Legal and Regulatory Status of CMM Ownership in Key Countries:
Considerations for Decision Makers

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U.S. EPA Coalbed Methane Outreach Program

Global Methane Initiative

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Acronyms and Abbreviations

acf	Actual cubic feet
acm	Actual cubic meters
AEPS	Alternative Energy Portfolio Standard (Pennsylvania, United States)
AERS	Alternative Energy Resource Standard (Ohio, United States)
AREPS	Alternative and Renewable Energy Portfolio Standard (West Virginia, United States)
AUD	Australia Dollar
BLM	Bureau of Land Management (United States)
CAA	Clean Air Act (United States)
CAD	Canada Dollar
CAR	Climate Action Reserve (United States)
CAZ	Conflict Administration Zone (United States)
CBM	Coalbed Methane
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMM	Coal Mine Methane
CO2e	Carbon Dioxide Equivalent
DOI	Department of Interior (United States)
EPCs	Emission Performance Credits (Alberta, Canada)
GGAP	Greenhouse Gas Abatement Program (Australia)
GHG	Greenhouse Gas
GMI	Global Methane Initiative
GRB	Green River Basin (Wyoming, United States)
IBLA	Interior Board of Land Appeals (United States)
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KRCRA	Known Recoverable Coal Resource Area (United States)
KSLA	Known Sodium Leasing Area (United States)
kWh	Kilowatt Hour
LRBs	Land and Resource Bureaus (China)
MEM	Ministry of Energy and Mines (British Columbia, Canada)
MLA	Minerals Leasing Act of 1920 (United States)
MLR	China Ministry of Land and Resources
MMA	Mines and Minerals Act (Alberta, Canada)

MMTA	Mechanical Mining Trona Area of Known Sodium Leasing Area
MW	Megawatt
NERC	National Electricity Regulatory Commission (Ukraine)
NSW	New South Wales (Australia)
OGC	Oil and Gas Commission (British Columbia, Canada)
PEMEX	Petróleos Mexicanos (Mexico state-owned petroleum company)
PRB	Powder River Basin (Wyoming and Montana, United States)
PSC	Production Sharing Contract
RECs	Renewable Energy Credits
RESA	Renewable Energy Sources Act of 2004 (Germany)
RRR	Raven Ridge Resources, Incorporated
SinoPec	China Petro-Chemical Corporation
SOE	State-owned Enterprise (China)
UAE	Utah American Energy (United States)
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	United States Dollars
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
VAT	Value Added Tax
VCS	Verified Carbon Standard (United States)

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Executive Summary

Methane is a greenhouse gas 25 times as potent as carbon dioxide[1]. Unlike other greenhouse gases, methane is the primary component of natural gas and can be converted to usable energy. The reduction of methane emissions from coal mines therefore serves as a cost-effective method to reduce greenhouse gases and increase energy security, enhance economic growth, improve air quality and improve worker safety.

Worldwide methane emissions from coal mines totaled nearly 600 million metric tons of CO_2 equivalent ($MtCO_2e$) in 2010 and are projected to increase to 630 $MtCO_2e$ by 2015 (USEPA, 2012). Launched in 2004, the Global Methane Initiative (GMI) is a voluntary, multilateral partnership that aims to reduce global methane emissions from five major methane sources including coal mines. GMI works to advance the abatement, recovery and use of methane as a valuable clean energy source by creating an international network of partner governments, private sector members, development banks, universities and non-governmental organizations in order to build capacity, develop strategies and markets, and remove barriers to project development for methane reduction in Partner countries.

At present, a number of countries are facing decisions related to legislation and regulation of coal mine methane (CMM) recovery and utilization, from ownership of gas resources to providing royalty relief for produced energy. Several key coal producing countries have existing laws and policies that provide incentives for CMM recovery and utilization and mitigate ownership conflicts; however, some of these policies are more effective than others. On behalf of GMI, the United States Environmental Protection Agency (USEPA) has prepared this document which highlights these issues in order to present considerations and options for developing laws and policies that prevent ownership conflicts, mitigate perceived legal risks for project developers, and encourage CMM utilization.

International Resource Ownership Case Studies

Mineral resources, including CMM, may be government owned, as in China, Ukraine, Mexico, and Germany; state/provincially owned as in Australia; or federally and privately-owned such as in the United States and Canada. Administration of mineral resources may also take place at the federal or state/provincial level, as in Canada where mineral resources are 90 percent federally owned, but laws and leases are administered at the provincial level.

In addition to the federal and state entities responsible for leasing minerals and collecting royalties, such as ministries, a number of additional stakeholders exist. **Table 1** lists entities involved in CMM project development.

Table 1: List of Potential CMM Project Development Stakeholders

Entity	Level of Government	Role
Ministries of energy, petroleum, land management, etc.	Federal or state/provincial	Leasing of federal or state/province owned mineral resources, reclamation requirements
Energy regulators	Federal or state/provincial	Permitting and inspection of natural gas pipelines and electricity infrastructure

[1] Global warming potential for 100-year time horizon. 2007 IPCC Fourth Assessment Report (AR4), p212. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf

Entity	Level of Government	Role
Departments of natural resources	Federal, state/provincial, municipal	Drilling requirements and permitting, reclamation requirements, production reporting, inspection of mines and oil & gas operations
Departments of wildlife	Federal or state/provincial	Assess impact of project activities on wildlife
Ministries or agencies of environment, environmental protection	Federal, state/provincial, municipal	Air and water quality rules and permitting, environmental impact analysis rules and evaluation, hazardous material regulations, reclamation requirements, carbon regulation/commitments/inventory
Electric utilities	Federal, state/provincial, municipal, or private	Facilitating grid access for produced electricity, purchasing electricity
Utilities commission, utility regulatory commission, public utilities commission or public service commission	Federal, state/provincial, municipal	Regulates rates and services of public utilities, enforces renewable/alternative portfolio standards
Mine safety ministries or administrations	Federal or state/provincial	Enforce compliance with mine safety and health standards, including methane concentration in air and approval of ventilation plans, inspections
Other occupational safety administrations	Federal or state/provincial	Enforce occupational safety requirements, perform inspections
Parks or historic site departments	Federal, state/provincial, municipal	Ensure preservation of historical sites and artifacts
Private surface land owners	Private (N/A)	Granting access to land
Private mineral rights owners	Private (N/A)	Leasing mineral rights
Coal mines	Federal, state/provincial or private	Project development, access to facilities/land, coordination of drilling activities
Existing gas lessees	Private (N/A)	Negotiate royalties, project collaboration, coordination of drilling activities
Environmental groups	Private (N/A)	Evaluation of leasing and adherence to regulations, public awareness of environmental issues

With numerous stakeholders involved in CMM projects, it is important to segregate authority in promulgating regulations to avoid conflict. From a project development standpoint, it is essential to recognize that acquiring ownership of the CMM resource is only one facet of an extensive process from idea to execution, and other considerations such as safety and environmental regulations must be taken into account when implementing a CMM project.

Table 2 summarizes CMM ownership laws as well as policies and incentives for CMM project development in the countries profiled in this report.

