

**NEW DEVELOPMENTS IN THE FIELD OF METHANE
MANAGEMENT IN POLISH MINES**



GIG 2020 FACTS AND FIGURES

- ❑ Research institute established 1925,
- ❑ Subordinates to the Ministry of State Assets of Poland.



BASIC AREAS OF GIG ACTIVITY

MINING AND GEOENGINEERING

ENVIRONMENTAL ENGINEERING

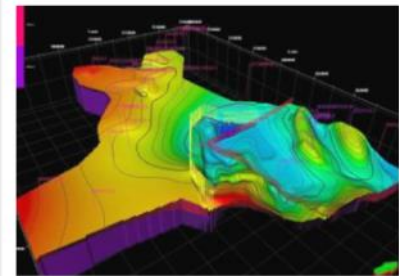
CLEAN COAL TECHNOLOGIES

**OCCUPATIONAL SAFETY IN THE
INDUSTRY**

MATERIAL ENGINEERING

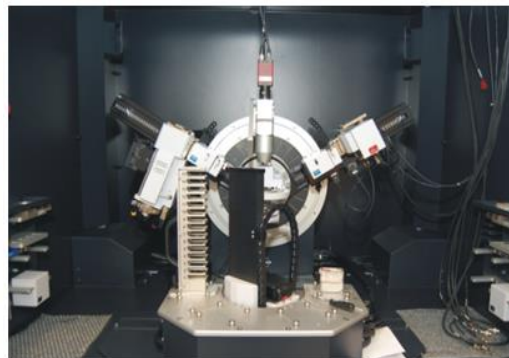
CERTIFICATION AND ATTESTATION

TRAINING AND EDUCATION



R&D STAFF AND INFRASTRUCTURE

Experts and research teams of GIG provide multidisciplinary services supporting industry, regional and local authorities as well as government institutions.



R&D SERVICES FOR DIFFERENT INDUSTRIES



Construction



Chemical



Energy



Fuel



Food



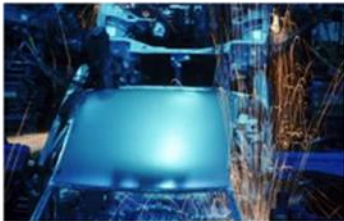
Medical



Metallurgy



Mining



Motorization



Shipbuilding



Transport



Waste Management



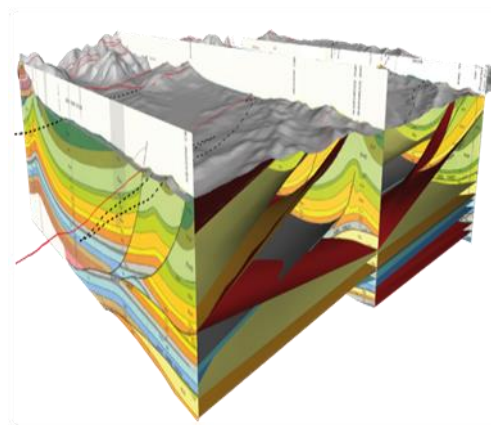
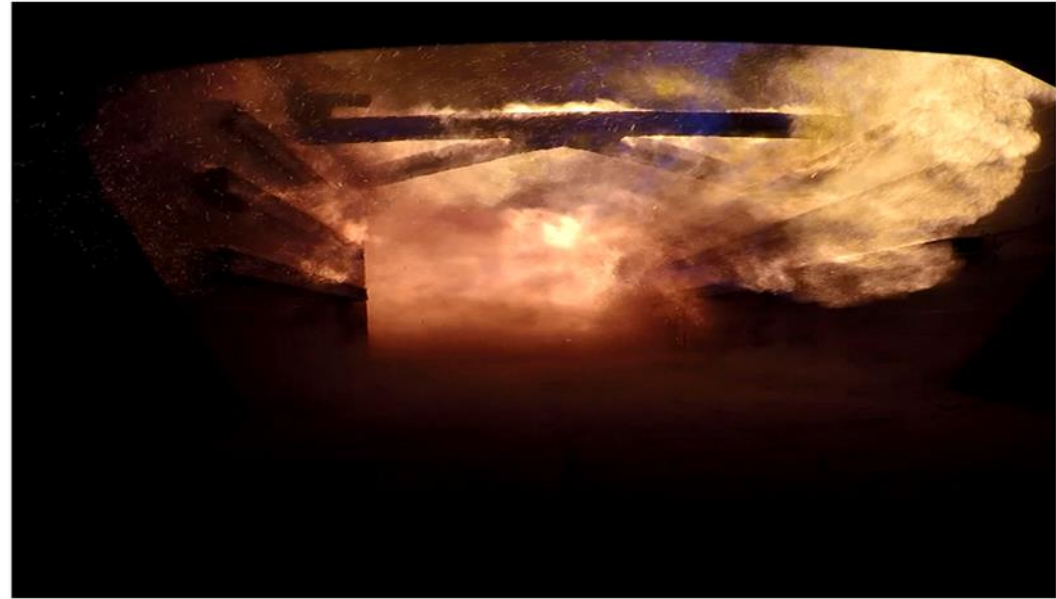
Waterworks



