430-B-20-002

U.S. Greenhouse Gas Emissions Trading Programs that Include Coal Mine Methane

Updated January 2021

Introduction

The coal mining industry is a key source of methane, a powerful greenhouse gas (GHG). In the United States, coal mines contribute about 10 percent of anthropogenic methane emissions, while worldwide, coal mines are estimated to produce more than 912 metric tons of carbon dioxide equivalent (CO_2e) of methane emissions by 2030.[1] Technologies for capturing and utilizing a significant portion of coal mine methane emissions are readily available.

Projects that capture and use coal mine methane (CMM), rather than venting it into the atmosphere, can earn GHG emissions reduction or offset credits created through compliance and voluntary programs in the United States. Some of these programs are driven by mandated caps on GHGs, while others operate in the voluntary carbon market.

As of 2020, two compliance and three voluntary GHG emissions trading programs operate in the United States; of these, four allow CMM emissions reduction projects (see Exhibit 1). This document summarizes these GHG programs and compares their key features as they pertain to CMM emissions reduction projects (see Exhibit 2). For example, some programs accept abandoned mine methane (AMM) recovered from abandoned coal mines or surface mine methane (SMM) recovered from surface coal mines, while others only accept CMM or ventilation air methane (VAM) recovered from active underground mines. The remainder of this document provides additional information about these four programs.

About the Coalbed Methane Outreach Program

Since 1994, the Environmental Protection Agency's (EPA's) Coalbed Methane Outreach Program (CMOP) has worked cooperatively with the coal mining industry in the United States–and other major coal-producing countries–to reduce CMM emissions.

Learn more at: www.epa.gov/cmop

Contact CMOP at: www.epa.gov/cmop/forms/contact-us-about-coal-methane-outreach-program

Exhibit 1. Key U.S. GHG Emissions Trading Programs

Program	Allows CMM Projects
Compliance Programs	
California Compliance Offset Program (COP)	✓
Regional Greenhouse Gas Initiative (RGGI)	
Voluntary Programs	
Climate Action Reserve (CAR)	✓
Verra's Verified Carbon Standard (VCS)	✓
American Carbon Registry (ACR)	✓

Disclaimer: U.S. EPA is providing this overview of the programs for informational purposes only and does not endorse or support any specific program.

[1] U.S. EPA. 2019. *Global Non-CO_2 Greenhouse Gas Emission Projections & Mitigation Potential: 2015-2050.* EPA 430-R-19-010. Available: https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-non-co2-greenhouse-gas-emission-projections.

Exhibit 2. Comparison of CMM Project-Eligibility Requirements for U.S. GHG Emissions Trading Programs

GHG Program:	COP	CAR	VCS	ACR
Type	Compliance	Voluntary	Voluntary	Voluntary
Protocol issue date	April 2014	October 2009 (updated October 2012)	CMM – November 2007 (updated February 2014) SMM revisions – March 2009 AMM revisions – July 2010	September 2019
Mine methane eligibility	CMM, AMM, SMM, VAM	CMM, VAM	CMM, AMM, SMM, VAM	CMM, AMM, SMM, VAM
Project end-use types	Boilers, heaters, electricity, flares, thermal oxidizers	Boilers, heaters, electricity, flares, thermal oxidizers	Boilers, heaters, pipelines, electricity, flares, thermal oxidizers	Boilers, heaters, pipelines, electricity, flares, thermal oxidizers
Location	United States	United States	Worldwide	North America
Project validation date	Projects must be validated within one year of project start date	Projects must be validated within six months of project start date	Under Standard v4.0, validation must be completed within two years of project start date	Under Standard v6.0, validation must be completed within two years of project start date
Additionality[a]	Performance standard	Performance standard	Project-based standard	Performance standard

a. Additionality refers to the eligibility requirement that offset credits must be in addition to what would have happened in the absence of the project, and that reductions are above and beyond business-as-usual. A performance standard establishes a threshold for technologies or processes that must be met or exceeded in order for a project to be additional. A project-based standard evaluates projects on a case-by-case basis and allows for the use of different additionality tests (e.g., financial, technological, common practice), depending on the type of project.[2]

GHG Emissions Trading Programs: Compliance

The COP is the only compliance program in the United States that allows CMM projects to be eligible for offset credits. The other U.S. compliance program, the RGGI, does not allow emissions reductions from CMM projects to receive credit.