Table 2: Summary of CMM Ownership and Policies in Key Countries

Country	CMM Ownership	CMM Policies/Incentives
United States	Predominantly federal in the West; Private in the East Historically not included with coal; however, IBLA decision has allowed a coal lessee to use CMM if desired	CMM emissions are not limited by regulations; however, reporting of greenhouse gases is required and permits are necessary in some instances; Projects can provide offsets under voluntary schemes as well as the state of California's mandatory greenhouse gas cap and trade program; CMM is included as an alternative energy source in numerous state portfolio standards
China	Federally owned Coal and CBM are licensed separately but may overlap; Surface pre-mine drainage requires CBM license (administered as oil and gas); Recovery of VAM, in-mine drained, gob drained CMM etc. does not require a CBM license	Required to use or flare drained CMM >30% CH4; 0.2 yuan/cubic meter subsidy for CMM utilization and a 0.25 yuan/kWh subsidy for CBM/CMM-fueled power generation; Exemptions for prospecting and licensing fees as well as VAT on equipment
Mexico	Federally owned Recovery and use of CBM/CMM for on-site usage by coal mining concessionaires or for gas sales to government-owned gas company is allowed	Carbon tax on fossil fuel use is expected to be implemented starting in 2014. CERs from Mexico-hosted CDM projects (including CMM) may be used to avoid the tax
Ukraine	Federally owned Government can issue CMM leases with new coal mining leases to mine operators; Existing mines are required to obtain a permit for CMM exploration and production; Mines may sell their rights to CMM	CMM project profits are not subject to taxation; Mines are required to limit CMM emissions; Recent tax code change made unconventional gas production, including CMM, subject to a production tax which makes CMM projects uneconomic
Australia	State owned Queensland: CMM utilization by mines is	Queensland: Flaring CMM is prohibited if it

Country	CMM Ownership	CMM Policies/Incentives
	allowed on-site, off-site sales requires petroleum lease New South Wales: Coal lessee may apply for inclusion of petroleum, or gas, in the mining lease provided the area is not already under a petroleum lease	is commercially or technically feasible to use the CMM New South Wales: Methane recovered in conjunction with coal mining is exempt from royalties (CBM leased through Petroleum Act is subject to royalties) Carbon tax requires entities which emit over 25,000 tonnes per year of CO2e (transport or agriculture) to surrender emissions permits and includes fugitive emissions from coal mines
Canada	Mineral resources ~90% federally owned, administered provincially Alberta: Coal lessee may recover CMM with government approval, if necessary for safety or conservation reasons; otherwise, CMM/CBM treated as natural gas British Columbia: Coal and CBM tenures may overlap; government has outlined process for mitigating conflicts Nova Scotia: Coal and CBM rights may overlap; government will notify existing rights holders before issuing overlapping rights and may alter existing lease to maximize resource development	Alberta: Greenhouse Gas Reduction Program requires facilities emitting > 100,000 tonnes CO2e/ year to reduce emissions intensity by 12 percent, as of July 1, 2007 British Columbia: Carbon tax excludes CMM
Germany	Federally owned Government transfers CMM rights to coal company for duration of coal license with option for a gas license after coal mining ceases.	Feed-in tariff for CMM used to generate power under the Renewable Energy Sources Act of 2004

The following sections discuss considerations and options for developing laws and policies that prevent ownership conflicts, mitigate perceived legal risks for project developers, and incentivize CMM utilization. These options are based on successful laws and policies in key CMM-producing countries.

Ownership Options

Ill-defined gas property rights, lack of clarity regarding the ownership of the CBM/CMM and permitting process in many developed countries serve as obstacles to the development of gas utilization projects

(USEPA, 2009c). As the international case studies show, there are numerous opportunities for conflict to arise in the absence of clear CBM and CMM ownership rules, particularly where coal and gas rights overlap.

As CMM projects require coal mine cooperation and are often initiated by coal companies, giving coal mines first priority for CMM exploration and development activities as in Ukraine and Germany, provides the most straight forward ownership solution. A step further to encouraging CMM utilization is to solicit coal mining areas as potential CBM concessions should the coal mine decline to explore for and/or develop the resource after a given time period.

Policy Options

A number of policy options exist to encourage CMM recovery and utilization. Several financial policies such as royalty relief, feed-in tariffs, and tax incentives have been successful, while conflicting tax policies such as Ukraine's recent tax on unconventional gas make CMM projects uneconomic. Renewable portfolio standards that are expanded to alternative sources such as CMM are also effective in promoting CMM-based power.

An important consideration in developing policies is to ensure that safety regulations take precedence and that unsafe activities are discouraged. Policies requiring CMM capture and use, particularly over a given concentration, such as China's standard requiring operators of CMM drainage systems with greater than 30 percent methane concentration to use or flare the gas, may encourage operators to maintain gas concentrations below 30 percent by dilution, ignoring best practices and safety standards.

When mine gas drainage is undertaken before the coal extraction process begins, the collection systems are not likely to be disturbed by ground movement, and, if feasible, relatively high purities of gas can usually be produced. Concentrations of 60 percent methane and higher should be achievable from pre-drainage methods, thus producing gas well outside of the explosive range (UNECE, 2010). Incentives such as royalty relief for pre-drained gas could be administered to encourage this method of degasification over other methods. Royalty relief has been successful as an incentive in the US by encouraging drainage of gas prior to surface mining in the PRB.

Feed-in tariffs can promote CMM projects through higher prices for alternative electricity on the electricity market. Feed-in tariffs such as China's subsidies for CMM utilization and CBM/CMM-fueled power generation provide grid access for CMM-based electricity and make CMM projects more economic.

Tax exemptions may provide an incentive to develop CMM projects. China provides exemption from VAT on CMM project equipment.

Education and information dissemination play an important role in the development of CMM recovery and utilization projects. There are CMM clearinghouses and information centers in such countries as China, India, and Russia. Many organizations such as the Global Methane Initiative (GMI), the International Energy Agency, and the United Nations Economic Commission for Europe (UNECE) as well as the USEPA have been actively participating in the dissemination of information on CMM recovery and utilization through technical information sessions, development of documents and tools, and participation in international events (USEPA, 2009c).

1. Background

Methane is a greenhouse gas 25 times as potent as carbon dioxide[2]. Unlike other greenhouse gases, methane is the primary component of natural gas and can be converted to usable energy. The reduction of methane emissions from coal mines therefore serves as a cost-effective method to reduce greenhouse gases and increase energy security, enhance economic growth, improve air quality and improve worker safety.

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This document includes international case studies which describe the legal and ownership status of CMM in the United States (US), China, Mexico, Ukraine, Australia, Canada, and Germany. As shown in **Figure 1**, China, the US, Ukraine, and Australia contribute significantly to global CMM emissions and are expected to continue this trend based on current coal production projections (USEPA, 2012a). These and other key countries were selected for profiling as they are representative of a variety of legislative and policy approaches related to CMM.