Workplace Safety

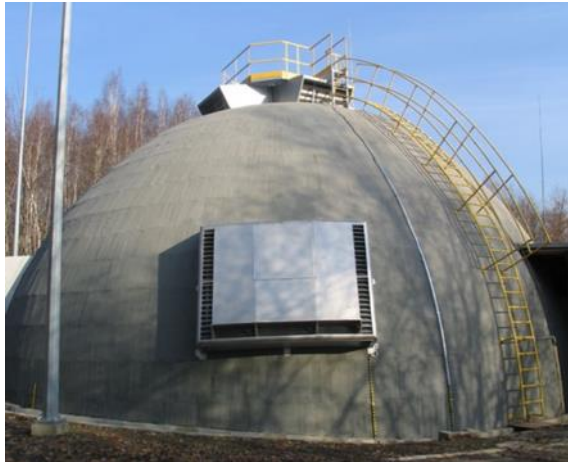
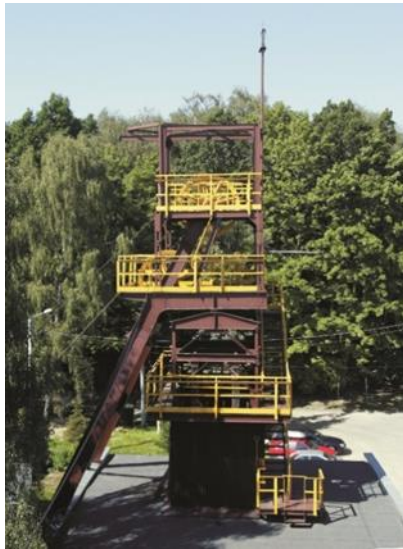
MINING AND GEOENGINEERING

- ❑ Resources and reserves estimation and documentation
- ❑ Bankable feasibility study
- ❑ Comprehensive design of underground coal mines
- ❑ Assessment and prevention of natural hazards in underground mining
- ❑ Coal preparation, design of CPP



EXPERIMENTAL MINE „BARBARA”

