Understanding the EU's Methane Regulation for coal

In May 2024, the EU approved its first-ever regulation to reduce methane emissions from the energy sector, of which coal mining is the largest source. Coal mining countries, both within and outside of EU borders will be impacted.

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About

This report outlines the implications on coal mining countries of the first-ever EU Methane Regulation, approved on May 27, 2024. It provides an analysis of the potential emissions reductions and covers case studies within, and outside of EU borders. Finally, the report highlights key gaps that must be addressed for the regulation to achieve meaningful emissions reductions.

Highlights

48%

reduction in EU coal mine methane emissions with the new rules, below the 58% necessary. The shortfall is due to the current lack of regulation on coking coal mines.

15

EU Member States will be required to implement mitigation measures. Only Poland and Romania will implement mitigation on active mines.

0

Out of the biggest 10 coal suppliers to the EU currently meet the methane measurements now required by the regulation.

“This regulation is a big step in the right direction for countries to act on methane from coal mining, which is still overlooked globally.

However, it is what happens next that will make the difference. The standards for monitoring, reporting and verification of methane need to shift the dial on what is accepted as 'best practice'. And we cannot afford to ignore emissions from coking coal used in steel making.

There are big opportunities for reducing coal mine methane both within the EU and through imports to the EU and this regulation must deliver on those.”

Eleanor Whittle
CMM Programme Director, Ember

First of its kind

EU first-ever Methane Regulation for coal mines

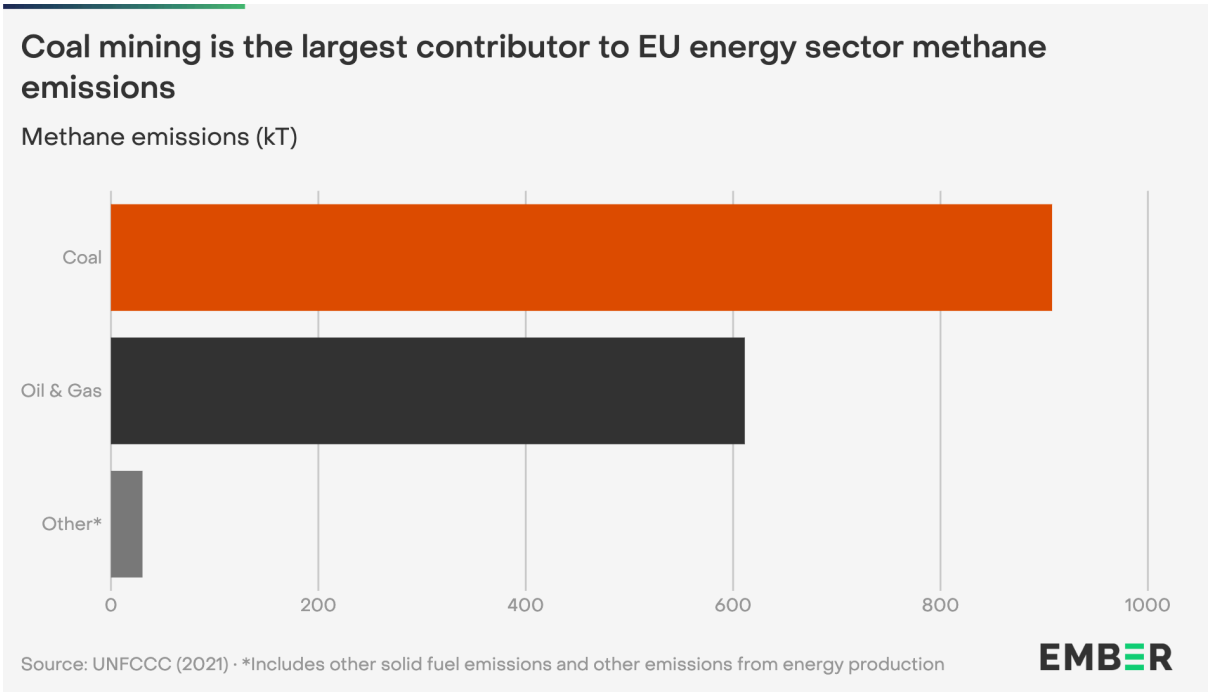
Methane is the second most important greenhouse gas contributor to climate change, contributing to about 30% of the rise in global temperatures since the Industrial Revolution.

In December 2021, the EU proposed the EU Methane Regulation as part of its efforts to implement the European Green Deal. The proposal followed the EU Methane Strategy adopted in 2020, in which the EU committed to rapid action on tackling methane emissions.

Approved on May 27, 2024, the regulation is the first of its kind globally for coal mines, requiring stringent monitoring, reporting and verification (MRV) of methane emissions. Coal mine operators are also compelled to mitigate emissions at both active and closed underground mines, which continue to release methane.

