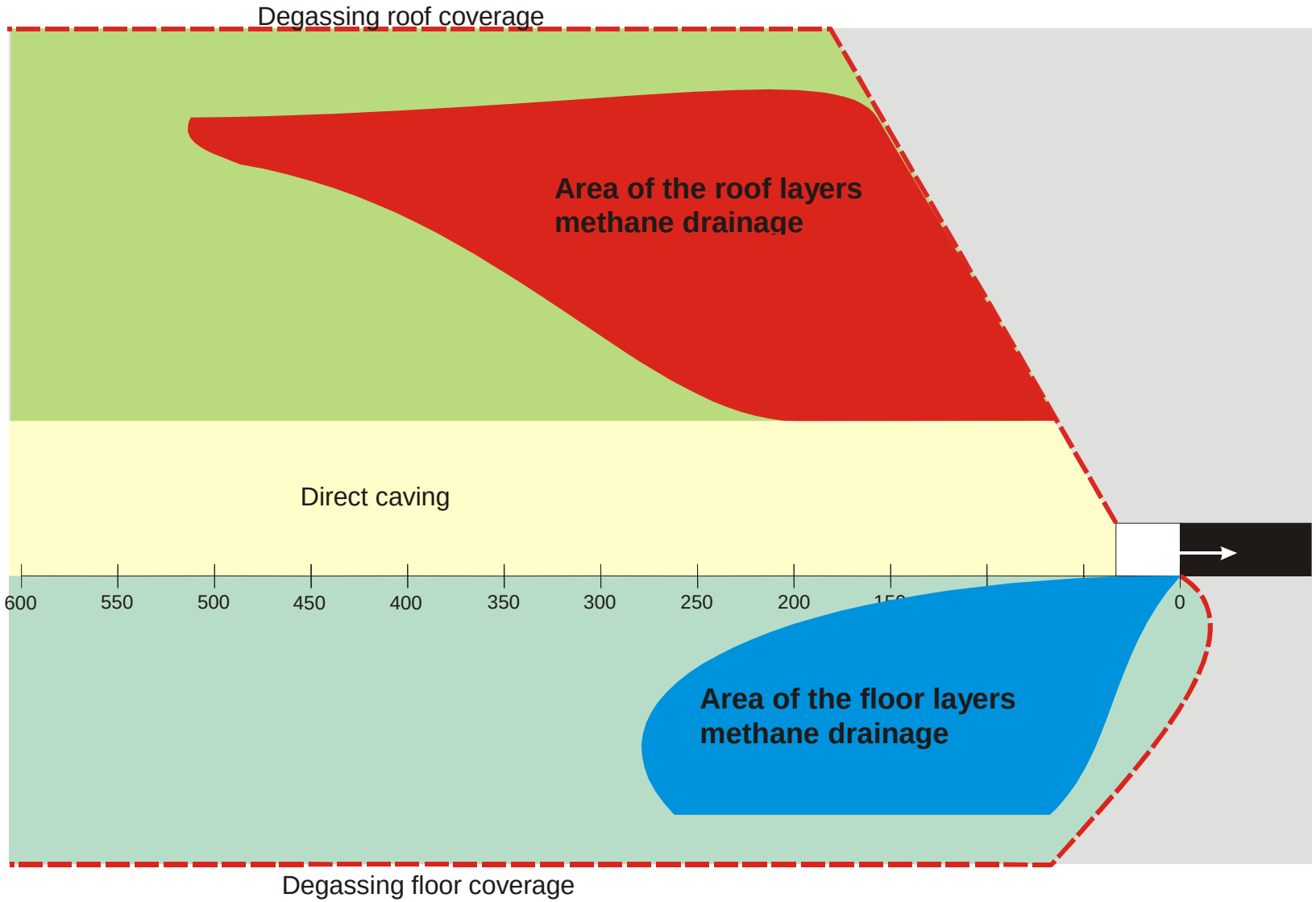
Ventilation of the longwall in „Y" type system with an indication of the migration directions of air and methane in the gobs



