Performance Standard Supplemental Description

GREENHOUSE GAS EMISSIONS REDUCTION METHODOLOGY FROM CAPTURING AND DESTROYING METHANE FROM COAL AND TRONA MINES IN NORTH AMERICA

VERSION 1.1

2023-10-03

Introduction

ACR's Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removal from Capturing and Destroying Methane from U.S. Coal and Trona Mines v1.1 (Mine Methane Capture or MMC methodology) enables the issuance of carbon credits to projects in the U.S., Canada, and Mexico that install and operate a device, or set of devices, that capture mine methane that would otherwise be emitted to the atmosphere and destroy it through an eligible end-use management option. The climate benefits of projects developed under this methodology are additional to what would have occurred under a business-as-usual scenario, current laws and regulations, and current industry practices, and without carbon market incentives. To demonstrate that the activities eligible under the MMC methodology are not common practice, ACR established a performance standard by evaluating penetration levels for mine methane capture and destruction in the applicable geographies.

This supplemental description of the performance standard aligns with and complements the MMC methodology. It is intended to supply additional details to interested parties about the sources consulted and analysis performed during methodology development to support the performance standard established therein. ACR was inspired to publish this document to provide even more transparency on a core component of the methodology and principle of the ACR Program. Project Proponents and Validation and Verification Bodies do not need to consult this supplemental when performing the work of developing and validating/verifying projects under the methodology.

Mine Methane Capture Methodology Performance Standard

The MMC methodology establishes a performance standard for most of the eligible activities,[1] including the capture and destruction of:

- Ventilation air methane (VAM) from an active underground mine;
- Underground mine methane (MM) drained from an active underground mine and destroyed by an eligible end-use option other than pipeline injection;
- Surface mine methane (SMM) drained from an active surface mine; and
- Abandoned mine methane (AMM) extracted from an abandoned underground mine when the mine did not inject mine methane into a natural gas pipeline for off-site consumption while active.

For these activities to qualify as additional under the MMC methodology, projects must exceed the performance standard defined in the methodology and pass a regulatory additionality test. The MMC methodology establishes a practice-based performance standard, developed by evaluating the adoption rates of these mine methane capture and destruction activities in the U.S., Canada, and Mexico and concludes that, based on low adoption rates, any MMC project that employs these activities and meets the eligibility and other requirements of the methodology is additional.[2]

Adoption Rates for Practice-Based Performance Standard

For U.S. based projects, ACR reviewed and largely relied upon the performance standard established in the California Air Resources Board (ARB) Compliance Offset Protocol for Mine Methane Capture Projects.[3,4] Based on a review of available literature and discussions with stakeholders, ARB established a practice-based performance standard by deriving number of mines (differentiated abandoned underground mines, active surface mines, active underground mines with no methane drainage systems, and active underground drainage systems) with MMC activities relative to its relevant mine population. ARB determined that only a small fraction of mines capture and destroy AMM, SMM, and VAM and concluded that any MMC activities for

[1] See the final section of this document for further detail on why certain eligible activities are excluded from the performance standard and how these projects can demonstrate additionality under the MMC methodology.
[2] See the eligible activities and general eligibility requirements listed in Chapter 2 and Section 3.1 of the MMC methodology, respectively.
[3] California Air Resources Board. Compliance Offset Protocol for Mine Methane Capture Projects, Capturing and Destroying Methane from U.S. Coal and Trona Mines, Adopted since April 25, 2014. https://ww3.arb.ca.gov/regact/2013/capandtrade13/ctmmcprotocol.pdf.
[4] Details of the performance standard for ARB's MMC Protocol can be found in Subsection II.C.2 of ARB's Initial Statement of Reasons (ISOR) Appendix A from September 4, 2013, additional documents (e.g., Ruby Canyon Engineering. "Subject: California Air Resources Board: Proposed Compliance Offset Protocol Mine Methane Capture Projects, dated August 19, 2013." Letter from Ronald C. Collings to Jessica Bede. 22 October 2013), and ARB response to comments in the Final Statement of Reasons (FSOR) from May 16, 2014. Files can be found at https://www.arb.ca.gov/regact/2013/capandtrade13/capandtrade13.htm.

