



Romania risks penalties for methane-intensive hard coal production

Under new EU rules to cut methane emissions from the coal sector, Romania must apply mitigation measures but the country risks non-compliance by not fully addressing its gassy hard coal mines.

Published date: 10th October 2024

Lead author: Dr Sabina Assan

The EU Methane Regulation is an opportunity for Romania to spring into action on its coal mine methane emissions. Utilising methane from its underground coal mines, whether active or closed, offers an immediate solution to reduce GHG emissions, however Romania must establish a clear pathway for implementation, which includes transparently addressing its hard coal production, and associated methane emissions.

Sabina Assan

Coal Mine Methane Analyst, Ember



Capturing and utilising methane from Romania's closed coal mines is not only feasible with current technologies, but also cost effective. By putting plans and funding in place to address this large and so far ignored source of greenhouse gases, Romania can mitigate emissions to reach its 2030 decarbonization targets, contribute to its commitments under the Global Methane Pledge, avoid penalties under the EU Methane Regulation and address energy security.

Mihai Stoica

Executive Director, 2Celsius



EU Methane Regulation	2
Romania's coal mine methane emissions exceed EU limits	2
Romania's CMM challenge	3
Coal mine methane in Romania	3
Underground hard coal mines in the Jiu Valley	3
Increasing methane intensity in ageing mines	4
CMM emissions are above the EU threshold	4
Methane doubles the climate impact of Romania's hard coal	5
CMM as a resource	7
Romania should prioritise coal mine methane capture	7
Romania's current lack of transparency	7
Coal production increases	8
Romania must move quickly for the Regulation to have impact	9
Improving methane capture at active mines for heat and power generation	9
Romania lags behind in abandoned mine methane utilisation	10
Supporting Materials	12
Methodology	12
Acknowledgements	14

EU Methane Regulation

Romania's coal mine methane emissions exceed EU limits

Methane, the second most important greenhouse gas driving climate change, continues to [grow at record rates](#) and is responsible for [about 47% of the observed warming](#) from 2010-2019.

In 2021, the European Union and the United States launched the Global Methane Pledge aiming to slash methane emissions by 30% by 2030. Last year, during COP28, the EU Commission presented the first-ever EU methane regulation to limit methane emissions from the energy sector, both in Europe and globally.

The new [EU Methane Regulation](#), approved on May 27, 2024, now requires EU countries, as well as coal exporters to the EU, to adopt stringent monitoring, reporting, and verification (MRV) of methane emissions. The regulation also mandates mitigation measures for fossil fuel operators, including both active and closed coal mines.

Romania, the EU's fifth largest coal producer, has four active underground mines, seven surface mines, as well as at least 173 abandoned and closed coal mines.

Ember analysis finds that three of the four active underground mines exceed the methane emissions limit set by the [new EU rules](#). However, even as hard coal production from the country's state-owned mines lacks transparency and is not fully reported to the EU, these mines will be required to implement mitigation measures to avoid penalties.

