



XXXI School of Underground Mining

Methane from underground mines – legal context, monitoring, capturing and utilization
Kraków, 12.04.2022



www.pgi.gov.pl

Janusz Jureczka, Jerzy Hadro

Methane Emission from Hard Coal Mines in Light of the New EU Regulations



Agenda

- ➔ **2021: New regulations concerning methane emission in the energy sector**
- ➔ **Methane emission of the Polish mines – at present and in the past (over the last 25 years)**
- ➔ **Regulations of the European Parliament and of the Council as related to coal mines – an overview**
- ➔ **Regulations concerning underground mines:**
 - active mines, including post-mining activities
 - closed and abandoned mines



2021 – New regulations concerning methane emission

1. *Global Methane Pledge – commitment to work together in order to collectively reduce global anthropogenic methane emissions across all sectors by at least 30 percent below 2020 levels by 2030.*

- Formally launched by USA and UE at the COP26 (Glasgow, 31.10–12.11.2021)
- Target – methane emission reduction in energy, waste and agriculture sectors
- Over 110 countries signed onto the pledge; excluding Poland.

2. *Proposal for a Regulation of the European Parliament and of the Council on methane emissions reduction in the energy sector and amending Regulation (EU) 2019/942; Brussels, 15.12.2021*

- The regulation is consistent with EU's commitments concerning the climate neutrality target by 2050, determined in the European Green Deal (among others: 2020 – EU strategy to reduce methane emissions, 2021 – European Climate Law with the commitment known as „fit for 55”).

Regulation of the European Parliament and of the Council on methane emissions reduction in the energy sector

www.pgi.gov.pl

Oil and gas sector

Exploration and production of oil and gas, gas transmission and distribution, underground gas storage