[2] Global warming potential for 100-year time horizon. 2007 IPCC Fourth Assessment Report (AR4), p212. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf

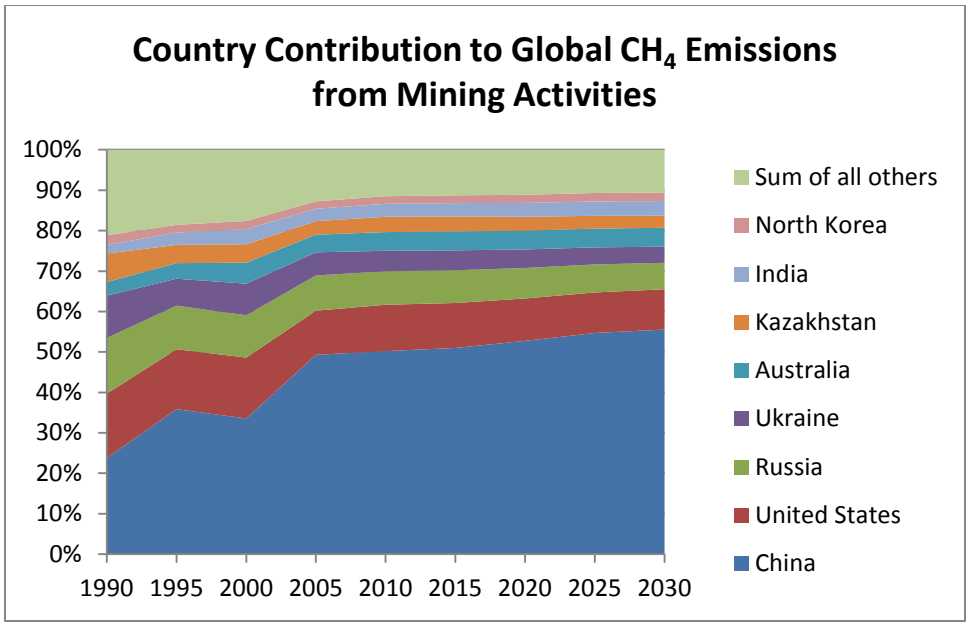

Figure 1: Contribution of Top CMM Emitting Countries to Global CMM Emissions (USEPA, 2012a)

Each country section provides a list of further reading options including USEPA, GMI, and other relevant references. USEPA has focused efforts on regulatory and ownership issues as well as policies and incentives related to CMM and have developed several key documents, including:

- Financial and Regulatory Incentives for U.S. Coal Mine Methane Recovery Projects: http://www.epa.gov/cmop/docs/cmm-financial-regulatory-incentives.pdf
- Major U.S. Greenhouse Gas Registries and Their Rules for Coal Mine Methane Projects: http://www.epa.gov/cmop/docs/ghg-registries.pdf
- State Renewable Energy Programs: http://www.epa.gov/cmop/docs/state-programs.pdf
- GMI Country Profiles: https://www.globalmethane.org/tools-resources/coal_overview.aspx

Following the case studies is a discussion of options for new or revised CMM legislation and regulations which are designed to encourage and control the development of methane resources associated with coal. This section describes ownership and leasing approaches, policy options including financial incentives and renewable or alternative portfolio standards, as well as a discussion of effective outreach and education activities.

2. International Resource Ownership Case Studies

The following sections describe ownership of CMM in several key coal producing countries, as well as identify policies and regulations that affect CMM project development. Mineral resources including CMM may be owned by federal governments, as in China, Ukraine, Mexico, and Germany; state/provincially owned as in Australia; or federally and privately-owned such as in the United States and Canada. Administration of mineral resources may also take place at the federal or state/provincial level, as in Canada where mineral resources are 90 percent federally owned, but laws and leases are administered at the provincial level.

In addition to the federal and state entities responsible for leasing minerals and collecting royalties, such as ministries, a number of additional stakeholders exist. **Table 3** lists entities involved in CMM project development.

Table 3: List of Potential CMM Project Development Stakeholders

Entity	Level of Government	Role
Ministries of energy, petroleum, land management, etc.	Federal or state/provincial	Leasing of federal or state/province owned mineral resources, reclamation requirements
Energy regulators	Federal or state/provincial	Permitting and inspection of natural gas pipelines and electricity infrastructure
Departments of natural resources	Federal, state/provincial, municipal	Drilling requirements and permitting, reclamation requirements, production reporting, inspection of mines and oil & gas operations
Departments of wildlife	Federal or state/provincial	Assess impact of project activities on wildlife
Ministries or agencies of environment, environmental protection	Federal, state/provincial, municipal	Air and water quality rules and permitting, environmental impact analysis rules and evaluation, hazardous material regulations, reclamation requirements, carbon regulation/commitments/inventory
Electric utilities	Federal, state/provincial, municipal, or private	Facilitating grid access for produced electricity, purchasing electricity
Utilities commission, utility regulatory commission, public utilities commission or public service commission	Federal, state/provincial, municipal	Regulates rates and services of public utilities, enforces renewable/alternative portfolio standards
Mine safety ministries or administrations	Federal or state/provincial	Enforce compliance with mine safety and health standards, including methane concentration in air and approval of ventilation plans, inspections
Other occupational safety administrations	Federal or state/provincial	Enforce occupational safety requirements, perform inspections
Parks or historic site departments	Federal, state/provincial, municipal	Ensure preservation of historical sites and artifacts
Private surface land owners	Private (N/A)	Granting access to land
Private mineral	Private (N/A)	Leasing mineral rights

Entity	Level of Government	Role
rights owners		
Coal mines	Federal, state/provincial or private	Project development, access to facilities/land, coordination of drilling activities
Existing gas lessees	Private (N/A)	Negotiate royalties, project collaboration, coordination of drilling activities
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2.1. United States

The federal government owns roughly 28 percent of the total of over 900 million hectares of land in the US. Four agencies administer federally owned land:

- The U.S. Forest Service (USFS) in the Department of Agriculture manages public surface lands in national forests and grasslands.
- The National Park Service in the Department of Interior (DOI) manages the 401 parks of the National Park System.
- The Fish and Wildlife Service in the DOI works to conserve, protect and enhance fish, wildlife and plants and their habitats as well as manage the 61 million acre US National Wildlife Refuge system.
- The Bureau of Land Management (BLM) in the DOI manages more land than any other federal agency in the US and manages public land resources for a variety of uses, such as energy development, livestock grazing, recreation, and timber harvesting. The BLM manages surface lands and resources as well as subsurface resources such as coal and natural gas.

Most federal lands are in the West and Alaska. See **Figure 2**. The BLM manages 100 million hectares of surface land and is responsible for 283 million hectares of subsurface mineral resources [3] (Gorte et al, 2012). When the surface is privately owned and subsurface mineral resources are

[3] Minerals used for energy are commonly called "energy leasables" which include oil and gas, oil shale, coal, and geothermal, which are available for development through BLM's mineral leasing program. Leases are issued for specific periods of time, and the lessee pays a rental fee and royalties on the minerals produced.

federally owned, this condition is referred to as "split-estate."[4] **Figure 2** shows both surface and subsurface owned by the government of the US.

