

METHANE REDUCTION EMISSIONS AS A JSW CAPITAL GROUP'S ENVIRONMENTAL STRATEGY MAIN GOAL

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The JSW Group is the largest producer of high quality hard coking coal in the European Union and one of the leading producers of coke used for smelting steel. Production and sale of coking coal and production and sale of coke and hydrocarbons constitute JSW Group's core business.



In 2022 the JSW Group's mines produced:

- 14.1 mt of coal,
- 3.2 mt of coke.



The European Commission listed coking coal on the list of Critical Raw Materials for the EU.

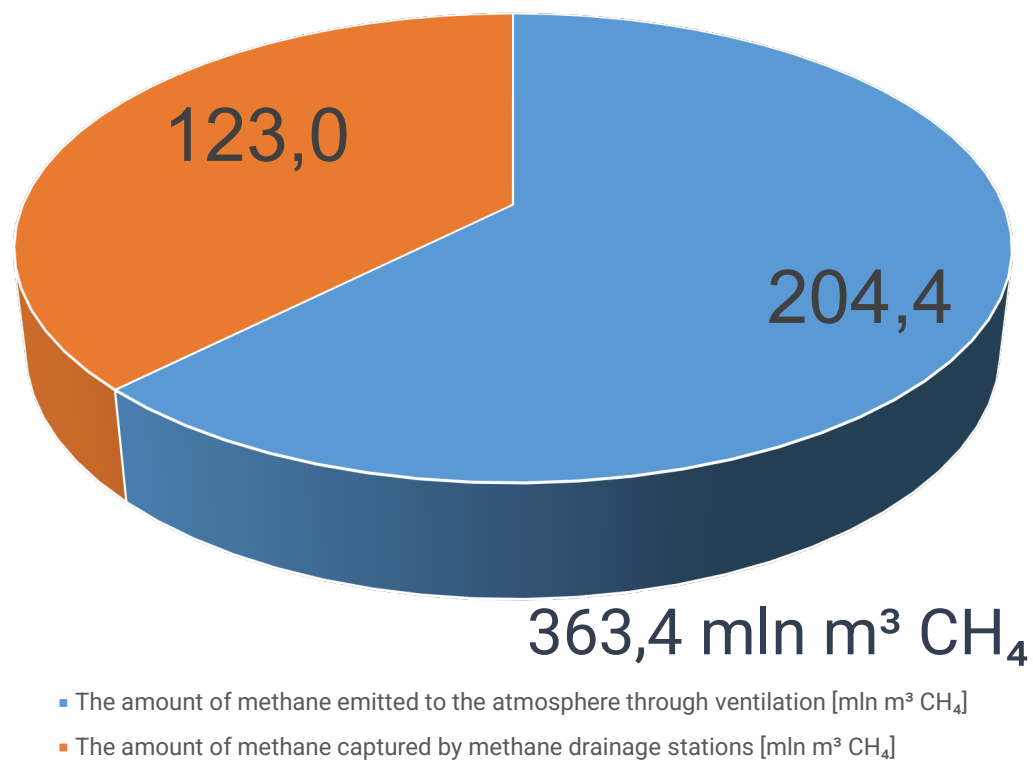
2023 CRITICAL RAW MATERIALS (30)			
ALUMINIUM/BAUXITE*	COKING COAL*	LITHIUM*	COPPER*
ANTIMONY	FELDSPAR*	LIGHT RARE EARTH ELEMENTS	SCANDIUM
ARSENIC*	FLUORSPAR	MAGNESIUM	SILICON METAL
BARYTE	GALLIUM	MANGANESE*	TANTALUM
BERYLLIUM	GERMANIUM	NATURAL GRAPHITE	TITANIUM METAL
BISMUTH	HAFNIUM	NIوبيUM	VANADIUM
BORATES	HELIUM*	PLATINUM GROUP METALS	TUNGSTEN
COBALT	HEAVY RARE EARTH ELEMENTS	PHOSPHATE ROCK	STRONTIUM
PHOSPHORUS*	NICKEL*	* strategic raw materials	