Coal mining sector

Operating underground and surface mines, closed underground mines

Import of fossil energy

Gathering information on methane emission in the countries of origin

Underground mines

Surface mines

Closed mines

Operating mines

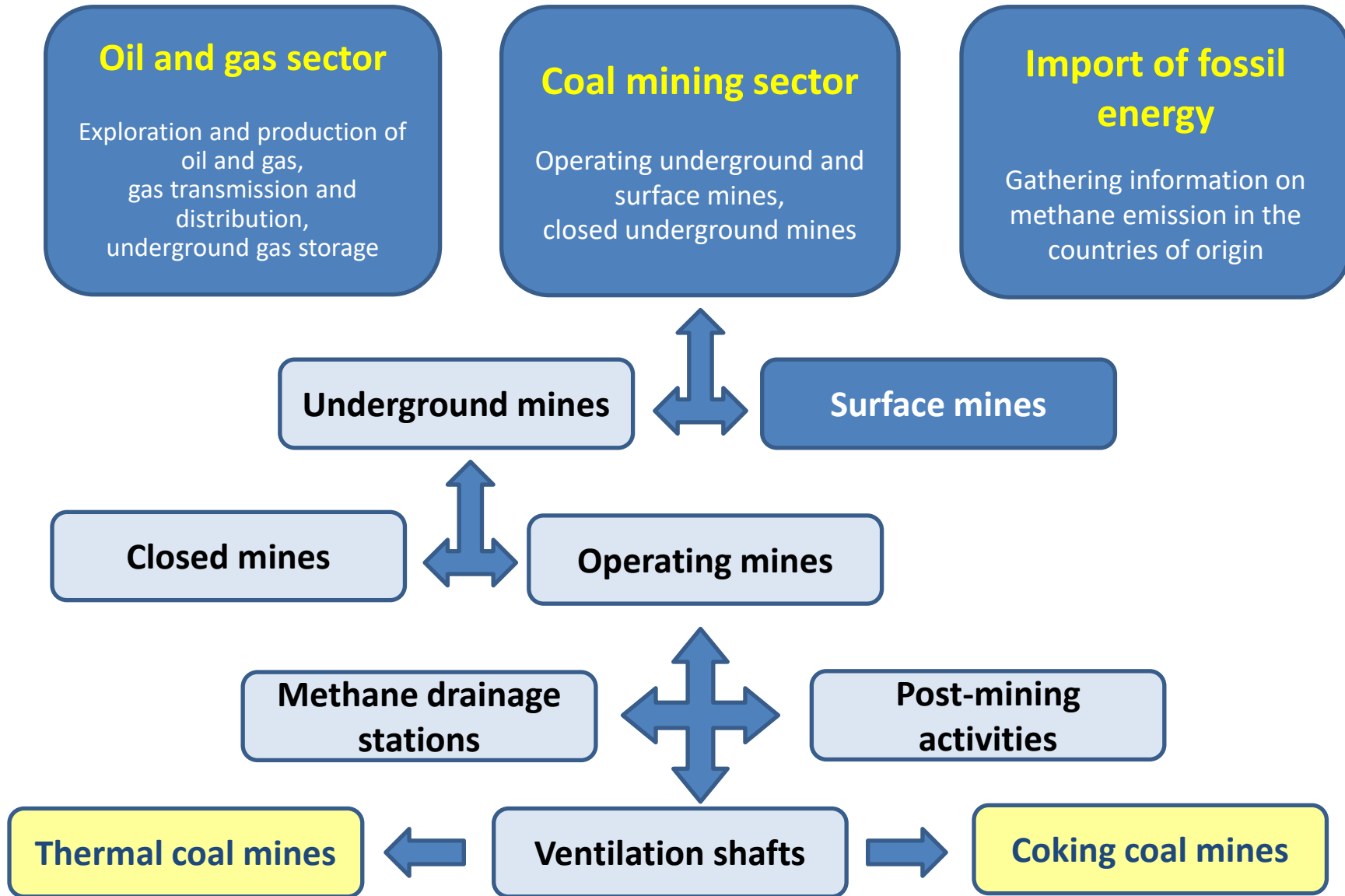
Methane drainage stations

Post-mining activities

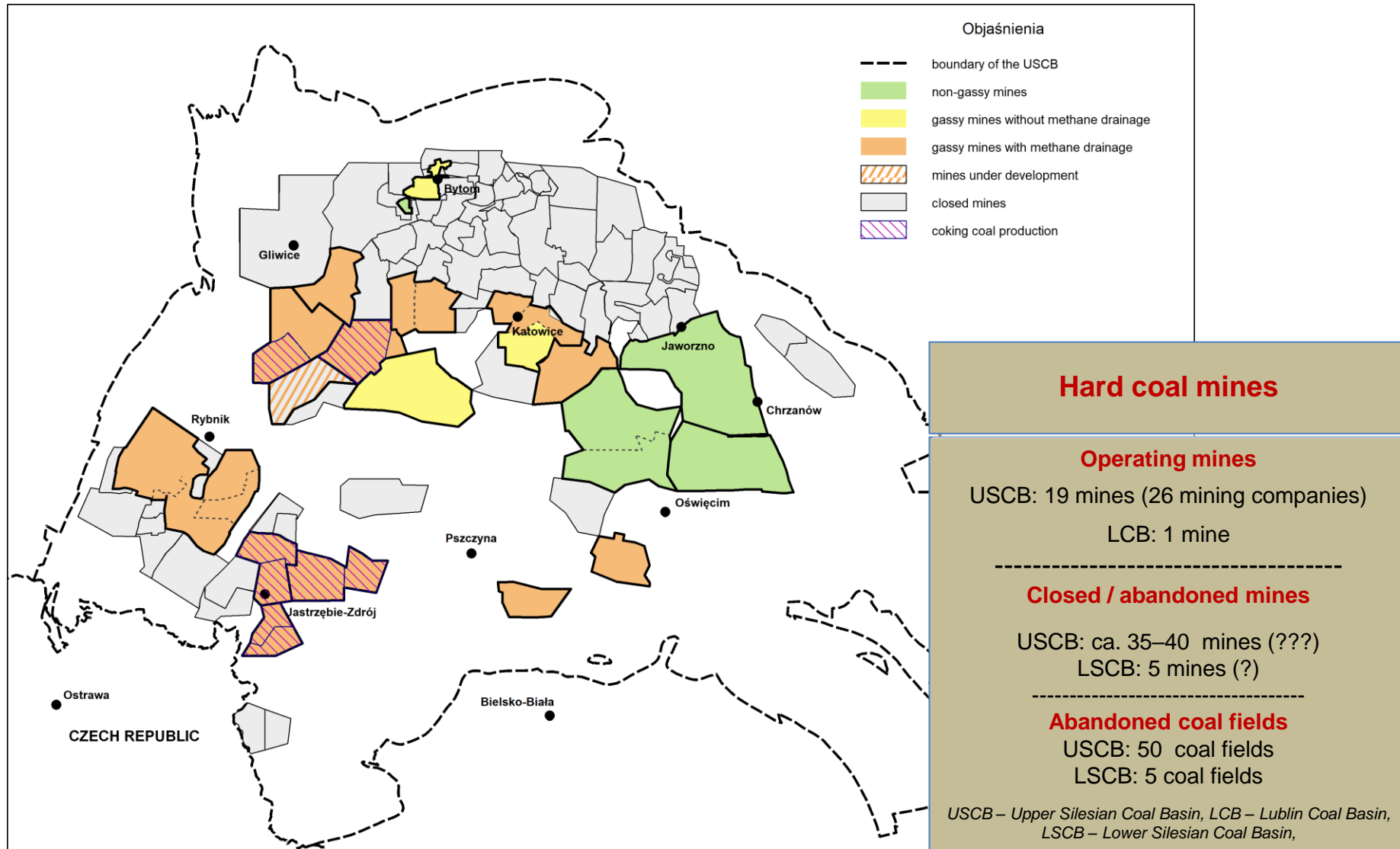
Thermal coal mines

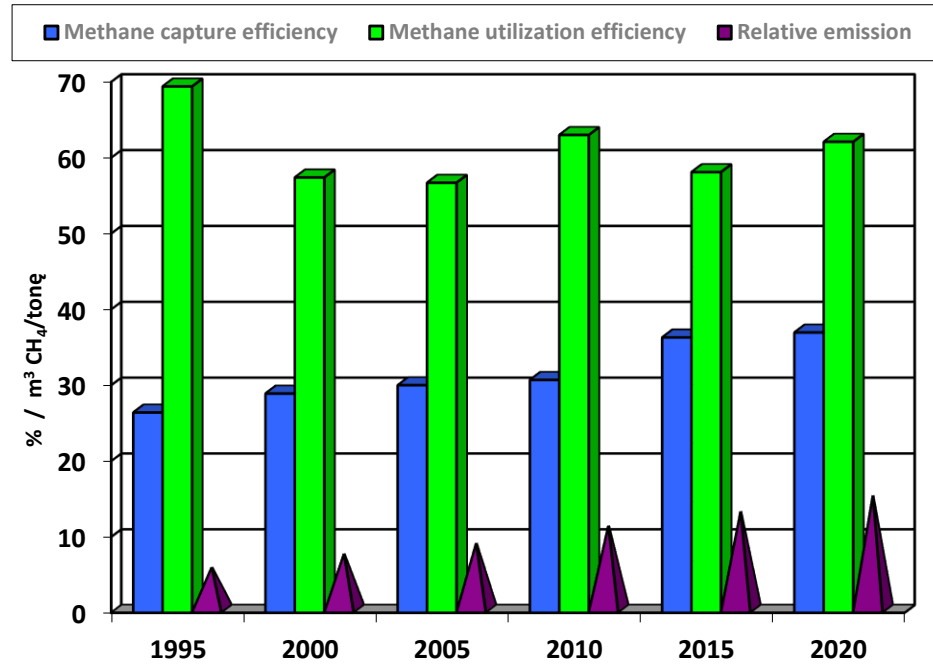
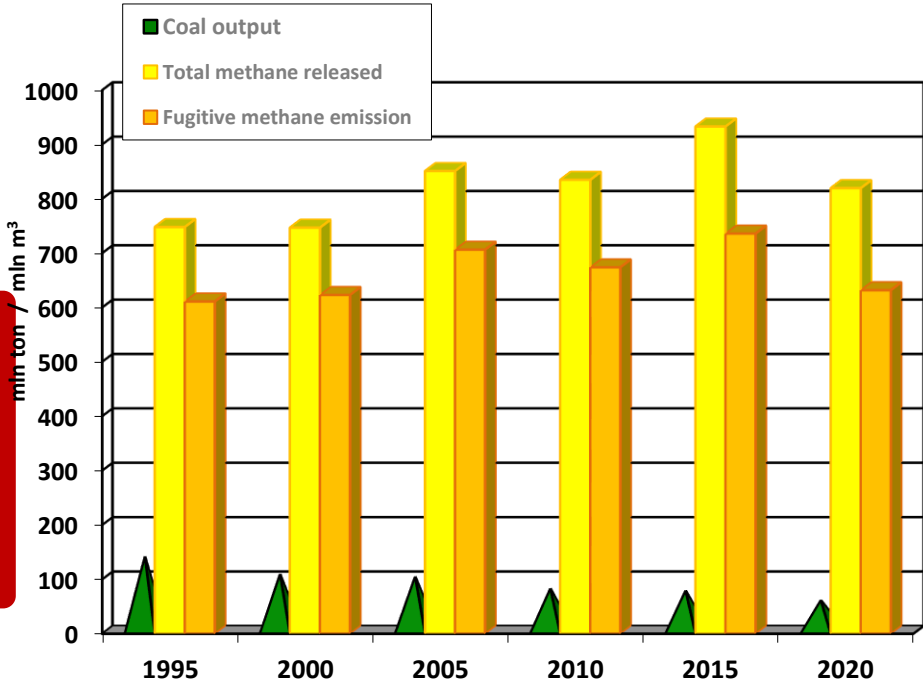
Ventilation shafts