As a leader of the Global Methane Pledge, the EU additionally aims to strengthen international collaboration for methane reductions. In 2022, the EU committed to reducing greenhouse gas emissions from fossil fuels through a Joint Declaration from Energy Importers and Exporters on Reducing Greenhouse Gas Emissions from Fossil Fuels. This commitment is also reflected in the EU Methane Regulation, which addresses methane emissions both within and outside of EU borders.

Coal is the largest energy sector methane emitter in the EU



According to UNFCCC reporting, in 2021 the energy sector released 2,497 thousand tonnes of methane, making it the third largest emitter in the EU after the agriculture and waste sectors. Methane from coal mining is the largest source in the energy sector, releasing 908 thousand tonnes in 2021. Coal contributes to 6% of the EU's total methane emissions.

The Methane Regulation

Regulations could have been stronger

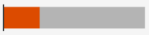
Ember projections indicate that the regulation will achieve a 48% reduction in EU CMM emissions by 2031, driven by EU thermal coal phase-out coupled with mitigation at closed mines. The emissions reductions fall short of EU Green Deal climate targets due to delayed regulation on coking coal mines.

Summary

The Regulation boasts some of the strongest requirements globally for monitoring and reporting methane emissions from coal mines, including a strong focus on measurement and mitigation at closed and abandoned mines.

Active thermal coal mines were initially targeted with ambitious requirements to mitigate their methane emissions. However, strong push back from the coal mining industry led to a significantly weakened regulation for mitigation from active mines. The threshold for the amount of methane emissions permitted per tonne of thermal coal - the “methane emission threshold” - was reduced sixfold since the initial regulation proposal.

Summary of the key regulations for coal mines

Coal Chapters	Summary	Ambition	% of EU CMM emissions covered within chapter	Could be improved by...
Monitoring and reporting in active coal mines	Underground coal mines are required to implement continuous and direct measurements and quantification of methane emissions from all drainage stations and ventilation shafts. Surface mines must establish deposit-specific emissions factors on a quarterly basis. Post-mining emissions factors must be updated annually and based on deposit-specific coal samples.	High		Surface mines should be required to take direct measurements and quantification of emissions
Mitigation of methane emissions from active underground coal mines	Venting methane from drainage stations are prohibited. For thermal coal mine operators, venting methane through ventilation shafts emitting more than 5 tonnes of methane per kilo tonne of coal mined is prohibited from 2027. This limit will be further reduced to 3 tonnes of methane per kilo tonne by 2031.	Low		Establish a lower methane emission threshold for thermal coal. Currently lacks an emission threshold for coking coal.
Methane emissions from closed underground coal mines and abandoned underground coal mines	An inventory of all closed and abandoned underground mines whose operations ceased up to 70 years ago, including the requirement of methane measurements in all such mines. Venting from all such mines is prohibited.	High		Bringing forward the timeline for implementation of mitigation measures
Methane emissions of coal placed on the Union market	Equivalence of MRV measures Methane intensity of coal production Methane transparency database and performance profiles	High		

Source: European Parliament, UNFCCC (2021)

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Delayed implementation timeline

The timeline for implementation of regulations has been extended throughout the negotiation process. Mitigation requirements start in 2025, with additional measures being implemented until at least 2031.

Timeline of events associated with the EU Methane Regulation

Events leading to emission reductions:

- No methane emissions at drainage stations
- Methane intensity threshold
- No methane emissions from abandoned and closed mines

Impacts:

- EU Monitoring, Reporting and Verification (MRV)
- Coal exporters to EU Market

2024	
1 Jul	★ EU Methane Regulation passed
2025	
1 Jan	Drainage stations can no longer emit methane
1 Jul	First reporting on annual methane emissions Deadline for inventory of closed and abandoned mines
2026	
1 Jan	Methane Transparency Database Rapid Reaction Mechanism Czechia to close last underground coal mine Romania to close Lupeni & Lonea underground coal mines
1 Apr	Measurements required at abandoned and closed mines
1 Jul	EU publishes methane performance profiles Global Methane Monitoring tool
2027	
1 Jan	MRV equivalence on imported coal Threshold on methane from ventilation shafts
1 Jul	Methane intensity threshold for coking coal established
2028	
1 Jan	Poland closes KWK Bolesław Śmiały (PGG) mine
2029	
1 Jan	Poland closes KWK Sośnica (PGG) mine
2030	
1 Jan	Ban on emissions from abandoned and coal mines
1 Jul	Methane intensity threshold established for imported coal
2031	
1 Jan	Reduced intensity threshold on methane from ventilation shafts