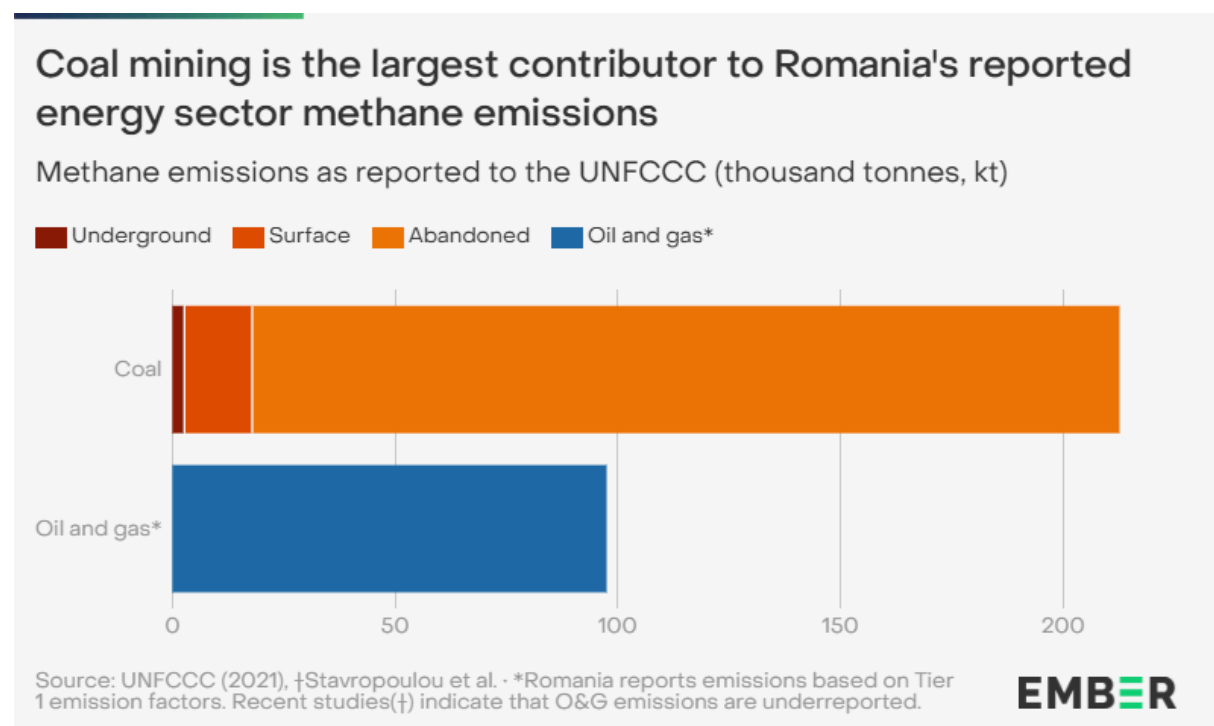
Romania will have only a year to establish and resource the competent authorities and responsible ministries, who will be required to deliver on the new regulations. Setting appropriate penalties will be vital to incentivise reducing emissions for coal mines and ensure an impactful Methane Regulation.

Romania's CMM challenge

Coal mine methane in Romania

Methane is produced during the formation of coal and remains trapped in the coal seam and surrounding strata. When coal is mined, this methane is released into the atmosphere, and emissions can continue for decades, even after mining activities have stopped.

In 2021, Romania [reported](#) that coal mining activities in the country emitted 213 thousand tonnes (kt) of methane, responsible for 60% of the country's energy sector methane emissions.



Underground hard coal mines in the Jiu Valley

After more than 150 years of hard coal mining, the Jiu Valley in Romania has been a [coal region in transition](#) since 2022. However, the region remains home to Romania's last four active underground hard coal mines.

These mines are operated by the [Jiu Valley Energy Complex](#) (CEVJ), a company created and controlled by Romania's [Energy Ministry, to produce electricity](#). In 2021, [Romania estimated](#) these mines emitted 2,712 tonnes (t) of methane, accounting for 1.3% of all methane emissions from Romania's energy sector.

Coal in the Jiu Valley is known to be particularly complex and gassy. This has led to Jiu Valley underground coal mines being especially dangerous for mine workers, with a [number of explosions](#) occurring – the most [recent incident was in 2017](#).

Increasing methane intensity in ageing mines

CEVJ's coal mines, which opened in the early 1980s, are particularly old. As these mines age, coal is extracted at greater depths and more of the coal seam is disturbed, resulting in greater methane emissions per tonne of coal mined.

Studies from Romania's [INSEMEX](#) found that the amount of methane per tonne of coal in three of the Jiu Valley's underground mines rose over time. The greatest increase was seen at the Lonea mine, which saw emissions rise from 8.8 tonnes of methane per kilotonne of coal in [2007](#) to 12.2 in [2019](#).