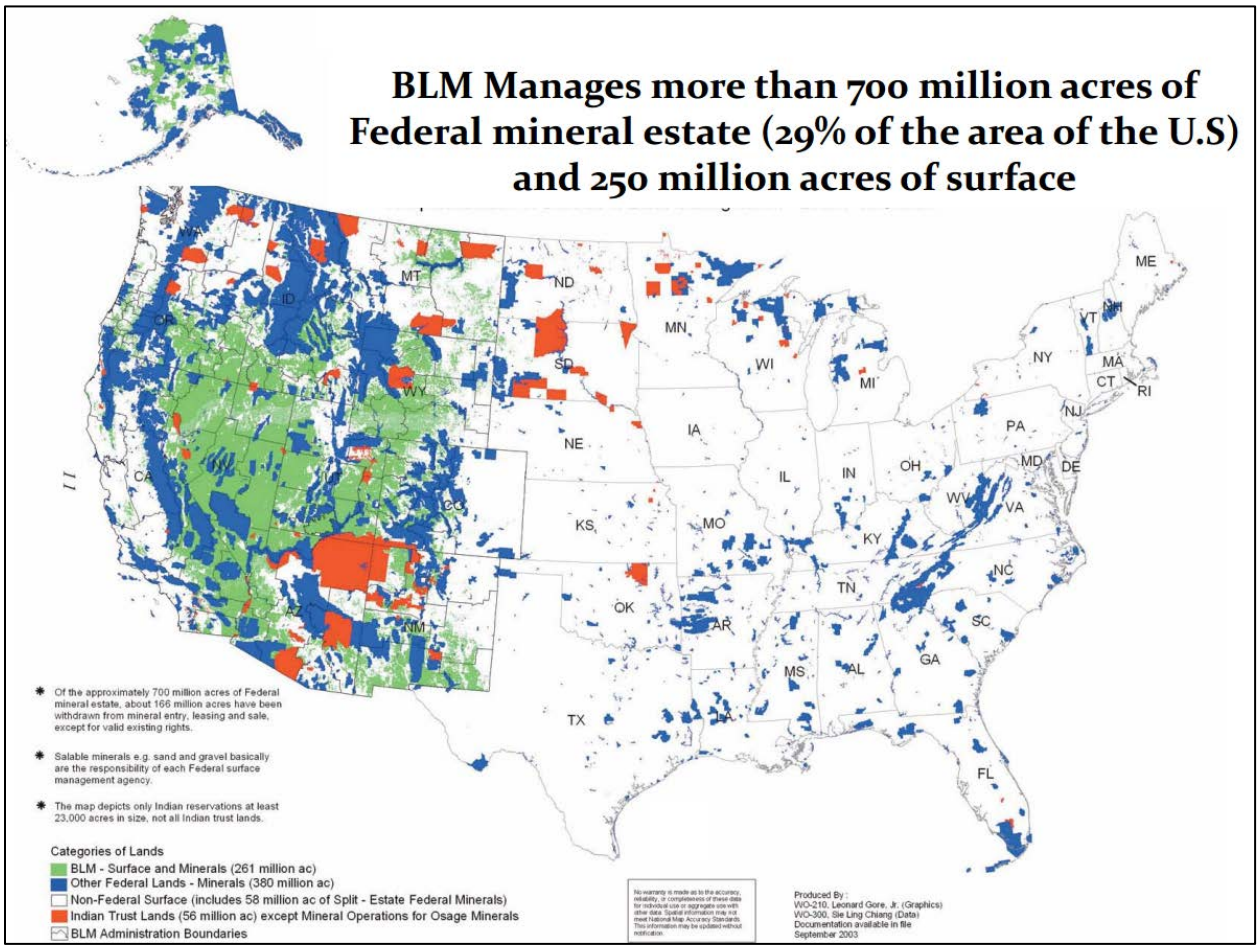

Figure 2: Federal Lands of the United States (Martin, 2011)

BLM has responsibility for coal leasing on approximately 230 million hectares where the coal mineral estate is owned by the U.S. government. Development of energy minerals such as coal and others including oil, conventional natural gas, CBM, and certain industrial minerals such as sodium on federal lands is managed under leases issued pursuant to the Mineral Leasing Act (MLA). As is the case of methane within federally-owned coal, multiple minerals may occur in a given area managed by BLM. Federal mineral leases only apply to individual minerals under the MLA; although multiple leases for individual resources may apply to a given area or parcel, such as separate leases for coal and CBM. The

[4] In split estate situations, the surface and subsurface rights (such as the right to develop minerals) for a piece of land are owned by different parties. Mineral rights are considered dominant, meaning that they take precedence over other property rights, including those associated with surface ownership. However, the mineral owner must show due regard for the interests of the surface estate owner, and occupy only those portions of the surface that are reasonably necessary to develop the mineral estate. The BLM's split estate policy applies only to situations where the surface rights are in private ownership and the rights to development of the mineral resources are publicly held and managed by the federal government.

MLA authorizes issuance of leases to extract and develop deposits of CBM[5]; however, BLM regulations do not specifically provide a process for an applicant to obtain a lease for CMM[6] (Bassett et al, 2009). Despite this, CMM projects have been developed on federal land through various leasing procedures (See **Underground Coal Mine CMM Project Case Studies**).

For areas with multiple minerals, BLM can designate state and local priorities for a given resource. In an area of Colorado, BLM designated what is called the Paonia-Somerset Known Recoverable Coal Resource Area (KRCRA) which gives priority for coal development where the overburden above the relevant coal seam (B-Seam of the Mesa Verde coals) is less 3,500 feet (1,066 meters) (Taylor and Dyer, 2006). The KRCRA Exception Criteria (BLM, 2012) state:

> *Oil and gas operators anticipating exploration or development operations are encouraged to consult and coordinate their activities with the affected coal operators. In the event that the oil and gas and coal operators are unable to reach agreement on proposed oil and gas exploration or development, the BLM authorized officer will intervene and use all pertinent lease terms, regulations, and policy to determine what course of action is in the public's interest. However, under no circumstances will the BLM approve any oil and gas operations that compromise maximum economic coal recovery or the safety of underground mining operations.*

Underground Coal Mine CMM Project Case Studies

Oxbow Mining LLC, with Aspen Skiing Company, Gunnison Energy Corporation, and Vessels Coal Gas, successfully developed a CMM-fueled power generation project at the Elk Creek underground coal mine in Colorado. The 3 MW power generation project commenced in 2012 utilizing Guascor gas-fired power generators (Aspen Skiing Company, 2012). Both coal and gas estates in the area are a combination of federally and privately owned parcels. Oxbow obtained coal rights through federal leases via the MLA and private agreements. Vessels Coal Gas and Oxbow obtained privately owned gas parcels, splitting the gas rights equally between them (COGCC, 2011). Gunnison Energy, a subsidiary of Oxbow, had previously leased federally owned gas parcels in the area as early as 2001[7] issued under the MLA (BLM, 2001). With rights to both the coal and gas already in place, Oxbow is able to utilize CMM to generate power as well as to oxidize methane utilizing an incinerator to reduce greenhouse gas emissions.

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[5] Coalbed methane (CBM) refers to methane that is found in coal seams. It is formed during the process of coalification, the transformation of plant material into coal. Coalbed methane is also known as "CBM," or virgin coal seam methane or coal seam gas. It is widely considered an "unconventional" source of natural gas. In the US, coalbed methane is a valuable resource that accounts for about 10% of total US natural gas production annually.

[6] Coal Mine Methane (CMM) refers to methane released from the coal and surrounding rock strata due to mining activities. In underground mines, it can create an explosive hazard to coal miners, so it is removed through ventilation and in some cases, drainage systems. In abandoned mines and surface mines, methane might also escape to the atmosphere through natural fissures or other diffuse sources. Like CBM, CMM is a subset of the methane found in coal seams, but it refers specifically to the methane found within mining areas (e.g., within a mining plan), while CBM generally refers to methane in coal seams that will never be mined. Methane that is drained from surface boreholes before any mining activities take place is referred to as "CBM" only in the Clean Development Mechanism *Consolidated methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation (ACM0008)* (http://cdm.unfccc.int/methodologies/DB/OA37XAW7EI9WHJVZ97RGH2EZ5S9E93).