AMM, SMM, or VAM could be deemed additional. Of the 25 active underground mines with drainage systems that ARB identified, ARB concluded that most had collected the drained MM and injected it into a natural gas pipeline for offsite destruction and made the conservative assessment that pipeline injection was deemed business-as-usual for active underground mines with methane drainage systems; for the same population, ARB determined that other MMC activities like electricity generation, production of transportation fuels, or flaring were not business-as-usual and could be deemed additional.

ACR also examined MMC activities that commenced operations between 2014 (i.e., the year the ARB MMC Protocol was adopted) and 2022, where ACR reviewed data tracked by the U.S. EPA Coalbed Methane Outreach Program (CMOP)[5] and as reported by active underground mines under Subpart FF of 40 CFR 98, more commonly known as the US GHG Reporting Program (GHGRP).[6] Based on those data, ACR made the following determinations.

- VAM: Between 2017 and 2021, there has been only one (1) VAM destruction activity (i.e., three regenerative thermal oxidizers at one ventilation shaft at one mine) established as a project under the California compliance carbon offset program. The GHG emissions reduced from that one MMC project in 2021 (i.e., 0.14MM tonnes of CO_2e) represents less than 0.4% of all CH_4 liberated by ventilation and degasification from all FF-reporting mines in that same year (i.e., 38.3MM tonnes of CO_2e). Destruction of VAM via any end-use management option automatically satisfies the performance standard evaluation because destruction of VAM is not common practice nor considered business-as-usual, and is therefore eligible for crediting under this methodology.
- MM: Between 2017 and 2022, there have been only five (5) mines with onsite destruction activities,[7] all established as projects under the California compliance carbon offset program. The GHG emissions reduced from those MMC activities (all flaring projects) in 2021 (i.e., 0.47MM tonnes of CO_2e) represents approximately 1.2% of all CH_4 liberated by ventilation and degasification from all FF-reporting mines in that same year (i.e., 38.3MM tonnes of CO_2e). Destruction of MM via any end-use management option (except for pipeline injection) automatically satisfies the performance standard evaluation because destruction of MM is not common practice nor considered business-as-usual, and is therefore eligible for crediting under this methodology.
- SMM: Between 2011 and 2022, there has been no reported SMM destruction activities. Destruction of SMM via any end-use management option automatically satisfies the

[5] U.S. EPA CMOP. Map of US Coal Mine Methane Current Projects and Potential Opportunities. https://www.epa.gov/cmop/map-us-coal-mine-methane-current-projects-and-potential-opportunities#Map-sources
[6] Data for underground coal mines are available at https://ghgdata.epa.gov/ghgp/main.do and at https://enviro.epa.gov/envirofacts/ghg/search.
[7] Whereas some mines reported onsite destruction at certain drainage wells with vacuum pump engines, these engines are excluded because they are integral to drainage systems and are generally not considered destruction devices by industry nor within the ARB MMC Protocol or ACR's Methodology.

performance standard evaluation because destruction of SMM is not common practice nor considered business-as-usual, and is therefore eligible for crediting under this methodology.

- AMM: Between 2014 and 2022, operations commenced at 28 abandoned mines, all of which relied on flaring and were established as projects under the California carbon offset program,[8] Whereas there are thousands of abandoned mines in the U.S. alone, there are over 514[9] that are considered "gassy." Given that there were 29 mines with AMM recovery projects in operation identified in 2013 that were not continuation of collection while the mine was active,[10] summing all AMM projects yields a penetration level of approximately 11%. Destruction of AMM via any end-use management option (except pipeline injection at mines that also injected MM into a natural gas pipeline for off-site consumption while active) automatically satisfies the performance standard evaluation because destruction of AMM is not common practice nor considered business-as-usual, and is therefore eligible for crediting under this methodology.

ACR also evaluated adoption rates of mine methane capture and destruction activities in Canada and Mexico.

As of 2015, when the most recent edition of the Coal Mine Methane Country Profiles was published, Canada had 24 permitted coal mines,[11] 19 of which operated in 2015.[12] According to the U.S. EPA CMOP International Coal Mine Methane Projects Database,[13] there has been no VAM, MM, SMM, or AMM utilization or destruction project developed in the past, and there is currently no VAM, MM, SMM, or AMM utilization or destruction project operating in Canada. As such, the adoption rate for Canada is 0%.