COP

Program Background

The California Air Resources Board (CARB) is the state agency responsible for maintaining healthy air quality and protecting the public from the harmful effects of air pollution. Since 2011, CARB has operated the COP as part of the state's broader Cap-and-Trade program. The state's largest emitters are required to meet GHG emissions caps by surrendering compliance instruments (i.e., allowances or offsets). The COP allows these covered entities

[2] Partnership for Market Readiness. 2015. *Overview of Carbon Offset Programs: Similarities and Differences*. Available: https://www.thepmr.org/system/files/documents/PMR%20Technical%20Note%206_Offsets_0.pdf.

to purchase and trade offsets from projects anywhere in the United States to meet up to eight percent (four percent beginning in 2021) of their compliance obligation. CMM projects are one of six project types with a protocol that has been approved to generate offsets under the COP. The other project types are U.S. forest, urban forest, livestock, ozone-depleting substances, and rice cultivation.

Exhibit 3. Summary of MMC Projects under CARB

ARB has issued offsets to 10 MMC projects under the current protocol. As of June 2020, MMC projects have been issued credits for 7.24 million metric tons of CO_2e reductions in the COP (including early action offsets), representing four percent of the total compliance offset credits issued by CARB.

When the COP began, it allowed qualified existing offset projects developed under voluntary programs to transition offsets to the COP. Only offsets achieved through 2014 were eligible to transition to the COP. Seven CMM projects transitioned offsets to the COP, for a total of 2.88 million offsets.[3]

Mine Methane Protocol

CARB's current CMM protocol is the Mine Methane Capture (MMC) Protocol, adopted on April 25, 2014. This protocol allows CMM projects at active underground mines, surface mines, and abandoned underground mines; as well as VAM projects at underground mines (Exhibit 3).

The MMC Protocol uses a performance standard approach to assess additionality rather than a project-based standard approach. A performance standard approach establishes a threshold for technologies or processes that must be met or exceeded in order for a project to be additional; while a project-based standard approach evaluates projects on a case-by-case basis and allows the use of different additionality tests (e.g., financial, technological, common practice), depending on the project type. In the MMC Protocol, the performance standard test is satisfied if the project destroys VAM via any end-use management option, destroys mine methane from an active underground mine via any end-use management option (except pipeline injection), destroys mine methane from a surface mine via any end-use management option, or destroys mine methane from an abandoned mine via any end-use management option except pipeline injection (unless the pipeline project existed only after the mine was abandoned). Pipeline injection of CMM from methane drainage systems at active underground mines was considered business-as-usual by CARB and, therefore, pipeline projects are ineligible to generate offsets under the MMC Protocol.

The MMC Protocol also requires that projects satisfy the Legal Requirement Test, which confirms that a project's GHG emissions reductions would not have occurred due to federal, state, or local regulations; or other legally binding mandates.

GHG Registries

For projects to be eligible, CARB requires that they be listed, reported, and verified through an approved offset project registry (OPR). Since 2016, three voluntary GHG registries—ACR, CAR, and VCS—are approved as offset project registries for the COP (see the following section for more information about these registries). These programs issue Registry Offset Credits (ROCs) once the registry approves the project. ROCs are then converted to CARB Offset Credits (CARBOCs) by CARB for use in the cap-and-trade program. One ROC is equal to one CARBOC, which is equal to 1 metric tonne of CO_2e. For more information, visit: https://ww2.arb.ca.gov/.

[3] State of California. 2020. CARB Offset Credit Issuance Table. Available: https://ww3.arb.ca.gov/cc/capandtrade/offsets/issuance/issuance.htm.

