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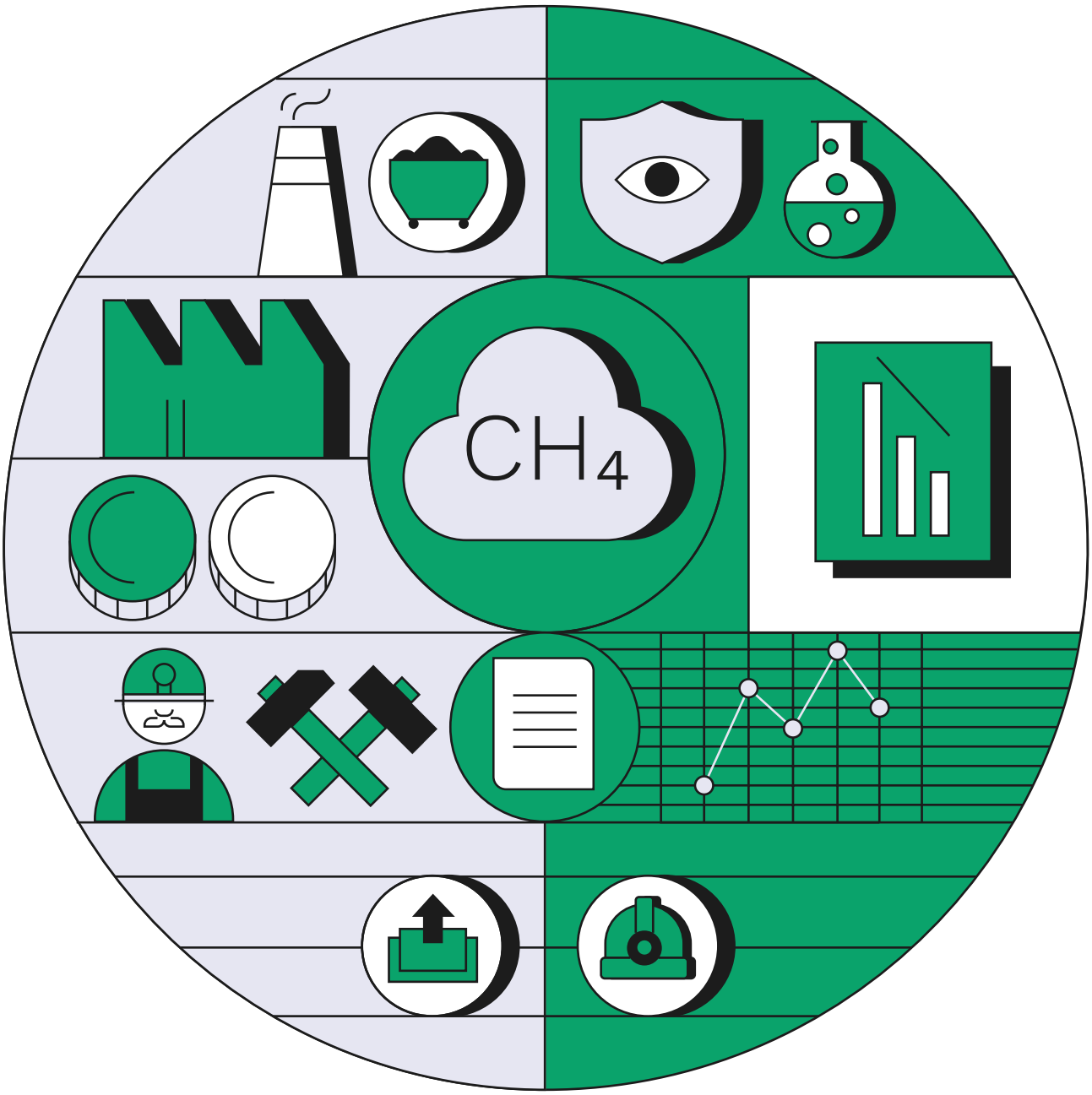
Methane emissions in Polish hard coal mining and reporting systems



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Instrat Policy Paper 01/2023
Jan Balcerowski
Zuzanna Charkowska

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Table of contents

Key findings and figures

90%
of methane emissions

from installations reporting to EPRTR in Poland comes from hard coal mining – a much higher proportion compared to the EU average, where the share of fossil fuel extraction equals to 38%.

More than 420 thousand tons of methane emissions

were emitted by Polish hard coal mines in 2021 – it is a 3% year-on-year decrease, but as much as 28% more than a decade ago.

PLN 0.34
(ca. EUR 0.07) per ton

is the environmental fee for methane emissions – very little compared to the pricing of CO_2 emissions under the EU ETS, given the much greater harmful climate footprint left by methane.

- Methane is a harmful greenhouse gas with a larger climate footprint than CO_2. The global warming potential of 1 ton of methane in the atmosphere in a 20-year time frame is comparable to the footprint of **more than 80 tons of CO_2**. Methane is also responsible for at least **25%** of the increase in Earth's temperature since the beginning of the industrial revolution.

- EU legislation on methane emissions will impose new obligations on Polish hard coal mines involving reporting on methane emissions. We therefore recommend **a reform of the system for reporting emissions** from individual mines and, in particular, strengthening the mandate of the State Mining Authority's (WUG – Wyższy Urząd Górniczy) in this regard. Under the EU's draft regulation on methane emission reductions, the new system would control methane measurement methodology standards. It would also require publishing detailed datasets to monitor progress in implementing the new policy.

- The increased cost of methane emissions should be the main policy instrument aiming to incentivize emission reduction. The polluter pays principle shall indicate an increase in the environmental fee in order to incorporate the environmental and social harmful effects of methane emissions, but also encourage investment in emission prevention technologies. The current rate of the fee is PLN 0.34 (ca. EUR 0.07) per ton and has only been increasing by the inflation rate for more than 20 years. We recommend raising this price to a target level of three and a half times the price of the CO_2 emission permit under the ETS. This would mean that the rate for methane emissions would be more than 3,800 times higher than currently.

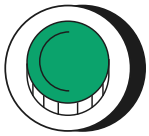
1. Introduction

Methane (CH_4) is a greenhouse gas responsible for at least 25% of the temperature increase since the industrial revolution (Ocko et al., 2021). Although its half-life in the atmosphere is only 9 years (IPCC, 2021), it affects the climate more strongly than carbon dioxide – the main greenhouse gas. The averaged impact of 1 ton of methane on global warming within 20 years of release into the atmosphere is comparable to more than 82.5 tons of CO_2.

Due to the high short-term harmful effects of methane, the International Panel on Climate Change (IPCC) has determined a reduction in its emissions. This is one of the best ways to counter global warming in the coming years (IPCC, 2021).

IMPACT OF METHANE EMISSIONS ON AIR QUALITY

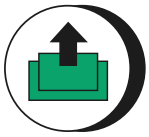
Methane emissions increase air pollution and consequently negatively affect our health. Methane is an important precursor to tropospheric ozone formation and is responsible for 50% of the increase in tropospheric ozone levels (Royal Society, 2008). Ozone is not only a greenhouse gas, but also a major component of photochemical smog (UNEP, 2011). Every year, it contributes worldwide to 1 million premature deaths from respiratory diseases (Puja-de-Lauraine et al., 2017).



THE SOCIAL AND ENVIRONMENTAL COST OF METHANE EMISSIONS

As studies show (Shindell et al., 2017), the difference in the social cost of emitting 1 ton of methane compared to CO_2 is higher than the difference in GWP (Global Warming Potential). The widely used GWP100 index, which assesses the climate warming impact of a gas compared to CO_2 over a 100-year horizon, fails to recognize the short-term impact of methane emissions on global warming. Thus, its harmful effects remain underestimated. In a 100-year horizon, the harmful effects of 1 ton of methane are comparable to 30 tons of CO_2, but in a 20-year horizon, 1 ton of methane affects global warming as much as 82.5 tons of CO_2.

So far, the social and environmental costs of methane emissions are not reflected in either the Poland's system of environmental fees or the EU ETS emissions pricing mechanism. Ember (2020) points out Poland's disproportionate contribution on a continental scale – 70% of mine methane emissions in Europe came from Poland.



SOURCES OF METHANE EMISSIONS

One can distinguish between anthropogenic and natural sources of methane emissions (such as swamps). Anthropogenic sources include: agriculture (animal husbandry), waste sector (e.g., landfills), and power industry, which generates emissions from a wide range of sources. They are created during the extraction, transportation and end-use of fossil fuels: oil, natural gas and coal (IPCC, 2021). We will focus on the latter in this report.

METHANE EMISSION REDUCTION

Reducing methane emissions has positive environmental and social as well as economic consequences. Unlike natural methane sources, emissions in the energy sector can be reduced relatively easily and with positive financial consequences for emitters.

First, ensuring that plants are leaktight is a saving of precious and non-renewable natural resources. Second, the emitter (mine) can use the captured methane for its own energy management. It can be used to produce electricity and heat. The solution is also to sell methane while reducing the demand for buying it from third parties. In this way, a natural resource that is currently being lost through release into the atmosphere would be productively used. It would also reduce the dependence of the plant and the entire energy system on conventional fossil fuels.

The European Commission has formulated a proposal for an EU regulation on reducing methane emissions[1]. It aims to regulate methane emissions and introduce new, transparent standards for reporting its emissions.