Coking coal mines



Methane Emission in the Upper Silesian Coal Basin





Methane emission from coal mines, methane drainage efficiency and emissions 1995–2020

(source: Higher Mining Authority)

| Year | Coal output [MM tons] | Total methane released [MM m ³ CH ₄] | Relative emission [m ³ CH ₄ /tons] | Volume of methane | | Efficiency of | | Fugitive emission [MM m ³] |
|------|--------------------------|--|---|----------------------------------|----------------------------------|----------------|--------------------|---|
| | | | | captured [MM m ³] | utilized [MM m ³] | capture [%] | utilization [%] | |
| 1995 | 135,2 | 748,0 | 5,5 | 197,5 | 137,1 | 26,4 | 69,4 | 610,9 |
| 2000 | 102,5 | 746,9 | 7,3 | 216,1 | 124,0 | 28,9 | 57,4 | 622,9 |
| 2005 | 98,1 | 851,1 | 8,7 | 255,3 | 144,8 | 30,0 | 56,7 | 706,3 |
| 2010 | 76,1 | 834,9 | 11,0 | 255,9 | 161,1 | 30,7 | 63,0 | 673,8 |
| 2015 | 72,2 | 933,0 | 12,9 | 339,0 | 197,1 | 36,3 | 58,1 | 735,9 |
| 2020 | 54,4 | 819,6 | 15 | 302,8 | 187,9 | 37,0 | 62,1 | 631,7 |

