Coal mine methane: is it a pollutant or a resource?

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16 MAY 2022

Acknowledgement

Special thanks are due to Clark Talkington for the application of his knowledge, editing and diplomatic skills to the text.

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1. Introduction

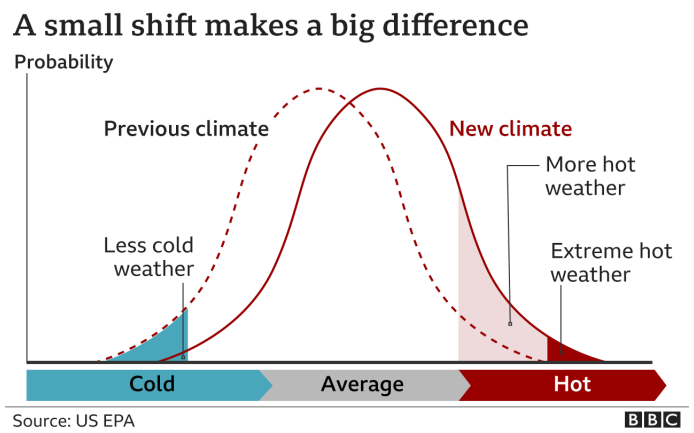
The climate is already changing. Every small increase in temperature can lead to major climatic and societal changes.

For example, this year over 1 billion people will be subjected to excessive heat.

Climate anxiety is rife among young people, who see an existential threat to their future and that of future generations.

Making practices look more environmentally friendly than they actually are ("Greenwashing") is equally rife among governments, large corporations and financial institutions.

GHG emission reduction targets are not being met. Stronger and more positive action is essential even to limit to a 2 degree C rise.



2. The status of CMM emission mitigation

In 2021, the estimated global coal production was 7,575 Mt of which almost half was mined in China.

Coal mines, active and abandoned, comprise one of the largest sources of anthropogenic methane emissions.

The coal mining industry is estimated to account for 11% of global methane emissions from human activities (U.S. EPA, 2019).

Current thinking is that CMM is a valuable energy source that offers the opportunity to mitigate global mine gas emissions. But is it effective? Probably less than 10% overall is destroyed.

With limited exceptions, national incentives, corporate policies and institutional campaigns have not been effective in significantly reducing CMM emissions.

3. Why is CMM a pollutant?

CH4 is released as a by-product of coal extraction. It is a potent greenhouse gas (GHG) with a global warming potential (GWP) 28-36 times that of CO_2 for a 100-year time horizon.

It also has a short residence time in the atmosphere with a GWP 84 times higher than that of CO_2 over a 20-year period.

Action to mitigate methane is therefore more effective than action to mitigate CO2.

There is growing interest among policymakers in the contribution of working and abandoned coal mine to global greenhouse gas emissions.

CMM is a pollutant with an energy value. When feasible, exploitation of the energy can help to offset a broader mitigation cost.

When extracted independently of mining, coal seam gas is no different than fossil gas (“natural gas”) and is often referred to as CBM.

4. Maximising CMM mitigation should be a priority

A paradigm shift from coal mine methane as a resource to methane as a major atmospheric pollutant is necessary.

We need metrics to accurately measure both methane emissions and also emission reductions against accountable targets.

Compliance and voluntary carbon markets have seen some success in incentivising mitigation projects, but without governments setting regulations, targets and penalties, mitigation is unlikely to be maximised and measurable on the global scale that is necessary.

The cost of the mitigation process should not be a limiting factor.

Coal mine methane should be disposed of by recovering its inherent energy where feasible and destroying when not.

The utilisation and mitigation technologies are well known but mines need to be operated in accordance with best practice guidance otherwise opportunities for maximum destruction at lowest cost will be lost.

5. Is a regulatory approach the way forward?

Several countries have implemented CMM MRV programs including Australia and the U.S.

The EU is a pioneer in recognising the need for regulatory enforcement of both emission monitoring and mitigation at coal mines and should be applauded for its intent.

Unfortunately, despite public consultations we believe the draft regulations would be difficult to implement because they did not reflect a sound understanding of the coal industry and methane management at working and closed mines.

Nevertheless, if significant reductions are to be achieved all the major coal mining countries will need to develop legal and regulatory instruments to set and enforce emission reductions at coal mines.

6. What technology is needed?

Current technologies for mine gas management, drainage, utilisation and VAM oxidation applied to gassy mines could potentially increase the quantity of CMM mitigated from less than 10% overall to over 34%.

There may be potential for enhancing VAM oxidation technologies.

In achieving the projected emission reductions, there would be a cost which would, and should, increase the cost of coal production and hence the market price of coal should reflect the negative externalities associated with methane emissions.

Only cessation of coal mining can lead to zero CMM emissions, and then only after treating AMM, but we should strive to the maximum extent possible to mitigate emissions until such time.

7. Who pays the price of CMM mitigation?

Coal mining is the source of emissions and coal mining companies are the emitters.

For many years, the full environmental cost of coal has not been met by coal producers and coal users in few, if any, countries.

Post closure (AMM) mitigation costs, generally, fall on national or local governments and hence the taxpayers.

The price of not mitigating GHGs, such as CMM and AMM, is paid by the inhabitants of the planet who are suffering intense storms, excessive heat, drought, failed crops, starvation and wild fires.

USEPA estimates the social cost of carbon is US$1500 per tCH_4

See: https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf; cost based on 3% discount rate

8. A CMM mitigation strategy for coal mining transition

We need to mitigate as much CMM as we can during the energy transition from fossil to renewable fuel sources by setting targets which require the gassiest working mines to implement proven technologies in accordance with UNECE best practice guidance and:

- Raise gas drainage standards to maximise capture and ensure CH4 concentration >25%.
- Discontinue hazardous low concentration drainage as cannot flare the gas if not used.
- Discharge low concentration gas in ventilation air for VAM mitigation.
- Destroy all unused, drained methane by flaring.
- Oxidise a proportion of the VAM at selected gassy shafts (e.g., 80% of total shaft flow).
- Ensure flaring or oxidation of unused, vented AMM.
- Introduce regulatory and fiscal policy to enforce and support implementation of the strategy.

Strategies for Mitigating Methane Emissions with Focus on VAM. 17th Session of the UNECE Group of Experts on CMM and Just Transition, 21/22 March 2022

9. Conclusions and recommendations

CMM is a pollutant and its emissions into the atmosphere should be minimised.

National governments should legislate to ensure the necessary actions are taken.

Treatment using current best practices and existing technology could potentially mitigate in excess of 30% of total CMM emissions.

There is room for enhanced technology solutions but we should not wait for protracted R&D to take action.

- For example, a single-pass, catalytic VAM oxidiser might allow more extensive VAM (and AMM) mitigation, but the development and capital cost could be high.
- Commercially available technologies can be deployed today, while promising R&D continues on technologies to reduce mitigation costs and increase efficiency.

THANK YOU

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