In this paper, we highlight selected challenges for the Polish hard coal mining sector in the context of the implementation of this regulation. In the second chapter, we summarize its key provisions and present the structure of the origin of methane emissions in the context of the mining activity of Polish mines. The third chapter presents a number of emission reporting systems. We point out the discrepancies between them and the limitations in accessing and analyzing the data. The fourth and final part is a summary of the main findings. It provides recommendations for public policy to deliver ambitious methane emission reduction targets, in particular pricing of methane emissions according to the polluter pays principle.

1 *Regulation of the European Parliament and of the Council on reducing methane emissions in the energy sector and amending Regulation* (EU) 2019/942, COM(2021) 805.

2. Draft EU regulation and the Polish hard coal mining sector

2.1. Methane emissions in the draft EU regulation

The draft EU regulation on reducing methane emissions in the energy sector covers emissions generated by the oil and gas industry and hard coal mining[2]. Regulations relevant to hard coal mining can be divided into two categories:

1. Reforming the reporting system.
2. Regulating venting and reducing emissions from thermal coal mines.

The regulation introduces new, more stringent rules for reporting emissions and any methane flaring. This is justified on safety grounds. Mining companies will be required to inform the designated institutions of any methane venting and combustion. The standard for reporting emissions from ventilation shafts will also be raised – operators will be required to measure emissions from this source or, when this is not possible, calculate emission values based on coefficients. Similarly, the regulation will impose an obligation to report emissions from methane drainage stations. Responsible entities will submit annual reports to designated institutions, detailing emissions by source. A similar obligation already exists today. Emitters thus shall report the value of emissions with the indication of the source to the National Database on Emissions of Greenhouse Gases and Other Substances maintained by KOBiZE (National Center for Emissions Management). 18 months after the entry into force of the regulation, the European Commission will prepare a publicly available emissions database based on the reports submitted.

2 The report refers to the published draft EU regulation on reducing methane emissions. If subsequent amendments relative to the original draft contain significant changes, this has been documented in footnotes.

The legislation also regulates methane venting and emissions from thermal coal mines:

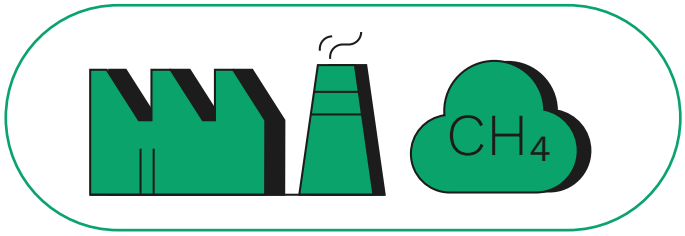
- In 2025, there will be a ban on methane flaring with an efficiency of less than 98%, as well as the release of this gas into the air from methane drainage stations. Mining and auxiliary companies will thus be forced to improve the tightness of their plants and find a way to safely dispose of the methane released.

- In 2027, it is expected that a ban will be introduced on the release of methane into the atmosphere from ventilation shafts of mines emitting more than 0.5 tons of methane per 1,000 tons of coal mined[3]. The European Commission will propose a delegated act to regulate emissions from coking coal mines no later than two years after the legislation comes into force.

- Penalties for non-compliance with the regulation will be set by Member States. Every year, they will be required to publish information on the amount of fines and violations of the regulation.

2.2. Sources of methane emissions versus hard coal mining

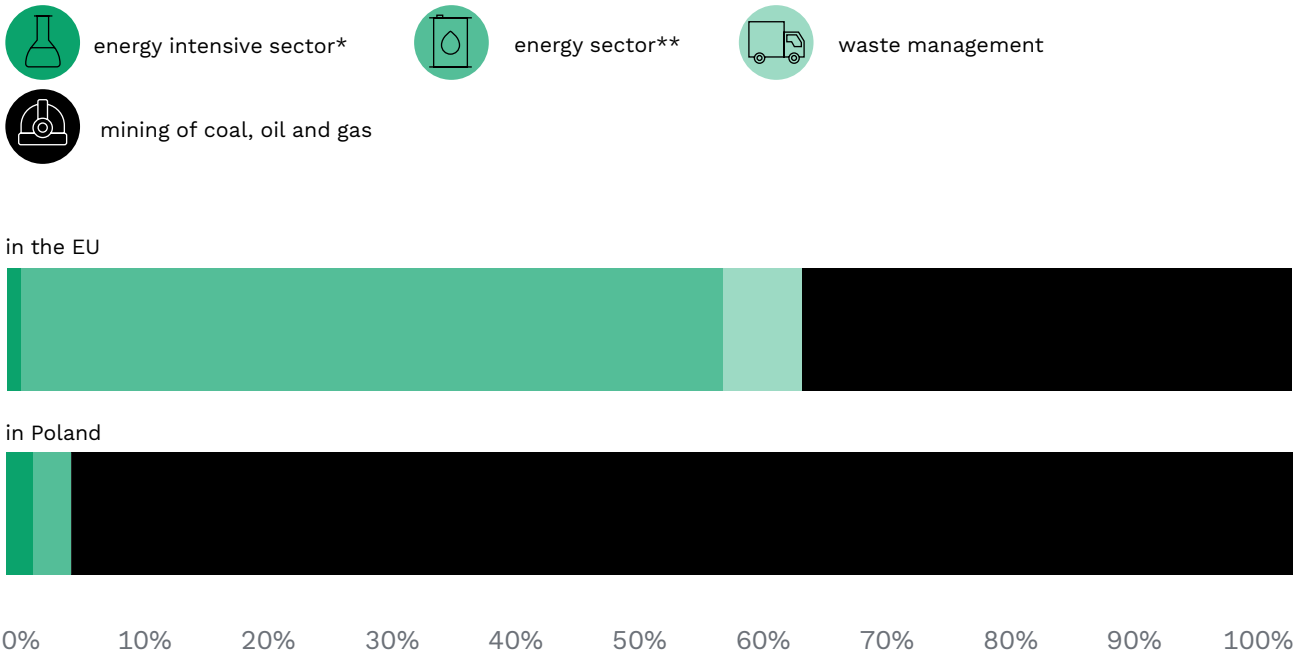
Poland is an exception on the European map of methane emissions due to the unusual structure of the emissions. Contrary to other countries, hard coal mines (including those closed) have the largest share in the structure of methane emissions in the E-PRTR system. Only a fraction of the emissions come from the natural gas and oil industries, which contribute significantly to EU-wide methane emissions.



3 The most recent amendments to the regulatory proposal (REV 5 and 6) propose a gradual postponement of this deadline until 2031, depending on the methane output of the mines. According to them, mines emitting more than 5 tons of methane per 1,000 tons of coal would be able to vent methane into the atmosphere by 2027, and mines emitting between 3 and 5 tons of methane – by 2031.

CHART 1. Structure of methane emissions by source — Poland vs EU

THE POLISH STRUCTURE OF METHANE EMISSIONS IS SIGNIFICANTLY DOMINATED BY EMISSIONS CAUSED BY HARD COAL MINING



Source: Instrat based on E-PRTR.

* The energy-intensive industry includes the chemical industry and the steel making sector.

** The energy industry includes the generation and processing of oil and gas.

E-PRTR includes only emissions reported by individual emitters

In 2013–2021, methane emissions from active hard coal mines in Poland remained steady at **450'000 to 525'000 tons** per year. Domestic emissions are only partially correlated with mining. Factors such as the intensity of mining and the depth of mining works are more important than the volume of excavated material. For example, the decrease in emissions in 2020 can be explained by the decrease in mining activity caused by the COVID-19 pandemic (chart 2). In contrast, the increase in emissions after 2012 is due to the start of mining deeper coal beds.

The inevitable decrease in coal production in the future – according to government projections included in the *Poland's Energy Policy until 2040* (PEP2040) and Instrat's modeling (2021a) – does not explicitly account for the proportional decrease in methane emissions. As the life cycle of mines progresses, mining activities involve deeper coal beds with higher methane content.

There are two main types of hard coal: thermal coal (types 31–33) and coking coal (types 34 and 35). Thermal coal is mainly used to produce electricity and heat. Coking coal, on the other hand, is important for the steel

and iron making industries, where coke serves not only as a fuel, but mainly as a reaction substrate. Coking coal has been a critical raw material of the European Union since 2020 (European Commission, 2020), which underlines its importance in the EU economy.

