

Brainstorming Session Notes on Solutions to the Top Barriers to Coal Mine Methane (CMM) Project Development

This document summarizes feedback that was obtained during the brainstorming session held at the 32nd GMI Coal Mines Subcommittee meeting on 22 March 2023. Participants consisted of GMI Delegates, GMI Project Network members, and United Nations Economic Commission for Europe (UNECE) Group of Experts on CMM. The brainstorming session aimed to identify approaches and solutions to the three CMM project barriers that were ranked as being the most relevant (described below). The GMI Coal Mines Subcommittee plans to discuss the potential solutions presented below to establish achievable follow up actions and products that can be developed to address the CMM project barriers.

[Brainstorming 1](#)

[Brainstorming 2](#)

[Brainstorming 3](#)

CMM Project Barrier #1

Ensure that policymakers and stakeholders have access to transparent, reliable, and timely data on coal sector operations and emissions so that they can contribute to and realize the sector's decarbonization mitigation potential, including development of supporting policies and regulatory frameworks.

Public access to data on emissions/methane resources

1. Provide mine-specific and country-level coal mine methane (CMM) and abandoned mine methane (AMM) emissions data on publicly accessible websites to support analysis of emissions and emissions reduction data and to facilitate policy development to encourage greater emission reductions/ Ensure data are provided in an editable and downloadable form (e.g., in MS Excel, CSV files, MS Word documents or other file formats that can be easily downloaded for review and analysis – not scanned documents, pdfs, jpegs)
2. Standardize data presentation across countries and other jurisdictions so that data presented to the public is clear and can be easily understood. CMM and AMM data are very technical and presented for industry and government and thus often difficult for the public to comprehend without some technical background./ / Provide guidance on how to use the data.
3. Make measured emissions data available to the public with clear guidelines (measured data are essential)/ Provide assumptions with reported data (e.g., volume to mass), uncertainties, margin of error.
4. Consider options for the public and other stakeholders to provide feedback on data and monitoring approaches that might be inaccurate/misrepresented on public/official websites and processes for evaluating and incorporating that feedback.

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5. Provide better information for investors as well as resources to fund R&D projects related to CMM mitigation
6. Ensure that everyone has access to information on forecasted CMM and AMM emissions and resources (in addition to historic data)/ Provide data on AMM reserves as mines close and methodologies for estimating reserves to support use and mitigation of AMM emissions.
7. Develop a publicly-accessible and easily navigable Wiki data system to include coal production data and other relevant information (e.g., isotherm adsorption data for coal). Data are contained in reports today, but the data are not easily accessible to the public. Start to aggregate the data in a way that we get a better idea about potential for emissions reductions
8. Where possible, provide methane emissions data that are closer to real time, such as by releasing interim data to reduce the lag time between when the data are published and measurements take place
9. Provide clear reporting templates that are easy for companies to follow

Quality of data on methane emissions/reserves

10. In many coal mining countries, there is a need to generate and make available reliable data on methane emissions from coal mining for policy development
11. Ensure published data are accurate, transparent, verified and measured at mine level/Ensure data facilitate an understanding of underlying policies when emissions are produced (data are needed to set caps for “carrots and/or sticks”)
12. Fund science studies that compare monitoring/measurement approaches to get the right information to policymakers on mitigation potential
13. Review and improve data measurement methodologies/ Bring together scientists from different disciplines to refine methodologies and get data to decisionmakers
14. Assess international organizations’ willingness to work with countries to improve measurement and data transfer
15. Establish a coordination mechanism for the public/data users in checking public data to ensure they use their resources effectively
16. Ensure that measurement data are presented in a way that provide dynamic view vs static view of methane emissions from coal mines (as it is variable source) (a lot of focus is on reported data now, but much of the data is incorrect). Dynamic view of data is more useful to project developers
17. Adapt the methodology for classifying AMM reserves to AMM methods to ensure accurate estimates/ Assess how to improve accuracy of methane reserves calculation, which is critical to financing

Information on cost/benefit of CMM mitigation

18. Develop an informational tool for policymakers to show comparison of costs and scale of reductions for various mitigation technologies for CMM/VAM vs other GHG mitigation options (e.g., Direct Air Capture, CCUS). Show that CMM and VAM can have a significant impact (scale) for the more attractive costs. Show cost/benefit and large scale of VAM and CMM.

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19. Develop an informational tool on mitigation technology profiles in the coal mining sector for policymakers (e.g., technologies, costs, applications, etc.)

