

**RFCS BIG TICKET PROJECT** 

# REM: A "big-ticket" RFCS project on the reduction of methane emissions from post-mining goafs



Co-funded by the European Union

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OIL AND GAS INSTITUTE National Research Institute





University of Oviedo

#### **REM in numbers**







**OIL AND GAS INSTITUTE** National Research Institute



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Total budget - 21 493 154 Euro EU funding - 10 746 577 euro 2 target sites 6 partners





#### Target site – Mine Pniówek





LEGENDA

Redukcja
Redukcja
Redukcja
Runkt pomiarowy
Czujniki wysokich stężen

Schemat uproszczony sieci ociadów odmetanowania "KWI

Subsect Versioner Balante

#### Target site – Petrosani Basin







#### **Project goals**

- increased safety of miners by removing significant volumes of AMM/VAM from underground workings,
- significant climate change mitigation by effective utilisation of captured AMM/VAM instead of venting it to the atmosphere,
- better adaptation of coal mines to climate change by emphasizing them/teaching them how effectively manage and control coal mine methane emissions,
- more cost-effective activities of coal mines to smooth future phase-out transformation by preparing lessons learnt document and training them based on REM project experience,
- increased pollution prevention and control by elaborating methodology to monitor VAM emissions through coal mines' shafts,
- increased motivation of coal mines' management to invest in CMM utilization by demonstrating the real economic effects of the REM project based on the successful "Pniówek" mine example.



#### **Project goals**

- 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



#### **Project schedule**





#### **Project schedule**





Construction of a methane drainage installation adjusted to Low Content **Abandoned Mine Methane** 



#### Construction of a methane drainage installation adjusted to Low Content Abandoned Mine Methane

![](_page_9_Figure_1.jpeg)

![](_page_9_Picture_2.jpeg)

#### Construction of a methane drainage installation adjusted to Low Content Abandoned Mine Methane

![](_page_10_Figure_1.jpeg)

![](_page_10_Picture_2.jpeg)

#### Project schedule

## VAM emissions to the atmosphere from coal mines' shafts monitoring

![](_page_11_Figure_2.jpeg)

![](_page_11_Picture_3.jpeg)

#### VAM emissions to the atmosphere from coal mines' shafts monitoring

![](_page_12_Figure_1.jpeg)

![](_page_12_Picture_2.jpeg)

#### VAM emissions to the atmosphere from coal mines' shafts monitoring

- SNIFFER4D Mobile sensor,
- Laser Methane sensor BLV HEQ PURWAY-CH-4.

![](_page_13_Picture_3.jpeg)

![](_page_13_Picture_4.jpeg)

![](_page_13_Picture_5.jpeg)

![](_page_13_Picture_6.jpeg)

#### VAM emissions to the atmosphere from coal mines' shafts monitoring

![](_page_14_Picture_1.jpeg)

![](_page_14_Picture_2.jpeg)

![](_page_14_Picture_3.jpeg)

![](_page_14_Picture_4.jpeg)

#### Satellite GHGSAT C1 Iris measurements

#### Project schedule

### **Risk Assessment, Ecoefficiency Analysis and Business Case Study**

![](_page_15_Figure_2.jpeg)

![](_page_15_Picture_3.jpeg)

#### Risk Assessment, Ecoefficiency Analysis and Business Case Study

The business case study will be mainly built on REM Project outcomes. A written document prepared under this task will describe how a coal mining company that has decided to move in this new direction should define its objectives and how it will achieve them. The business case will set out a practical example for coal mining companies from the marketing, financial, and operational point of view.

![](_page_16_Picture_2.jpeg)

![](_page_16_Picture_3.jpeg)

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.

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

JSW SA

In 2023 the JSW Group's mines produced: > 13.51 mt of coal > 3.2 mt of coke.

2023 CRITICAL RAW MATERIALS (30)			
ITIMONY	COKING COAL	LITHIUM	COPPER
RSENIC	FELDSPAR	LIGHT RARE EARTH ELEMENTS	SCANDIUM
UXITE	FLUORSPAR	MAGNESIUM	SILICON METAL
RYTE	GALLIUM	MANGANESE	TANTALUM
RYLLIUM	GERMANIUM	NATURAL GRAPHITE	TITANIUM METAL
SMUTH	HAFNIUM	NIOBIUM	VANADIUM
DRON	HELIUM	PLATINUM GROUP METALS	TUNGSTEN
DBALT	HEAVY RARE EARTH ELEMENTS	PHOSPHATE ROCK	STRONTIUM
IOSPHORUS	NICKEL		

#### JSW CG environmental strategy by 2030 and in 2050 perspective

![](_page_18_Picture_1.jpeg)

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.

Overarching objective: Intermediate objective: aiming to achieve climate neutrality by 2050 reduction of carbon footprint by 30% by 2030 compared to 2018

73% of JSW CG's carbon footprint is **METHANE => Methane Emissions Reduction Programme to 2025** methane capture of approximately 50% and its economic use of up to 95%

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

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![](_page_18_Picture_8.jpeg)

![](_page_18_Picture_9.jpeg)

![](_page_18_Picture_10.jpeg)

#### Methane Emissions Reduction Program

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In 2022 Jastrzębska Spółka Węglowa has presented the new Strategy including the Group's Subsidiaries until 2030. Important part of the business strategy is the Environment Strategy. One of the significant elements of the adopted Strategy is counteracting climate change by reducing the carbon footprint by 30% by 2030 and achieving climate neutrality in 2050.

The main source of greenhouse gas emissions resulting from the Group's operations is methane, which accounts for approximately 72% of the carbon footprint.

**The Methane Emissions Reduction Program** developed by the Methane Drainage and Management Office is the answer to this challenge.

95%

Planned energy use of captured methane in 2025

50%

Methane drainage effectiveness in 2025

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![](_page_20_Picture_1.jpeg)

Key indicators at JSW and the Pniówek mine.

- increase in methane drainage efficiency 30%
- economic utilization of methane

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projects implementation

![](_page_20_Picture_7.jpeg)

![](_page_20_Picture_8.jpeg)

60 MWeINSTALLER CAPACITY8 MWe400 MWh thou/yearENERGY PRODUCTION60 MWh thou/year

![](_page_20_Picture_10.jpeg)

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# **Thank you** for your attention!

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