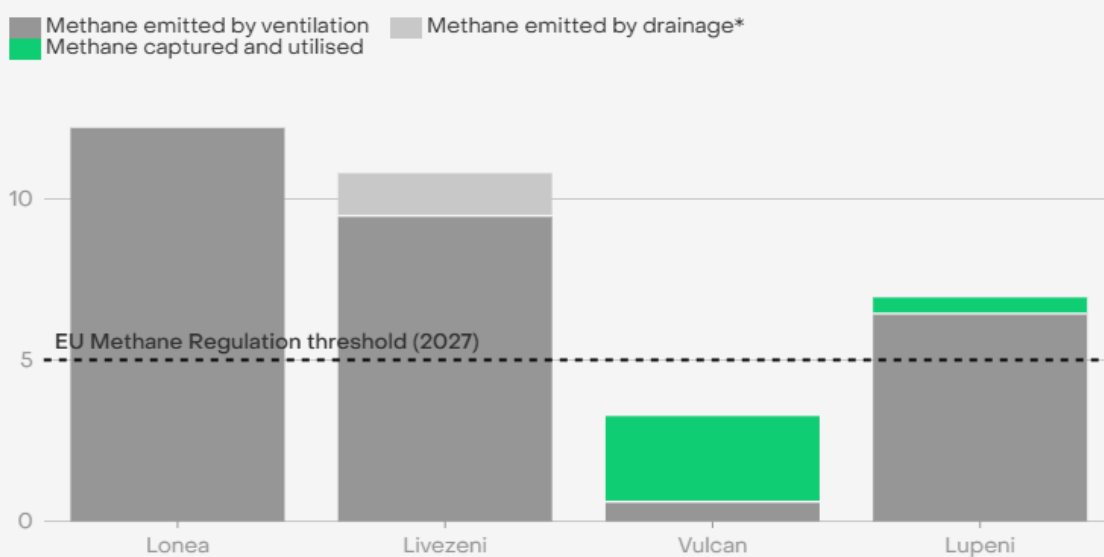
CMM emissions are above the EU threshold

From 2027, the EU Methane Regulation will require coal mined by CEVJ to have a methane intensity of no more than 5 tonnes of methane per kilotonne of coal. However, [data from 2022](#) indicates that the methane emission intensity of the active coal mines from the Jiu Valley was on average 14.9 tonnes of methane per kilotonne of coal. This means that CEVJ will have to reduce the methane intensity of their coal by threefold, compared to 2022 levels.

[Data from 2019](#) indicates that three of the four coal mines are [above the EU's first methane intensity threshold](#). If the Lonea and Lupeni underground mines are closed in 2027, as currently planned, the Livezeni mine will be the only active coal mine required to implement mitigation measures. Livezeni was also the largest methane emitter in 2022.

3 out of 4 mines could face penalties for exceeding the EU's methane intensity threshold

Mine by mine methane intensity in 2019 (t methane/kt coal)



Source: Methane emissions from the mines belonging to the Hunedoara Energy Complex
 *These emissions will be banned by the regulation in 2027

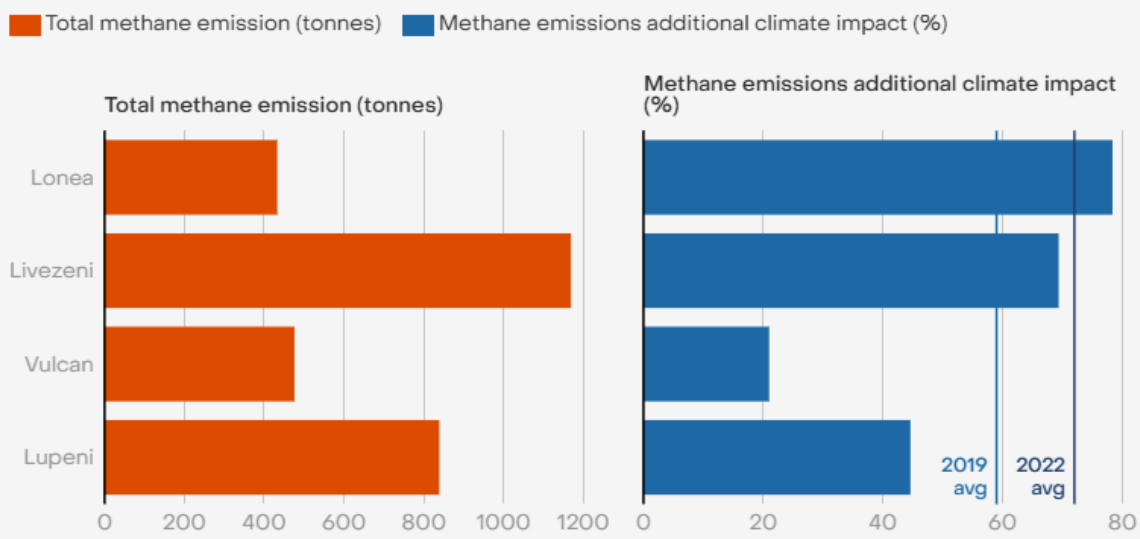
Methane doubles the climate impact of Romania's hard coal

Coal mined by CEVJ in the Jiu Valley is [burned in the Paroseni power station](#), a thermal power plant used to produce electricity.