An unique place for mining investigations in a real scale



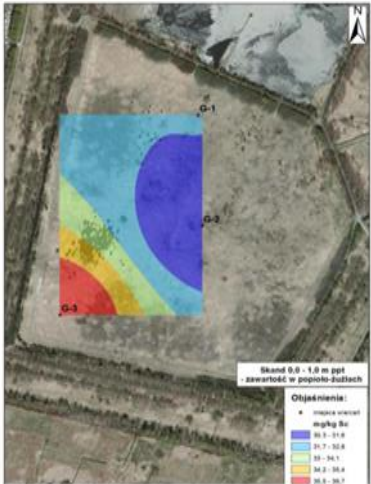
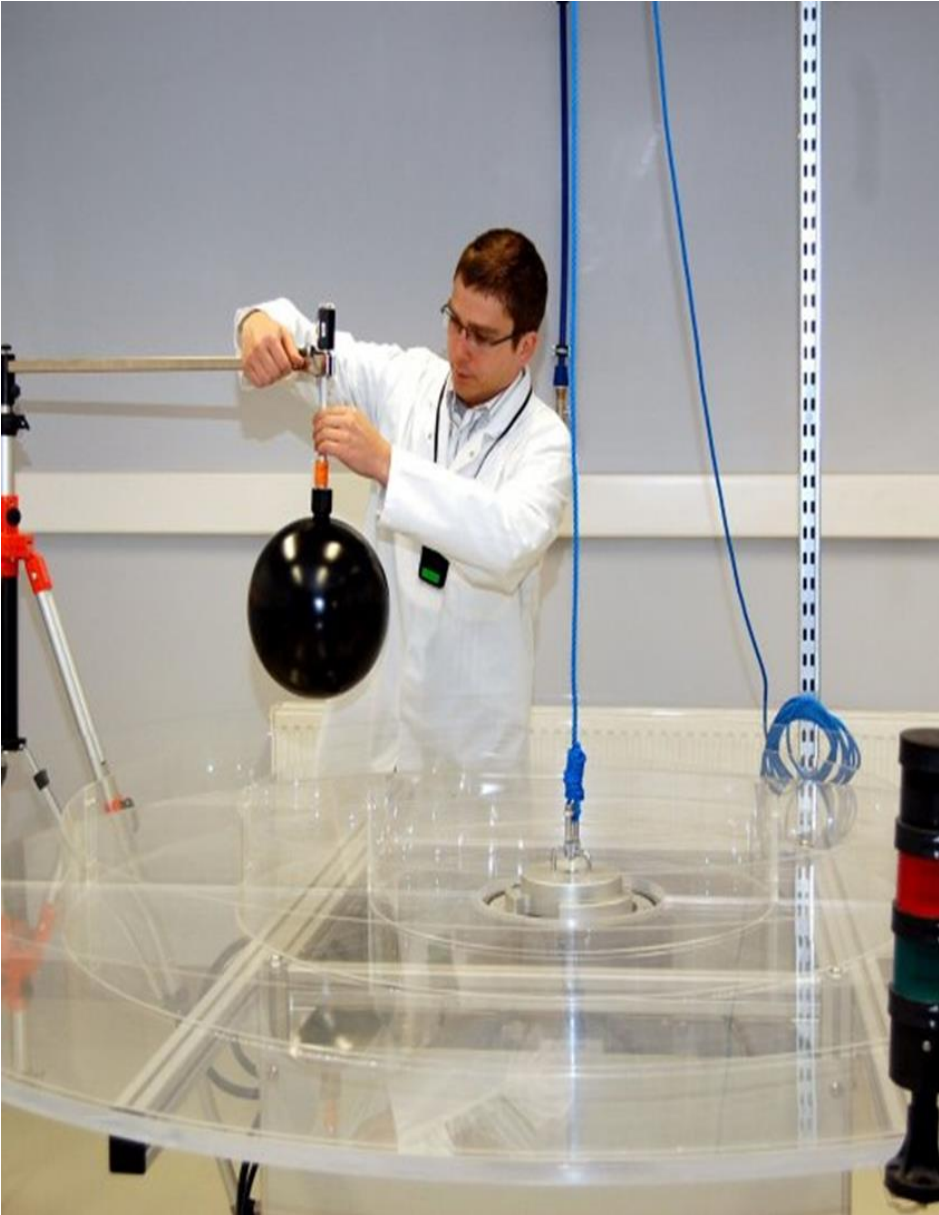
BLASTING BUNKER



**EXPERIMENTAL
FACILITIES**

ENVIRONMENTAL ENGINEERING

- Management & monitoring of environment
- Waste management
- Water management
- Air protection
- Land reclamation
- Natural radioactivity and radioactive contamination assessment – Silesian Centre for Environmental Radioactivity



CLEAN COAL TECHNOLOGIES

- ❑ Coal gasification,
- ❑ Coal liquefaction by direct hydrogenation,
- ❑ Capturing, storing and utilizing of carbon dioxide,
- ❑ Optimization and improvement of efficiency of coal combustion in power plants