[7] COC 65117, API # 05-051-06050 (COGCC, 2002; BLM, 2001)

Although BLM precedent previously held that all methane gas captured from federal lands must be done in compliance with a federal gas lease issued under the MLA, an administrative decision in 2008, *Vessels Coal Gas, Inc., 175 I.B.L.A. 8, 9–10*, successfully challenged this standard. Utah underground coal mine, Aberdeen, operated by Utah American Energy (UAE) vented methane gas into the atmosphere as it developed its federal coal lease in compliance with Mine Safety and Health Administration (MSHA) regulations. UAE partnered with a project developer, Oso Energy, on a project to capture vented methane gas, in order to profit from its use as a high concentration methane source. UAE and Oso requested a license for the gas from BLM, which determined that a competitive lease sale under the MLA was required. A lease was eventually issued to Oso for the "exclusive right for the surface capture of ventilated mine gas, known as mine vent gas, from the Aberdeen Coal Mine." The lease stipulations included a restrictive clause stating: "This lease does not grant the right to drill for, mine, extract, remove and dispose of all the oil and gas in the lands described herein." A third party, Vessels Coal Gas, Inc. challenged the sale as anticompetitive, arguing that the stipulations prevented any company from winning the lease except Oso. After extensive litigation, the Interior Board of Land Appeals (IBLA) reasoned that mine methane released by coal mining into the environment from vents drilled by the coal mine operator at the direction of MSHA for protection of coal miners was not the kind of oil and gas "deposit" covered by the MLA (Haderlie, 2010; Bassett et al, 2009).

Subsequently, this decision enabled BLM to amend the federal coal lease of Colorado's West Elk underground coal mine allowing the mine to capture and utilize CMM despite its lack of a federal oil and gas lease. Though the lease amendment authorizes West Elk to capture methane, it doesn't require it. The operator of West Elk, Arch Coal, studied the economic feasibility of methane capture or flaring, and report that they find that neither approach is economically viable (Webb, 2010).

Conflict Administration Zones (CAZ)

As indicated above, the MLA authorizes issuance of leases to extract and develop deposits of CBM. A given piece of land may also be leased for multiple minerals through separate leases. Wyoming's Powder River Basin (PRB) is home to extensive coal and CBM deposits. Over 90 percent of the PRB's coal estate is in federal ownership and accounts for one-third of all US coal production via large surface mines. About 45 percent of the oil and gas estate (including CBM) in the PRB is under federal ownership.

Commonly in the PRB, resource ownership is a "split estate" issue where the surface owner may not own the mineral rights below, leading to conflicts between coal licensees and oil & gas developers. Much of the mineral rights in the basin are owned by BLM and leased to private companies. Most federal oil and gas leases in the PRB preclude and thus are senior to coal licenses; however, at the time of overlapping licensure, extensive CBM development was not anticipated. In the past, traditional oil and gas and coal conflicts generally involved oil and gas resources contained in reservoirs much deeper than the coal, thereby allowing for development of coal without loss of the oil and gas development. Since CBM is trapped within the coal seams and was considered a valueless gas which escaped from coal, rather than part of the valuable coal fuel itself, coal companies routinely vented the gas to the atmosphere. Rising interest in CBM exploration and development as a result of new technology, a better understanding of the resource and increasing energy demand has created a mineral conflict situation concerning federal leases.

In order to optimize production of coal and CBM on federal lands, the BLM has established Conflict Administration Zones (CAZ); which serve to encourage oil and gas operators to produce gas prior to coal extraction, resulting in reduced methane liberation during surface mining. The CAZ typically include areas located immediately west, or basinward, of the existing surface coal mines in the PRB which BLM

has identified as having the highest potential for conflict between CBM development and surface coal mine development. The CAZ include areas where surface mines will be mining coal within the next 10 years and where CBM development is underway or anticipated. Each CAZ is reviewed annually to adjust its boundaries. BLM created the CAZ to:

- Prevent future conflicts on coal tracts that may be leased;
- Provide a timely notice to the coal and CBM lessees or operators prior to their planned development of coal or CBM development to allow for enough time to resolve future conflicts on coal tracts that may be leased; and
- Optimize federal coal and gas development.

Once the CAZ is identified, the CBM lessees or operators are notified that their oil and gas lease is within the CAZ and informed of future mining activities. BLM requires the proper and timely development of leased resources, the prevention of waste and proper abandonment of wells, and the availability of incentives such as royalty rate reductions to encourage development. Once a CAZ has been identified, BLM proceeds to:

- Review the status of all oil and gas leases within the CAZ for CBM development;
- Provide direction related to the development of the resources;
- Mitigate conflicts between surface coal mining and CBM operations; and
- Oversee public health, safety environmental impacts.

BLM offers a royalty rate reduction to oil and gas lessees and allows wells to be drilled on 40 acre centers. Well spacing for CBM wells drilled in the PRB are typically 80 acre centers. This provides additional gas drainage over a shorter period of time. BLM offers this incentive to encourage CBM operators to drill wells and drain as much CBM as possible in the time available prior to mine-through while ensuring uninterrupted coal mining operations. This CAZ policy does not apply to oil and gas wells which produce from deeper zones. To qualify for a royalty rate reduction the oil and gas lessee must agree to the following:

- Expedite CBM production in a manner that will maximize the recovery of the resource before required abandonment;
- Cease production operations and abandon wells and facilities at BLM's request prior to the commencement of mining operations in the area of the CBM wells; and
- BLM will notify the oil and gas operator at least 180 days prior to the date when the well should be abandoned.

CBM lessees with leases located on federal oil and gas property within a CAZ who agree to these conditions are eligible for a 50 percent royalty rate reduction on CBM production for the remaining life of each well. BLM has determined that without the royalty reductions, recovery of valuable CBM resources within the CAZ would not be maximized[8].

[8] The details of this program can be found in BLM's Instruction Memorandum No. 2006-153, May 18, 2006 (BLM, 2006) attached in Annex 1: BLM Instruction Memorandum on Conflict Administration Zones.

Non-coal Mines Case Study: Trona Mines in Wyoming

Trona is a naturally occurring mineral that is identified chemically as sodium sesquicarbonate. Soda ash, or bicarbonate of soda, is made by processing trona and nahcolite, a mineral often found with trona deposits. In 2009, Wyoming trona mines produced 95 percent of the soda ash in the United States and 24 percent of the world's soda ash. The trona deposit near Green River, Wyoming that extends into Utah is the best known occurrence, where four mines extract approximately 17 million tons per year. Nearly 50 percent of Wyoming's trona is federally owned (BLM, 2011). The location of the trona deposits in the Green River area is designated as the Green River Basin (GRB) Known Sodium Leasing Area (KSLA) by the BLM and comprises 700,000 acres wherein trona deposits exceed 4 feet (1.2 meters) in thickness.

Oil and gas-containing shale underlies each trona bed in the Green River deposit. Much of the KSLA has been leased for oil and gas production by BLM and private mineral owners. In the 1990s, the potential conflict between development of underground trona resources and drilling operations for conventional oil and gas was studied by a joint industry committee formed by all stakeholders in the area (Bassett et al, 2009). In 1993, the BLM established a Mechanical Mining Trona Area (MMTA) within the KSLA and began placing existing oil and gas leases within the boundary in suspension amid concerns that oil and gas drilling within the basin's KSLA could cause accidental cave-ins, flooding or gas seepage into the underground trona mines in the basin, as well as miners encountering abandoned oil and gas wellcasing to disastrous effects (Gearino, 2004). The BLM Kemmerer Field Office, the BLM office with jurisdiction over the area, stated in their 2008 Resource Management Plan Record of Decision: "Existing oil and gas leases are suspended in the MMTA. The MMTA is administratively unavailable for new fluid mineral leasing until the oil and gas resource can be recovered without compromising the safety of underground miners," (BLM, 2010).