Scheme of the longwall environment

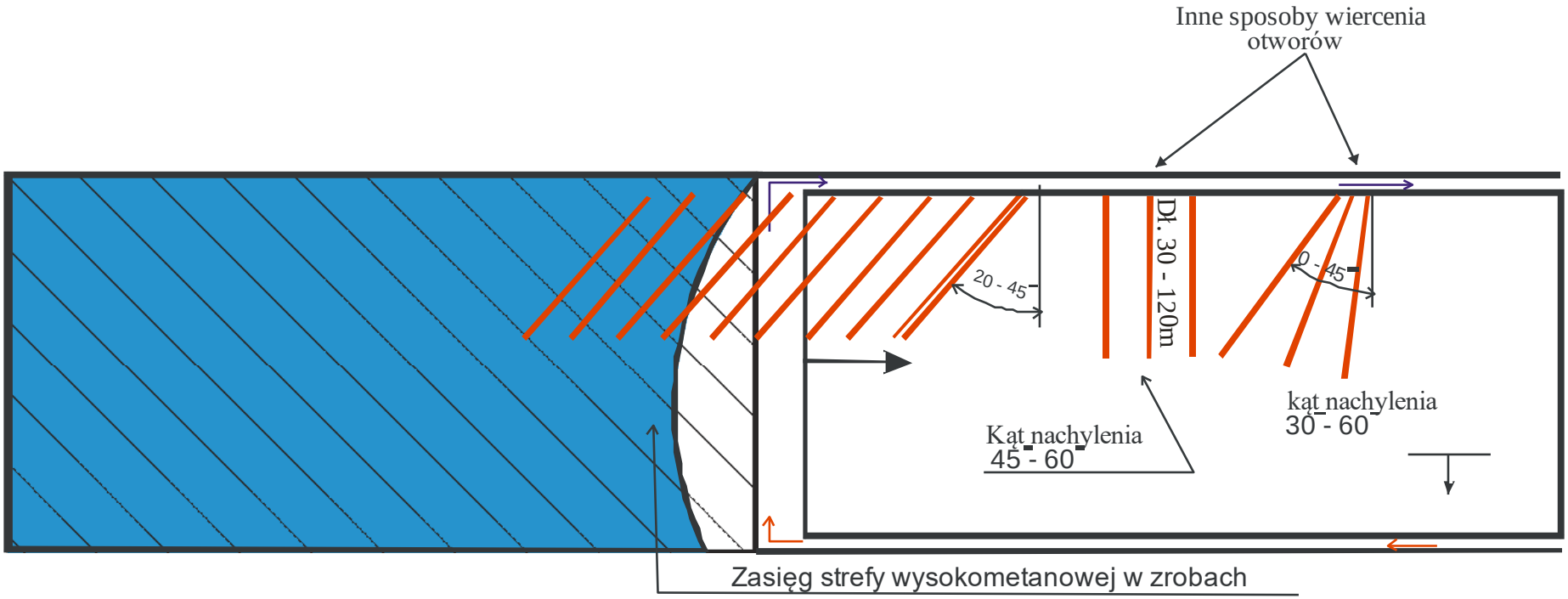


Methane drainage areas in the longwall panel

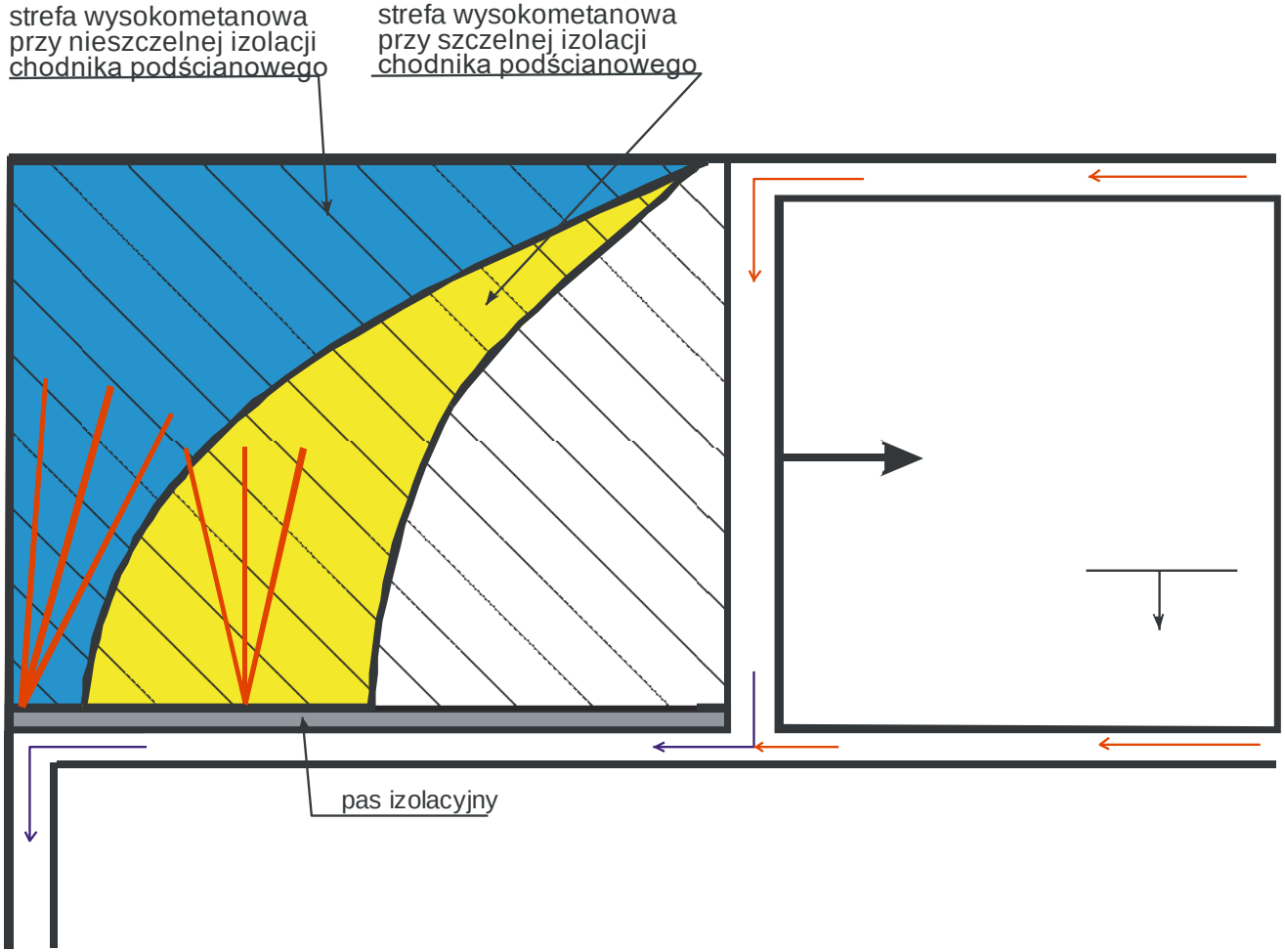


Methods of methane drainage in Poland