**Since its establishing in 1925
GIG is assisting miners in their daily operations and
especially when fighting natural hazards**

Gas hazards

Fire hazard

Dust hazard

**Seismic and
rock burst hazard**

Water hazard

Climatic hazard

Radiation hazard



GIG's DEPARTMENT OF MINING AEROLOGY structure:

- **LABORATORY OF MINE AIR-CONDITIONING**
- **LABORATORY OF MINE VENTILATION, MINE AIR CONDITIONING, GAS HAZARD PREVENTION AND GAS AND ROCK OUTBURST HAZARD PREVENTION**
- **LABORATORY OF COAL SPONTANEOUS COMBUSTION**
- **LABORATORY OF GAS ANALYSES**

GIG was always well aware of methane gas:

- as a safety hazard
- its role as a potent GHG and valuable source of energy

If not recovered earlier as **CBM from the surface**

CMM emissions (and not leakages !) during underground mining operations can be reduced by **efficient drainage** (before or in course of mining)

or/and

by capturing what is left (and diluted due to safety reasons)

and then vented as **Ventilation Air Methane (VAM)**

The most important methane related projects performed recently in GIG's DEPARTMENT OF MINING AEROLOGY :

RECOPOL: Reduction of CO₂ emission by means of CO₂ storage in coal seams in the Silesian Coal Basin of Poland, **2001 – 2005**.

MOVECBM: Monitoring and verification of CO₂ storage and ECBM in Poland, **2006 – 2008**.

CO₂REMOVE: CO₂ geological storage: research into monitoring and verification technology, **2006 – 2012**.

EPA 1: Detailed Characteristics of the Ventilation Air Methane Emissions from Ten Gassy Underground Coal Mines in Poland (Upper Silesian Basin)", **2008 – 2010**.

CARBOLAB: Improving the knowledge of carbon storage and coal bed methane production by "in situ" underground tests, **2009 – 2013**.

EPA 2: A first feasibility study for cost effective methane degassing and capture ahead of mining operations to reduce methane emissions in Poland during mining (Pawlowice 1 coal field, Upper Silesia), **2009 – 2013**.

AVENTO, Advance tools for ventilation and methane emissions control, **2012 – 2015**.

GasDrain: Development of Improved Methane Drainage Technologies by Stimulating Coal Seams for Major Risks Prevention and Increased Coal Output, **2014 – 2018**.

ExPRO: Prediction and mitigation of methane explosions effects for improved protection of mine infrastructure and critical equipment, **2014 – 2017**.

MAPROC: Monitoring, Assessment, Prevention and Mitigation of Rock Burst and Gas Outburst Hazards in Coal Mines, **2015 – 2018**.

PICTO: Production Face Environmental Risk Minimisation in Coal and Lignite Mines, **2018 – 2022**.

DDMET: Advanced methane drainage strategy employing underground directional drilling technology for major risk prevention and greenhouse gases emission mitigation, **2019-2023**

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



Imperial College
London



Universidad de Oviedo
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University of Oviedo



DD-MET

GRANT AGREEMENT NO. 847338 – DD-MET – RFCS-2018
Duration: July 2019 – December 2023

DD-MET



GiG Instytut
Badawczy

Imperial College
London



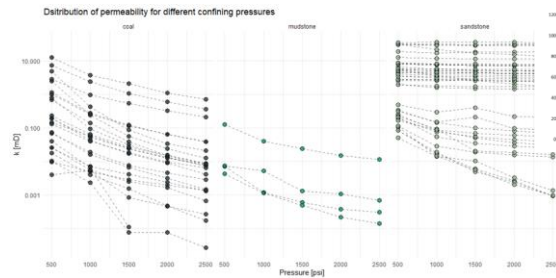
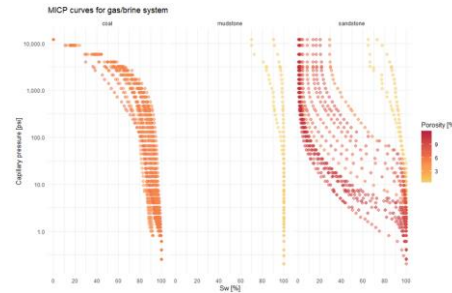
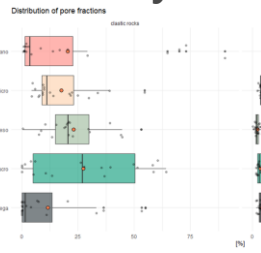
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REI DRILLING
DIRECTIONAL UNDERGROUND