Despite lack of a gas lease, the Green River Trona Mine in Wyoming operated by Solvay Chemicals, Inc., has implemented a project to recover and utilize the methane originating in interbedded layers of methane-bearing oil shales that must be removed to maintain safety of the miners. Solvay submitted an application to BLM for an amendment to their federal trona lease that would permit the capture and use (or destruction) of mine methane in conjunction with their mining operations under the leases. The requested amendment is based on the provisions authorized by BLM in the **West Elk** mine amendment above (Bassett et al, 2009). BLM approved the use of the methane and the project commenced in 2010 (Refsdal and Dean, 2012).

CMM Policies and Incentives

US Supreme Court Decision: Greenhouse Gases are Pollutants

Federal regulation of greenhouse gases in the U.S. is predicated on the Supreme Court decision in *Massachusetts v. EPA*, 549 U.S. 497 (2007). In that case, the Court considered whether the USEPA was required to respond to a petition for rulemaking on the threat posed by greenhouse gases to public health and welfare.

The Court found that greenhouse gases are air pollutants covered by the Clean Air Act (CAA),[9] and that the USEPA therefore must determine whether or not emissions of greenhouse gases from new motor

[9] The Clean Air Act (CAA) is a United States federal law designed to control air pollution on a national level. It requires USEPA to develop and enforce regulations to protect the public from airborne contaminants known to be

vehicles cause or contribute to air pollution, "which may reasonably be anticipated to endanger public health or welfare,"[10] or whether the science is too uncertain to make a reasoned decision.

Endangerment Finding

On April 17, 2009, the USEPA Administrator signed the proposed "endangerment" and "cause or contribute" findings under the CAA for greenhouse gases emitted by new motor vehicles and engines. The USEPA held a 60-day public comment period, and received over 380,000 public comments. On December 7, 2009, the Administrator signed two distinct final findings regarding greenhouse gases:

> Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases — carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) — in the atmosphere threaten the public health and welfare of current and future generations.
>
> Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare (USEPA, 2013a).

The endangerment finding did not itself impose any requirements on industry or other entities.

Vehicle Emission Standards

USEPA's finding that greenhouse gas emissions from new motor vehicles contribute to endangerment of public health and welfare triggered the USEPA's requirement under the CAA to regulate these emissions. In collaboration with the National Highway Traffic Safety Administration (NHTSA), the USEPA finalized fuel efficiency standards for light-duty vehicles (2012-2016 model years) in May of 2010 and heavy-duty vehicles (2014-2018 model years) in August of 2011 (USEPA, 2013a). The President has directed the USEPA and NHTSA to develop and issue the next phase of medium- and heavy-duty vehicle fuel efficiency and greenhouse gas standards by March 2016. Under this timeline, the agencies are expected to issue a Notice of Proposed Rulemaking by March 2015 (White House, 2014).

Greenhouse Gas Reporting

Beginning in 2010, the USEPA's Greenhouse Gas Reporting Program[11] has required large sources and suppliers from a variety of industries to monitor and report their greenhouse gas emissions and supply. Owners or operators of underground coal mine facilities that liberate 36,500,000 actual cubic feet (acf[12]) (1,033,056 actual cubic meters (acm)) of methane (CH4) or more per year (equivalent to 100,000 acf (2,832 acm) of CH_4 or more per day) must report their greenhouse gas emissions. Under the Reporting Program, U.S. underground coal mines that are subject to the reporting rule first began monitoring their greenhouse gas emissions in 2011 and reporting their emissions in 2012. Facility data are published annually on the USEPA website.

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hazardous to human health. The 1963 version of the legislation established a research program, expanded in 1967. Major amendments to the law, requiring regulatory controls for air pollution, passed in 1970, 1977, and 1990

[10] Clean Air Act section 202(a)(1), 42 USC 7521(a)(1).

[11] http://www.epa.gov/ghgreporting/index.html

[12] Measure of the volume of gas at operating temperature and pressure

President Obama's Climate Action Plan

On June 25, 2013, President Obama announced a series of executive actions to reduce carbon pollution, prepare the US for the impacts of climate change, and lead international efforts to address global climate change. As part of this Climate Action Plan,[13] President Obama issued a Presidential Memorandum directing USEPA to work expeditiously to complete carbon pollution standards for the power sector (USEPA, 2014a). On September 20, 2013, The USEPA proposed performance standards for new fossil fuel-fired power plants to be built in the future.[14] The proposed standards for new power plants are the first uniform national limits on the amount of carbon pollution that future power plants will be allowed to emit. The USEPA proposed to set separate standards for natural gas-fired turbines and coal-fired units. The agency received many comments on the proposal during the formal public comment period and is in the process of reviewing and responding to those comments.

On June 2, 2014, the USEPA proposed performance standards for existing power plants.[15] The agency's proposal is flexible—reflecting the different needs of different states. This proposal is undergoing a formal comment period before it is finalized.

Climate Action Plan – Strategy to Reduce Methane Emissions

On March 28, 2014, the White House released the "Strategy to Reduce Methane Emissions."[16] The plan outlines steps to further cut methane emissions from landfills, coal mining, agriculture, and oil and gas systems through cost-effective voluntary actions. For the coal mining sector, the strategy includes both a voluntary element through USEPA's Coalbed Methane Outreach Program (CMOP), and a component highlighting potential regulatory action on federal lands, under jurisdiction of the Department of Interior's Bureau of Land Management. In April 2014, BLM released an Advanced Notice of Proposed Rulemaking (ANPRM) to gather public input on the development of a program for the capture and sale, or disposal of waste mine methane[17] on lands leased by the federal government (Utech, 2014; BLM, 2014). BLM is accepting public comments on the ANPRM through June 2014.

Voluntary Programs

Since 1993, CMOP has worked in a voluntary partnership with the coal mining industry and other stakeholders to promote the cost-effective recovery and use of methane from coal mines. The program provides technical information, analyses, and tools to share best practices for recovering CMM. Since the program began in 1994, cumulative methane emissions reductions are over 140 million metric tonnes of carbon dioxide equivalent.

CMM is included in a number of voluntary emission reductions schemes. For example, the Climate Action Reserve (CAR) has developed protocols for project development and the quantification of carbon offset credits in voluntary markets for several sectors. CAR has adopted the Coal Mine Methane Project Protocol which sets standards and quantifies emission reductions associated with destroying methane that would have otherwise been vented to the atmosphere from active underground coal and Category III gassy trona mines in the U.S. and its territories.

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[13] http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf
[14] http://www2.epa.gov/carbon-pollution-standards/2013-proposed-carbon-pollution-standard-new-power-plants
[15] http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule
[16] http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf
[17] Term used by BLM meaning methane emitted from coal mines, or CMM

The Verified Carbon Standard (VCS) is another voluntary carbon offset program which allows for the use of Clean Development Mechanism (CDM) methodologies as well as new methodologies proposed by project developers. VCS currently includes surface mine, abandoned mine, and underground mine projects, as well as a project developed under the *Interception and Destruction of Fugitive Methane from Coal Bed Methane (CBM) Seeps, v1.0* methodology.