Source: Ember

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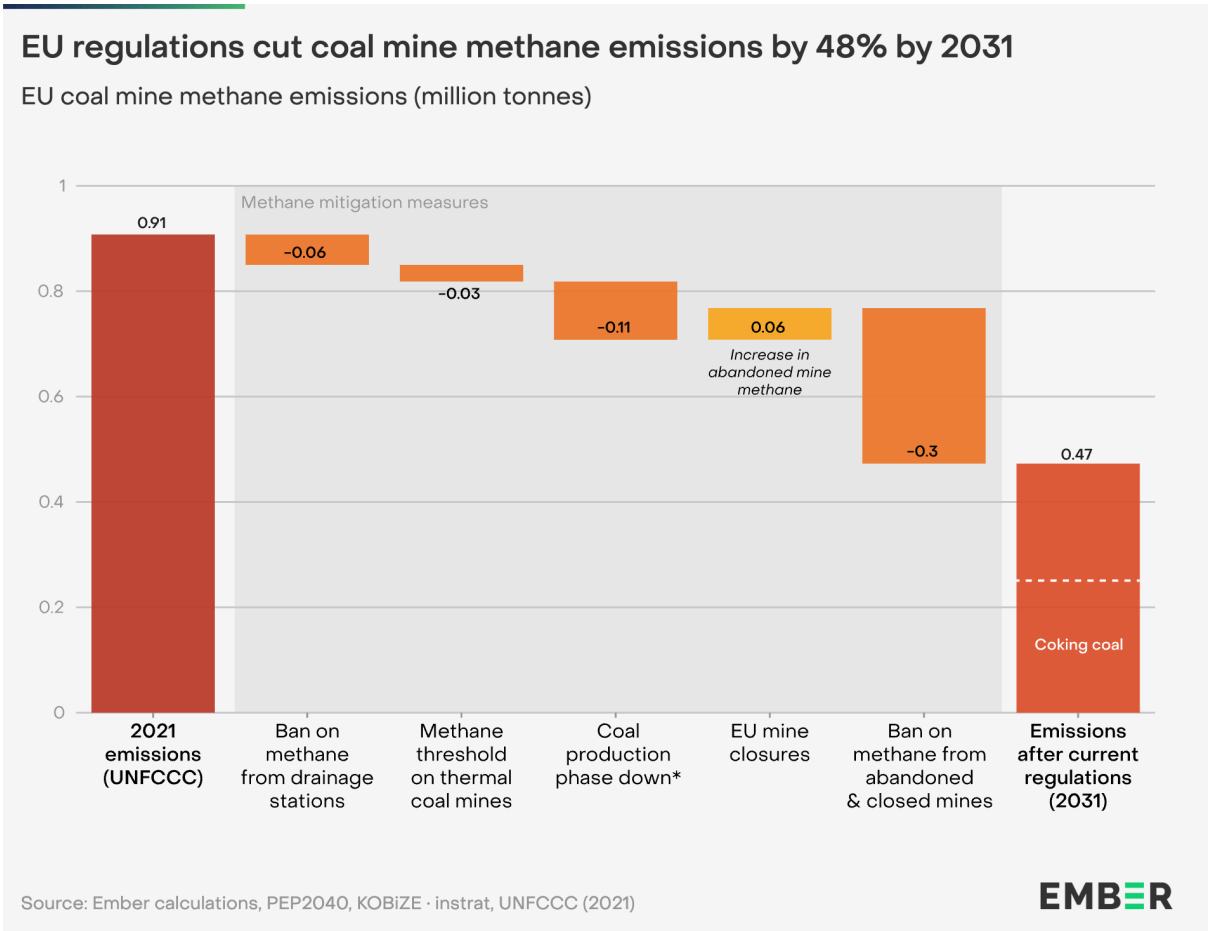
Most concerningly, establishing the timeline and scale of a methane emission threshold per tonne of coking coal has been postponed to 2027. This threshold will be pivotal to determining the EU's total emission reductions from coal mining.

For exceptions and more details on the regulations, find the full text here.

Reductions fall short of EU Green Deal

Ember analysed the regulation's potential to reduce emissions from the coal mining industry, evaluating various mitigation measures and the EU's thermal coal phase-out plan.



Ember estimates that the current regulation will mean that the EU's CMM methane emissions will decrease by 47.9% by 2031 compared to 2021 emissions. The emission

reductions are driven by the ban on methane released from closed and abandoned coal mines (AMM).

The European Green Deal targets a minimum 55% reduction in GHG emissions by 2030 compared to 1990. As highlighted in the original regulation proposal, achieving this goal necessitates a 58% reduction in methane emissions from the energy sector by 2030 compared to 2020. This goal for CMM will not be reached until the regulations include mitigation requirements from coking coal mines.

Reducing emissions by mitigation at active mines: 10% reduction
Ember estimates that prohibiting the release of methane by venting and flaring (with efficiency below 99%) from drainage stations will reduce the EU's annual CMM emission by approximately 6.4%.

