EMBER

Comments to the 'Public consultation on the revised Climate, Energy and Environmental Aid Guidelines (CEEAG)'

Coal Mine Methane

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Introduction

State Aid in the context of coal mine methane.

In June 2021, the European Commission (EC) published a draft Communication on the "Guidelines on State aid for climate, environmental protection and energy 2022" (CEEAG), which are due to come into force in January 2021. The EC has invited public comments to be submitted by August 2nd, 2021.

Ember welcomes these guidelines, and particularly the focus on the phase out of the coal industry in the EU. We would like to make the following comments to address how state aid might relate to coal mine methane. Glossary of key terms is at the end of the document.

Overview

Coal Mine Methane ("CMM") is methane released as a result of operating coal mining activities, with deep underground mines emitting particularly large quantities. Where mines are closed, they may continue to emit methane for many decades. This is referred to as Abandoned Mine Methane ("AMM").

Methane is a very powerful greenhouse gas, with a global warming potential ("gwp") of 86x than that of carbon dioxide over the first 20 years in the atmosphere. It is released into the atmosphere from various sources, including natural and anthropogenic processes. The anthropogenic sources of methane emissions include agriculture, oil, gas and coal mining sectors.

For the last 30 years, the EU coal mining industry has undergone steady and rapid decline. As a result, CMM emissions have also been falling. Nevertheless, the remaining operating underground coal mines in Poland are still substantial emitters. The UNFCCC reports that in 2018, these Polish mines emitted 584 kilotonnes of methane, equivalent to 50m tonnes of CO2 emissions. To put it into perspective, that is over 5x Ryanair's emissions in the equivalent period. And methane's impact is not limited to operational coal mines: when coal mines close, they often continue to emit coal mine methane for many decades, greatly contributing to global heating.[1]

The European Union shows global leadership in dealing with climate change in areas such as promotion and support of renewables; energy efficiency; circular economy and more. Yet its

[1] Nazar Kholod, 2020: *"Global methane emissions from coal mining to continue growing even with declining coal production", Journal of Cleaner Production*

approach to coal mine methane is markedly out of step from the above, with minimum legislation in place, targeted at reducing methane emissions. EU is committed to the goals of the Paris agreement, yet global emissions of coal mine methane put this under threat. In our opinion, EU should lead by example in addressing EU based coal mine methane emissions as much as possible. Given that countries globally that are embarking on energy transition are looking to the EU for best practices, there is an opportunity to showcase effective management of greenhouse gas emissions in any remaining coal mines in the EU.

Coal mine methane can be captured and utilized to generate heat, electricity, hydrogen or treated for direct injection into the gas grid. In exceptional cases, it can simply be flared, which still has significantly less climate impact compared to direct venting into the atmosphere. In the case of abandoned mines, Germany and the Czech Republic have demonstrated that projects capturing AMM for generation of electricity can provide substantial economic and environmental benefits.

Suitability of Different CMM Projects for State Aid

We distinguish 3 types of coal mine methane projects. Whilst they all involve methane, they have different characteristics and hence different policies appropriate to them.

Category 1: Drained Coal Mine Methane ("Drained CMM") from Active Mines:

Overview:

This is methane produced from drilling surface and wells into the coal seams of operational coal mines, with subsequent extraction to a surface pumping station. These wells produce relatively high concentration methane with a concentration of 10-60%, depending on a number of factors. This process is done predominantly to improve mine safety and productivity, as drainage reduces methane concentrations inside the coal seams, thereby reducing risks that methane will ignite or explode during production.

How is drained CMM utilized?

Drained CMM can easily be sent into power plants, producing electricity and potentially heat for mine's own consumption or for sale to grid. In case of local demand, it can be sent to local industry through pipelines or more rarely injected into a natural grid after some processing and purification.

Appropriateness for State Aid:

Ember believes that such projects are not suitable for state aid, as they normally have good economics without any government support. Any additional support for such projects risks improving mine profitability and increase its operational lifetime.

Category 2: Ventilation Air Methane from Active Mines:

Overview:

Not every mine has CMM drainage, but all major underground mines have ventilation systems, where ventilators pump atmospheric air into the mine, diluting gas, which then exits coal seams during mining activities. The resulting mixture exits through exhaust shafts and is called Ventilation Air Methane

("VAM"). Methane concentrations of VAM is generally kept at concentrations well below the explosive limit of 6%, with a typical concentration of around 0.5%. In case this concentration goes up, then mines have to take steps to reduce it, through increased ventilation or stoppage of mining activities.

