POLAND'S SECOND Bełchatów

Methane leaking from Poland's coal mines needs more urgent action





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Contents

Executive summary	1
1. Poland's coal mine methane problem	3
2. Methane leaks in Poland's operational underground coal mines	6
3. What is the solution?	10

Executive summary

Did you know that methane leaking from coal mines is a bigger cause of global warming than aviation and shipping combined? This subject of coal mine methane has been largely neglected, but as the European Commision aims to clamp down on methane emissions, coal mine methane is now getting the attention it deserves. **This report lifts the lid on coal mining's dirty little secret.**

We analysed Europe's country-by-country methane emissions reported to the UNFCCC for 2018. We found that:

- 70% of methane leaks from Europe's operational coal mines were from Poland.
- Most of Poland's coal mine leaks were from operational underground coal mines (89%). The rest are from surface mines, including lignite, and abandoned coal mines, although it is possible that the leakage rate for abandoned mines is underestimated.
- The climate impact of methane leaks from Poland's coal mines was bigger than that of Belchatów power plant. The 659 kilotonnes of methane emitted from Poland's coal mines are equivalent to 56.7 million tonnes of carbon dioxide. This is more than Belchatów's CO₂ emissions, which were <u>38.3 million tonnes</u> in 2018. This assesses methane's fast-acting impact over 20 years, where one tonne of methane is equivalent to 86 tonnes of CO₂; even if it is assessed over 100-years when methane's impact is reduced to the equivalent of 34 tonnes of CO₂, then Poland's coal mine methane climate impact would be 22.4 million tonnes of CO₂. In this report, when we convert into CO₂, we do so acknowledging the quick upfront impact of methane on climate, by using the 20-year multiplier of 86.

We then analysed mine-by-mine emissions in 2018 in Poland. We found that:

 Two Polish companies were responsible for 90% of methane leaks from Poland's operational hard coal mines. JSW was responsible for 50% (231 kt out of 462 kt)¹, and PGG was responsible for 40% (186 kt)². JSW is mostly mining coking coal for steel-making³, whereas PGG is mostly mining thermal coal for electricity generation.

^{1.} The figure excludes Jas-Mos. Though JSW is still an owner of this mine, ventilation shafts are owned by Spółka Restrukturyzacji Kopalń, SRK.

^{2.} The figure excludes Wieczorek, partially owned by PGG and SRK.

^{3.} Currently 69% of coal mined by JSW mines is coke.

- Methane leaks add on average 23% to the climate impact of burning hard coal in Poland. Methane leaks add 51% over half to the lifecycle emissions of JSW's coal, and 22% to PGG's coal. This is despite the fact that 43% of Polish hard coal is mined with near-zero methane emissions.
- Budryk deep mine is the biggest methane emitter of JSW, Poland, and the whole of Europe. It emitted 93 kilotonnes of methane in 2018⁴; this is equivalent to 8 million tonnes of CO₂. Methane leaks more than double the lifecycle emissions of Budryk's coal, adding 107%.
- Methane leaks at two of PGG's mines added over 50% to the lifecycle emissions of the coal mined from those mines. These mines were Mysłowice-Wesoła and Sośnica. The methane leaked added 73% and 52% to the lifecycle emissions respectively, calculating methane's impact over 20 years.
- 16% of the methane leaks are from methane that has already been captured. This methane could be easily flared to reduce its environmental impact or, simply, sold. The value of this gas in 2018 was 110 million PLN.

There are six solutions that we believe will help to reduce Polish coal mine methane emissions:

JSW needs to accelerate its plans to cut methane.
PGG needs to prioritise closure of its two most methane-intensive mines.
Ban release of captured methane with immediate effect.
Use the Just Transition fund to reduce leaks from closed mines.
The European Commission's methane strategy should legislate for coal mine methane.
The Emissions Trading Scheme should include methane from 2030.

Poland has a problem with methane leaking from coal mines, which has been hidden under the carpet for far too long. It's time now to urgently deal with this problem to avoid further reputational damage to Poland's mining industry.