The methane emission threshold on thermal coal mines will reduce annual 2027 CMM emissions by 1.7% and 2031 emissions by 3.6%.

Reducing emissions by reducing coal production: 5.4% reduction
By 2031, Ember estimates that annual CMM emissions will decrease by 5.4% due to reduced coal production from Poland alone.

Mitigating methane from closed coal mines: 32.5% reduction
The greatest reduction in CMM emissions is due to the EU's underground mine closures in combination with the mitigation of abandoned and closed coal mine methane emissions.

Underground mine closures in Poland, Czechia and Romania will reduce emissions from active mines by 6.6%. The methane emissions from these mines will continue after operations cease as abandoned mine methane. Therefore, these emissions are only mitigated due to the ban on methane emissions from closed coal mines.

Total emissions reductions from the ban on venting methane from abandoned or closed mines are projected to be 32.5% in 2031 compared to 2021 levels.

Methane from coking coal mines will hinder the EU from reaching climate targets

Rather than thermal coal which is used in electricity production, coking coal is used in steel production. Poland's coking coal mines contributed to 32% of the EU's total CMM emissions and are one of the largest unaddressed methane emission sources in the Methane Regulation.

The gassiest underground mines in Poland currently mine coking coal (mines producing > 50% coking coal) and are operated by PGG, JSW, and PKW.

The EU has delayed determining a methane emission threshold, or timeline for these mines, until 2027.

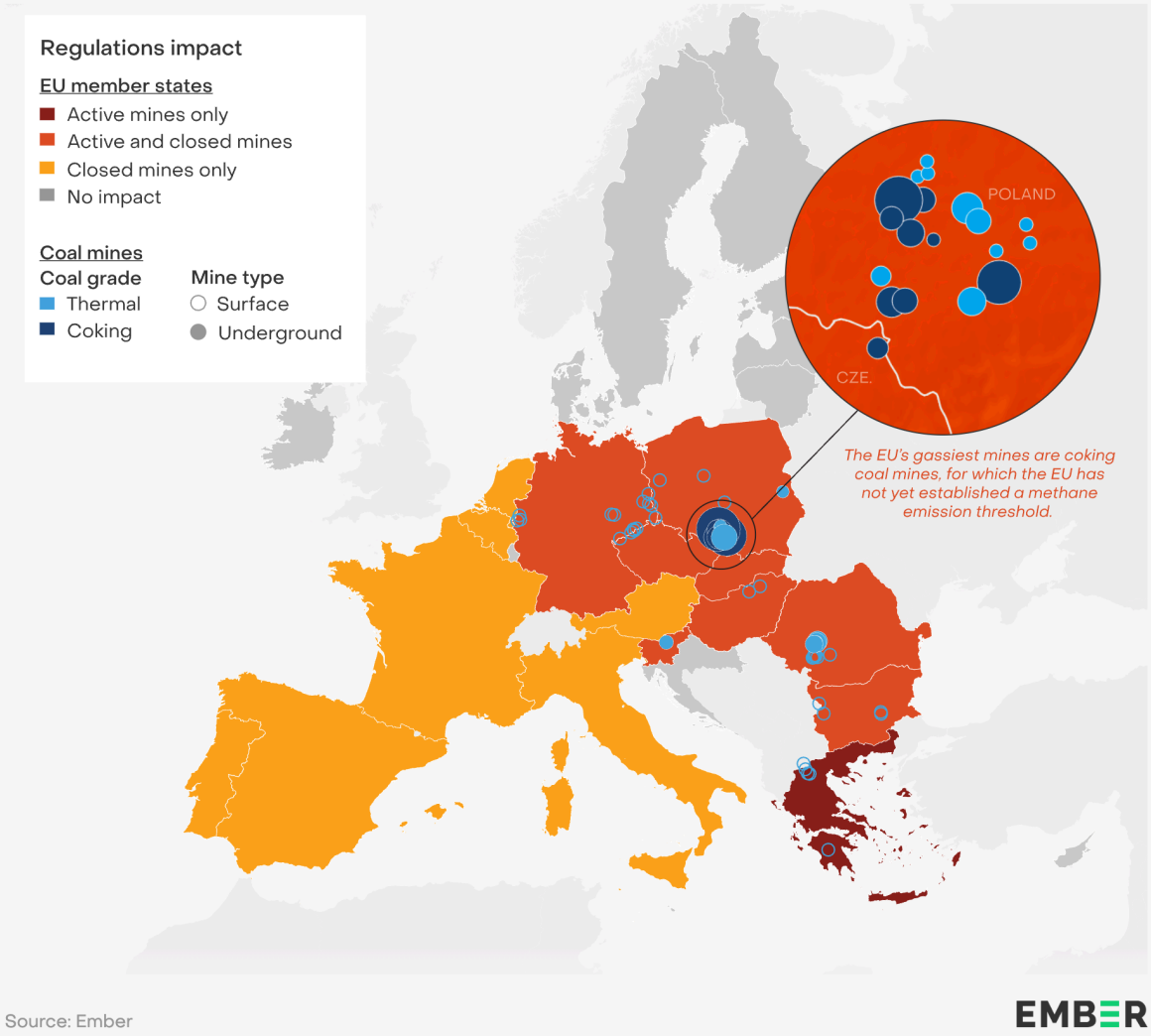
An ambitious emission threshold will aid the EU in achieving the remaining emissions cuts necessary to achieve the EU Green Deal. Applying the same threshold to coking coal as has been applied to thermal coal would achieve the required reduction from the coal industry.

