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Sustainable resource management:
Groups of Experts on Energy Efficiency, Renewable Energy and Coal Mine Methane

Best practice guidance for effective methane recovery and use from abandoned coal mines

Note by the secretariat

Introduction

1. As requested by the Committee on Sustainable Energy at its twenty-sixth session (Geneva, 26-28 September 2017) (ECE/ENERGY/113, para. 73), the Group of Experts on Coal Mine Methane with the support of the secretariat developed the Best Practice Guidance for Effective Methane Recovery and Use from Abandoned Coal Mines. The document is hereby presented to the Committee for endorsement.

2. The document will be issued as publication United Nations Economic Commission for Europe (ECE) Energy Series 64 and ECE/ENERGY/128.

I. Summary of the document

3. Closure of coal mines, and therefore Abandoned Mine Methane (AMM) emissions, will continue to be a relevant and important issue for the foreseeable future as countries continue to exploit and exhaust their coal reserves at a faster pace. This is true for many developed countries where coal production is declining, and mines are closing. However, this is also the case in some developed and developing economies where coal production will continue to play a significant role in the energy mix and closing mines are replaced by new mines. The total sum of emissions from closed and closing mines could, therefore, be substantial and will likely grow in importance. Forecasts of global coal mine methane (CMM) emissions indicate that AMM represented 17% of the total mine methane emissions in 2010 and the proportion may increase to as much as 24% in 2050.

4. Cessation of coal mining due to exhaustion of commercially viable coal reserves does not halt gas emissions. It is important to assess the magnitude of the AMM in place and potential emission rates due to uncontrolled surface emission risks, greenhouse gas emission concerns and utilisation opportunities. New methods of assessing emissions, from use of remote sensing to measuring methane concentrations in the atmosphere and pinpointing sources, to estimations based on historical coal production, may help countries more comprehensively identify and inventory methane resources. More precise estimates of the

cumulative volume of emissions should focus attention on this potentially important source and may also drive supportive policy frameworks incentivizing investment.

5. Surface gas emission risks are a particular concern in mature coal mining areas which are heavily populated. The risk can be mitigated in many instances by passive venting. Where large quantities of AMM are identified, there may be opportunities for active gas extraction and utilisation of the gas as a clean energy resource. Active gas extraction will also help to minimise surface emission risks.

6. Once mining ceases, groundwater pumping, used to keep the active mine from flooding, is usually halted leading to flooding of the workings. This can also lead to progressive reduction in the accessible AMM resource and can potentially reduce connectivity from a gas production point to the gas reservoirs. The rate of flooding can vary according to the hydrogeology, extent, and depth of workings. In a few instances, groundwater pumping may be continued to protect deeper mine workings from flooding risks.

7. The potential environmental impacts, therefore, should be examined during mine closure, and suitable engineering measures designed and implemented to minimise risks to the environment. These measures together with a post closure monitoring strategy allow effective management of post mine closure emissions and risks.

8. The potential for extracting and exploiting AMM can be assessed at the same time as evaluating safety and environmental risks together with the need for appropriate control measures. The presence of methane in an abandoned mine is not sufficient reason alone for justifying development of an AMM extraction and utilisation scheme. A pre-feasibility study is needed as a first step.

9. Methods are available for estimating AMM resources and reserves. The methods used should be based on sound physical principles, use traceable data sources, recognise the uncertainties and potential risks and state all assumptions.

10. Uncertainties in the estimates are inevitable due to the difficulty of obtaining accurate data on water incursion in abandoned workings and the potential problems with air ingress as suction pressure is increased. Reserves should be discounted to take account of such uncertainty, and a reasoned explanation given for the discount factor applied.

11. Not all abandoned mines are suitable for AMM projects. Favourable mining and geological conditions must exist, but the most critical condition is a suitable end user to generate demand for the gas. Without a market for AMM-based energy, it is unlikely that there will be a viable and sustainable project. However, destruction of the gas by flaring may be feasible in some countries as a carbon offset project. Experience has shown that efforts made at the pre-feasibility and feasibility stages of a project can significantly reduce both operational problems and future costs.

12. The document developed by the Group of Experts on Coal Mine Methane is aimed at raising awareness of AMM opportunities and hazards by providing accessible high-level guidance for senior corporate, government and financial decision-makers – all of whom play an integral role in decisions to implement best practices. Recommended principles and standards on CMM capture and use have already been set out in the Best Practice Guidance on Effective Methane Drainage and Use in Coal Mines (ECE Energy Series 31 and ECE/ENERGY/73[1]; and ECE Energy Series 47 and ECE/ENERGY/105[2]). The new document complements that guidance and is aimed at completing the coal mining cycle by considering the methane emissions that continue after mining has ceased and mines have closed.

13. The AMM Best Practice Guidance does not replace or supersede laws and regulations or other legally binding instruments, whether national or international. A clear legal framework and supportive policies can help in getting methane to market. The principles

[1] http://www.unece.org/fileadmin/DAM/energy/se/pdfs/cmm/pub/BestPractGuide_MethDrain_es31.pdf

[2] http://www.unece.org/fileadmin/DAM/energy/cmm/docs/BPG_2017.pdf

outlined herein are intended to provide guidance to complement existing legal and regulatory frameworks and to support development of post-mining projects to reduce the overall emissions attributable to the coal mining life cycle by optimising recovery and use of methane that would otherwise be released to the atmosphere.

14. The full version of the document is posted to the ECE website.[3]

II. Recommendations

15. To gain a greater understanding about the potential growth of methane emissions from abandoned underground coal mines and the consequent impact on global efforts to reduce global warming, affected ECE member States and Global Methane Initiative (GMI) members are urged to consider ways to improve their knowledge of the magnitude and rate of growth of this emission source by including methane emissions from abandoned underground coal mines in their national inventories.

16. The Committee on Sustainable is invited to endorse the Best Practice Guidance for Effective Methane Recovery and Use from Abandoned Coal Mines (Energy Series 64 and ECE/ENERGY/128).

17. The Committee is further recommended to request that the Group of Experts on Coal Mine Methane and other relevant groups of experts engage, with the support of the secretariat, in dissemination activities of the Best Practice Guidance as mandated in their respective work plans.

[3] http://www.unece.org/fileadmin/DAM/energy/images/CMM/CMM_CE/AMM_BPG_FINAL.pdf