How is VAM utilized?

Because of its very low concentrations, VAM cannot be utilized in a traditional manner and can generally just be destroyed. The leading technologies are oxidation in specialized equipment such as thermal or catalytic oxidisers. Such processes convert methane into water, carbon dioxide and heat. As methane is a far more powerful greenhouse gas than carbon dioxide, such projects are eligible to generate carbon credits. In practice, only a handful of VAM mitigation projects were ever implemented, with the majority implemented under the UNFCCC Clean Development Mechanism. After the demise of the UNFCCC carbon markets, VAM destruction projects stopped being economically feasible.

Appropriateness for State Aid:

Like carbon capture and storage, VAM mitigation projects do not have an obvious revenue stream outside of the carbon incentives or government incentives. Ember always has concerns about coal mining industry receiving State Aid, but from VAM, we are being pragmatic. Whilst we believe that coal mines should be closed as soon as possible, we also understand that in the near-term, this is impossible, particularly for metallurgical coal.

Therefore we would support State Aid, which supports the implementation of VAM mitigation projects at active coal mines in Europe. In addition to direct environmental benefits, the knowledge gained from such projects could be exported globally and if this happens, the potential reduction of greenhouse gas emissions from VAM mitigation projects could be enormous.

Any such measures would have minimal effect on coal mine profitability and are unlikely to lead to increased coal production.

Category 3: Abandoned Mine Methane:

Overview:

Stopping coal mining at a site will reduce coal mine methane emissions, however it will not immediately reduce emissions to zero, since significant methane leaks can continue in the absence of adequate control measures. Annex 2 of the draft CEEAG 4.12 mentions that dewatering activities may be financed under state aid. Dewatering of closed coal mines is a very important activity, as water ingressions can cause surface damage or lead to surface and underground water pollution. However, this presents a challenge in that, unless flooded, closed coal mines continue to leak methane into the atmosphere for many decades and are practically impossible to fully seal [Fig. 1].

Such leaks lead to local pollution, tropospheric ozone production (a potent air pollutant) and substantially contribute to global heating. If managed correctly, this methane can be collected and either destroyed (normally through flaring) or utilized to produce heat and electricity.

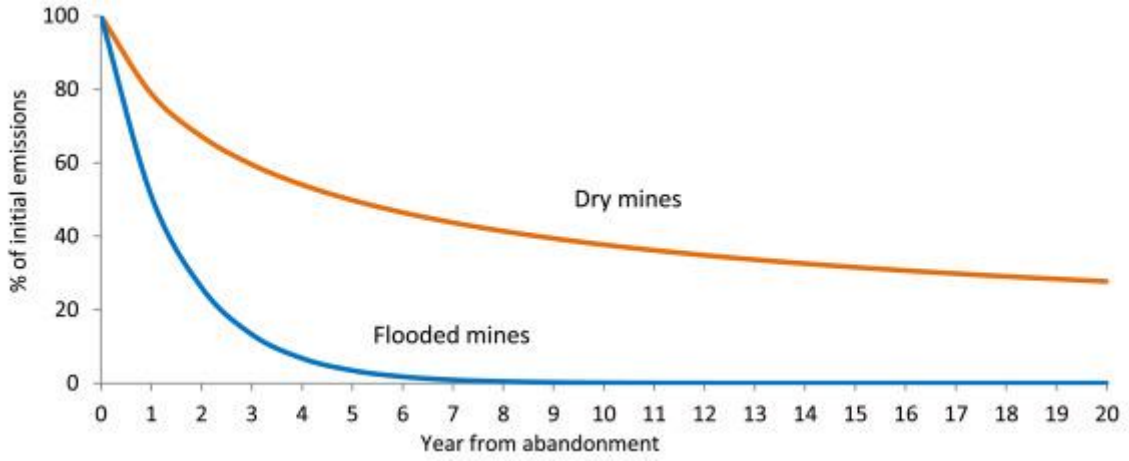

Figure 1: Assumed AMM emission reductions over time from dry and flooded mines.[2]

How is AMM utilized?

In case abandoned mines are sealed properly, it is possible to capture methane from those mines and convert it to heat and electricity, using the same technologies as for drained CMM. Such projects are very beneficial, as otherwise, AMM would inevitably leak into the atmosphere, contributing to climate change and local pollution.