Implications

What it means for Member States

The Regulation will require 16 Member States to measure and report CMM emissions. Meanwhile, 15 will be compelled to implement methane mitigation measures, most of which are on closed or abandoned mines.

Countries affected by the EU methane regulations



Source: Ember

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Ember's analysis found that in 2024 there are 61 active coal mines across EU Member States, with the largest number of active coal mines in Poland, Romania and Germany. Active mines are currently found across eight EU countries, with a further eight Member States that will have to solely address methane escaping from closed or abandoned underground coal mines. This includes Austria, Belgium, France, Italy, Netherlands, Spain, Slovakia and Portugal.

In total, 15 EU Member States will be compelled to implement methane mitigation measures on coal mines. Poland and Romania will be the only EU Members with active underground mines affected.

Case Study: Poland

In 2021, Poland contributed to 62% of the EU's total CMM emissions, most of which were emitted from deep, gassy, underground coal mines. Poland has 19 active underground coal mines, many of which will require mitigation measures under the new regulations.

Methane emission threshold at thermal coal mines
Ember analysis estimates that five thermal coal mines will be required to implement mitigation measures in order to achieve the 3 tonnes of methane per kilotonne of coal emission threshold. The operator of 4 of these mines, PGG, can achieve this by improving the efficiency of their drainage capture to 60%. PGG has already committed to increasing drainage effectiveness to at least 50%.

Coal mine methane as a resource
All underground mines will need to capture and use or destroy methane released by the drainage systems.

There is a strong business case for companies in Poland to have high-efficiency methane gas drainage systems. Enhanced methane control leads to enhanced safety, environmental mitigation, and higher energy recovery.

According to the State Mining Authority (WUG), in 2022 Polish mines had an average methane capture efficiency of 38%, utilising approximately 70% of the captured methane.

If Poland increases its capture efficiency to at least 50%, Ember estimates that coal mining companies could generate around 1 TWh of electricity per year, as well as the potential for local use of waste heat. This is equivalent to 79 million euros of electricity and enough waste heat to heat almost 25,500 hospital beds per year.

Case Study: Germany

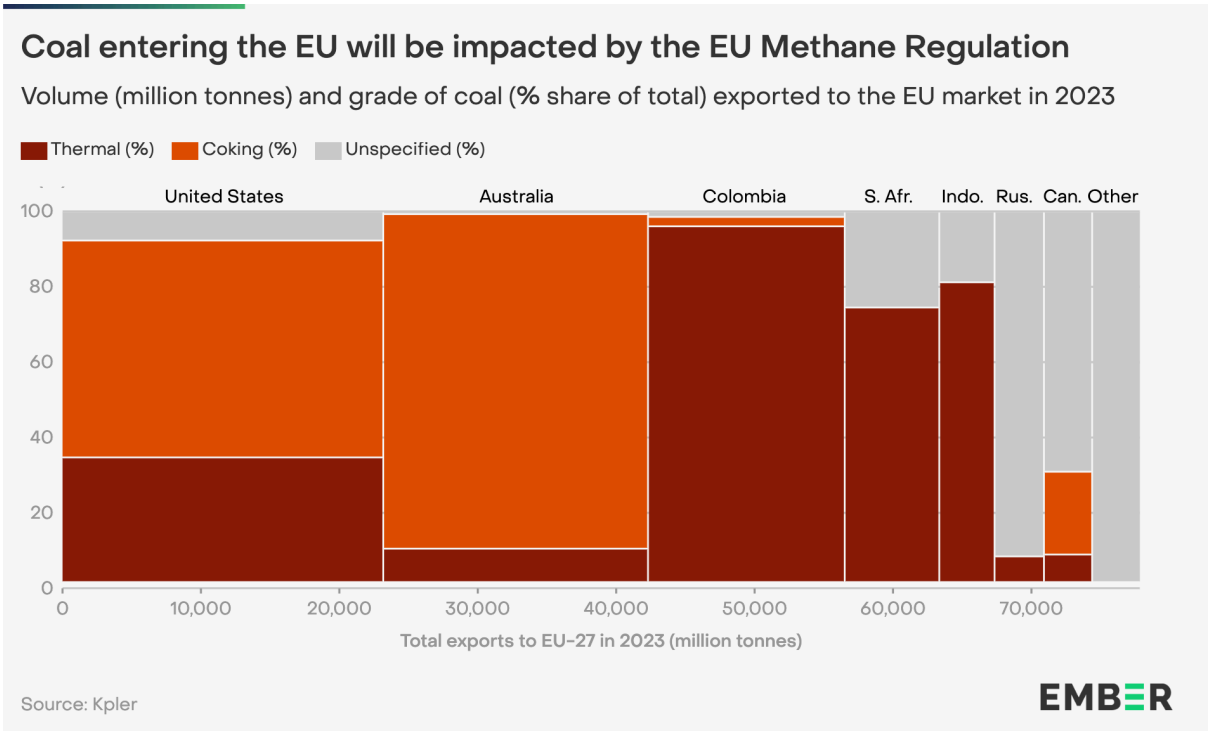
Germany is the EU's largest coal producer, mining 44% of the EU's 2022 lignite production at large surface mines. Surface mines are not required to implement any mitigation measures, but they will be required to improve the current emission estimation methodology.