Need for other information and capacity building

20. Make data actionable (lack of data not an issue, need to determine how to make data relevant and target decisionmakers and mine operators)
21. Set up a forum for information exchange amongst stakeholders to share their experiences in developing and operating past CMM emissions reduction projects
22. Provide a forum for engineers and technical specialists to exchange best practices including mine operators and mining engineers
23. Ensure access to information on best available technologies and best practices internationally
24. Expand the list of participants in the various CMM forums by increasing the participation of more technical stakeholders to participate in the dialogue, e.g., engineers, technical specialists
25. Identify opportunities and strategies to promote CMM mitigation in countries with other major methane sources, such as oil & gas (CMM can fly under the radar)
26. Aggregate and present more and better information on informal or illegal mining in some countries including the impacts on CMM emissions.
27. Ensure remote sensing companies develop/share transparent, open-source algorithms to process satellite data for coal areas to determine hot spots and potentially even emissions (e.g., by partnering with U.S. NOAA). Right now, it is not clear if the private remote sensing data on coal emissions are accurate, and that makes it hard to do apples-to-apples comparisons with measurements for specific mines or for inventories for larger areas. Thus, we aren't yet fully able to use satellite data to improve our understanding of the situation, but it seems like we should be able. (And this is not to say that we will use satellite data instead of inventories, but rather, to cross check and ensure that we are not significantly over or under counting).
28. Undertake a campaign to ensure that coal mine operators are aware of how much methane they are emitting and understand the impact of those emissions but also the emissions reduction potential
29. Begin using top-down methods of estimating emissions from coal mines to raise the profile with policymakers

Incentives and policy requirements for mitigation and monitoring

30. Focus on mitigation rather than focusing on emissions data. Prioritize data needed to set the caps on emissions, the mines will sort it out their emissions.
31. Focus on better implementation of existing regulations first (look at "carrots" first, then look at "sticks") before moving to more stringent emission reduction requirements.
32. Consider how to get better surface mining data (it is probably under-reported in some countries); require companies to share data from continuous emission monitoring systems (CEMS)
33. With measurement technology readily available, governments could require the use of and subsidize CAPEX of continuous emissions monitoring equipment
34. Establish reporting frameworks in all coal producing countries that rely on measured/empirical data (and subject to verification) rather than relying on emission factors.

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35. For countries requiring coal mines to report GHG emissions, require direct measurements and establish third-party monitoring. For other countries, require coal mines to report. Consider IMEO as source for data access and data validation/Measure emissions at mine level/Allow 3rd party monitoring, especially of super emitters
36. Consider costs associated with 3rd party monitoring (there is an urgent need for countries that do not have reporting programs to establish them based on international best practice)
37. Fund R&D projects related to CMM mitigation

Policy development

38. Develop clearer information for policy makers on the difference between CBM and CMM/AMM, and whether developing each of these projects helps reduce emissions. It would be helpful to have clear, simple info (maybe a brochure, or a webpage in partnership with IEA, or the Global Methane Hub) that allows people to understand the difference.
39. Develop clearer information on the policy options and needs in different geological and market conditions, including a core focus on the importance of clear rights to the gas. This information exists in reports of the Expert Group, but countries are not typically finding this info, and may not want to read a long report. How can we better get the word out? Can we create a coalition of high-profile organizations that can align messaging?
40. Facilitate a better understanding of impacts of proposed policies and regulations on the coal mining sector
41. Ensure transparency of legal and regulatory policies on emissions mitigation and monitoring in each country

CMM Project Barrier #2

Ensure that project developers and coal mine owner/operators have clarity and access to CMM/AMM resources and ownership rights, including the energy and environmental commodities produced through recovery and use of these resources.

Educational & outreach materials

1. Prepare brief white papers or fact sheets on legal & regulatory information, show the links between methane management practices & regulatory/legal requirements per geography (limit number of pages)/ Provide clear, easy-to-understand information on the legal rights and procedures in each country with significant CMM/AMM emissions. This can help ensure that policy makers get the message and also adopt policies aligned with this, but also that the information is easy for project developers to access. It could delay project development and prove to be expensive for project developers if policy development become mired in legal reviews.
2. Develop country-specific fact sheets on regulatory issues around AMM as well as case studies
3. Prepare papers reviewing existing regulatory frameworks and outlining what regulatory options could exist for each country/ Generate diagrams to provide a visual model to help better convey the regulatory compliance assessment

Dissemination of best practices

4. Consider how international standardization of ownership and liability approaches could reduce costs for project development to develop new projects around the world
5. Distill and share best practices from countries that have developed effective systems for closing mines and reducing AMM emissions, including Germany and UNECE AMM guidance