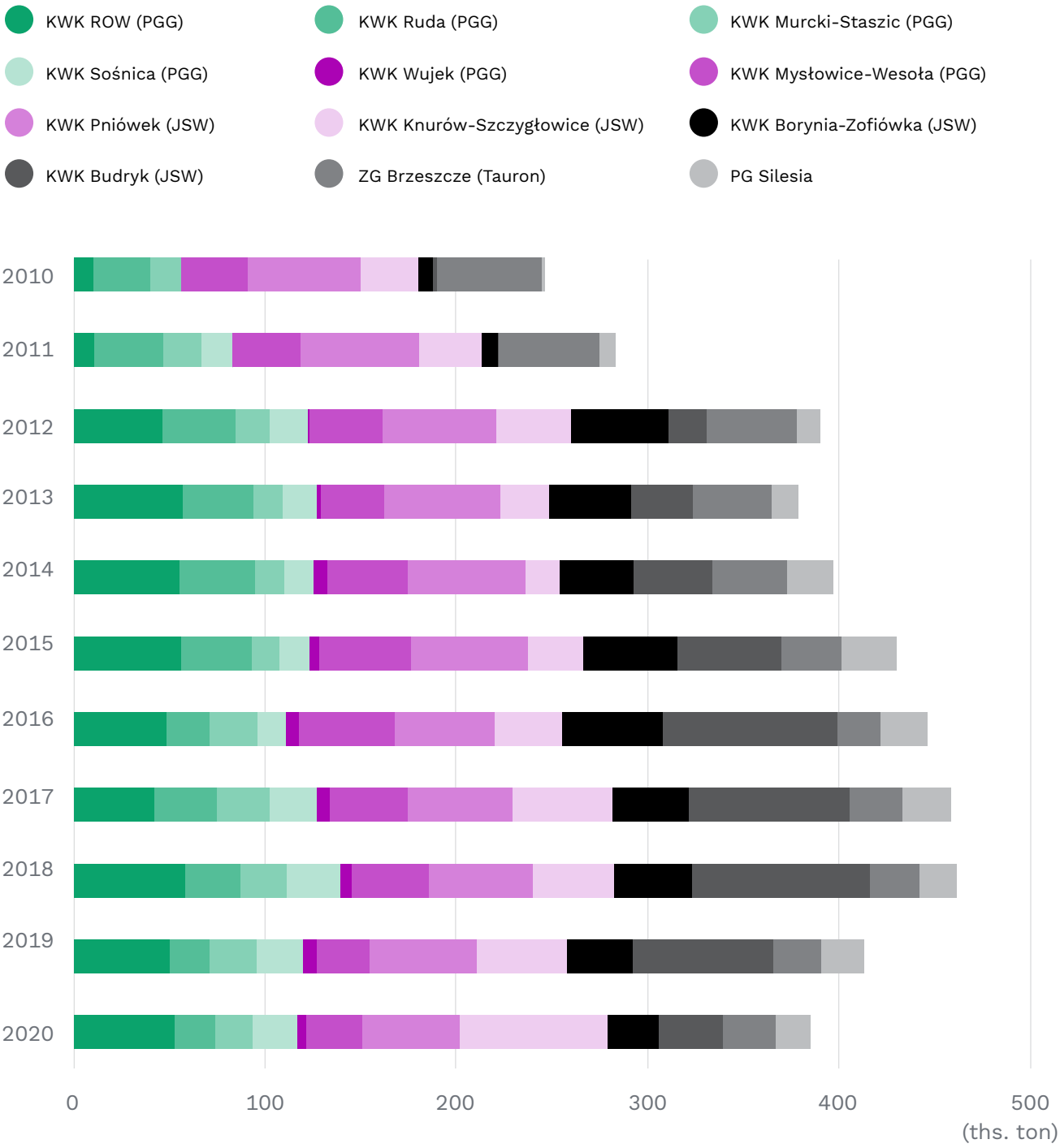
Between 2010 and 2021, the amount of annual hard coal production in Poland fell by more than 20 million tons, i.e. by 28%. At the same time, methane emissions increased by 26% – to 426'000 tons in 2021.

CHART 2. TRENDS IN HARD COAL MINING IN POLAND AND MINE METHANE EMISSIONS

Source: Instrat based on KOBiZE and ARP Katowice (polskirynekwegla.pl).

CHART 3. Methane emissions in hard coal mining by ownership structure of mines (2010–2020)

IN RECENT YEARS, METHANE COAL MINING METHANE EMISSIONS HAVE DECREASED TO APPROX. 400'000 TONS

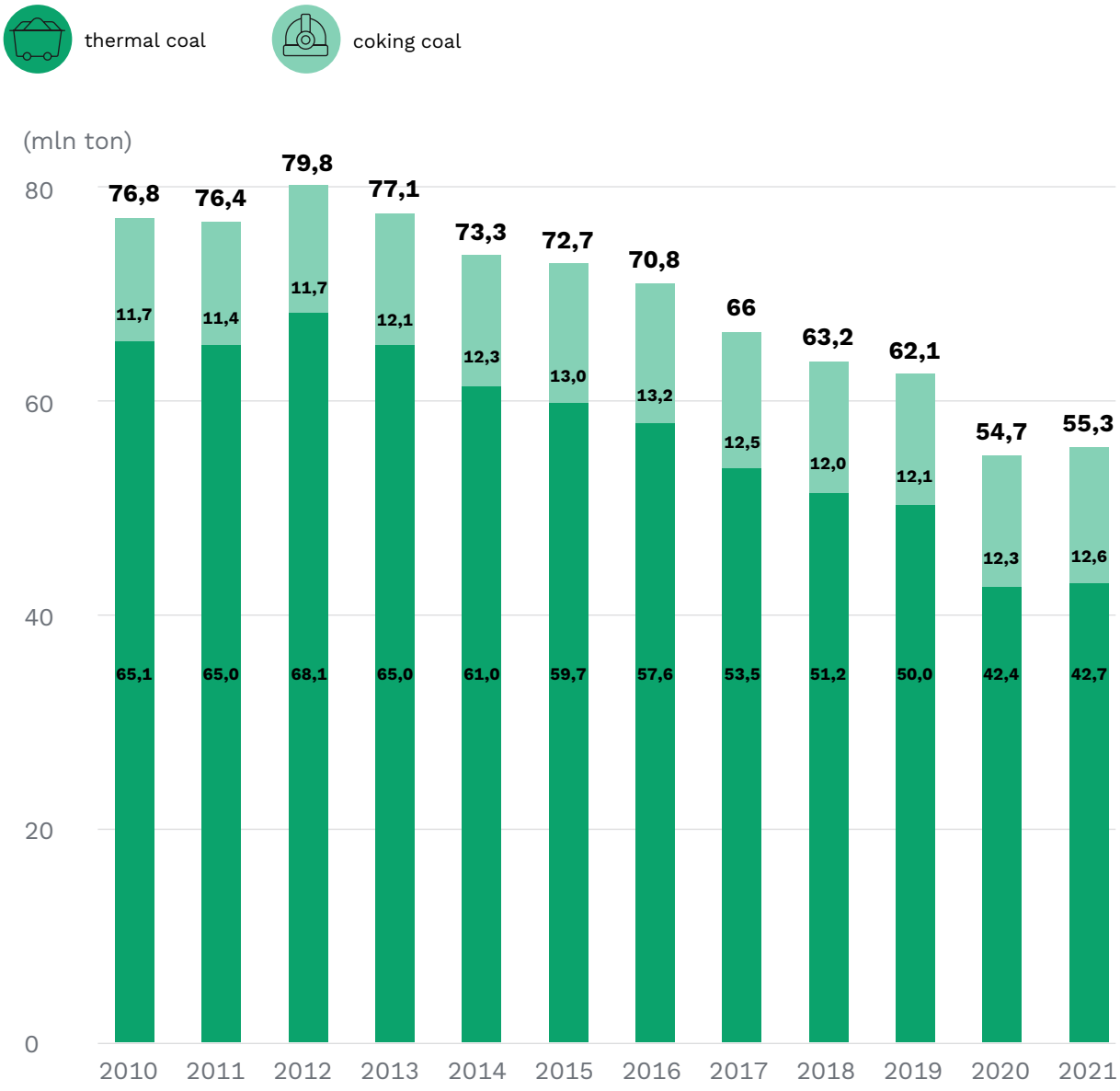


Source: Instrat based on KOBiZE.

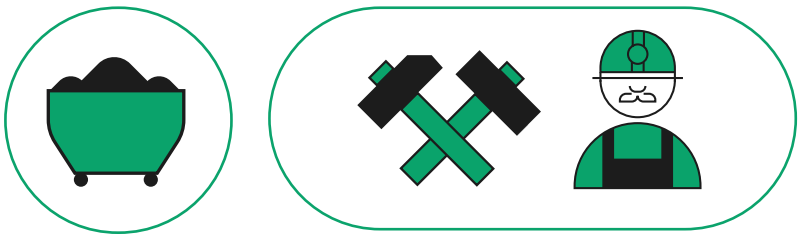
Despite a steady decrease in hard coal production, the coking coal production remains steady at approx. 12 million tons. In 2021, it was 12.6 million tons and accounted for 23% of total hard coal production in that year (chart 4). Approximately 11 million tons of this was mined by Jastrzębska Spółka Węglowa (JSW, 2021).

CHART 4. Production of thermal and coking coal in Poland (2017–2021)

THE COKING COAL PRODUCTION REMAINS AT APPROX. 12 MILLION TONS DESPITE A DECREASE IN THERMAL COAL PRODUCTION



Source: Instrat based on Statistics Poland (GUS).



3. Data governance in the Polish hard coal mining sector

There data governance in the Polish hard coal mining sector contains a plenty of barriers. Without overcoming those, it will be difficult to meet the ambitious targets set by the EU regulation on reducing methane emissions. Without reforming the methane emissions reporting systems (and many other parameters), implementation of these requirements may prove difficult. Without unifying and making public the methodology for collecting, verifying and releasing data (metadata), many existing reporting systems may appear to be redundant and full of conflicting information. Thus, the analysis of the deliverables regarding the value of emissions by year may contain errors (*garbage in*, *garbage out)* and cause excessive administrative burdens for emitters reporting on emissions and for public institutions collecting and analyzing data.