^{4.} The value includes 14.6 kt of methane released by CHP "Żory" to which methane from Budryk is supplied. According to E-PRTR and Environmental Protection Institute, 14.6 kt of methane has been released by the plant in 2018.

1. Poland's coal mine methane problem

The International Energy Agency (IEA) research shows that methane leaks from coal mines are worse for climate change globally than shipping and aviation combined. Methane is embedded in coal seams and, when the coal is mined, it seeps up through the shaft and is released into the atmosphere. Since methane is a very potent greenhouse gas, even small methane leaks from coal mines are leading to a large impact on the climate.

The IEA also <u>shows</u> that Poland's coal mines are some of the leakiest in the world. The IEA analysis shows that only in Russia and Kazakhstan, where mines are generally deeper and geologically older, is there more methane leaked per tonne of coal mined, than in Poland. In this report, we use IPCC figures to quantify methane's impact on global warming. As a greenhouse gas, a tonne of methane is estimated to have an impact comparable to ~86 tonnes of CO_2 when considering its global warming potential over a 20-year timeframe (GWP20 scenario) and 34 tonnes of CO_2 if looking at its impact over 100 years (GWP100 scenario) (table 8.7 from IPCC). In this report, when we convert into CO_2 , we do so acknowledging the quick upfront impact of methane on climate, by using the 20-year multiplier of 86.

Additionally, methane is chemically reactive in the Earth's atmosphere, contributing to the production of tropospheric ozone, a potent air pollutant. Tropospheric ozone triggers a variety of respiratory diseases, including asthma, emphysema, and chronic bronchitis.

Direct and indirect social costs of methane emissions are <u>currently</u> estimated at 1400-6830 USD per tonne of methane.



New research is showing a need for increased urgency on methane: one <u>study</u> showed that methane emissions from mining fossil fuels have been underestimated by up to 40%; <u>analysis</u> from a satellite is quantifying major leaks from coal, oil and gas hotspots; and US <u>research</u> has caused concern about how much methane is leaking in the Permian Basin.

The European Commission's methane strategy seeks to cut methane emissions, including from coal. On 14th October, the European Commission released its <u>methane strategy document</u>. It is expected that by the end of 2021, the European Commission will deliver legislative proposals that may impact Poland's coal mines. This includes improving measurement and transparency of the issue through an international methane emissions observatory, curbs in routine venting and flaring, and ultimately may look to implement a minimum emissions standard.

The scope of the methane strategy also covers international methane emission standards, which would mean these standards would also apply to international coal.

There is even a small chance that methane will be added to the EU Emissions Trading Scheme. The scope of the EU ETS will be reviewed as part of a reform package in 2021. Although there's a very low likelihood it would be included in this package, coal mine methane may be added to the EU ETS in future reform packages.

UNFCCC data shows Poland was responsible for 70% of all the methane leaks from operational coal mines in 2018. When including closed mines, this falls to 57%, due to the high reported emissions from abandoned coal mines in Romania. Poland emitted 659 kt from all mines, which is 57% of the 1152 kt total EU-27 emissions. Poland's proportion is likely to significantly increase in the future: Germany's coal mines have already closed; Czech emissions are certain to rapidly fall as its hard coal mines close as soon as 2021⁵, and as its coal commission agrees a plan to phase out lignite; and Greece plans to close all its existing lignite plants by 2023⁶.

5. https://www.neweurope.eu/article/czech-okd-looks-to-close-all-coal-mines-as-early-as-2021-or-2022/

^{6. &}lt;u>https://www.clientearth.org/press/greeces-ppc-announces-surprise-2023-end-to-lignite-but-fails-to-withdraw-its-biggest-polluter/</u>



UNFCCC data shows that the vast majority (89%) of Poland's methane is from underground coal mines - 584 kt out of 659kt. Surface mining - mostly lignite - contributes 8% to the total coal mine methane emissions in Poland, because lignite is from younger and shallower coal seams that have less methane embedded in them. Abandoned mines also leak methane but although the data suggests this problem is not significant, we highlight that the data quality may actually underestimate the volume of methane released from abandoned mines.