Jastrzębska Spółka Węglowa – methane emissions



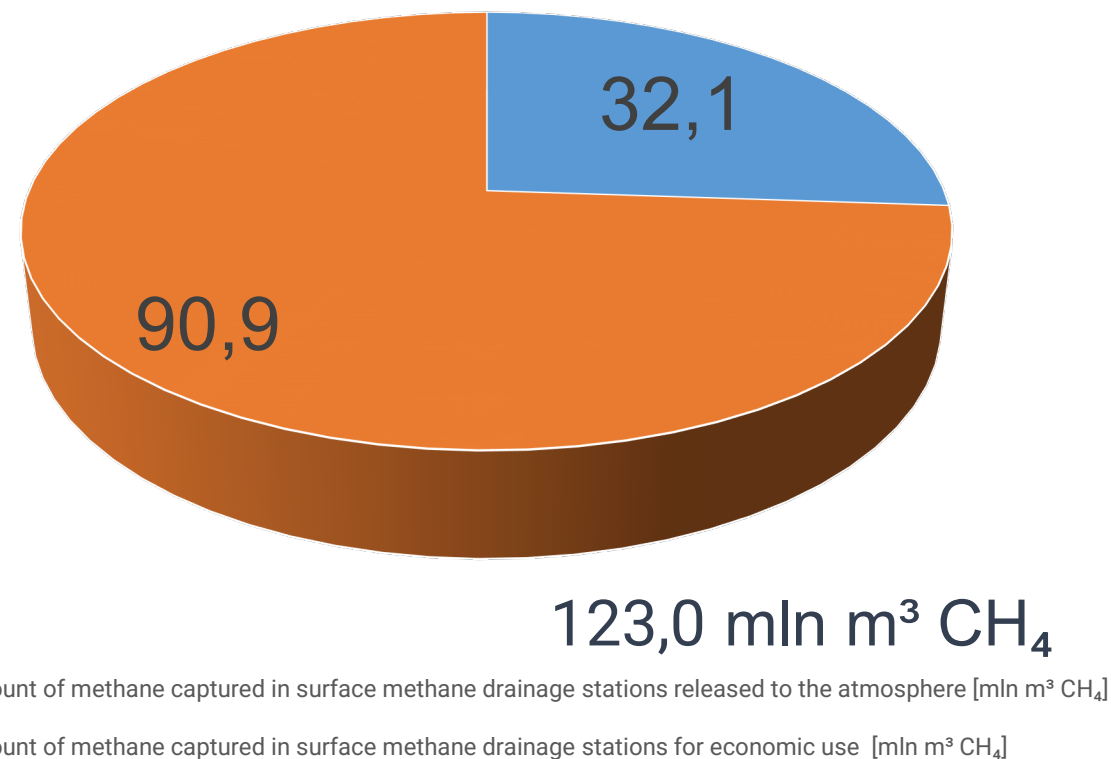
The release of methane during exploitation

Total amount of methane released in the coal mining process in JSW S.A. mines for 2022 [mln m³ CH₄]



Management of captured methane

Utilization of managed methane for 2022 [mln m³ CH₄]



JSW CG environmental strategy by 2030 and in 2050 perspective



The basis of the Environmental Strategy is to clarify the role of JSW CG in the environmental and energy-climate transformation of Poland and the European Union as a response to changes in the external environment – regulatory, technological and market environment.

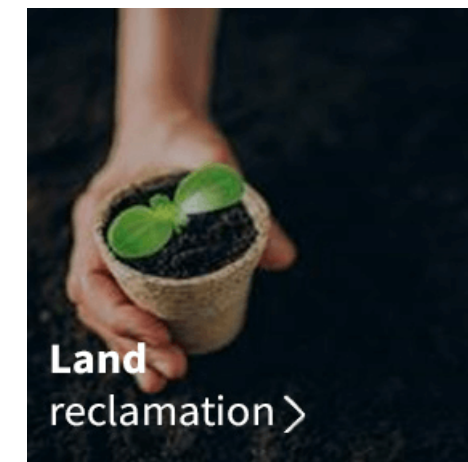
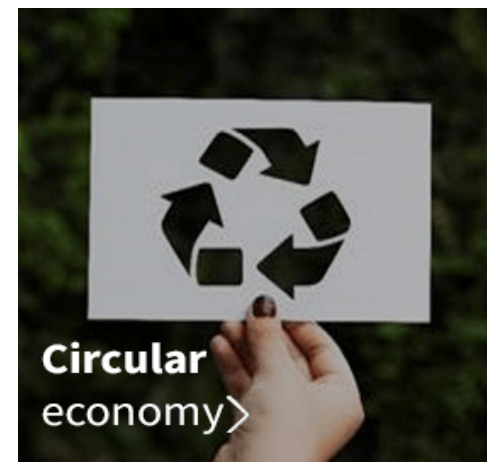
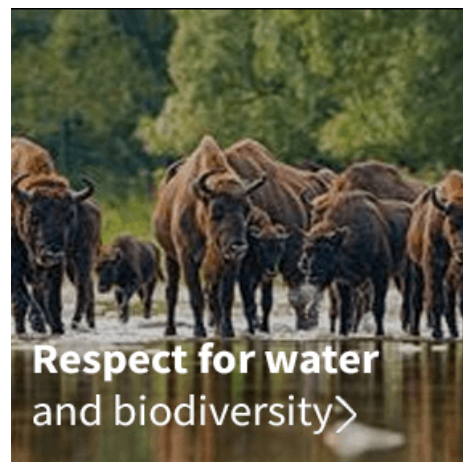
Primary objective: **achieve climate neutrality by 2050**