Instrat has regularly highlighted the problem of lagging reporting standards and publication of resulting statistical information from the energy and mining sectors (Frank Bold, 2020; Instrat, 2020a, 2020b, 2021b, 2022). In particular, limited access to data in this area is a problem. The institutions responsible for publishing them deliberately keep barriers hindering the process of obtaining and analyzing the most up-to-date data, such as by keeping them in user-unfriendly formats (PDF) or even selling them for a fee through an online store.

Progress in these areas has been noticeable in recent years, but it remains uneven. Only some state institutions have implemented, in part or in full, the data transparency standards outlined in the Governmental Open Data Program for 2021–2027 period (Cyfryzacja KPRM, 2021).

3.1. Challenges in analyzing data from individual institutions

Responding to the analytical needs of the public administration and the emitters themselves, we present the identified sources of data on mine methane emissions in Poland, as well as the challenges posed by limitations in the availability of these data and inconsistencies between their sources.

TABLE 1. Overview of the most important data sources on hard coal mining and methane emissions

	1	2	3	4	5	6	7
Institution	**Industrial Development Agency Katowice Branch – ARP Katowice** (commissioned by the Ministry of State Assets)	**National Center for Emission Balancing and Management**	**Polish Geological Institute – National Research Institute**	**State Mining Authority**	**Ministry of Climate and Environment**	**Mining companies**	**Marshal's Offices** (Silesia and Lesser Poland)
Name of publication or data file	*Information on the drainage and management of methane from hard coal mines in Poland*	National Database on Emissions of Greenhouse Gases and Other Substances	1. Balance of mineral resources deposits in Poland 2. MIDAS database	*Assessment of the state of occupational safety, mine rescue and public safety in connection with mining and geological activities*	List of prospecting, exploratory and mining licenses for solid mineral deposits	1. Periodic reports 2. Management reports on operations	Ekopłatnik system
Legal basis	*Act of September 7, 2007 on the functioning of the hard coal mining industry*	*Act of July 17, 2009 on the system of managing emissions of greenhouse gases and other substances*	*Act of June 9, 2011 – Geological and Mining Law*			*Act of September 29, 1994 on accounting*	*Act of April 27, 2001 – Environmental Protection Law; Regulation of the Minister of Climate of December 11, 2019 establishing lists containing information and data on the extent of use of the environment (...)*
Place of publication and access	Portal polskirynekwegla.pl; Public Statistics – portal of the Katowice Industrial Development Agency	None – need to make a request for access under the right to environmental information	PIG-PIB home page – pgi.gov.pl (including MIDAS geoportal)	State Mining Authority homepage – wug.gov.pl	dane.gov.pl portal	Websites of companies; National Court Register – viewing financial documents online	None – need to make a request for access under the right to environmental information

	1	2	3	4	5	6	7
Institution	**Industrial Development Agency Katowice Branch – ARP Katowice** (commissioned by the Ministry of State Assets)	**National Center for Emission Balancing and Management**	**Polish Geological Institute – National Research Institute**	**State Mining Authority**	**Ministry of Climate and Environment**	**Mining companies**	**Marshal's Offices** (Silesia and Lesser Poland)
Scope of publication							
Environmental data	X	X	X	X	X	X	X
Economic data	X	—	—	—	—	X	—
Technical data	—	—	—	X	—	X	X
Administrative data	—	—	X	—	X	X	X
Data granularity	Aggregated – no information on specific emissions	Unit-based (plant)	Unit-based (deposit)	Unit-based (operation)	Unit-based (deposit)	No uniform model – aggregated, specific in exceptional cases	None
Data publication format	PDF file	Editable CSV file	1. PDF file 2. Database generating online reports once	PDF file	Any data formats – XLSX, JSONLD, CSV	PDF file	None
Date and frequency of publication	Semi-annually – quarterly publications within 2 months after the end of the semi-annual reporting period	Annually – reporting takes place by the end of February of the following year	Annually – publication around July of the following year	Annually – publication around June of the following year	Whenever changes are introduced in the existing list	Annually, quarterly or monthly depending on the company's articles of association	Annually

Source: own study of Instrat based on the data listed in Table 1.

1 Industrial Development Agency (Katowice Branch) – ARP Katowice

ARP Katowice is conducting two surveys on request of the Ministry of State Assets:

1. Statistical surveys based on the annually updated Statistical survey program of official statistics (PBSSP).
2. Monitoring of hard coal mining operations under the Act on the functioning of the hard coal mining industry.

One of the studies published on a semi-annual basis is the *Information on the methane drainage and management of methane from hard coal mines in Poland*. It contains aggregated (anonymized) data on the methane intensity of mined longwalls and as well as methane discharge and management of methane from hard coal mines, including the amount separated, captured and emitted to the atmosphere.

Until the end of 2021, the publication was, like all other publications of ARP Katowice, developed within the PBSSP and available on polskirynekwegla.pl only against a fee of up to several hundred PLN. Although since 2022 the publication has been available free of charge, data access barriers still delay the publication of data and the unfriendly PDF format hinders their analysis.

2 National Center for Emission Balancing and Management (KOBiZE)

On the basis of individual reports from emitters obliged to report to the National Database on Emissions of Greenhouse Gases and Other Substances, KOBiZE prepares a summary report for reporting in the UNFCCC and EU system (E-PRTR). Detailed individual data can be accessed, and the editable format of the data transferred (CSV or XLS file) is the obvious advantage. However, a complication is the need to request data access each time under the right to environmental information (on request). According to Instrat's data analysis, despite the high level of detail and the range of unit-level data unavailable elsewhere, the records specified in the KOBiZE database contain internally inconsistent category names and make it impossible to accurately and reliably identify the source of emissions.

3 Management reports on the activities of mining companies, periodic reports

Depending on the size, ownership structure (including public trading) and the level of complexity of the company's structure, reports are either available on the website of the company in question or only in the online browser of financial documents maintained by the National Court Register. However, different standards and methodologies used make it difficult to compare important technical, financial and environmental figures between companies, such as production or employment data. The reports differ in the level of detail of reporting. Examples of inconsistencies that hinder data analysis:

- The Polish Mining Group, a leader in the Polish hard coal market, reports in its annual report the individual production of a given mine by type of coal mined – thermal or coking coal.
- The second largest hard coal producer in Poland, Jastrzębska Spółka Węglowa – JSW, despite being listed on the Warsaw Stock Exchange and hence by definition sharing more information, reports only aggregate production values for all mines, making it impossible to distinguish between the types of coal produced.
- Smaller companies, such as PG Silesia or ZG Siltech, do not report production at all. None of the reports examined show methane emission values by mine.

4 Polish Geological Institute

The Polish Geological Institute collects a range of information from mineral mining companies about their current operations, including the environmental aspects of work at specific coal beds. A flagship publication of the Polish Geological Institute is the annual *Balance of resources of mineral deposits in Poland*. The data presented in this report is also published in the Geoportal MIDAS. Due to its scientific nature, the Polish Geological Institute does not verify the data it receives from companies, leading to emerging inaccuracies between other reporting systems. The format of the data published is not conducive to analysis by users. It is also impossible to download data from the MIDAS portal in aggregated form, which requires labor-intensive formulation of queries to the system.

5 State Mining Authority

The main purpose of the authority is to provide information on the safety and technical side of production operations. It presents its surveys in annual thematic reports: *Assessment of the state of occupational safety, mine rescue and public safety in connection with mining and geological activities* (...). In addition to analyzing operating conditions, the reports also indicate the efficiency of methane drainage stations. Data on individual methane emissions from individual mines and shafts are available, partly coinciding with the KOBiZE data.

6 Ministry of Climate and Environment

The list of prospecting, exploratory and mining licenses for solid minerals of the Ministry of Climate and Environment is a limited set of data. It contains only basic data about the operating company. However, it presents open access data on the central governmental open data platform dane.gov.pl in the best way of all the sources analyzed. Therefore, it should be a benchmark for how other institutions that maintain their own data sets present the data. A challenge in data analysis is the lack of information on the entire legal process of mining a particular coal bed. Expanded access would make it possible to monitor new investment projects and analyze their impact on the natural and social environment.

7 Marshal's Offices

Marshal's Offices maintain their own databases of individual emissions. The Silesian and Lesser Poland Voivodeships use the Ekopłatnik system, which is used for preparation by the entity using the environment of lists with information and data on the scope of use of the environment and the fees due. Based on these lists, the authority determines the amount of the fee and whether the entrepreneur exceeded the statutory threshold in a given year. It currently amounts to PLN 800 per year for each type of emission. Up to this amount, the polluter is exempt from fees.

The voivodeships thus have data that partially overlap and are partially complementary with the data reported by emitters to the database maintained by KOBiZE. Access to unit-based emission information of individual emitters is possible only on the basis of a request for environmental information. There is no public access to either individual data or aggregated data in editable format from these databases.

3.2. Challenges in analyzing data from individual categories

Production

The individual value of coal production at a given mine (or even a mine-shaft/open pit) can be accessed from two sources: the Balance of mineral resources deposits in Poland, maintained by PIG-PIB, and selected periodic reports of mining companies. The latter information is considered market data, so it is not directly covered by the obligation of companies to publish. However, combining production data from PIG-PIB data sets makes it possible to identify the value of production at a particular mine operating specific coal beds.