Appropriateness for State Aid:

As for drained CMM, such projects can in theory be profitable without state support, but because they don't have an active coal mine, they are more suitable to government support, as such aid does not risk extending the operational lifetime of a mine. Additionally, the environmental benefits of AMM capture and utilization are enormous, which makes it very suitable for State Aid. the only question is whether to let previous mine's operators to own and operate such projects or invite new operators for the right to operate these.

Our Comments

Comments on section 4.12 "Aid for coal, peat, and oil shale closure"

We support the text of Annex 2, but would like to make the following additions:

Annex 2: Definition of costs referred in Section 4.12.2

To *"1. Costs by undertakings which have closed or are closing coal, peat and oil shale activities"* ***add****:*

(n) costs of sealing the coal mines as well as the construction and operation of systems for the extraction of methane from the closed coal mine.

To *2. "costs made by several undertakings"* ***add****:*

(d) in case there is no economically viable activity to utilize the extracted methane, costs for the construction and operation of facilities for its full destruction (i.e. flaring).

[2] Nazar Kholod, 2020: *"Global methane emissions from coal mining to continue growing even with declining coal production", Journal of Cleaner Production*

Comments on section 4.1 "Aid for the reduction and removal of greenhouse gas emissions including through support for renewable energy"

We recommend with regards to promoting Coal Mine Methane emission abatement projects via State Aid:

Allow aid to projects for abatement of coal mine methane emissions subject to the following cumulative requirements:

A. Operational Coal Mines:

Ember's overriding objective is to promote the phase-out of coal. Nevertheless, we take a pragmatic approach in that coal mining will not cease overnight and that any pollution resulting from coal production must be mitigated as much as possible. We believe that state aid for coal mine methane mitigation, with sufficient level of penalties for methane emissions - i.e. a balance of carrot and stick is appropriate

A1: Measures for destruction and/or utilization of ventilation air methane:

a) Independent assessment that such aid does not extend the operational lifetime of the coal mine. And that the level of aid puts the projects' economic return commensurate with their cost of capital, without providing profits to mine operators.

B. Closed or closing coal mines:

B1: Measures to promote the utilization of methane from closed coal mines, via power generation, injection to gas or flaring (no owner):

a) Such projects must be allowed, subject to transparent and competitive access to ownership for AMM rights.

b) Flaring must be the option of last resort, when no other technically or economically viable alternatives exist. In such cases, independent assessment needs to be performed, highlighting the reasoning behind the decision.

B2: Utilization of methane from closing coal mines, via power generation, injection to gas or flaring (mine owner remains):

a) A transparent and competitive process must be run for the rights to AMM and revenues for their generation, with potential operators having equal opportunities as the mine owners.

b) Flaring must be the option of last resort, when no other technically or economically viable alternatives exist. In such cases, independent assessment needs to be performed, highlighting the reasoning behind the decision.

Glossary of Key Terms

(If ***"UNECE"*** **-** then from the 2008 UN Economic Commission for Europe's Ad Hoc Group of Experts Glossary of Terms. Otherwise, **Ember**))

Term:	Definition
Abandoned Mine	A mine where all mining activity including mine development and coal production have ceased, mine personnel are not present in the mine workings, and mine ventilation fans are no longer operative. ***(UNECE)***
Coal Associated Gas "CAG"	All methane contained within a coal seam and the immediate surrounding strata above and below the seam. ***(UNECE)***
Abandoned Mine Methane (AMM)	Methane remaining in the coal deposits after the mine has been abandoned. Such methane may leak into the atmosphere or stay trapped in the coal seams. ***(UNECE)***
Coal Mine Methane (CMM)	Methane released as a result of mining activities. It may either be vented through ventilation air ("Vented Methane") or drained through wells drilled into the mine. Abandoned Mine Methane can be considered as a subset of CMM.
Methane emissions	The volume of liberated methane released to the atmosphere. Methane used is not considered methane emitted. Methane emissions are calculated by subtracting the amount of methane used from the amount of methane liberated. ***(UNECE)***
Ventilation Air methane (VAM)	Methane contained in the exhaust air of the ventilation system of a mine, which is originated across the mine workings and diluted to low concentrations by the circulation of outside air ***(UNECE)***
Vented Methane	A system that is used to control the concentration of methane and other deleterious gases within mine working areas. Ventilation systems consist of powerful fans that move large volumes of air through the mine workings to dilute methane concentrations. ***(UNECE)***

About Ember

Ember is an energy think tank that is focused on accelerating the global transition to fossil-free electricity.

Its team and board of energy experts across Europe and Asia have worked in utilities including RWE, E.ON, Shell and BP.