The climate impact of methane leaking from Poland's coal mines is bigger than that of Belchatów power plant. The 659 kilotonnes of methane emitted from Poland's coal mines are equivalent to 56.7 million tonnes of carbon dioxide, when assessed over a 20-year lifetime. This is more than Belchatów's CO_2 emissions, which were <u>38.3 million tonnes</u> in 2018. When measured over 100 years, the climate impact of Poland's coal mine methane is equivalent to 22.4 million tonnes of carbon dioxide, which is still over half the emissions of Belchatów power plant.

Yet coal mine methane in Poland has not received even a fraction of Belchatów's attention.

This next section explores Poland's mine-by-mine emissions.

2. Methane leaks in Poland's operational underground coal mines

Poland's coal mine methane emissions are reported mine-by-mine by the Environmental Protection Institute, *Instytut Ochrony Środowiska*. In 2018, operational underground coal mines emitted 462 kt of methane. This data is not published, but is available by request⁷. Other reports on methane emissions exist but the methodology varies from geological calculations and estimations to direct methane emissions measurements. Data from the Environmental Protection Institute is considered to be the only data source accounting for low concentration methane emissions, too diluted to be quantified by the measuring apparatus installed in the ventilation shafts in coal mines⁸.

This data tallies well with the UNFCCC data above, which reports 478 kt of methane emissions from underground mines. However, the UNFCCC adds an additional 22% emissions for "post-mining activities" such as coal crushing, bringing the total to 584 kt for underground operational coal mines. Therefore, since the Environmental Protection Institute does not include "post-mining activities", the reported mine emissions may be even 22% higher.

Key findings:

Methane leaks add on average 23% to the climate impact of burning coal in Poland. Poland's coal mines emitted 490 kt⁹ of methane in 2018, which is equivalent to 42.1 million tonnes of CO_2 , measured on methane's climate impact over 20 years. According to the National Geological Institute these mined 63.9 million tonnes of coal, which would produce 183 million tonnes of CO_2 when burnt, converting it into CO_2 emissions by multiplying by 2.86, the common conversion rate, in line with <u>EIA calculations</u>. Therefore, the methane leaks of 42 Mt CO_2 add 23% to the 183 Mt of CO_2 of burning the coal.

This takes into account that 43% of Polish hard coal is mined at mines with near-zero methane emissions. Some coal seams (particularly in shallower mines) have naturally very low methane content, leading to near-zero methane emissions. That means there are some of the mines emit much more methane than 23% national average.

^{7.} It matches emissions reported in the European Pollution and Release Transfer Registry (<u>E-PRTR</u>), excepting that some smaller-emitting mines fall below the reporting threshold for E-PRTR.

^{8.} Following our discussions with the experts in the field, we would like to highlight that methane measurements from the ventilation shafts, employed rather for safety than due to environmental concerns, are not extremely precise, reportedly showing even negative methane concentrations.

^{9.} This figure includes methane emissions reported from SRK-owned ventilation shafts (in contrast to 462 kt reported in previous paragraph)

The results show two Polish companies were responsible for 90% of methane leaks.





W2L	PGG
JSW was responsible for 50% of methane leaked from Poland's operational coal mines in 2018 (231 kt out of 462 kt) [‡] . This is equivalent to almost 20 million tonnes of CO_2 measured over 20 years. JSW is mostly mining coking coal for steel-making.	PGG was responsible for 40% of methane leaked from Poland's operational coal mines in 2018 (186 kt out of 462 kt) ⁶ . This is equivalent to 16 million tonnes of CO ₂ measured over 20 years. PGG is mostly mining thermal coal for electricity generation.
Methane leaks add 51% - over half - to the lifecycle emissions of JSW's coal.	Methane leaks add 22% to the lifecycle emissions of PGG's coal.
Budryk deep mine is the biggest methane emitter of JSW, Poland, and the whole of Europe. It emitted 93 kilotonnes of methane in 2018 ^β ; this is equivalent to 8 million tonnes of CO ₂ measured over 20 years.	ROW is the biggest methane emitter of PGG. It emitted 58 kilotonnes of methane in 2018; this is equivalent to 5 million tonnes of CO_2 measured over 20 years.
Methane leaks more than double the lifecycle emissions of Budryk's coal, adding 107%.	Methane leaks at two of PGG's mines added over 50% to the lifecycle emissions of the coal mined from those mines. These mines were Mysłowice-Wesoła and Sośnica. The methane leaked added 73% and 52% to the lifecycle emissions respectively, calculating methane's impact over 20 years. These two mines emitted 37% of PGG's methane, but only produced 9% of PGG's coal.