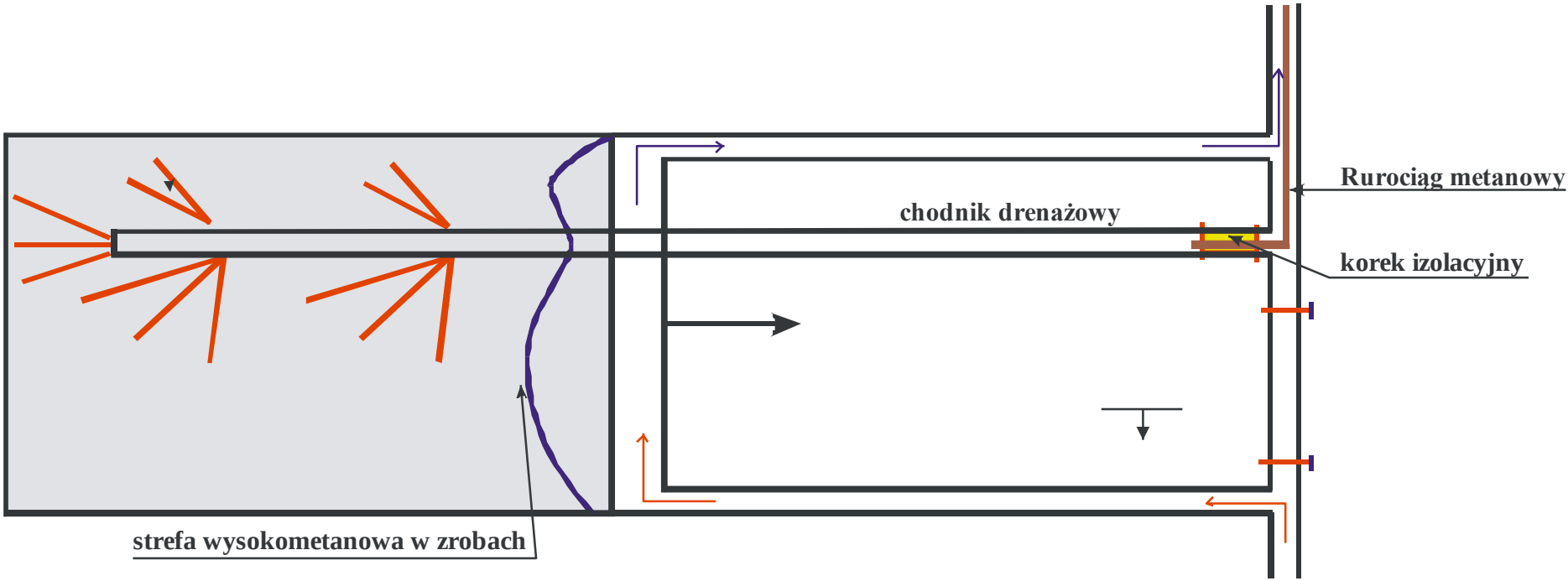
- **Drainage of the coal seams ahead of mining (before exploitation)**
- **Drainage during coal exploitation**
- **Drainage of goaves**