A comparison of data from the two sources reveals significant differences in reported production. Mining companies report production to PIG-PIB. Due to the lack of uniform standards for their publication (metadata), the value of reported production varies between sources. The most likely reason for these discrepancies is the lack of clear distinction in reporting systems and publication of resulting information between excavated material, gross production and net production, or even sales.

For example, output from the listed LW Bogdanka mine, according to the company's report available on its website, was 47% higher in 2021 than the value published by PIG-PIB. As can be seen in the chart below, the differences in production apply to each coal mine, so they cannot be attributed to an error associated with the reporting of a single company.

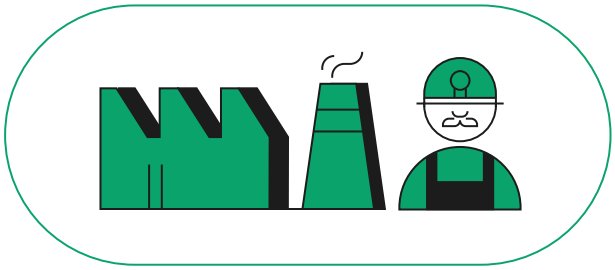
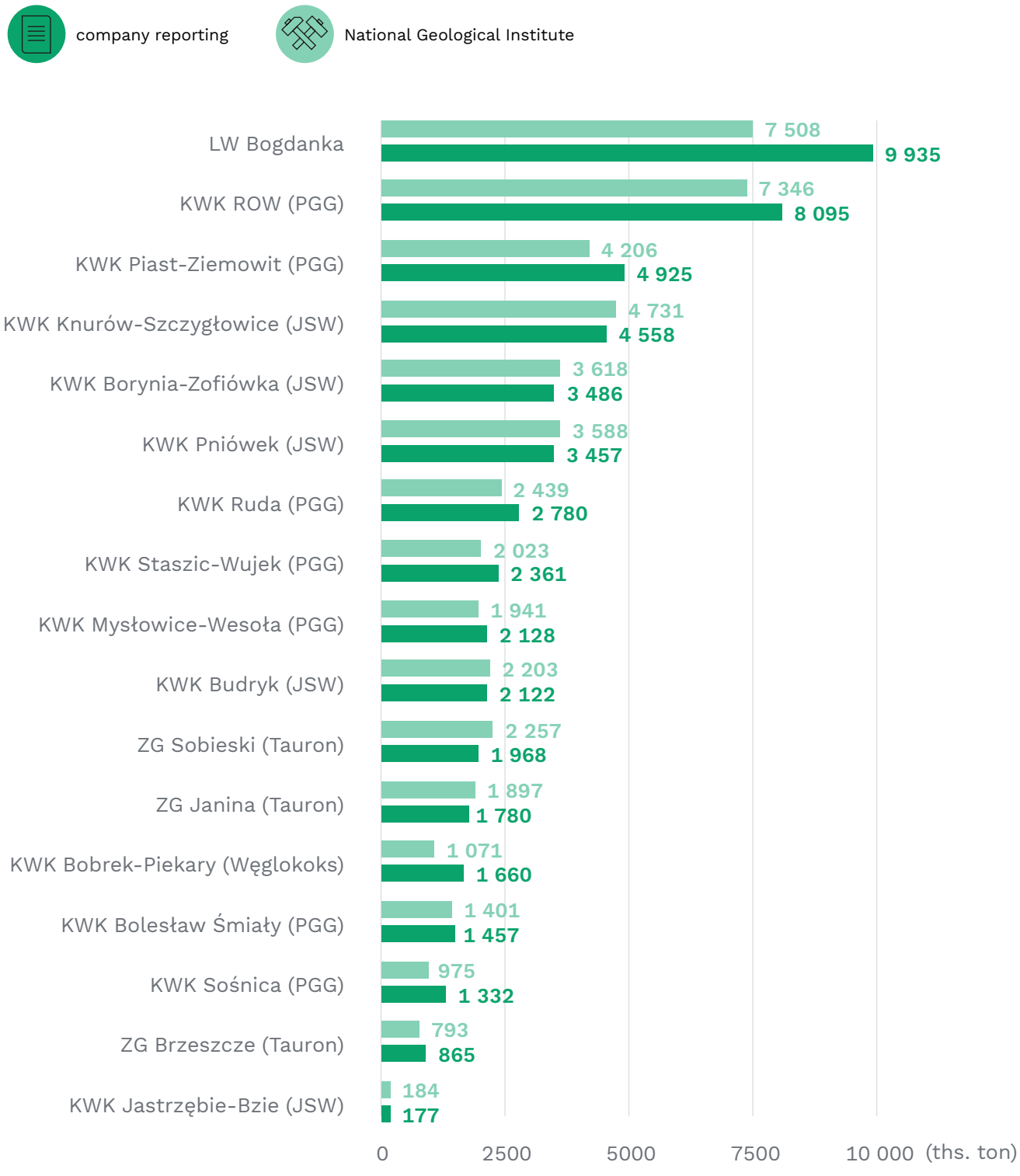


CHART 5. Differences in hard coal production reporting in 2021.

THE LARGEST DIFFERENCE IN REPORTING IS 32% (LW BOGDANKA)



Source: Instrat based on PIG-PIB data and annual reports of mining companies.

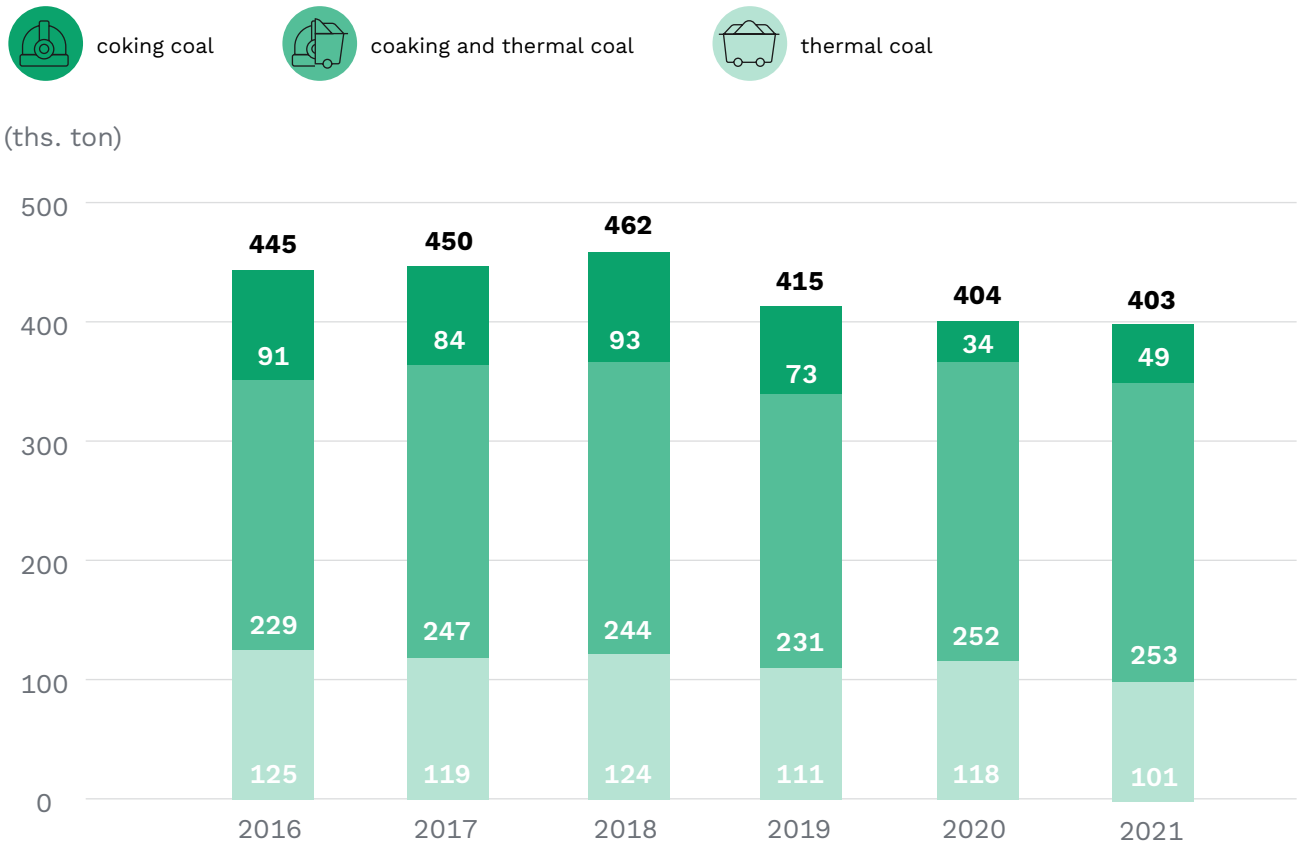
Methane emissions intensity of coking coal

The way production is reported to PIG-PIB makes it difficult to distinguish how much methane emissions were generated by mines producing a particular type of coal. Chart 6 shows that 63% of emissions in 2021 came from mines with both thermal and coking coal in their coal beds. However, the extent to which these resources are operated is unknown. Therefore, it is difficult to determine the quantity of methane emissions attributed to the mining of each of these types of coal.