State Incentives

A number of states have established renewable portfolio standards that include coal mine methane, and one state (California) has established a greenhouse gas cap and trade program that includes coal mine methane projects as a source of emissions offsets.

In 2006 the state of California passed Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006, which led to the 2011 adoption of the cap-and-trade regulation. The regulation covers major sources of greenhouse gas emissions in California such as refineries, power plants, industrial facilities, and transportation fuels. The cap-and-trade program includes an enforceable emissions cap that will decline over time. California does not have active coal mines and thus does not cap CMM emissions; however, the Air Resources Board has developed and adopted a protocol for CMM projects to provide compliance offset credits. The Mine Methane Capture (MMC) protocol addresses the two primary sources of methane from active underground mines: methane released through ventilation shafts, and methane released from drainage systems. The protocol also covers methane emissions from abandoned underground mines as well as active surface mines. Compliance offset credits are greenhouse gas emission reductions that meet regulatory criteria and may be used by an entity to meet up to eight percent of its triennial compliance obligation under the cap-and-trade program. The MMC protocol joins the Forestry, Urban Forestry, Livestock and Ozone Depleting Substance protocols as a source of potential offsets under California's cap-and-trade program (ARB, 2014).

In 2004, Pennsylvania was the first state to include CMM as an alternative energy fuel in their Alternative Energy Portfolio Standard (AEPS). The AEPS requires that a certain percentage of all electric energy sold to retail customers be derived from "alternative" energy sources. The level of alternative energy required gradually increases according to a fifteen year schedule, calling for an 8 percent benchmark for Tier I resources, which includes a 0.5 percent solar requirement, and a 10 percent benchmark for Tier II resources, which includes CMM, by 2020 (PUC, nd).

Ohio law requires electric distribution utilities and electric services companies to secure a portion of their electricity supplies from alternative energy resources. By the year 2025, 25 percent of the electricity sold by each utility or electric services company within Ohio must be generated from alternative energy sources. At least 12.5 percent must be generated from renewable energy resources which includes "methane gas emitted from an abandoned coal mine" (Ohio PUC; Ohio Revised Code, Title 49, Chapter 4928).

In June 2009, West Virginia enacted the Alternative and Renewable Energy Portfolio Standard (AREPS), requiring investor-owned utilities with more than 30,000 residential customers to supply 25 percent of retail electric sales from eligible alternative and renewable energy resources by 2025. Effective January 1, 2015, electric utilities are thereafter required to own alternative and renewable energy credits in an amount equal to a percentage of electricity sold in the preceding year. Credits can be purchased or generated from alternative and renewable energy sources. The AREPS does not establish a minimum contribution from renewable energy sources, and the term "alternative energy resources" is more broadly defined than the term "alternative energy" in other states. Alternative energy resources includes CBM and recycled energy such as "waste gas, waste fuel or other forms of energy that would otherwise be flared, incinerated, disposed of, or vented," like CMM. The AREPS was amended in

November 2009, allowing the portfolio standard to be met solely by alternative energy resources with no requirement for renewable resources (DSIRE, 2012; WV Legislature, 2009).

In March 2008, Utah established a renewable portfolio goal in the "Energy Resource and Carbon Emission Reduction Initiative Act," which is similar to renewable portfolio standards in other states. Under the act, to the extent that it is cost-effective to do so, investor-owned utilities, municipal utilities, and cooperative utilities must use eligible renewable energy sources to account for 20 percent of their 2025 adjusted retail electric sales. Utilities can meet these targets either by producing electricity from an eligible form of renewable energy or by purchasing renewable energy certificates (RECs). In 2010, the Utah legislature passed H.B. 192 "Renewable Energy – Methane Gas," which amended the definition of "renewable energy 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. The amendment was effective as of May 11, 2010 (Utah State Legislature, 2010).

Further Reading

The following links provide additional information:

U.S. Laws and Policies Regarding Capturing Methane Gas (Holland & Hart LLP):
http://epa.gov/cmop/docs/cmm_conference_sept09/02bassett_white_paper.pdf

Carbon Offset Markets and Coal Mine Methane (Point Carbon):
http://epa.gov/cmop/docs/cmm_conference_oct10/Felt.pdf

Coal Mine Methane: The True Unconventional Gas, A Survey of Issues Concerning Ownership, Control, and Development of Emission Reduction Projects (Ruby Canyon Engineering):
http://epa.gov/cmop/docs/cmm_conference_oct10/Kennedy.pdf

Developments in Climate Change Policy:
http://epa.gov/cmop/docs/cmm_conference_oct10/Kruger.pdf

Greenhouse Gas Credits and Renewable Energy Incentives for Coal Mine Methane Projects:
http://epa.gov/cmop/docs/cmm_conference_oct11/Cote.pdf

Analysis of Opportunities and Challenges for U.S. Coal Mine Methane Projects:
http://epa.gov/cmop/docs/cmm_conference_sep12/02_Kennedy.pdf

United States GMI Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch36.pdf

2.2. China

CBM and CMM Ownership

China's mineral resources are state owned. All exploration and mining activities must be approved by the Ministry of Land and Resources (MLR) or with provincial land and resources bureaus (LRBs) to obtain exploration or mining rights. Large coal mines in excess of 100 million metric tons of reserves must

obtain licenses through the MLR; however, smaller mines may obtain permission from provincial LRBs as a result of government restructuring in the late 1970s. Oil and gas activity must be registered through the MLR as the central government did not transfer management power to local levels as it did in the coal industry. China's Mineral Resources Law was passed in 1986 and did not list CBM independently as a mineral resource until it was amended in 1996, clarifying that CBM is one of China's 34 mineral resources, amongst other issues. Exploration and mining of CBM is registered in the same manner as conventional oil and gas, and since 1998 three centrally-controlled state-owned enterprises (SOEs), China United Coalbed Methane Co., Ltd, China National Petroleum Corporation and China Petroleum and Chemical Corporation registered for exploration rights of approximately 65,000 m^2 of CBM blocks, comprising more than half of the total CBM blocks, while other SOEs such as China Petro-Chemical Corporation (SinoPec) registered for smaller shares (Lin, 2011).

Because licensure is awarded for many mines at the local level while CBM licensure is obtained from the top-level administration of the MLR, significant overlap occurs between coal and CBM licenses. By the end of 2007, 86 out of the total of 98 CBM mining licenses had the issue of overlapping licenses; thus, 86 CBM licenses overlapped with 1406 coal mining licenses, covering an area of 12,534 km^2. This has resulted in significant conflict, particularly in Jincheng, Shanxi Province where in 2003, SinoPec filed a complaint with the MLR against coal licensee Jincheng Coal Group as a result of Jincheng Coal Group subsidiary Qinshui Lanyan CBM Co. Ltd.'s methane recovery in the area. Complaints resulted in formation of a cross-ministry investigation team that concluded Jincheng Coal Group conducted "illegal gas drainage." Jincheng Coal Group argued that methane had to be dealt with as a safety concern for miners as well as Chapter 35 of the Coal Law of China, which stipulates that "the State encourages coal enterprises to …comprehensively utilize CBM, gangue, coal clay and slurry." The issue was not resolved and the State Council issued "Opinions on Speeding up CBM Extraction and Utilization" (State Council General Office [2006] No. 47), which stipulates that with new exploratory licenses, CBM and coal resources must be prospected, evaluated and their reserves must be determined. If the density of gas per ton in the coalbed surpasses that of the regulated standard and is suitable for development, a CBM and coal development plan must be composed and coal production activity is not allowed without a CMM drainage system (Lin, 2011; IEA, 2009). The policy also stated that coal mines must implement CMM measurement and monitoring activities.