Germany, like all other EU Member States with surface mines, is currently using outdated or default emission factors which do not provide a robust estimate of the scale and variability of emissions.

Germany will need to measure and calculate an emissions factor for each coal deposit, which includes any potential emissions from the surrounding strata.

What it means for coal entering the EU market

None of the coal exporters to the EU currently achieve the MRV equivalence as requested by the EU Methane Regulation, this includes coal imports from advanced economies such as the US and Australia.



The EU Methane Regulation includes two key strategies to tackle the methane emissions of energy imports. Firstly, importers to the EU market will be asked to comply with the same monitoring, reporting and verification (MRV) measures as will apply to EU coal operators.

Secondly, imported coal will have to achieve a maximum methane intensity. The methane intensity will be established by the EU by 2030, taking into account the "*best performing*" classes of coal, and set at a level which "*promotes global methane emission reductions*".

Importers will be subject to penalties if they fail to provide the required information or fail to comply with mitigation measures and methane intensity requirements.

Ember analysed the MRV requirements of the 10 largest importers of coal to the EU. None of them achieved the EU's MRV equivalence standards.

Summary of the key regulations for importers

Importer Rules	Summary	Date
Methane transparency database	Importers must provide data which will support the Methane Transparency Index Includes information on whether the exporter carries out source level methane emissions and quantification, third party verification, measures to control and restrict venting and flaring, and volumes of vented and flared methane calculated annually for each coal mine.	June 2025
Methane transparency database	Commission will publish information on quality and reliability of methane emissions and mitigation efforts of coal exporters to the EU market. Information tool is free of charge and publicly available	Jan 2026
Methane performance profiles	Methane performance profiles for Member states and for exporters to the EU. Including analysis of super emitting events and how they were addressed	July 2026
Equivalence of MRV measures	Contracts signed after the regulation enters into force are subject to MRV measures equivalent to the EU Contracts signed before the regulation enters in force , importers must show they have taken "all reasonable efforts" to ensure MRV equivalence, including amendment of supply contracts	Jan 2027
Methane intensity of coking coal	EU to set out restrictions on venting methane from ventilation shafts for coking coal mines	July 2027
Methane intensity of production	EU seta out a methodology to calculate producer level methane intensity	July 2027
Methane intensity of production	Coal producers must report the methane intensity of their coal	July 2028
Methane intensity of production	EU establishes the maximum methane intensity value for coal imported to the EU market	July 2029
Methane intensity of production	Importers of coal to the EU market must demonstrate the methane intensity of their coal production is below the maximum methane intensity value	July 2030

Source: European Parliament

Case Study: United States

In 2023, the United States exported the largest amount of coal to the EU Market, representing approximately 40% of the EU's coking coal imports and 23% of the EU's thermal coal imports.

In the US, underground mines are only required to measure their ventilation air and drainage methane emissions on a periodic basis. Drainage system methane emissions are determined on a weekly basis, whereas ventilation air methane emissions can be determined on a quarterly basis.

Surface mines are not included in the Greenhouse Gas Reporting Program and do not need to report or measure methane emissions or mine specific emission factors. The US estimates its methane emissions from surface mines on a basin-level, using basin-specific coal production by basin specific gas content and an emission factor.

According to methane emission estimates from the International Energy Agency (IEA), the average methane intensity of coal from the US is 3.7 tonnes of methane per kilotonne of coal, meaning that much of the coal from the US already achieves the methane emission requirements for EU coal. Despite this, the US measurement standards currently fall below the EU's new requirements.