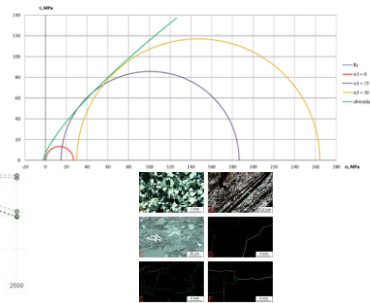


GiG Research
Institute

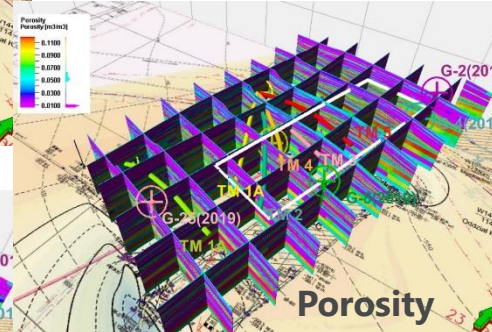
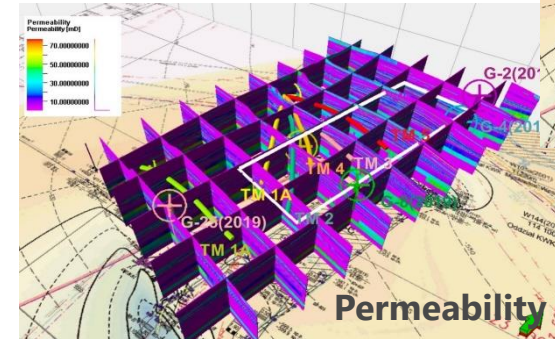
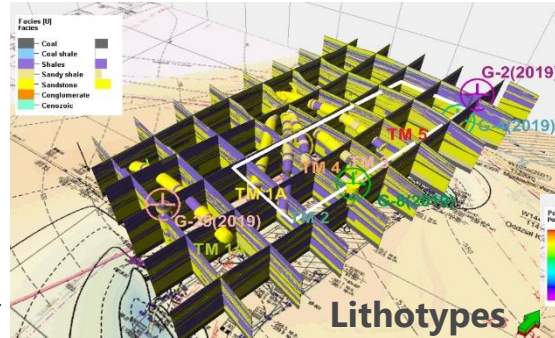
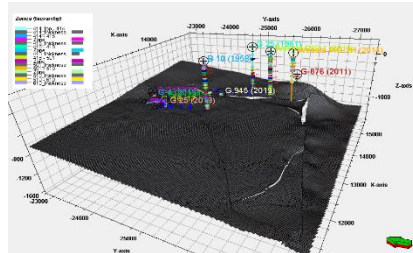
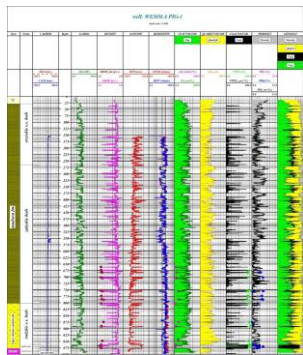
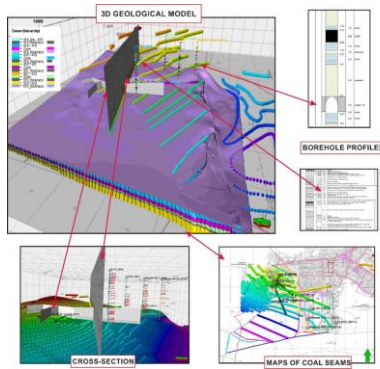
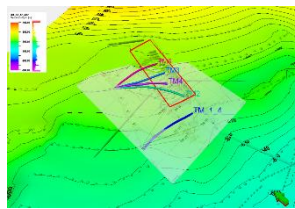
Laboratory data