The attribution of methane emissions to the production of a particular type of coal is important because of the new requirements set forth in the draft EU regulation on reducing methane emissions. It provides for a ban on methane emissions from 2027 only from thermal coal mines. This lack of distinction makes it impossible today to assess the impact of the regulation holistically. It only leaves room for emitters, not public institutions, to assess based on data and analysis whether and to what extent and within what timeframe it is possible to implement the ambitious goals of the legislation.

CHART 6. Methane emissions from thermal and coking coal mines according to PIG classification

MOST OF THE METHANE COMES FROM MINES WHOSE MAIN TYPE OF COAL MINED WE CANNOT CLEARLY IDENTIFY



Source: Instrat based on KOBiZE.

Sources of unit-level coal mine methane emissions

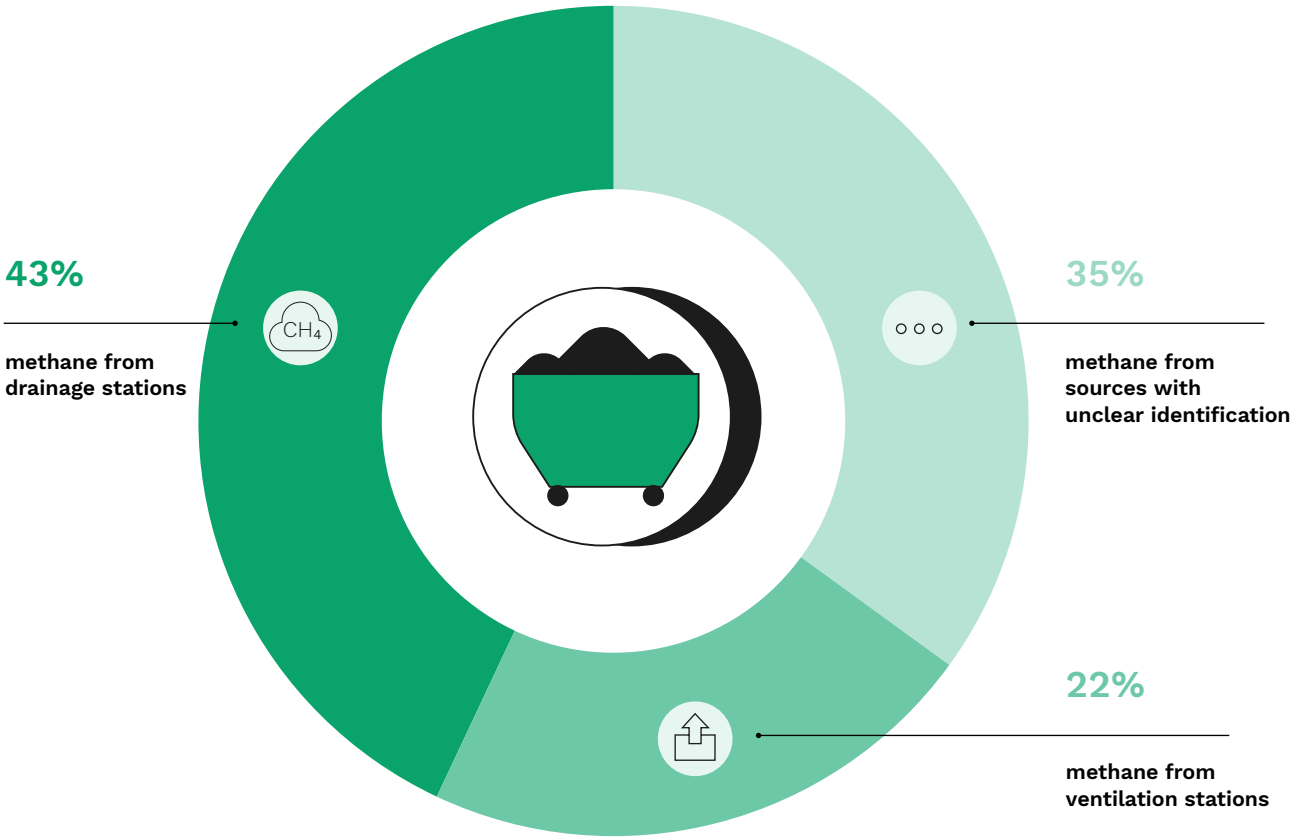
Methane escapes into the atmosphere from active underground hard coal mines in two different ways:

- through the methane drainage system,
- through the ventilation shafts.

This means that some of the reported emissions can be managed by increasing the efficiency of the methane drainage stations. Unfortunately, due to inconsistent ways of presenting data in the KOBiZE database, it is not possible to read the information on what part of the total mass of emissions comes from a given source. Information on one of the two types of emissions can be attributed to about □ of the value of the total emissions – the rest is not described at all in terms of how methane is emitted into the atmosphere.

CHART 7. Methane emissions by source

ALMOST HALF OF THE METHANE REPORTED TO THE KOBIZE COMES FROM VAGUELY DESCRIBED PLANTS



Source: Instrat based on KOBiZE.

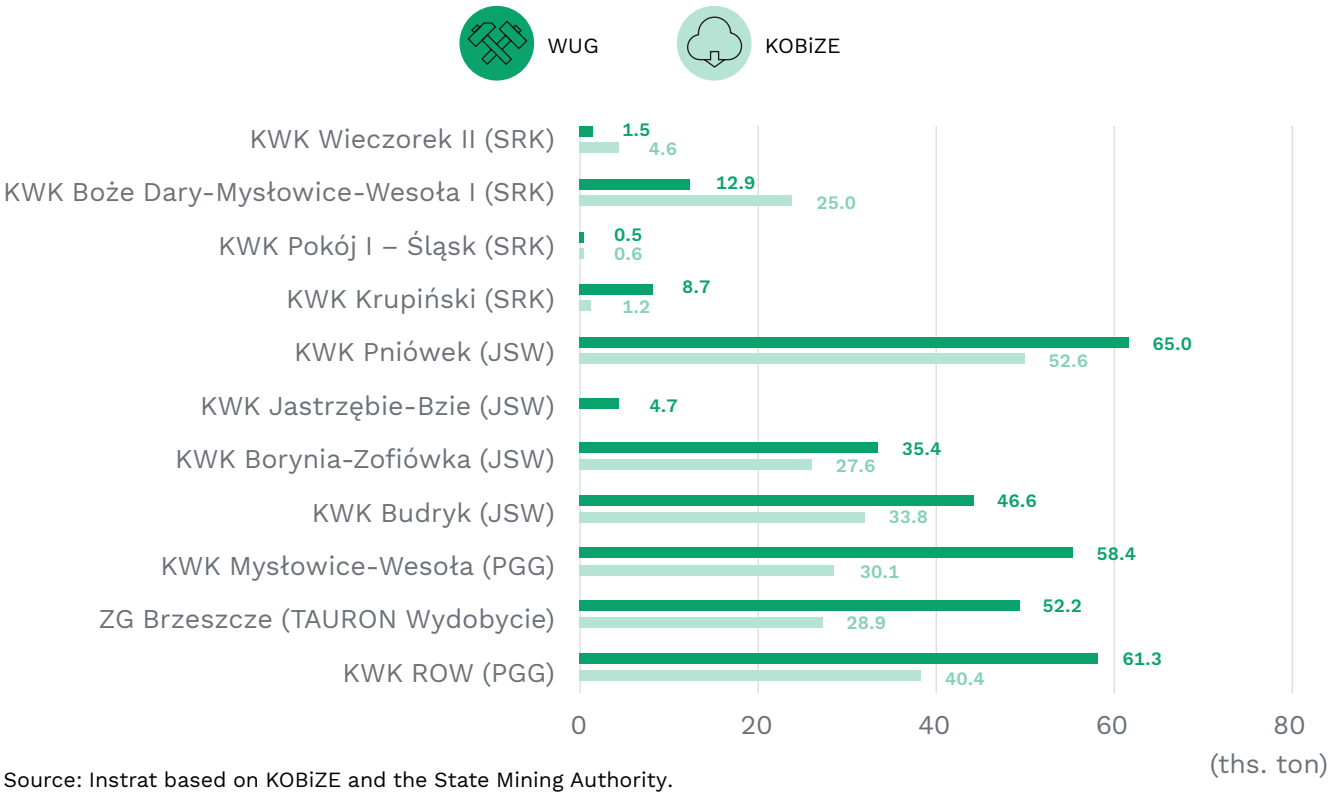
The volume of methane emissions

The value of emissions with unit-level granularity is in principle available in two sources: in the annual report of the State Mining Authority (WUG) and the KOBiZE. The lack of harmonized reporting of the same information between institutions, but presented for different purposes, results in significant discrepancies in emission values at the same mines.

The data of the State Mining Authority is used to assess mine safety risks. They describe the effectiveness of methane drainage. Hence they report how much of the total methane found in the mine was captured, and how much was vented to the atmosphere via shafts. Thus, information on total emissions is collected here not only by weight (tons), but also by volume (cubic meters).

The KOBiZE data and the statistical reports created from it are used to monitor climate policy goals and focus on the weight and performance characteristics of emitters in many sectors (not just the energy sector). It is worth recalling that the KOBiZE is responsible for reporting volumes of emissions to EU (E-PRTR) and UN (UNFCCC) bases. They constitute the basis for public policy recommendations and regulatory impact assessments.