GHG Emissions Trading Programs: Voluntary

The purchase of voluntary offset credits is driven by companies wishing to offset their own emissions for corporate social responsibility or pre-compliance reasons. Voluntary carbon markets co-exist with compliance markets, which operate to manage market caps and GHG emissions permits for regulated industries.

Climate Action Reserve (CAR)

Program Background

CAR is a nonprofit organization based in California that operates a voluntary offset program and trading system. Launched in 2008, and most recently updated in 2019, it is the newest voluntary offset program within the U.S. carbon market. The program establishes standards to develop, quantify, and verify GHG emissions reduction projects for a variety of project types in the United States and Mexico (Exhibit 4). The registry's standards are outlined in project-specific protocols for various sectors, including forest, livestock, landfill, urban forest, CMM, organic waste digestion, nitric acid production, ozone-depleting substances, grasslands, nitrogen management, organic waste composting, and rice cultivation.

Mine Methane Protocol

CAR's CMM Protocol was first issued in 2009; the updated version, *Coal Mine Methane Project Protocol Version 1.1*, was issued October 26, 2012. This protocol allows CMM projects only at underground mines, including gas drainage or VAM projects. The CMM Protocol uses a performance standard approach similar to CARB's protocol, in which the performance standard test is satisfied if the project destroys CMM from an active underground mine through any end-use management option (other than injection into a natural gas pipeline) for offsite consumption, or destroys VAM through any end-use management option. The protocol also requires that projects satisfy the Legal Requirement Test, which ensures that a project's GHG emissions reductions would not have occurred due to federal, state, or local regulations; or other legally binding mandates.

Exhibit 4. Summary of Projects under CAR

Four CMM projects have been issued climate reserve tonnes (CRTs) from the CAR; however, all of these CRTs were transitioned to early action offset credits for use in the COP. No CMM projects are currently quantifying emissions reductions under CAR's CMM Protocol.

The COP and CAR are the only programs that do not include pipeline projects or CMM projects outside the borders of the United States and its territories.

GHG Registry

CAR manages its own registry where it lists projects, collects project documents, facilitates verification, and issues and retires offset credits for its projects. CAR's emissions reduction unit is the CRT, where 1 CRT is equal to 1 metric tonne of CO_2e. For a list of emissions reduction units by program, see Exhibit 5.

CAR became an approved OPR for the COP in 2012. For more information, visit: https://www.climateactionreserve.org/.

Exhibit 5. Emissions Reduction Units by Program

Program	Emissions Reduction Units
CAR	CRT. One CRT is equal to 1 metric tonne of CO_2e.
VCS	Voluntary carbon unit (VCU). One VCU is equal to 1 metric tonne of CO_2e.
ACR	Emission reduction ton (ERT). Consistent with other GHG programs, 1 ERT is equal to 1 metric tonne of CO_2e.

Verified Carbon Standard (VCS)

Program Background

The VCS program, launched in 2006 as a pilot program, sets a global standard and provides a framework to verify voluntary GHG emissions reductions. The most recent VCS Standard v4.0 was released September 19, 2019. VCS covers a diverse range of project types in 11 sectors using over 40 VCS-approved methodologies (Exhibit 6). VCS also accepted methodologies developed by the United Nations Framework Convention on Climate Change Clean Development Mechanism (CDM) and CAR. Unlike the other GHG programs, VCS provides a framework for project developers to develop new methodologies or revise existing CDM methodologies.

Mine Methane Protocol

For CMM projects, VCS uses methodology elements from CDM's approved consolidated methodology (ACM0008)—"Consolidated methodology for coal bed methane, CMM and VAM capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation." In 2014, ACM0008 was updated and renamed "Abatement of methane from coal mines," v8.0. VCS accepts all CMM project types, including pipeline sales, boiler use, electricity generation, flaring, and VAM.

Exhibit 6. Summary of Projects under VCS

To date, VCS has registered a total of 46 CMM/AMM/SMM projects, mostly AMM projects from Germany whose crediting periods have expired. As mentioned above, three U.S.-based VCS projects transitioned VCUs to early action offset credits for use in the COP.