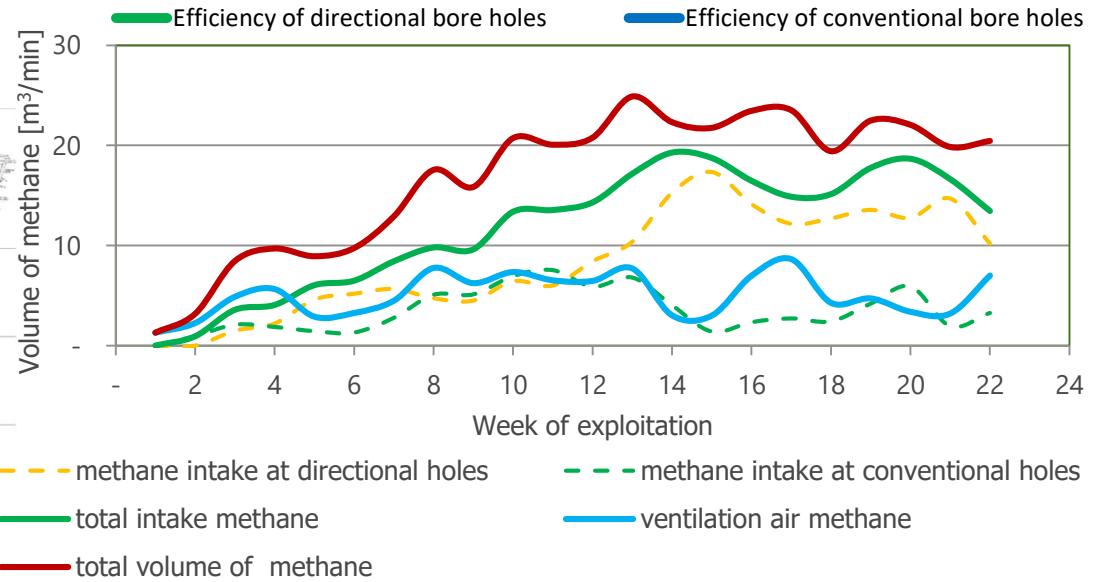
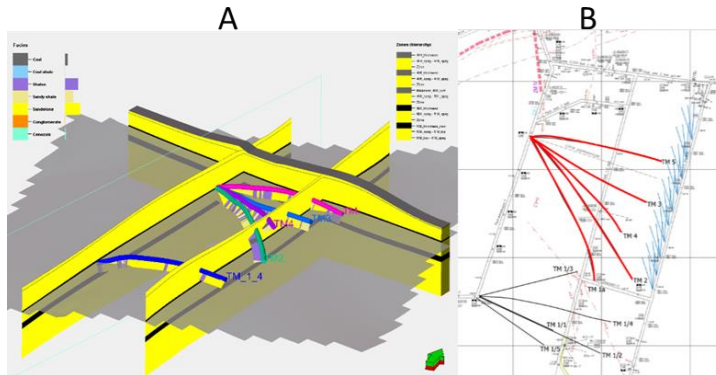
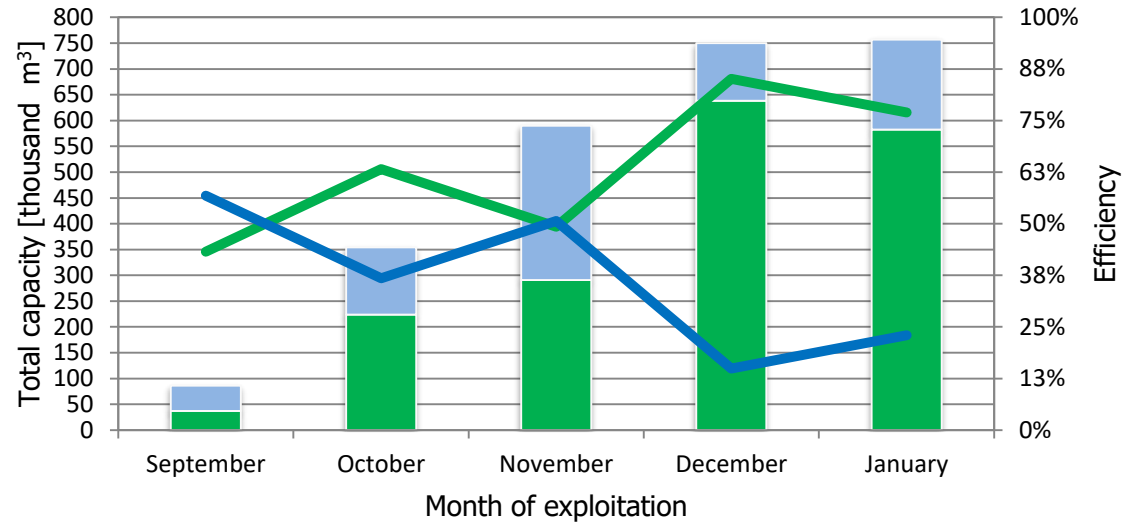
Sandstone, roof longwall 1c, section 20