CHART 8. Differences in reporting methane emissions at selected mines



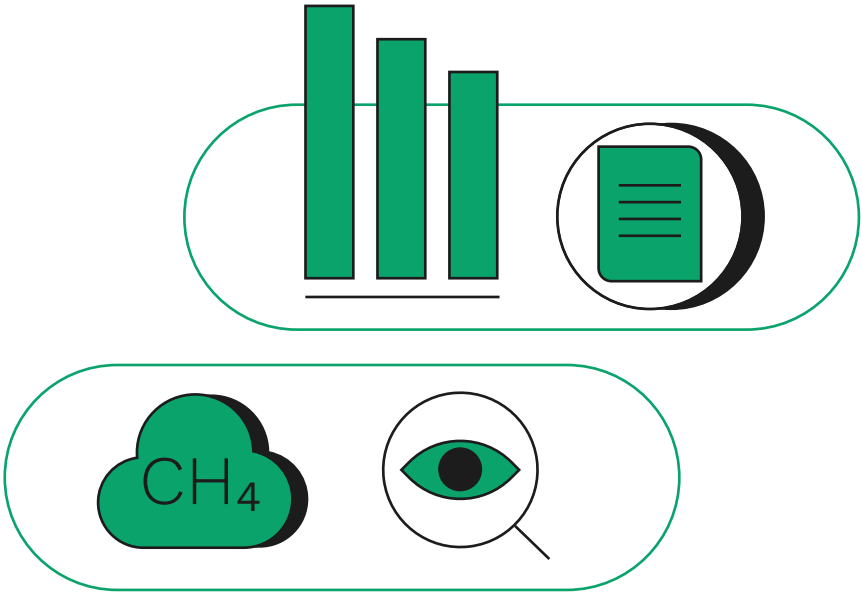
Source: Instrat based on KOBiZE and the State Mining Authority.

* The methane density factor of 0.65 kg/m^3 was used for the calculations.

A comparison of data from the two main sources (the State Mining Authority and KOBiZE) shows that the difference between the data presented was about 67 thousand tons of methane (about 15%) in 2021. Both hard coal production and methane emissions are reported in various sources. As a result, the competencies of public institutions are duplicated instead of being complementary to each other. This is a source of errors and discrepancies between data in different reporting systems and, as the emitters themselves raise in the public debate, creates unnecessary administrative obligations. Even if the objectives of the measurements carried out are different, this should not involve differences in volumes.

Implementation of the EU regulation on reducing methane emissions will require a reform of the reporting system on sources and volumes of emissions. This should eliminate errors and discrepancies, increase data accessibility standards, as well as simplify and harmonize reporting obligations of emitters.

Instrat recommends introducing a system for verifying records entered and providing a wide choice of formats for publishing individual and aggregated data. Such activities would fulfill the goals of the Governmental Open Data Program for 2021-2027 period (Cyfryzacja KPRM, 2021) and implement good practices for sharing public and private data (Cyfryzacja KPRM, 2022).



4. A look into the future: recommendations for Poland

4.1. Reforming the reporting system

Instrat's research shows that the first step towards reducing methane emissions is establishing a uniform, consistent and transparent reporting system. We identify the following as major challenges:

- overlapping competences of institutions and identical data,
- inconsistencies between data due to differences in methodologies,
- no metadata developed,
- no open access to aggregated or individual data.

Without reforming the methane emissions reporting system, it will be challenging to assess the regulatory impact of the EU regulation on reducing methane emissions and monitor its implementation in Poland. It is essential that stakeholders in the mining industry and the state administration also have insight into and understand the activities of this sector (in practice, 2-3 largest coal producers), which is responsible for Poland's significant contribution to global greenhouse gas emissions.

Duplication of reporting obligations is one of the challenges pointed out by the mining industry itself. What is more, mining companies are losing out on the lack of transparency, because it makes it harder for investors to make decisions and discourages investing in new technologies that improve the efficiency of methane drainage and combustion processes.

We recommend reforming the system for reporting methane emissions and, in particular, harmonizing the competencies of institutions responsible for a range of reporting obligations. The mandate of already existing institutions should change. The State Mining Authority should be tasked with verifying and harmonizing as well as publishing unit-based data from individual emitters. Under the EU regulation on reducing methane emissions, the State Mining Authority could control the compliance of measurement methodologies and verify reported unit-level emissions and production data.

The remaining institutions identified (KOBiZE, ARP Katowice should be required to cooperate and co-verify the data. The data collected should also include a classification of emissions by source, i.e., broken down into emissions from methane drainage plants and emissions from ventilation shafts.

Published datasets should be made available in accordance with good practices of data openness standards – in line with the goals of the Governmental Open Data Program for 2021-2027 period (Cyfryzacja KPRM, 2021). The resulting information should be accompanied by a description of the methodology (metadata) for both measurement and quantification, which would prevent misinterpretation and the occurrence of conflicting records. Ultimately, the dataset should be available in an editable format (e.g. CSV, API) and made available on the government portal dane.gov.pl.

We recommend that mining companies raise the standard of non-financial reporting and commit to regularly publishing data on individual emissions from individual mines. Some companies (JSW, LW Bogdanka) have already included emission reduction and methane management targets in their ESG strategies – but the lack of public scrutiny of meeting these targets makes it impossible to verify progress toward this goal.

4.2. Pricing of methane emissions

We recommend reforming the system environmental fees by appropriately raising the pricing of methane emissions to a level that will provide incentives for emitters to invest in methane emission abatement technologies. Pricing in accordance with the polluter pays principle requires raising the current rate to a level that reflects the negative environmental and social impacts of methane emissions.

The revenue generated should be reinvested in technologies that offset the negative effects of emissions and in environmental protection. This will provide the right incentives for investment in more efficient emissions reduction technologies and encourage funding for methane innovation.

Taxing methane emissions is one of the elements of the U.S. *Inflation Reduction Act*, which sets ground for introduction of a gradually increased fee. Operators of oil and gas processing plants are required to pay for emissions starting in 2024, when this fee will be USD 900 per 1 ton of methane emitted (about PLN 3’600). It will rise to USD 1’200 (PLN 4’800) in 2025 and reach USD 1’500 (PLN 6’000) in 2026, and will remain at that level in the following years (IEA, 2022).

The environmental fee in Poland in 2023 is only PLN 0.34 (ca. EUR 0.07) per ton of methane emissions and is only adjusted at the inflation rate. Thus, it is more than 2’500 thousand (17’500) lower than even the lower (upper) threshold for the methane emissions fee, which will become effective in the USA next year (in 3 years).

This fee is paid to the account of the relevant Marshal's Office – in the case of methane mines, these will are the Silesian and Lesser Poland voivodeships. There are also minimum emission thresholds below which there is no obligation to pay a fee or report emissions. These thresholds are PLN 800 and PLN 100, respectively, for one type of environmental use.

In the case of methane emissions for example for the year 2022, this means that an environmental report must be filed only when its annual emissions exceed 312.5 tons, and the fee must be paid after at least 2'500 tons of methane have been emitted.

We recommend that the current model for pricing emissions of the harmful greenhouse gas – methane – be replaced by one of two models:

1 **The first model** assumes a simplified link between the methane fee and the EU ETS fee

Combustion of 1 ton of methane in high-efficiency cogeneration plants (with efficiency of more than 90%) is associated with the emission of approx. 3 tons of CO_2 and (assuming operation under the ETS system) incurring a fee ranging from EUR 80 to 100 per ton at present. Methane emissions in the ventilation process, which are more harmful, should therefore cost at least as much.

WE RECOMMEND raising the fee for emitting 1 ton of methane to at least 3.5 times the average price of an allowance to emit 1 ton of CO_2 in the previous year. Assuming an average price of EUR 80 per ton of CO_2 emissions (close to the average for 2022), a single environmental fee for emitting a ton of methane would be about PLN 1,300, i.e. more than 3,800 times the current price.

2 **The second model** would use the social costs of methane emissions estimated on the basis of research data

From the calculations of the UNEP and WMO report (UNEP, 2011) it can be deduced that mine methane emissions from Poland caused about 145 premature deaths (VSL – value of a statistical life) and up to PLN 200 million of the loss of added value in other sectors.

Hence, simply recalculating ETS allowances may not be enough to reflect these negative effects.

WE RECOMMEND adopting this approach in Poland and introducing an environmental fee for the cost of lives lost and losses incurred by the economy. This was the model chosen by the US Congress in the recently passed *Inflation Reduction Act*. Depending on the accounting methodology, the estimates for Poland should very certainly give a higher pricing than in the first model.

Implementing such a reform in just a few years would only be feasible with high political support and the willingness of the mining sector to invest accordingly. Therefore, the price should be raised gradually so that by the end of the decade (by 2030), it would reach the recommended amount analogous to the rules implemented in subsequent years in the USA.

With the right investments in high-quality methane flares and higher methane drainage efficiency, operators could not only recover a valuable energy resource, but also avoid emission costs. The key elements for creating the right conditions for investment in these technologies are the stability and predictability of the emission fee and the high opportunity cost of not investing in emission reductions. Today's low cost of the environmental fee creates virtually no incentive for the necessary investments. It also generates, not irrelevant to the scale of the problem, a financing source. Supportive reform of reporting standards should also make it possible to distinguish emission sources and assess opportunities for improvements.

