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Emerging Incentives for the Development of CMM Emission Reduction Projects

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Coal mine methane (CMM) is a major source of anthropogenic greenhouse gas (GHG) emissions, accounting for an estimated 9% of global methane emissions by 2020.[1] Considerable progress has been made, as of 2016, in the United States in reducing CMM emissions, which have dropped below 1990 levels.[2] Major U.S. coal mines are now capturing and using, selling, or destroying the gas. Emerging state and federal financial and regulatory incentives enable coal mines to develop and operate CMM emission reduction projects for both economic and environmental reward. Mines benefit financially from avoided energy costs and/or from revenues generated from CMM recovery and use or destruction, while reducing GHG emissions.

Potential Markets for CMM

The largest and most prevalent CMM emission reduction projects in the United States involve capture and sale of produced gas directly to natural gas pipelines. Using CMM to fuel electrical generation via gas turbines or internal combustion engines is another potentially profitable way to generate revenue by selling energy into the electricity grid. Alternatively, mines can reduce costs by using power generated onsite to run ventilation fans and other equipment.

Other uses for CMM include producing heat for coal drying or heating mine ventilation air during the winter months, feedstock fuel for manufacturing and processing end uses, and vehicular fuel (e.g., liquefied or compressed natural gas). Methane emission reduction credits or offsets associated with CMM emission reduction projects may be sold into emerging carbon markets (see next page). Carbon credit revenues can be generated for emission reductions from both active and abandoned coal mines.

State Alternative Energy and Renewable Portfolio Standards

Several major coal-producing states have enacted alternative energy and renewable energy programs that include coal-related methane as a targeted renewable or clean energy resource.

State Programs that include CMM/coalbed methane (CBM): Colorado, Indiana, Ohio, Pennsylvania, Utah

- In 2004, ***Colorado*** created a Renewable Portfolio Standard (RPS) by ballot initiative requiring utilities to generate or purchase enough renewable electricity to supply 10-30% of their electric sales by 2020.[3] Legislation enacted in 2013 expanded the list of "eligible energy resources" to include CMM.

- Established in 2012, ***Indiana's*** Voluntary Clean Energy Portfolio Standard Program provides utilities with incentives to voluntarily increase the amount of clean energy resources – which includes coal bed methane – in their electricity portfolios, with a goal of 10% by 2025.[4]

- ***Ohio's*** Alternative Energy Resource Standard (AERS) was created by S.B. 221

in 2008. The AERS applies to electric utilities and electric service companies with Ohio customers and requires utilities to provide 12.5% of their retail electricity from alternative energy sources by 2026.[5] Amendments passed in 2009 expanded the "advanced energy resource" definition to include methane gas emitted from operating or abandoned coal mines, and amended the "advanced energy project" definition to include CMM pipeline sales. Ohio's House of Representatives voted in March 2017 to turn the AERS into a voluntary standard. The bill then went to the Ohio Senate, where it stalled.[6]

- ***Pennsylvania*** was the first state to define CMM as an alternative energy fuel in its Alternative Energy Portfolio Standard (AEPS), signed into law November 30, 2004. Eligible technologies include demand-side management, waste coal, CMM, and coal gasification. The AEPS requires each electric distribution company and electric generation supplier that sells electricity to customers in Pennsylvania to supply 18 percent of its electricity from alternative energy resources by 2021, with at least 8 percent from "Tier I" resources (which includes CMM) by May 31, 2021.[7]

- ***Utah*** established a renewable portfolio goal in the "Energy Resource and Carbon Emission Reduction Initiative" (S.B. 202) enacted in March 2008. Under this act, to the extent that it is cost-effective to do so, retail electric sales of each electrical corporation and municipal electric utility shall consist of "qualifying electricity" or renewable energy certificates (RECs), equal to 20 percent of its adjusted retail electricity sales. Unlike other state RPS policies, Utah's does not include any interim targets and the first compliance year is 2025. Amendments passed in 2010 expanded the source to include "methane gas from an abandoned coal mine or a coal degassing operation associated with a state-approved mine permit" as part of waste gas or waste heat captured or recovered for use as an energy source for an electric generation facility.[8]

Regulatory Incentives

In recent years, federal and state land management agencies have provided regulatory incentives in the form of royalty relief and/or other rights granted in coal or oil and gas leases or amendments for mine operators to utilize or destroy CMM. Recent efforts include:

- The ***U.S. Dept. of Interior's Bureau of Land Management (BLM) Colorado State Office*** amended two federal coal leases in December 2017 for the West Elk Mine. The amendments extended 2009 coal lease amendments to a new area of the mine that allow the mine operator to "…develop, produce, and capture for use or sale any or all of the coal mine methane…" [9]

- ***Utah's Trust Lands Administration*** has been asked to consider coal or oil and gas lease amendments and royalty waivers or reductions for CMM captured and destroyed on School Trust Lands.[10]

- ***Wyoming's Office of State Lands and Investments*** has adopted a Natural Gas Flaring Policy that enables owners/ operators to request oil and gas royalty relief for approved flaring operations that do not constitute waste. CMM emission reduction projects that gather and produce low quality methane from shut-in CBM wells surrounding surface coal mines could be excellent candidates for royalty relief.[11]

Carbon credits, however, are particularly useful for improving the cash flow of projects that are otherwise economically marginal.

The emerging carbon credits market consists of two main types:

- ***Regulated Carbon Markets:*** Cap-and-trade systems under regulatory regimes, such as California's Air Resources Board

(ARB) Emissions Trading Program and the Northeast's Regional Greenhouse Gas Initiative (RGGI).[12]

- ***Voluntary Carbon Exchanges:*** Voluntary – yet legally binding – membership-based cap-and-trade systems (e.g., Climate Action Reserve, American Carbon Registry, Verra – formerly Verified Carbon Standard).

In California, the ARB Emissions Trading Program helps the state achieve its goal of reducing GHG emissions. In 2014, the ARB approved amendments to the state's GHG cap-and-trade program, adding mine methane capture projects as an eligible offset project type. In July 2017, the cap and trade program was extended to 2030.[13]

Additional information can be found on CMOP's website at https://www.epa.gov/cmop/project-resources.

Carbon Financing for CMM Project Development

In general, CMM recovery, sale, and/or use projects can offer financial returns that are economically feasible. These CMM projects capture methane that would otherwise have been vented into the atmosphere, and either use or destroy the methane; thus, reducing GHG emissions. If properly monitored and verified, these emission reductions could qualify as GHG offsets that can be sold as "carbon credits" in voluntary or compliance markets. However, in most cases, carbon credits alone do not provide sufficient funding for CMM recovery projects that require significant capital investments (such as for electricity generation and natural gas processing and transmission).

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[1] U.S. EPA. 2012. *Global Anthropogenic Non-CO_2 Greenhouse Gases Emissions: 1990–2030*. EPA 430-R-12-006. Available: https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-anthropogenic-non-co2-greenhouse-gas-emissions.
[2] U.S. EPA. 2018. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2016*. EPA 430-R-18-003. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016
[3] DSIRE. 2018. Renewable Energy Standard. Updated June 14. Available: http://programs.dsireusa.org/system/program/detail/133.
[4] State of Indiana. 2019. Indiana Choice Program. Renewable Energy by 2025. Indiana Office of Energy Development. Available: http://www.in.gov/oed/2649.htm.
[5] DSIRE. 2018. Alternative Energy Portfolio Standard. Updated June 29. Available: http://programs.dsireusa.org/system/program/detail/2934.
[6] DSIRE. 2018. Alternative Energy Portfolio Standard. Updated June 29. Available: http://programs.dsireusa.org/system/program/detail/2934.
[7] Pennsylvania General Assembly. 2004. Alternative Energy Portfolio Standards Act – Enactment Act of Nov. 30, 2004, P.L. 1672, No. 213, Cl. 66. Available: http://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2004&sessInd=0&act=213.
[8] Utah State Legislature. 2010. Renewable Energy – Methane Gas. H.B. 192 Enrolled. Available: http://le.utah.gov/~2010/htmdoc/hbillhtm/HB0192.htm.
[9] BLM. 2017. United States Forest Service Supplemental Final Environmental Impact Statement for Federal Coal Lease Modifications COC-1362 & COC-67232 (including on-lease exploration plan). U.S. Department of Interior Bureau of Land Management. December 15.
[10] Based on discussions with representatives of Utah's Trust Lands Administration and Wyoming's Office of State Lands.
[11] Wyoming Office of State Lands and Investments. 2014. Natural Gas Flaring Policy. Effective date March 1, 2014. Available: https://drive.google.com/file/d/1F1Mowva4jbEi9VPADv467C7-V32I4VTR/view.
[12] Ten East Coast states participate in RGGI: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. RGGI does not currently address CMM emission reductions.
[13] CARB. 2017. California Air Resources Board's News Updates. Available: https://ww2.arb.ca.gov/news/carb-approves-cap-and-trade-improvements.