Geological data integration



DD-MET



„Most of the fossil fuels consumed in the EU are imported, and 75-90% of the methane emissions associated with these fuels are emitted before reaching the EU’s borders”

page 4 of EU INCEPTION IMPACT ASSESSMENT

THIS YEAR RFCS CALL:

- DISMET (4TH TIME 😞!) LACK OF UNDERSTANDING CMM PROBLEMS

DISSEMINATION OF BEST PRACTICES ON COAL MINE METHANE (CMM) AND INTERNATIONAL CMM SAFETY STANDARDS TO EFFECTIVELY SUPPORT UNITED NATIONS ECONOMICAL COMMISSION FOR EUROPE GROUP OF EXPERTS ON CMM WORKS.

The primary objective of the proposed project is to effectively disseminate Best Practices on **Coal Mine Methane** (“CMM”) capture and its utilisation by organisation of dedicated workshops and trainings **in connection with health and environmental risks caused by coal mine methane released during and after mine exploitation. Proposed effective dissemination program will contribute to the assessment and enhancement of European and International CMM safety standards.** The project aims to support **capacity-building activities in United Nations Member States** through **dissemination of best practices in economically viable methane abatement and utilisation, socially acceptable underground coal mine practices, and environmentally responsible methane management.**

- GI-MINE

SUSTAINABLE AND INTELLIGENT MINE WASTE MANAGEMENT TOWARDS GREEN DEAL ECONOMY **PILOT AND DEMONSTRATION** PROJECT GI-MINE (GREEN AND INTELLIGENT MINE)

Sustainable and intelligent mine waste management towards green deal economy are the key issues when minimizing costs of coal mines' liquidation process. It could turn the costs of coal mine basic wastes disposal into profit. **GI-mine** (Green and Intelligent mine) pilot and demonstration project is going to demonstrate "green management" of coal mine solid wastes by developing technology (installation) to crush it and mix with municipal dewatered sewage sludge in order to produce soil substrate ready for agricultural purposes, while **developing universal software will allow for "intelligent management" of captured coal mine methane - minimizing its emissions and related penalties.** **GI-mine** pilot and demonstration project proposal consists of two parts. The first is focused on coal mines' solid wastes management and **second on efficient management of problematic excess Coal Mine Methane ("CMM") released to the atmosphere from coal mines' compressor stations.** The project will be handled by international team of researchers and practitioners. It was designed to be simple but effective to achieve its goals. Joining two apparently different problems: i.e. "*green management*" of coal mine solid wastes" and "*intelligent management*" of captured coal mine methane is very logical and comes again from the practical observation from the industry. Most of return ventilation shafts emitting methane to the atmosphere are located in the peripheries of the mines in the areas which were used for disposing the post-mining solid wastes. The project will demonstrate utilisation of soil substrate in post-mining areas growing different types of plants. It will also calculate efficiency of constructing greenhouses for above purposes using excess heat energy from coal mine methane and old mining dumps. Performed tests and demonstrations will contribute to the development of innovative technologies and support coal regions in transition, contributing to the objectives of the European Green Deal.

Thank you for your attention



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