In 2022, the Paroseni power plant emitted [333,429 tonnes](#) of CO₂e. However, this figure does not include the methane emissions released during the coal mining process, which is equivalent to 239,497 tonnes of CO₂ (using methane's 20-year [Global Warming Potential](#)).

As a result, CMM emissions add 72% - over half - to the climate impact of burning hard coal at the Paroseni Power plant in 2022.

On average, coal mine methane emissions more than double the climate impact of burning Romanian hard coal



Source: European Commission, INSEMEX (2019), INSEMEX (2022) · Ember calculations

CMM as a resource

Romania should prioritise coal mine methane capture

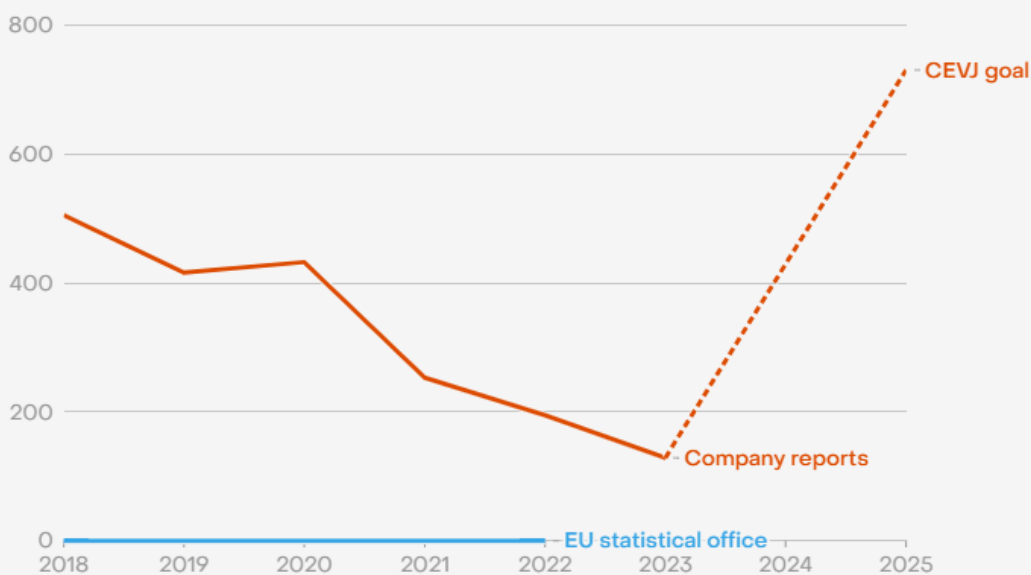
Methane emissions from coal mining can be captured and converted to generate electricity and/or heat whilst reducing GHG emissions. However, currently only 0.2% of the methane emitted from active and closed underground mines in Romania was utilised, according to 2019 data. The rest is released into the atmosphere.

Romania's current lack of transparency

For the EU Methane Regulation to be effective in Romania, the country must ensure that the enforcing bodies have enough [autonomy to avoid tensions and conflicts of interest](#), as active and inactive underground mines are state-owned assets. Moreover, the country must be more transparent regarding its hard coal production.

Data on Romania's hard coal production is missing from EU reporting

Time series of Romania's reported hard coal production since 2018 (kt)



Source: Eurostat, Complexul Energetic Hunedoara S.A company reports, CEVJ Board of Director Report

In 2022, the total hard coal production in the EU was reported to be 54.5 million tonnes (Mt), according to [Eurostat](#). Meanwhile, Romania reported no production, despite CEVJ’s mines reportedly producing approximately [200,000 tonnes of hard coal](#) that year.

Coal production increases

In addition, despite announcing to end hard coal extraction [by 2030](#), the [Energy Ministry](#) stated that coal production will continue until open reserves are exhausted, to facilitate a safe mine closure process. As a result, the Paroseni Power plant is still receiving [state aid to burn the coal extracted](#).