American coal mines exporting to the EU will be expected to have direct and continuous measurement and quantification of methane emissions at underground mines, and quarterly updated emission factors for surface mines.

Case Study: Australia

Australia is the second largest exporter of coal to the EU and represents approximately 50% of the EU's coking coal imports.

Using data from the IEA, Ember estimates that the average methane intensity of Australian coal is 3.6 tonnes of methane per kilotonne of coal. Nonetheless, as with all other coal exporters, Australia's methane measurements also fall below what is now required by the EU.

In Australia, underground mines must measure their ventilation air and drainage methane emissions. Mines can choose whether to undertake continuous or periodic monitoring of methane emissions, which can be as infrequent as once a month. Most mines apply the periodic monitoring option which is not sufficient with the new EU rules.

Surface mines can choose whether to use a state-wide, or mine specific emission factor. This can include multiple factors per mine. Once this factor is established, it should be updated if the owner plans to mine for coal in new areas or deeper seams, however, there are no practical requirements for it to be updated periodically. Unless the surface mines update their emission factors on a quarterly basis, current methods are not sufficient to achieve EU MRV equivalence.

Recommendations

Missing Pieces

The impact of the regulation in reducing methane emissions from coal mines depends on several key factors which are still to be defined. Establishing robust MRV standards, penalties and determining an ambitious methane threshold for coking coal are crucial steps which will ultimately dictate its success in achieving emissions reductions.

The current EU Methane Regulation is a first step in the right direction, however, to achieve meaningful emissions reductions within, and outside of EU borders, policymakers must ensure that the remaining gaps in the regulation do not go overlooked.

To achieve the required emission targets, Ember recommends the EU take three key actions:

1. Significantly improve on the globally accepted “best practices” for MRV from coal
2. Set guidelines and a standard for infringement penalties
3. Set an ambitious methane emission threshold for coking coal mines

Integrity of the regulation is dependent on the development of robust MRV standards

European standardisation organisations will be requested to draft harmonised “standards” for measurement and quantification of methane emissions from underground, surface and closed coal mines across different member states. The integrity of such standards is vital to ensure that industry measurements achieve the level of accuracy intended by the regulation.

This is of particular importance for surface mines as few standards or studies exist on how to develop emission factors which truly reflect emissions. Emissions from this source have long been overlooked and understudied, therefore the EU will need to implement significant improvements to what is currently accepted as global “best practice”.

Developing high MRV standards at all coal mines in the EU will have a substantial positive impact globally since imported coal must comply with the EU's MRV equivalence requirements.

Set a common level of expectation for penalties to ensure compliance

Member States will have to establish their own guidelines and rules on penalties, which the regulation states must "*be effective, proportionate and dissuasive*". The regulation does not, however, provide a uniform EU-wide rule or a methane fee. This leaves the decisions on the type, level, and effectiveness of penalties up to individual Member States, as well as their enforcement.

Not only could this lead to divergent qualities of implementation across the EU, but depending on Member State characteristics it has the potential to seriously impact the level of methane reductions both within the EU and for coal imported to the EU market.

Setting a common level of expectation for such fees will be important to ensure EU-wide compliance with the regulation. A recent analysis by the Ecologic Institute suggests a core reference value of 6,000 EUR/tCH4. Their detailed analysis of penalties and legal issues can be accessed here.

An ambitious threshold for coking coal to change global attitudes to methane mitigation

The global steelmaking industry will continue to use coal until 2050 even under the most optimistic decarbonisation scenarios, making emissions from this type of coal all the more important to address.

Underground coal mines can mitigate almost all of their methane emissions however most companies take minimal efforts to prevent or minimise methane emissions as they have no economic interest or incentives.

An ambitious methane emission threshold for coking coal combined with penalties would be the strong financial driver to change this attitude globally and incentivise coal mining companies around the world to start prioritising investing in mitigation technologies.

Aside from capturing and utilising drained gas, Regenerative Thermal Oxidizer (RTO) technology can be used by underground coal mines to destroy the majority of their methane emissions.

The cost of such technology over 10 years of operation is approximately 250 euros per tonne of methane. This is significantly below the social cost of methane established in the US and Australia which is $1500-$1940/tonne of methane, and costs on average less than 1% of the price of steel.

The Steel Methane Programme, currently in the final draft stages, is an example of an initiative in which companies commit to mitigate methane emissions in the steel supply chain. The programme, established by the United Nations Environment Programme, outlines a performance and reporting framework for the metallurgical coal industry, including commitments on methane emissions reductions.

Supporting Materials

Glossary

Closed and abandoned coal mines

After an underground coal mine ceases operations, methane emissions continue to seep from the old mine workings and surrounding strata. If a mine is not sealed or flooded, the methane will continue to be emitted into the atmosphere for decades. This source of methane is called “abandoned mine methane”

More information on this emission source can be found here.