Intermediate objective: **reduction of carbon footprint by 30% by 2030 compared to 2018**

72% of JSW CG's carbon footprint is **METHANE => Methane Emissions Reduction Programme till 2025**
methane capture of approximately 50% and its economic use of up to 95%

Additional measures to further optimise electricity consumption and to improve energy efficiency, develop our own RES capacity and increase the share of 'green energy' in the volume of energy purchased from the market. Planned innovation and development initiatives related to the reduction of ventilation air methane (VAM) emissions

4 key areas of pro-environmental and pro-climate action:

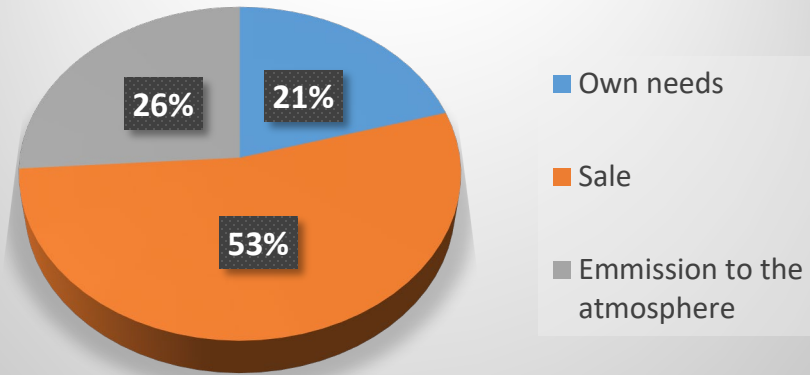


SELF-PRODUCTION OF ENERGY FROM METHANE

today and in the near future

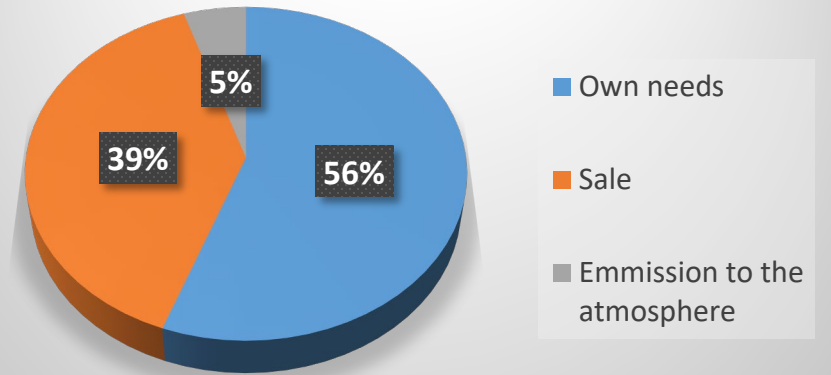


Methane economic usage structure in JSW 2022

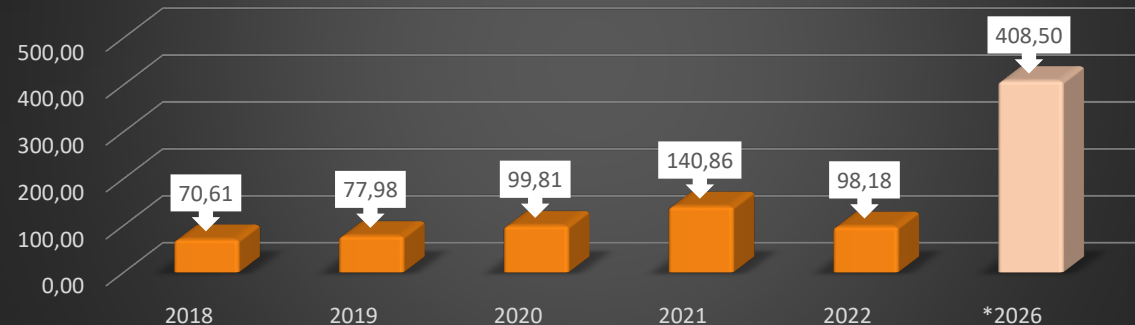


*Methane
Emissions Reduction
Programme*

Methane economic usage structure in 2026



The amount of energy produced in own
instalations
[thous. MWh]