The figure excludes Jas-Mos. Though JSW is still an owner of this mine, ventilation shafts are owned by Spółka Restrukturyzacji Kopalń, SRK.

- β The value includes 14.6 kt of methane released by CHP "Żory" to which methane from Budryk is supplied. According to E-PRTR and Environmental Protection Institute, 14.6 kt of methane has been released by the plant in 2018.
- δ The figure excludes Wieczorek and Śląsk, both partially owned by PGG and SRK.

Two other companies owning methane-intensive mines are Tauron and Silesia.

- Methane leaks from Tauron's ZG Brzeszcze doubles the lifecycle emissions of its coal. In 2018, ZG Brzeszcze leaked 35 kilotonnes of methane. This adds 106% to the lifecycle emissions of its coal calculating methane's impact over 20 years.
- Silesia's methane emissions added 38% to the climate impact of burning its coal in 2018. That year, Silesia mined 1,6 mln tonnes of coal in 2018 and emitted 19 kt of methane.

We found that 16% of the methane leaks are from methane that has already been captured. Diving into 2018 mine-by-mine data for underground mines methane emissions¹⁰ provided by Environmental Protection Institute (*Instytut Ochrony Środowiska*) and State Mining Authority (*Wyższy Urząd Górniczy*), we discovered that almost 16% of emissions come from demethanisation plants.

^{10.} These data exclude post-mining activities for underground mines included in the UNFCCC data.

Demethanisation plants capture some methane from the mines and use it to provide energy for the mine itself. Except that sometimes this high-concentration stream of captured methane is then released into the air if the methane supply exceeds the internal demand for energy. Disappointingly, this methane is not even flared, even though flaring it would not require significant investments. This is striking - it shows the scale of the negligence of the environmental aspects of methane emissions.

According to our calculations, methane worth 700 mln PLN was released in 2018 by operational mines in Poland. 110 mln PLN was released by demethanisation plants alone.¹¹ Though capturing all methane released by Poland's underground mines involves significant upfront costs, <u>JSW stresses</u> that due to the value of methane itself, capturing methane can be treated as a business opportunity.

^{11.} We calculated this value taking a conversion factor of 1m³=10.45 kWh and took average european gas (Dutch TTF) prices in 2018 (23.56 euro/MWh).

3. What is the solution?

There are six solutions that we believe will help to reduce Polish coal mine methane emissions:

1	JSW needs to accelerate its plans to cut methane.
2	PGG needs to prioritise closure of its two most methane-intensive mines.
3	Ban release of captured methane with immediate effect.
4	Use the Just Transition fund to reduce leaks from closed mines.
5	The European Commission's methane strategy should legislate for coal mine methane.
6	The Emissions Trading Scheme should include methane from 2030.

1. JSW needs to accelerate its plans to cut methane

JSW announced its <u>methane strategy</u> last December, and then followed it up with a <u>technical interview</u>, which revealed more details on its methane plans.

JSW's strategy and transparency are welcome. JSW has made a pledge by 2022 to burn all the methane captured; this would reduce the leakage rate from 80% in 2019 to 65%. Additionally, they want to further reduce this to 30% although have given no timeline to reach this. They also say that it may be possible to capture much of the final 30%, but this will take more research time and money.

JSW should commit to a date to reduce leakage to their 30% target rate as quickly as possible. JSW implies that it can profitably use the methane captured; this is because burning the methane in gas turbines will save on buying grid electricity. If JSW pledges to cut to 30% as soon as possible, the European Commission should act in good faith and help fund the research needed for JSW to reduce their leakage from 30% towards zero, which JSW highlights is not yet profitable for them to do alone. This would help develop technology and research which could help slash methane emissions across the world.