Meanwhile, coal extraction at CEVJ mines [increased from 500 to 700 tonnes](#) in January 2024. On top of this, the CEVJ [Board of Directors report](#) highlights the aim to increase this even further to 2,000 tonnes per day by June 2024, to achieve net profit by the end of the financial year.

Romania must move quickly for the Regulation to have impact

Recognising its hard coal production will help Romania to effectively implement the EU Methane Regulation, reduce methane emissions, and capture a useful resource. However, there is only a short time window to do so.

By February 2025, Romania must establish its competent authorities and responsible ministries whose function is to plan and execute the Regulation. Ultimately, the quality of implementation depends on the regulators being provided with the necessary resources and powers.

Improving methane capture at active mines for heat and power generation

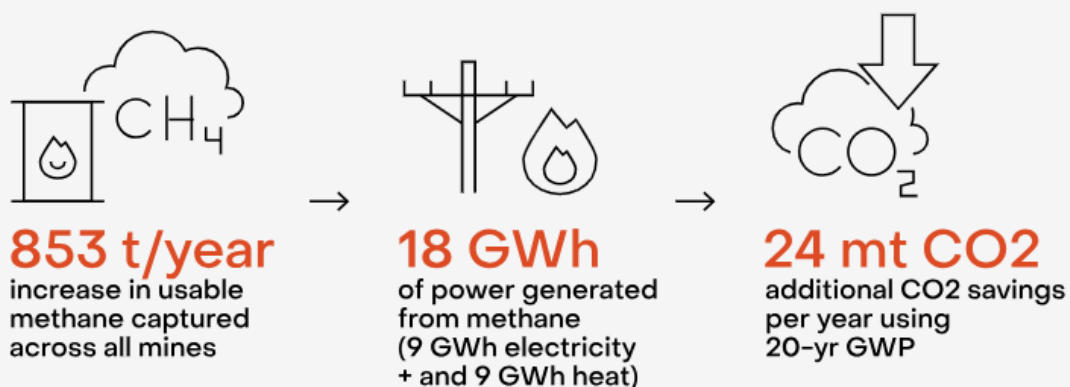
Romanian researchers have studied the [available tools for improving the capture and utilisation of CMM at each underground mine](#). Their findings indicate that using CMM for electricity production and thermal energy are [viable options](#).

The research emphasised that the most straightforward method to capture methane is by improving a mine's degassing system. One approach, used in Russia, Germany, France and Poland, involved isolating older mine areas, which increased degassing efficiency to 50-60%, capturing gas with a high methane content of 60-70%.

Despite these known solutions, INSEMEX data indicates that in 2019, Romanian mines had an average degassing efficiency of only 25%, with Vulcan mine being a notable exception, reportedly capturing and utilising [81% of its methane](#).

Ember analysis finds that increasing the degassing efficiency to at least 50% across all mines would increase usable methane from 447 tonnes to 1,310 tonnes per year. Transforming the methane using Combined Heat and Power (CHP) could result in 9,000 MWh of electricity and heat annually, and additional CO₂e savings of 24,000 tonnes per year (using 100-year GWP).

Increasing the degassing efficiency of Romania's underground mines will lead to more power generation and CO₂ savings



Source: Ember

EMBER

Romania lags behind in abandoned mine methane utilisation

Whilst the EU Methane Regulation will ban all emissions from closed and abandoned mines in 2031, utilisation of Abandoned Mine Methane (AMM) is already widespread in Europe as it is [cost-effective](#). Common options for commercial methane utilisation are power and heat generation as well as sale to natural gas pipelines.

In 2020, North Rhine-Westphalia in Germany captured and used AMM in 107 combined heat and power plants, producing around [544 GWh of electricity and 108 GWh of heat](#). In [France](#), [six sites](#) currently use AMM for electricity generation.

Romania has recorded 173 closed underground mines between 1935 and 2019, yet no AMM projects have ever been implemented. Plans for AMM capture and utilisation are also currently missing from any [mine closure plans](#).

As CEVJ's coal extraction will end in 2030 and the four mines will be closed by 2032, methane emissions from these sites will continue as AMM, adding thousands of tonnes to Romania's reported annual emissions from abandoned mines, [194,753 t in 2021](#). Addressing AMM capture and utilisation in Romania's mine closures could facilitate methane mitigation effectively.