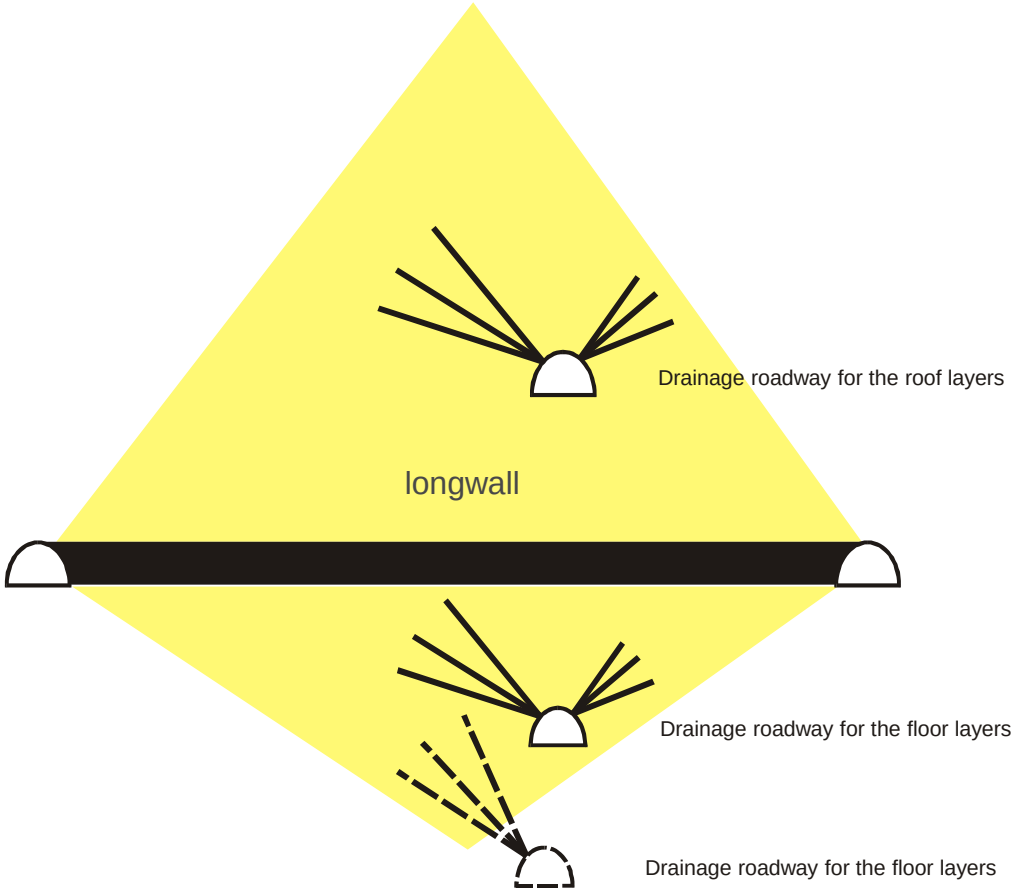
A longitudinal longwall carried from the field with liquidation of the workings ("U" type system) - methane drainage efficiency 20 ÷ 30%, occasionally up to 40%



A longitudinal longwall carried from the field ventilated in "Y" type system - methane drainage efficiency is about 40%



A longitudinal longwall exploited with methane drainage roadway working - Methane drainage efficiency up to 80%