According to the Mexican Geologic Service (Servicio Geológico Mexicano) there were, at least, nine active mines operating in 2015.[14] There has been only one MM project developed in

[8] Data on AMM project activities can be found on ACR's public registry, accessed via https://americancarbonregistry.org/how-it-works/registry-reports. Data from other public registries (accessed via https://thereserve2.apx.com/mymodule/mypage.asp, https://registry.verra.org/app/search/VCS/All%20Projects, and https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program).
[9] U.S. EPA CMOP. Abandoned Coal Mine Methane Opportunities Database (2017). https://www.epa.gov/sites/default/files/2016-03/documents/amm_opportunities_database.pdf
[10] Ruby Canyon Engineering. "Subject: California Air Resources Board: Proposed Compliance Offset Protocol Mine Methane Capture Projects, dated August 19, 2013." File can be found at https://www.arb.ca.gov/regact/2013/capandtrade13/capandtrade13.htm.
[11] U.S. EPA CMOP. Coal Mine Methane Country Profiles, Chapter 6. Canada (2015). https://www.globalmethane.org/documents/toolsres_coal_overview_ch6.pdf
[12] Ibid.
[13] U.S. EPA CMOP. International Coal Mine Methane Projects Database (2021), developed at the request of the Global Methane Initiative (GMI) Coal Subcommittee. https://www.globalmethane.org/resources/details.aspx?resourceid=1981.
[14] U.S. EPA CMOP. Coal Mine Methane Country Profiles, Chapter 21. Mexico (2016). https://www.globalmethane.org/documents/toolsres_coal_overview_ch21.pdf

Mexico and it ceased operation in 2019.[15] There has been no other VAM, MM, SMM, or AMM utilization or destruction project developed in the past, and there is currently no VAM, MM, SMM, or AMM utilization or destruction project operating in Mexico.[16] As such, the adoption rate for Mexico is 0% since 2019.

The low 0-11% adoption rates for the U.S., Canada, and Mexico demonstrate that the eligible mine methane capture and destruction activities covered by the performance standard are not common practice in these countries. As a result of the analysis and findings described above, the MMC methodology concludes that, based on low adoption rates for such projects, any MMC project that employs the activities included in the performance standard and meets the eligibility and other requirements of the methodology is additional.

Eligible Mine Methane Capture Activities Excluded from the Performance Standard

Some eligible mine methane capture and destruction activities are excluded from the performance standard, mine methane destruction via pipeline injection for:

- MM drained from an active underground mine; and
- AMM recovered at abandoned underground mines that also injected mine methane into a natural gas pipeline for off-site consumption while active.

While the ARB protocol determined these activities to be common practice and therefore ineligible for crediting, a public comment from U.S. EPA to ARB during the protocol development process suggested a reexamination of this conclusion once the GHG Reporting Program Subpart FF has collected and analyzed several years of mine- and well-specific data.[17] In developing version 1.1 of its MMC methodology, ACR analyzed the data that had been made available in the intervening years since the ARB protocol was developed and found the adoption rate for these pipeline injection activities to be inconclusive based on a range of analytic approaches. As a result, MMC methodology v1.1 excluded these activities from the performance standard and instead enables additionality to be assessed on a case-by-case basis. For these activities to qualify as additional under the MMC methodology v1.1, projects must pass a three-pronged test to demonstrate that they exceed currently effective and enforced laws and regulations, exceed common practice in the relevant industry sector and geographic region, and face a financial implementation barrier. This three-pronged approach is further detailed in Section 3.3.3 of the MMC methodology and the ACR Standard.

[15] U.S. EPA CMOP. International Coal Mine Methane Projects Database (2021), developed at the request of the Global Methane Initiative (GMI) Coal Subcommittee. https://www.globalmethane.org/resources/details.aspx?resourceid=1981.
[16] Ibid.
[17] California Air Resources Board. Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, Final Statement of Reasons. response to comments in the Final Statement of Reasons (May 2014). Comment J-1.25. https://www.arb.ca.gov/regact/2013/capandtrade13/ctfsor.pdf.