REM Project in Pniówek Coal mine



Universidad de Oviedo

In 2022 „Big tickets call” the European Research Fund for Coal and Steel awarded the highest rating to the REM project submitted by a consortium of companies: GIG, INiG-PIB, JSW. S.A., PIG-PIB, UNIOVI (Universidad de Oviedo), INSEMEX (Institutul National de Cercetare Dezvoltare Pentru Securitate Minierasi Protectie Antiexploziva Insemex Petrosani). It was recognised for its innovation and its importance for environmental protection.

The project budget amounts to € 21 493 154 and the EU co-financing is € 10 746 577.

This grant is the largest single EU grant-aid to the Polish mining industry so far.

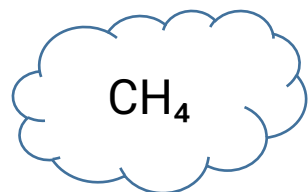


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- Building a spatial and flow model of methane accumulation in goafs,
- Identification of methane accumulation locations in the reservoirs - delineation of goaf areas,
- Directional drilling to extract methane from selected goafs,
- Sealing post-mining goafs,
- Analysis of methane emissions into ventilation air and atmosphere,
- Concept, design and construction of methane drainage installation with reduced methane content,
- Production of electrical energy and heat in specially designed gas engines



REM Project in Pniówek Coal mine



Methane emissions forecast in 2025 – 82 mln m³

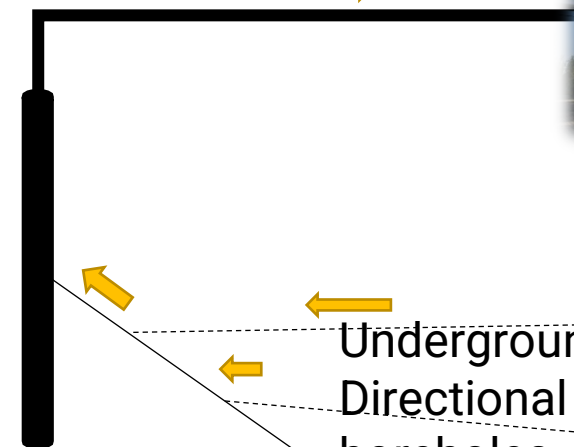
Forecasted methane emissions when REM project is implemented in 2025 – 63 mln m³



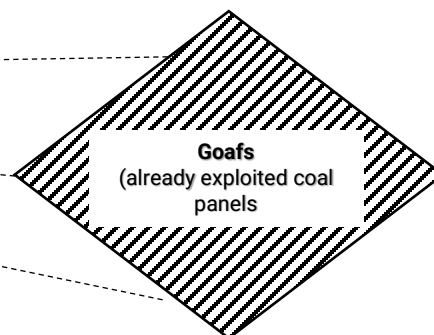
Low-concentration methane system.
Drainage station



Energy production
60 000 MWh/year



Underground
Directional
boreholes



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EUROPEAN MINING IN THE GREEN AND DIGITAL ECONOMY ERA

A project under the Horizon Europe - Framework Programme for Research and Innovation (2021-2027) with a global scope. The aim of the project is to develop technological and methodological solutions for the sustainable and innovative development of the mining industry.

- Project budget – €13 840 490
 - Grant – €11 963 526
- GIG and JSW S.A. budget – €1 130 988
 - GIG and JSW S.A. grant – € 962 309



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The project will involve a consortium of 22 units (including 2 from Poland):