Location of drainage galleries against the longwall

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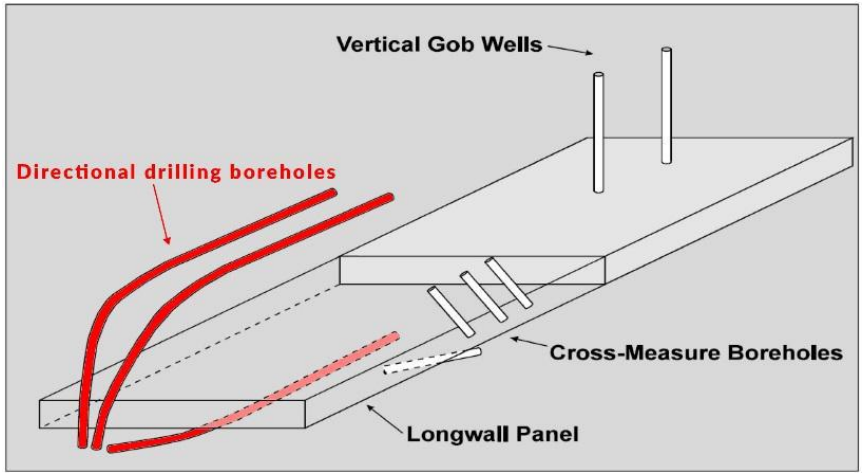
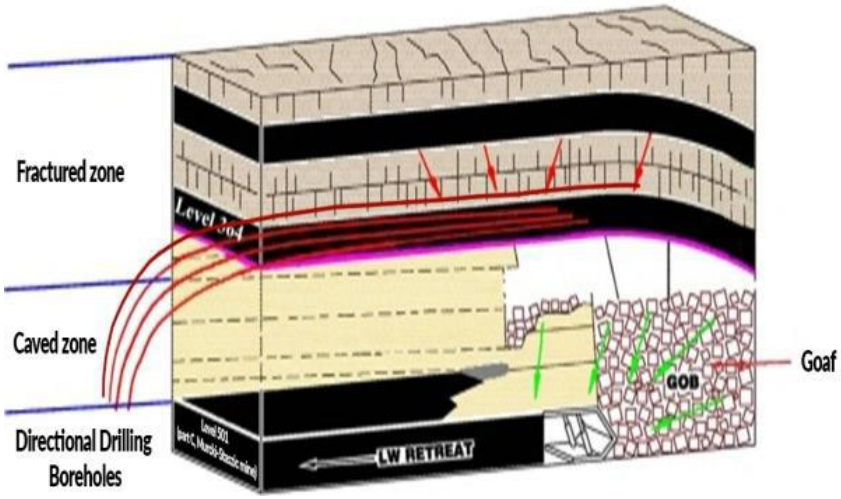
General scheme of the drainage boreholes location





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DD-MET .

Advanced methane drainage strategy employing underground directional drilling technology for major risk prevention and greenhouse gases emission mitigation.

DD-MET

The primary objective of the proposed project is to demonstrate application of long reach underground directional boreholes drilled above mined coal seams as a novel methane drainage technology in longwall mining of coal.

The project aims at demonstration of alternative methane drainage technology (not used in Europe) which will contribute to increased mine safety and productivity, reduction of methane emissions and hazards mitigation costs. **The project will be conducted in Poland and in Russia.**

The implementation of proposed technology will be supported by research (laboratory experiments, numerical modelling and extensive field testing) to assure adjustment to field conditions and technology optimisation.

DD-MET – Work Packages:

WP1. Coordination

WP2. Characterisation of coal seams and rocks – laboratory and field experiments

WP3. Numerical modelling and simulation of methane drainage process

WP4. Field scale demonstration and implementation

WP5. Risk assessment

WP6. Pre-feasibility study, LCA analysis and eco-efficiency

WP7. Conclusion, recommendations and dissemination

DD-MET

Consortium – participants:

- Instytut Nafty i Gazu INiG – **Poland**
- Central Mining Institute GIG – **Poland**
- Universidad de Oviedo – **Spain**
- Polska Grupa Górnicza – **Poland**
- Imperial College of Science Technology and Medicine – **UK**
- Federal state budgetary institution of science **Institute of Comprevensive Exploitation of Mineral Resources Russian Academy of Sciences – Russia**

SUMMARY

1. Due to often occurence of endogenic fires' hazard , about 80% of all exploited hard coal panels in Polish coal mines is ventilated using „U" type systems along coal face

2. Ventilation of coal panels in „U" type system along coal face is recognized as optimal when fighting coal fires hazard because when liquidating longwall workings one can significantly reduce migration of air through the gobs, however when fighting methane hazard (while high methane release/emission) it requires application of additional very strict prevention means and it is not beneficial .

3. According to the binding regulations the „U" type ventilation system can be applied if total volume of released methane coming out of the longwall working and its gob into the ventilation roadway is not higher than 20 m3/min.

THANK YOU FOR YOUR ATTENTION

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