Supporting Materials

Methodology

Hard coal production data

The hard coal production is officially reported as a by-product of the mine closure process under the 2032 self-imposed deadline stipulated within the Decarbonisation Law. [CEVJ states](#) coal extraction at its four mines is to cease by the end of 2030 and closure works are to be completed by 2032, in agreement with the decarbonization commitments of Romania through the National Recovery Resilience Plan.

Consequently, the Paroseni Power plant receives [state aid to “neutralise” the coal](#) by burning it and the electricity produced is officially traded on the [Day Ahead Market \(PZU\)](#) and on the [Balancing Market](#).

Despite Romania’s objective to stop hard coal extraction, CEVJs 2024 [Board of Directors](#) aimed to increase hard coal extraction to 2,000 tonnes per day by June 2024 to achieve net profit by the end of the financial year.

In January 2024, CEVJ [reported on their website](#) that production had already increased from 500 to 700 tonnes. This has been [confirmed by the Energy Ministry](#) who indicated that production would increase to 1,000 tonnes per day in the weeks following January.

The following statistics were compiled for coal production, and consumption of coal in the Paroseni Power Plant. For coal production, Ember uses 2019-2022 data from administrator reports, and estimates 2023 production using the power plant production data.

Figures for 2019 - 2022 in the administrator's [report](#) state production as follows:

2018: 532,205 tonnes own production

2019: 416,031 tonnes own production

2020: 431,993 tonnes own production

2021: 265,880 tonnes out of which 253,018 tonnes from own production

2022: 216,459 tonnes out of which 194,550 tonnes from own production

Production statistics from the Paroseni Power Plant were found as follows:

2021: Working hours: 2360 hours, Energy production: 268.910 MWh, Coal consumption: 201.139 tonnes, Gas consumption: 6.893.298 Nmc, Caloric power of coal: 3.300-4.510 Kcal/kg

2022: Working hours: 2503 hours, Energy production: 283.969 MWh, Coal consumption: 216.459 tonnes, Gas consumption: 8.149.579 Nmc, Caloric power of coal: 3.300-4.510 Kcal/kg

2023: Working hours: 1851 hours, Energy production: 159.735 MWh, Coal consumption: 128.681 tonnes, Gas consumption: 7.687.226 Nmc, Caloric power of coal: 3.300-4.510 Kcal/kg

EU Reporting

The EU statistical office reports 0 hard coal production for Romania. Ember has contacted the Romanian National Institute of Statistics for clarification, with no response.

Methane Global Warming Potential

Global Warming Potential (GWP) is a measure to express the effects of GHGs in CO₂ equivalent terms. Given that CH₄ absorbs much more energy when in the atmosphere, but has a shorter lifetime than CO₂, the IPCC considers its impact over 20 years (GWP = 82.5) and over 100 years (GWP = 29.8).

The challenge of comparing methane and carbon dioxide

One of the shortcomings of this metric is that it assumes a constant value of methane's effects over time, when in reality it varies significantly.

Historically, the 100-year value has been used by Governments and in major international agreements on the basis that global warming is a long term challenge.

At Ember, we propose to use the 20-year GWP. Climate change is an emergency, and the next 20 years are critical with regards to climate action. Methane's short atmospheric lifetime means emissions reductions can reduce global heating in the near term.

Within the report, we are sometimes required to use the 100-year GWP in order to draw comparisons to official reporting on CO₂e savings.

"Not an either/or" Carbon dioxide and methane do not need to be compared using GWP as only concerted action against both greenhouse gases will address the current climate crisis.

Acknowledgements

Thank you

The authors would like to thank several Ember colleagues for their valuable contributions and comments, including Eva Mbengue, Sarah Shannon, Reynaldo Dizon and others. We would also like to extend our gratitude to our partners: Mihai Stoica at 2Celsius for help in uncovering data, development and dissemination of the report.

Image credit

Mihai Stoica

© Ember, 2024

Published under a Creative Commons ShareAlike Attribution Licence (CC BY-SA 4.0). You are actively encouraged to share and adapt the report, but you must credit the authors and title, and you must share any material you create under the same licence.