Even in the first model for pricing methane emissions as proposed by Instrat, the fee should lead to a significant improvement in the situation in Poland. It would motivate the highly popular combustion of vented methane and improve the efficiency of methane drainage systems. These improvements are among the most effective in reducing emissions, guaranteeing net gains for both emitters and the society (Shindell et al., 2017).

Both systems proposed have their place in the ecosystem of the EU legislation proposed. It assumes a ban on the release of methane from methane drainage stations from 2025 and a ban on the use of ventilation shafts from 2027, but only in mines with emissions exceeding 0.5 tons of methane per 1'000 tons of coal produced[4]. The proposed fees could therefore apply to methane emitted despite these bans and above the ultimately designated range. Until the relevant delegated act is adopted, they would only apply to thermal coal mines. We recommend that the fee should already be in effect before the bans described above come into force, so as to ensure a smooth transition and roadmap and encourage companies to innovate.

4 The REV 5 amendment increases this value tenfold – to 5 tons per 1,000 tons of coal mined.

Abbreviations and definitions

ARP Katowice	Industrial Development Agency, Katowice Branch
EU ETS	European Union Emissions Trading System
E-PRTR	European Pollutant Release and Transfer Register
KOBiZE	National Center for Emissions Management
EC	European Commission
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act
JSW	Jastrzębska Spółka Węglowa
PBSSP	Survey program of national statistics
PEP2040	Polish Energy Policy until 2040
PGG	Polska Grupa Górnicza
PIG-PIB	Polish Geological Institute – National Research Institute
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environmental Programme
UNECE	United Nations Economic Council on Europe
WUG	Wyższy Urząd Górniczy – State Mining Authority

References

- ARP Katowice (2022). Polski Rynek Węgla. https://polskirynekwegla.pl/.
- Cyfryzacja KPRM (2021). Otwarte dane publiczne. https://www.gov.pl/web/cyfryzacja/otwarte-dane-publiczne.
- Cyfryzacja KPRM (2022). *Uwolnić potencjał danych. Zarządzanie danymi jako zasobem współdzielonym.* Warszawa. https://www.gov.pl/web/cyfryzacja/uwolnic-potencjal-danych-zarzadzanie-danymi-jako-zasobem-wspoldzielonym--raport.
- EEA (2022). *European Pollutant Release and Transfer Register.* European Environmental Agency. https://industry.eea.europa.eu/download.
- Ember (2020). *Drugi Bełchatów. Metan kopalniany w Polsce.* Ember Climate. https://ember-climate.org/app/uploads/2022/01/Polish-Polands-Second-Belchatow.pdf.
- Frank Bold (2020). *Analiza dot. Prawnych aspektów ponownego użycia danych ze statystyki publicznej sektora energetycznego. Rola Agencji Rynku Energii S.A.* https://instrat.pl/wp-content/uploads/2020/06/Frank-Bold-Opinia-prawna-statystyka-publiczna-i-ARE-energy.instrat.pl-v1.0-PUBLIC.pdf.
- Instrat (2020a). *Apel o otwarty dostęp do danych w energetyce i górnictwie.* https://instrat.pl/energy-instrat-apel/.
- Instrat (2020b). *Sezam otwarty. Pierwsza porcja bezpłatnych danych o energetyce dzięki Fundacji Instrat.* https://wysokienapiecie.pl/31425-sezam-otwarty-pierwsza-porcja-bezplatnych-danych-o-energetyce-dzieki-fundacji-instrat/.
- Instrat (2021a). *Droga do celu. Odejście od węgla w polskiej elektroenergetyce.* https://www.teraz-srodowisko.pl/media/pdf/aktualnosci/10109-instrat-raport-droga-do-celu-v1.pdf.
- Instrat (2021b). *Baza danych o kopalniach węgla kamiennego i brunatnego.* https://energy.instrat.pl/coal_mining_map.
- Instrat (2022). *Data governance in Poland's coal mining sector. Harnessing open data to monitor delivery of climate policy targets.* UNECE. https://unece.org/sed/documents/2022/03/presentations/data-governance-polands-coal-mining-sector-harnessing-open-data.
- International Energy Agency (2022). *Inflation Reduction Act 2022*: Sec. 60113 and Sec. 50263 on Methane Emissions Reductions. https://www.iea.org/policies/16317-inflation-reduction-act-2022-sec-60113-and-sec-50263-on-methane-emissions-reductions.
- IPCC (2021). Summary for policymakers. *In Climate change 2021: The physical science basis. Contribution of working group I to the sixth assessment report of the intergovernmental panel on climate change* (s. 3–32). Cambridge University Press. https://doi.org/10.1017/9781009157896.001.
- JSW (2021). *Dane operacyjne Grupy Kapitałowej JSW.* Jastrzębska Spółka Węglowa. https://www.jsw.pl/relacje-inwestorskie/dane-finansowe/podstawowe-dane-operacyjne/dane-za-2021-rok.
- KOBiZE (2021). Krajowa baza o emisjach gazów cieplarnianych i innych substancji. https://krajowabaza.kobize.pl/.
- Komisja Europejska (2020). *Zmniejszenie emisji gazów cieplarnianych: W ramach Europejskiego Zielonego Ładu Komisja przyjmuje strategię UE dotyczącą metanu.* EUR-Lex. https://ec.europa.eu/commission/presscorner/detail/pl/IP_20_1833.

- Ministerstwo Klimatu i Środowiska (2021). Lista koncesji poszukiwawczych, rozpoznawczych oraz wydobywczych dot. kopalin stałych. https://dane.gov.pl/pl/dataset/221/resource/28754,lista-koncesji-poszukiwawczych-rozpoznawczych-oraz-wydobywczych-dot-kopalin-staych-stan-na-dzien-28-lutego-2021-r.

- Ocko, I. B., i in. (2021). *Acting rapidly to deploy readily available methane mitigation measures by sector can immediately slow global warming.* Environmental Research Letters, *16*(5), 054042. https://doi.org/10.1088/1748-9326/abf9c8.

- Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy (2022). Geoportal MIDAS. MIDAS. http://geoportal.pgi.gov.pl/midas-web.

- Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy (2022). *Bilans Zasobów Złóż Kopalin w Polsce wg stanu na 31 XII 2021 r.* Państwowy Instytut Badawczy. https://www.pgi.gov.pl/aktualnosci/display/13679-bilans-zasobow-zloz-kopalin-w-polsce-wg-stanu-na-31-12-2021-r.html.

- Pujade-Lauraine, E., i in. (2017). *Olaparib tablets as maintenance therapy in patients with platinum-sensitive, relapsed ovarian cancer and a BRCA1/2 mutation (SOLO2/ENGOT-Ov21): A double-blind, randomised, placebo-controlled, phase 3 trial.* The Lancet Oncology, 18(9), 1274–1284. https://doi.org/10.1016/S1470-2045(17)30469-2.

- Royal Society (2008). *Ground-level ozone in the 21st century: Future trends, impacts and policy implications* (RS1276 ed., Vol. 15/08). The Royal Society. https://royalsociety.org/topics-policy/publications/2008/ground-level-ozone/.

- Shindell, D. T., Fuglestvedt, J. S., & Collins, W. J. (2017). *The social cost of methane: Theory and applications.* Faraday Discussions, 200, 429–451. https://doi.org/10.1039/C7FD00009J.

- UNEP (2011). *Integrated assessment of black carbon and tropospheric ozone.* United Nations Environmental Programme.

- Wyższy Urząd Górniczy (2021). *Ocena stanu bezpieczeństwa pracy, ratownictwa górniczego oraz bezpieczeństwa powszechnego w związku z działalnością górniczo-geologiczną w 2020 roku.* Wyższy Urząd Górniczy. https://www.wug.gov.pl/download/WUG_Stan_bhp_20,7584.pdf/view.

Legal acts:

- *Rozporządzenie Ministra Klimatu z dnia 11 grudnia 2019 r. w sprawie wykazów zawierających informacje i dane o zakresie korzystania ze środowiska oraz o wysokości należnych opłat* (Dz.U. z 2019 r. poz. 2443).

- *Rozporządzenie Parlamentu Europejskiego i Rady w sprawie redukcji emisji metanu w sektorze energetycznym oraz zmieniające rozporządzenie (UE) 2019/942*, COM(2021) 805.

- *Ustawa z dnia 27 kwietnia 2001 r. Prawo ochrony środowiska* (t.j. Dz.U. z 2022 r. poz. 2556).

- *Ustawa z dnia 29 września 1994 r. o rachunkowości* (t.j. Dz.U. z 2023 r. poz. 120).

- *Ustawa z dnia 7 września 2007 r. o funkcjonowaniu górnictwa węgla kamiennego* (t.j. Dz.U. z 2022 r. poz. 1309).

- *Ustawa z dnia 17 lipca 2009 r. o systemie zarządzania emisjami gazów cieplarnianych i innych substancji* (t.j. Dz.U. z 2022 r. poz. 673).

- *Ustawa z dnia 9 czerwca 2011 r. – Prawo geologiczne i górnicze* (t.j. Dz.U. z 2022 r. poz. 1385).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