In March 2009, VCS approved a modification to CDM methodology ACM0008 to accept SMM projects. This methodology, VMR0001, allows pre-mine drainage wells drilled in advance of surface (or open-cast) mine highwalls to become eligible once the well comes into contact with air egress from the mine face. In July 2010, VCS approved another modification to ACM0008 to include methane recovery and use or destruction from abandoned coal mines. This methodology, VMR0002, includes AMM, which is defined as "methane extracted from open or sealed vents, shafts, portals or gob wells at locations where active ventilation has ceased."

These CDM methodologies use a project-based standard to assess additionality. The CDM methodology, ACM0008, differs from the other CMM protocols in this document because it allows for additional emissions reductions to be claimed for projects that displace or avoid fossil-based energy from other sources such as electricity generation, heat, and vehicle fuel use. The protocols used by the COP, CAR, and ACR programs, on the other hand, quantify offsets simply based on the destruction of methane that would otherwise have been emitted into the atmosphere, and do not consider displacing GHG emissions that are associated with project-related fossil fuels that otherwise would have been combusted.

GHG Registry

Verra launched its own registry for the VCS program, the Verra Registry, in April 2020 to list projects, collect project documents, facilitate validation and verification, and issue and retire offset credits. Previously, it used two international registries: APX Inc. in North

America; and IHS Markit in the United States, the United Kingdom, and Asia Pacific regions. VCS's emissions reduction unit is the VCU. One VCU is equal to 1 metric tonne of CO_2e.

VCS became an approved OPR for the COP in 2016. For more information, visit: https://verra.org/project/vcs-program/.

American Carbon Registry (ACR)

Program Background

Founded in 1996 as a voluntary offset program, ACR was the first private GHG registry in the United States. ACR originally partnered with Environmental Resources Trust, an organization that provides carbon technical services, but was eventually acquired by Winrock International in 2008. As a nonprofit, ACR publishes standards, methodologies, and protocols, which are all based on International standards Organization 14064 and sound scientific practices. ACR has developed its own standards and over 20 methodologies for multiple sectors, such as forestry, livestock, landfill, CMM, and carbon sequestration. In addition, ACR generally accepts CDM methodologies to the extent that they are found to be consistent with the ACR Technical Standard. ACR published its most recent Standard v6.0 in July 2019.

Mine Methane Protocol

For CMM projects, ACR uses the *Capturing and Destroying Methane from Coal and Trona Mines in North America* methodology published in September 2019. While ACR accepts projects worldwide, the CMM methodology is a performance-based methodology applicable to North American mines only. Unlike the CMM methodologies adopted by the COP and CAR, the ACR methodology uses a more streamlined quantification approach and allows for CMM pipeline sales as an eligible project type. In addition, AMM projects are not limited by a maximum volume.

GHG Registry

ACR manages its own registry where it lists projects, collects project documents, facilitates validation and verification, and issues and retires offset credits. ACR's emissions reduction unit is the ERT. Consistent with other GHG programs, 1 ERT is equal to 1 metric tonne of CO_2e.

ACR became an approved OPR for the COP in 2012. With this approval, ACR had over 10 CMM projects registered in 2019. For more information, visit: https://americancarbonregistry.org/.

Exhibit 7. Acronyms and Abbreviations Used in this Document

Acronym	Definition
ACR	American Carbon Registry
AMM	Abandoned mine methane
CARB	California Air Resources Board
CARBOC	CARB Offset Credit
CAR	Climate Action Reserve
CDM	Clean Development Mechanism
CMM	Coal mine methane
CMOP	Coalbed Methane Outreach Program
CO_2e	Carbon dioxide equivalent
COP	California Compliance Offset Program
CRT	Climate reserve tonne
ERT	Emission reduction ton
GHG	Greenhouse gas
MMC	Mine Methane Capture
OPR	Offset project registry
RGGI	Regional Greenhouse Gas Initiative
ROC	Registry Offset Credit
SMM	Surface mine methane
VAM	Ventilation air methane
VCS	Verra's Verified Carbon Standard
VCU	Voluntary carbon unit