Coking coal

Coking coal is used as a fuel and as a reactant in the process of steelmaking. In the EU regulation it is defined as:

“*Bituminous coal with a quality that allows the production of a coke suitable to support a blast furnace charge. Its gross calorific value is greater than 23 865 kJ/kg (5 700 kcal/kg) on an ash-free but moist basis*.”

It is listed within the EU’s list of Critical Raw Materials and has therefore been subject to delayed regulations. To ensure that steelmaking is not endangered by the restrictions, the EU Commission will establish the coking coal threshold once additional data has been gathered.

A coking coal mine is defined as “*a coal mine where at least 50% of the production output averaged over the last 3 available years is coking coal*”

Thermal coal

Thermal coal is used primarily as an energy source. To achieve the EU’s energy and climate goals, EU countries need to phase out thermal coal. Europe’s coal exit timeline can be found here, and EU work on coal regions in transition here.

Venting

Venting is the direct release of methane gas to the atmosphere. Underground coal mines can vent methane from drainage stations or ventilation air shafts.

Flaring

At coal mines, flaring is the practice of burning the methane gas that would otherwise be released directly into the atmosphere. It usually occurs at drainage stations where the methane content in the gas released is high enough to burn. It can be seen as a form of methane mitigation as the methane is converted to CO2 which has a lower greenhouse gas warming potential.

The EU Methane Regulation requires flaring of 99% efficiency, which is the requirement that 99% of the methane must be destroyed.

Methane Emission Intensity/Emission Threshold

The methane emission intensity of coal is the amount of methane emissions emitted per unit of coal. In this report, the units used are tonnes of methane per kilotonne of coal.

The methane emission threshold is the limit on the methane emission intensity of coal imposed by the EU.

Summary of EU Methane Regulation for coal mines

Monitoring and reporting in active coal mines

- Underground coal mines are required to implement continuous and direct measurements and quantification of methane emissions from all drainage stations and ventilation shafts.
- Surface mines must establish deposit-specific emissions factors on a quarterly basis.
- Post-mining emissions factors must be updated annually and based on deposit-specific coal samples.

Mitigation of methane emissions from active underground coal mines

- Flaring with a destruction and removal efficiency below 99% and venting methane from drainage stations are prohibited.
- For thermal coal mine operators, venting methane through ventilation shafts emitting more than 5 tonnes of methane per kilo tonne of coal mined is prohibited from 2027. This limit will be further reduced to 3 tonnes of methane per kilo tonne by 2031.

Methane emissions from closed underground coal mines and abandoned underground coal mines

- An inventory of all closed and abandoned underground mines whose operations ceased up to 70 years ago, including the requirement of methane measurements in all such mines.
- Venting and flaring from all such mines is prohibited.

Methane emissions of coal placed on the Union market

- Equivalence of MRV measures: Importers have to prove that coal is subject to the equivalent monitoring and verification of methane as set out in the Regulation.
- Methane intensity of production: Imported coal required to have a methane intensity below the maximum methane intensity of the EU.
- Methane transparency database and methane performance profiles: methane performance profiles for Member states and for exporters to the EU.

Methodology

Emissions Reductions Methodology

Emission **reductions due to mitigation at active mines** were estimated using the dataset of coal mines and methane emissions from Poland's underground mines provided by Instrat. This analysis uses the mine by mine emissions as reported by KOBiZE. Reductions were estimated assuming all methane emissions from drainage stations are mitigated, and the methane emission threshold was applied per operator, i.e. coal mines which mined greater than 50% of thermal coal in 2022 were grouped per operator. Coal production decreases until 2031 were taken into account using PEP2040 forecasting.

Emission reductions from the **EU's thermal coal phase down** were estimated using only thermal coal phase down estimates from Poland, using PEP2040 coal production forecasting. This does not take into account reduction of coal production at coal mines in other coal producing countries. This should not significantly impact the analysis as any additional reductions in production is from surface mines, which do not currently report significant methane emissions.

Emissions reductions from **EU coal mine closures** were estimated using mine by mine data from KOBiZE for Poland. For mine closures in Slovakia, Czechia and Romania emissions reductions were estimated using UNFCCC reporting.

Emissions **reductions from closed and abandoned mines** were estimated by assuming all current AMM emissions would be mitigated, including all emissions from EU coal mines closures until 2031 (as above).

Emission intensity for coal on the EU market

The top 10 coal exports to the EU Market were estimated using Kpler data.

The average emission intensity for coal placed on the EU market was estimated using 2022 methane emission estimates from the IEA's Methane Tracker, and 2022 coal production reported by the EIA. The value is an average which includes all coal and does not split by coal grade.

Acknowledgements

Ember Contributors

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