It is in JSW's long-term interests to slash its methane leaks. JSW sees itself as a key future supplier of steel to Poland's wind industry. Indeed, JSW cheered when coking coal was recently added to the EU's <u>list of critical raw materials</u> - a decision made, in part, because of steel's role in helping build the wind industry.

The wind industry will demand that the climate footprint of steel is kept as low as possible.

2. PGG needs to prioritise closure of its two most methaneintensive mines

In the agreement <u>signed</u> between the mining unions and the Polish government in September, closure dates were agreed for each of PGG's mines. If we multiply methane emissions in 2018 by the number of years remaining at each mine, that equates to over 3 million tonnes of methane emissions by the time all the mines shut. That means PGG would emit an equivalent of 26x of Ryanair's CO_2 emissions in 2018 from methane alone, when measuring methane's climate impact over 20 years.

PGG has two particularly methane intensive mines that contribute only 20% of PGG's coal mined, but contributed 46% to their methane emissions. The methane leaks at these two mines increase the climate impact of burning the coal mined by over 51% (measured over a 20-year period) - 73% at Mysłowice-Wesoła and 52% at Sośnica. However, none of them are scheduled to close soon: Sośnica is pencilled to close in 2029 and Mysłowice-Wesoła in 2041. It is not sustainable for such methane leaks to happen in a climate-constrained world. Overall, given the unprofitable nature of these mines, we have a strong preference to closing the mines early, rather than investing to reduce methane at unprofitable mines.

3. Ban release of captured methane with immediate effect

The fact that a significant proportion of captured methane is released to the atmosphere shows both a flagrant lack of consideration to the methane's environmental impact and poor management, since 100 mln PLN worth of methane is released from demethanisation stations in Poland.

We urge the Polish government to enforce strict measures that would oblige demethanisation stations to use all methane that has been captured or, at the very least, to flare it to diminish its environmental impact.

4. Use the Just Transition Fund to reduce leaks from closed coal mines

The scope and focus of the Just Transition Fund should explicitly award funds to reduce methane leaks from closed coal mines. This may require further research to understand which mines require the most urgency to fix. This would help secure employment of some existing mining jobs in Poland.

Other coal regions outside Poland also have leaky coal mines that are now closed, so the Just Transition Fund could help to reduce methane emissions in other countries as well. Whilst European money could also be used to help reduce leaks at operational coal mines, we are wary that this may inadvertently cause perverse incentives to keep existing coal mines operating that they would have otherwise closed.

At the EU level:

5. The European Commission's methane strategy should legislate for coal mine methane

The European Commission is planning a strategy to reduce Europe's direct and indirect methane emissions. Together with Climate Action Network Europe (CAN-E), we urge the European Commission to:

- Set standardized Monitoring, Reporting and Verification (MRV) for all member states. This should also account for methane released during coal processing and monitoring methane emissions from abandoned coal mines.
- Prohibit venting methane that has been already captured.
- Demand presenting a clear plan for full methane emissions reduction from all operational emitters, including ventilation air methane capture and utilisation.
- Provide economic incentives for:
 - » Capturing otherwise uneconomical low-concentration methane to achieve full emissions reduction.
 - » Third-party companies to mitigate methane from abandoned coal mines where no existing owner is liable.
- Adopt a mandatory methane performance standard that caps methane emissions along the entire supply chain for both domestic and imported coal sold and consumed in the EU by 2025.

6. The Emissions Trading Scheme should include coal mine methane emissions from 2030

It is necessary to provide an economic incentive to stop releasing methane into the atmosphere, in addition to some direct legislation to limit methane leaks, so that the burden of effort is shared between these two policies. But it would be unfair to suddenly spring a carbon price on coal mines, before they have a chance to adapt. That's why we'd advise a date from 2030 - when JSW will have had a chance to reduce emissions at all their mines, and when PGG will hopefully have shut their leakiest mines.