- | | | |
|---|-------------|-------------|
| • INSTITUTO TECNOLOGICO DE ARAGON | (ES) | |
| • CORE KENTRO KAINOTOMIAS AMKE | | (EL) |
| • INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS | (EL) | |
| • FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (DE) | | |
| • GŁÓWNY INSTYTUT GÓRNICTWA | | (PL) |
| • DIMOKRITIO PANEPISTIMIO THRAKIS | | (EL) |
| • TAMPEREEN KORKEAKOULUSAATIO SR | (FI) | |
| • ARISTOTELIO PANEPISTIMIO THESSALONIKIS | | (EL) |
| • UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG | | (ZA) |
| • SUBTERRA INGENIERIA SL | | (ES) |
| • AURORA GEO LP | | (EL) |
| • LIBRA AI TECHNOLOGIES PRIVATE IDIOTIKI KEFALAIOUCHIKI ETAIREIA | | (EL) |
| • STRATAGEM ENERGY LTD | | (CY) |
| • TERRADUE SRL | | (IT) |
| • DARES TECHNOLOGY SL | | (ES) |
| • DIGITALTWIN TECHNOLOGY GMBH | | (DE) |
| • IOTA STIFTUNG | | (DE) |
| • TAPOJARVI OY | | (FI) |
| • THARSIS MINING SOCIEDAD LIMITADA | | (ES) |
| • TERNA MAG SA | | (EL) |
| • JASTRZĘBSKA SPÓŁKA WĘGLOWA SA | (PL) | |
| • ETICAS RESEARCH AND INNOVATION | | (ES) |



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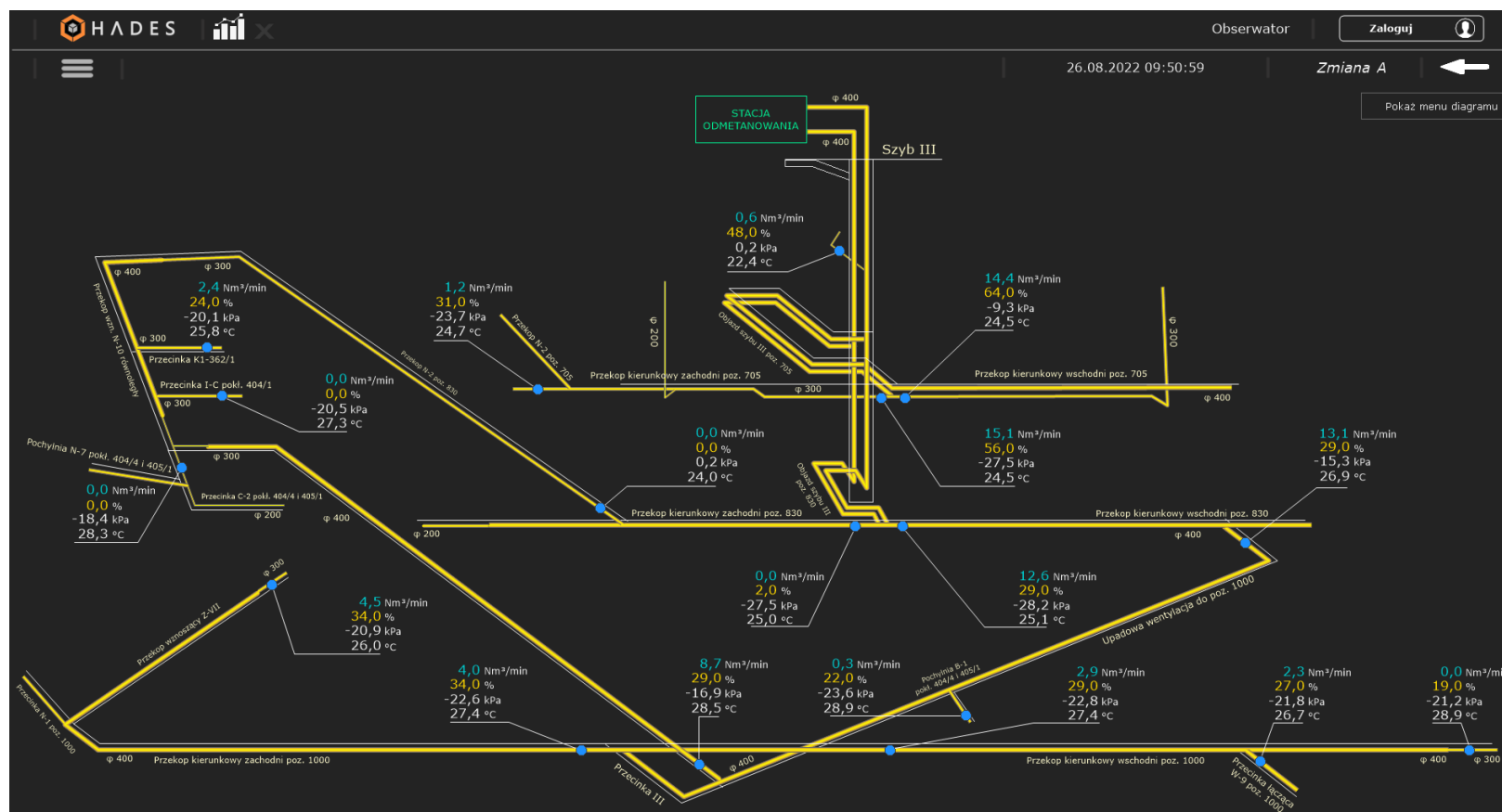
Mining companies participating in the programme:

- La Parilla mine, located in the province of Caracas (Spain) - an open pit mine extracting about 2,700 tonnes of **tungsten** and 500 tonnes of **tin** per year;
- TERNAMAG - mine located in the northern part of the island of Evia (Greece) extracting **magnesite** and **magnesia**;
- Kemi deep mine and Siilinjärvi open pit mine located in Finland; Kemi supplies **chromite** while Siilinjärvi is the only **phosphate** mine in Western Europe;
- The THARSIS group's mines are the only Spanish mines with 100% Andalusian capital, and are involved in the mining of **copper, silver, gold** and **cobalt**;
- SIBANYE-STILLWATER is an international metals mining and processing group based in South Africa, they mine **platinum, palladium** and **rhodium**;
- JSW SA - is one of the largest producers of **coking coal** and **coke**, located in southern Poland.

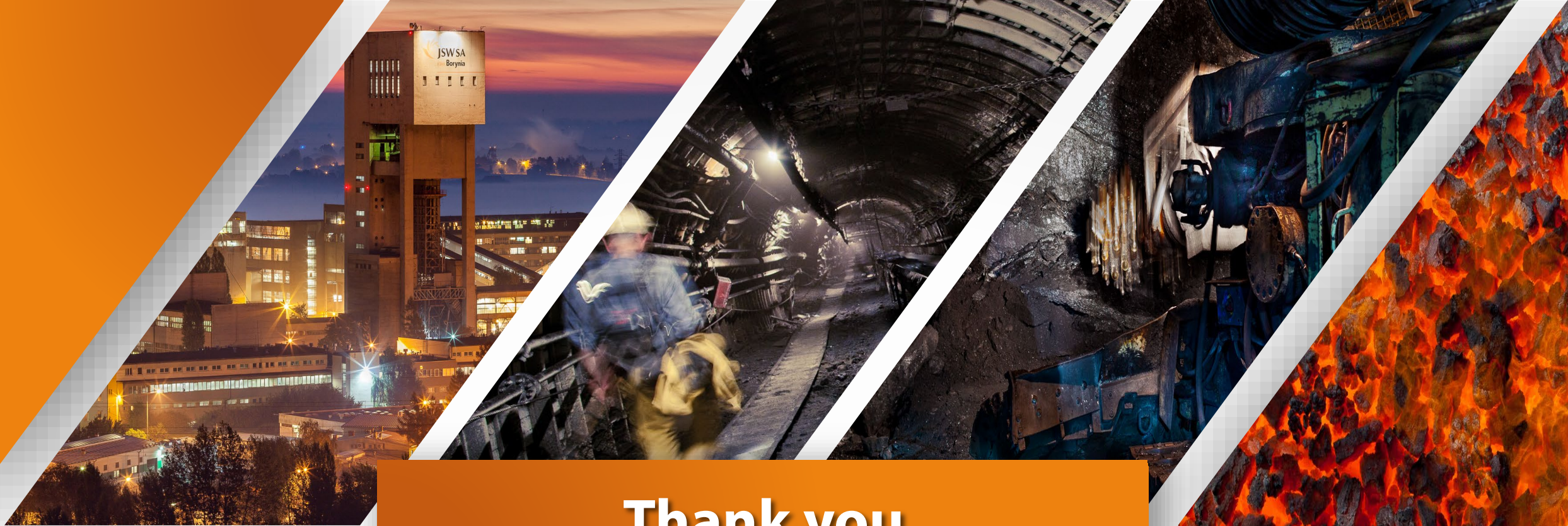


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Polish partners involvement in the project (JSW S.A. and GIG) will focus on the development of an intelligent network to support the optimal methane drainage of hard coal mines. As part of the work, a network concept will be developed covering both hardware needs and the necessary software. The project should conclude with the modernisation of the existing drainage installation to enable it to be controlled from the surface or to operate autonomously based on data from a suitably developed sensor system.



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Thank you



Jastrzębska Spółka Węglowa SA

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SPÓŁKA NOTOWANA NA

WIG20