Policy & regulatory development

6. Establish clear regulations for coal extraction and gas extraction licenses
7. For coal mine closure, establish incentives and a clear roadmap (early action). This makes it easier to plan for investment, potentially re-use existing installations for alternative energy development, and seek investments.
8. Develop a clear understanding of what happens if a mine becomes insolvent, and it is still emitting methane/Ensure that operating coal mines plan and have financial assurance for closure
9. Incorporate AMM and mine closure at the initiation of permitting for coal mining
10. Reduce bottlenecks by encouraging pre-drainage for both underground and open cast mines
11. Develop regulations to ensure that AMM project developers do not inherit the liability issues with that come with closed/abandoned mines (sharing liabilities can be costly when developing a new project)

Ownership/control of coal and gas resources

12. Provide good geologic data to regulators so that regulators have a better idea of resources available at hand

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13. Consider default rights to methane at a coal mine to go to coal mining companies unless those rights are waived. Ensure there is no conflict between coal and gas rights owners.
14. Consider during mine operations that there should be rights to gas drainage and destruction, but they revert to the gas owner upon closure
15. Establish clarity on who owns coal mining assets in major coal emitting countries; identification of ownership and/or control of coal and gas assets should be made available to the public
16. Assess ways to address liability issues, e.g., whether adjacent owners should shoulder liability if ownership is not clear
17. Consider options to enable transfer of the rights of gas / Establish a clear and appropriate licensing system
18. Consider how to make AMM-specific considerations and licensing earlier after (or before) closure (licensing of AMM capture and use is often reliant on an oil and gas regime, which is not appropriate and also late because the resources start to decline exponentially with time)

CMM Project Barrier #3

Demonstrate to policymakers, investors, and the coal industry the environmental, financial, and technical viability of CMM/AMM projects as a critical near-term and mid-term climate mitigation option.

Outreach & capacity building

1. Prepare simple fact sheets based on case studies that show financial, environmental and societal benefits of implemented projects
2. Compile the known and published feasibility and pre-feasibility studies that have been published
3. Develop country-level case studies to show key countries that could see substantial potential for CMM contributing a significant share of GHG reductions, thus helping them prioritize CMM emission reductions in an economy-wide strategy (how much value do you get for each dollar?)
4. Prepare studies to show emissions reduction potential for projects (not just financials)/ Compare CMM/VAM to other power generation and methane mitigation options. The cost of alternative technologies might be higher than treating VAM at coal mines/ Make climate benefits an important consideration
5. Ensure companies provide transparent financial information/costs on mitigation projects and mitigation potential
6. Prepare a document about the safety record of mitigation equipment, including on process safety for flares, gas engines, gas turbines, VAM/ Elevate the importance of safety as a priority (financing entities are interested in safety and will not finance projects that are not safe)
7. Demonstrate industrial safety of CMM and AMM projects

Dissemination of best practices

8. Consider Germany as a good example of successful projects with favorable policies:
 - a. Potential for emissions reductions
 - b. Legal conditions
 - c. Attractive financial conditions
9. Consider UK as an example of a country that allowed flexibility in contracts to adjust to the market for power from CMM/AMM.

Communication/cooperation

10. Improve the communication between mine operators, regulatory agencies, and technology providers to ensure that each benefits from methane monitoring, reporting and verification and methane mitigation (climate, technology sale, etc.)
11. Share credible data to facilitate understanding of emissions early in the process at project formation/development

Policy & regulatory development

12. Governments can provide resources to support development of the right technologies through research
13. Develop estimates on internalizing costs of methane emissions, e.g., the social cost of carbon, which will raise the profile for coal mine operators and policymakers

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14. Policymakers need to understand the emission reduction potential and the conditions to make profits profitable
15. Consider “sticks” such as regulatory requirements to limit emissions to address higher-cost emissions reductions that have a large scale (incentives are okay for net negative, net zero, or low cost). VAM technologies offer large-scale emission reductions but are not financially recoverable. Drained gas often competes with low energy prices
16. Focus on lower concentration emissions/shafts (incentives now only support the most favorable projects), but huge impact on climate
17. Create stable, clear policy conditions that also ensure that conditions are favorable for investment/ In EU, there is no certainty about coal mines’ future, which makes it challenging to install VAM technologies
18. Broaden existing incentives to encourage development of alternative technologies for CMM/AMM capture and use (not just power). Establish incentives for CMM/AMM conversion to LNG, CNG or other uses. This particularly needed in countries where the gas is stranded

Market

19. Development of support mechanisms are not keeping pace with the dynamics of the market. Need flexibility in markets for investors to recoup their investments. UK had flexibility mechanisms built in and allowed for certain changes.
20. Ensure that projects are financially feasible/ The market demands tangible benefits, rather than solely emission reductions for climate. Help mitigation projects identify/plan for tangible co-benefits to drive emissions reductions/But it is still important that investors understand the climate benefits
21. Identify and facilitate an understanding of markets for clean coal, especially for met coal mines, steel, cement
22. Set up a separate emissions trading system for methane emissions reductions instead of cross-trading with CO2 as offsets