Regulation... – basic information

1. For the first time at the EU level, a **single legal framework** is applied for monitoring, reporting and mitigation of methane emissions in the energy sector.
2. The EU member states shall appoint **competent authorities** to oversee that operators comply with the obligations laid down in the Regulation, as well as **independent accredited verifiers** to ensure the correctness of reports prepared by operators.
3. Competent authorities shall have appropriate authorizations to **perform full inspection** of operators' facilities, including technical documentation, emission measurements, equipment, operations and sites related to methane emission.
4. **Any natural or legal person** which considers that it has suffered injury as a result of a breach of the requirements of the Regulation, may lodge a **written complaint** with the competent authorities.
5. The regulation will apply to all European Union countries, but as far as operating hard coal mines are concerned, it will practically **only apply to Poland**.
6. The necessity to implement methane emission monitoring and reporting procedures in underground coal mines covers all operating mines, **including non-gassy mines**.
7. The EU member states will lay down rules on sanctions in the event of infringements of the Regulation and will take all necessary measures to ensure that they are implemented. **The penalties must be effective, proportionate and dissuasive** and may include fines proportionate to the environmental damage, calculated so as to effectively deprive the economic benefit of the infringements, and **progressive increases in the amount of the fines** in the event of repeated infringements.

Monitoring, reporting and mitigation of methane emission in operating mines

1. Venting and flaring of methane from drainage stations shall be prohibited **from January 1, 2025**.
2. Venting of methane through ventilation shafts in coal mines emitting more than 0.5 tons of methane/kiloton of coal mined (0,75 m³ methane per ton of coal) shall be prohibited **from January 1, 2027**; it does not apply to coking coal mines for which applicable rules will be adopted within 3 years.

Post-mining activities

3. Monitoring and reporting of methane emissions also applies to the so-called post-mining activities and the use of post-mining emission factors – determination of methane emissions after coal has been mined and brought to the surface, including its transportation and further storage / processing.
4. By definition: „Post-mining activities are activities carried out after coal has been mined and brought to the surface, including coal handling, processing, storage, and transport”.
5. Measurements of coal gas content for post-mining activities in all mines, which has not been practiced in the Polish mining industry so far and requires **development of an appropriate methodology**.
6. Mine operators shall estimate coal post-mining emissions using coal post-mining emission factors, updated annually, based on deposit-specific coal samples and in accordance with appropriate scientific standards. The operator is obliged to report post-mining emission factors and description of method employed for their calculation, as well as post-mining emissions (in tons).
7. The definition of **appropriate scientific standards**, repeated in the Regulation, is not specified. The term "standard" can be understood as a canon (model) or as an official standardization document.

Methane emission from closed and abandoned mines

1. The Regulation applies to methane emission from shafts, coal mining equipment, use of which has been discontinued, as well as other point emission sources.
2. Within one year: the EU member states shall set up an inventory of all closed and abandoned coal mines, containing at least: map showing borders of the mine, schemes of mine workings, results of methane concentration measurement at all listed and identifiable elements (e.g. inoperative shafts, all unused methane capturing installations, outcrops of the mined coal formation, and identifiable strata fractures) **from all mines, including non-gassy ones.**
3. **Comment:** In Polish conditions (Upper Silesian and Lower Silesian Coal Basins), it will be quite a challenge to compile such an inventory along with methane concentration measurements, mainly due to a significant number of decommissioned mines, a long time elapsed since their decommissioning, insufficient availability of documentation and methane emission data, frequent changes in the boundaries and mining areas of these mines, as well as changes in the names of the entities operating the mines (including aggregation of mines, multi- operatorship, etc.).
4. Within 1.5 year: measurement equipment shall be installed on all the previously listed elements in closed and abandoned coal mines where **operations have ceased within the last 50 years.**
5. **Comment:** This is another challenge, taking into account a large number of mines that have already been closed in the Upper Silesian and the Lower Silesian coal basins (in fact – after 1993). Also, in the USCB geological conditions, it is assumed that the release of methane from gobs lasts up to several years (15 years according to the Central Mining Institute empirical model). Therefore, the monitoring time should be reduced to a maximum of 20 years, while non-gassy mines should be excluded altogether.
6. Methane emission to the atmosphere from closed and abandoned mines is practically prohibited after 2030.



XXXI School of Underground Mining

Methane from underground mines – legal context, monitoring, capturing and utilization
Kraków, 12.04.2022



www.pgi.gov.pl



Thank you for your attention



Participation in the conference was financed by the National Fund for Environmental Protection and Water Management.



Państwowy Instytut Geologiczny
Państwowy Instytut Badawczy