Another investigation team determined that Jincheng Coal Group conducted "illegal gas drainage;" however, Jincheng was not penalized and the MLR issued notice that overlapping licenses are to be managed through negotiation as per April, 2007 "Notice on Strengthening Coal and CBM Comprehensive Prospecting and Mining Management" (MLR [2006]96) (Lin, 2011).

China's laws generally do not differentiate between CBM and CMM in legal terms; however, methane recovered through surface pre-mine drainage is generally considered CBM and methane recovered through underground capture is considered CMM. CMM was distinguished from CBM by the MLR in the aforementioned notice MLR [2006]96 which provide methods to address overlapping mining rights of coal and CBM/CMM:

> *Coal mining licensees should apply for a CBM license if they drain CBM by means of surface drainage within its mining area; but no CBM draining license is required for recovery of the underground gas (CMM).*
>
> *In cases of overlapping coal and CBM licenses, the coal and CBM licensees should negotiate a cooperation or production agreement based on the principle "CBM drainage first, coal mining second;" thus, conducting comprehensive prospecting and mining of coal and CBM. If both parties fail to reach an agreement, the MLR will conduct mediation. If both parties agree to mediation, one party will make compensations to the*

other for its investment in the resource. If mediation fails, the land and natural resources bureau will act in accordance with 'the principle of integrated gas drainage and coal mining, supporting the comprehensive prospecting and mining of CBM resources by the coal production enterprises in the project area.' (Lin, 2011)

CMM Policies

China's Ministry of Environmental Protection issued an Emission Standard of CBM/CMM in 2008 for new coal mines and drainage systems. The standard requires operators of CMM drainage systems with greater than 30 percent methane concentration to use or flare the gas. As of 2012, anecdotal evidence indicated this policy was creating a perverse incentive in some areas to maintain gas concentrations below 30 percent by dilution, ignoring best practices and safety standards (USEPA, 2012c).

The Chinese government's Eleventh Five Year Plan encouraged CBM/CMM development with targeted national output of 10 billion cubic meters by 2010. The plan included price management for CMM transported through city pipelines, gave priority to CMM-generated electricity on the grid with a subsidized price, and provided for financial subsidies for onsite, residential and chemical feedstock use (Franklin, 2010).

CBM and CMM are a significant component of natural gas development in the government's Twelfth Five-year Plan. The plan calls for CMM to be used primarily as a local fuel, with the number of residential users to approximately double to about 3.3 million households between 2010 and 2015, and power generation capacity to quadruple to 2850 MW as overall CMM utilization rises by about 5.5 billion cubic meters (USEPA, 2012c). The plan calls for total CMM output of 30 billion cubic meters by 2015 (Huang, 2012).

A number of other policies that are preferential towards CMM exist to encourage CMM recovery and utilization. The government provides a 0.2 yuan/cubic meter subsidy for CMM utilization and a 0.25 yuan/kWh subsidy for CBM/CMM-fueled power generation, which is the same subsidy offered for biomass power generation. Since 2007, the central government has awarded subsidies of 1.839 billion yuan to support CBM/CMM development, which accounted for 9.195 billion cubic meters (Huang, 2012).

Additionally, developers are exempt from the prospecting and licensing fee on CBM development, and no royalties are levied on CBM through 2020. Value added tax (VAT) collected from coal mines recovering and utilizing CBM/CMM is returned to the coal mining companies, and no income tax is paid by enterprises developing technologies for CMM recovery and utilization. Import-related taxes and VAT are also exempted for CMM exploration and development operations and equipment. Coal mine owners or developers investing capital in CMM projects through loans or self-equity financing can claim 40 percent of the capital value to offset income taxes (Huang, 2012; IEA, 2009).

These policies have the potential to encourage CMM project development; however, it is notable that in order to obtain the aforementioned subsidies and tax exemptions, a developer must request them at the appropriate level as well as follow up on a regular basis.

As a Non-Annex I party to the Kyoto Protocol, China previously dominated the CMM sector of the CDM, hosting all 79 registered CMM projects (UNFCCC, 2013). In July 2010, the special economic zone of Shenzen, the municipality Chongqing, cities Beijing, Shanghai, Tianjin, and provinces Guangdong and Hubei were named the sites of China's first low-carbon program by the National Development and Reform Commission. Foundation of the China Emissions Exchanged followed and the first pilot carbon trading program was launched in Shenzen June 2013 (China Daily, 2013).

Further Reading

The following links provide additional information:

China's Energy Markets: Anhui, Chongqing, Henan, Inner Mongolia, and Guizhou Provinces:
http://www.epa.gov/cmop/docs/2012ChinaEnergyMarket.pdf

Coal Mine Methane in China: A Budding Asset with the Potential to Bloom (International Energy Agency):
http://www.iea.org/publications/freepublications/publication/china_cmm_report.pdf

Financial and Regulatory Incentives for U.S. Coal Mine Methane Recovery Projects (page 15):
http://www.epa.gov/cmop/docs/cmm-financial-regulatory-incentives.pdf

China GMI Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch7.pdf

2.3. Mexico

Article 27 of Mexico's Constitution of 1917 provides that all natural resources, including hydrocarbons, are the property of the nation. The Mining Law regulates Article 27 and Article 4 of the Law lists "The mineral coal in all its varieties and the gas associated with the deposits of this one" as "minerals or substances, which constitute deposits in veins, strata, masses or beds, different from the components of land" (Mexico Mining Law, 2006). Petróleos Mexicanos (PEMEX), the state-owned petroleum company, has historically held exclusive authority over exploration, recovery, processing and sales of oil and gas including coalbed and coal mine methane. PEMEX is managed by a board of directors appointed by the Executive Branch of the Mexican Government that is mandated to seek "economic value creation for the benefit of Mexican society" as well as other objectives including enhancing the environment and energy security (APEC, 2012).

Following a methane-related explosion at the Pasta De Conchos Mine in February, 2006 Mexico's Congress and Senate amended the Mining Law, allowing for the recovery and use of CBM/CMM for on-site usage by coal mining concessionaires or for gas sales to PEMEX (Kelefant, 2011). Where formerly the regulatory law emanating from Article 27 of the Constitution meant that coal mines could not legally sell CMM or use it to generate heat or electricity on site, since exploration, production, processing and sales of all hydrocarbons were the exclusive province of PEMEX, the amendments to the law now allow coal mines to recover and use CBM and CMM from their operations for self-consumption or even their sale, though exclusively to PEMEX through a binding contract (Wallace, 2008). In 2011, the Ministry of Energy (SENER) submitted amendments to the law which add requirements for obtaining CBM permits. These amendments state that applications by mining concessionaires for a permit for CBM production must include a description of the scope of the project and the facilities for the extraction, measurement and use of the coalbed methane as well as a specification of the intended use of the methane (i.e., self-consumption, delivery to PEMEX or both). The amendments also provide that in the case of projects for gas to be delivered to PEMEX, the ministry may refuse to issue a permit on certain grounds - for example, where it considers that the project is not feasible or the project infrastructure is inadequate to comply with the technical and qualitative conditions required at the point of delivery (López-Velarde and Almaraz, 2011).

Incentives and Policies

Mexico is currently in the process of passing a bill that will levy a carbon tax on fossil fuel use. The carbon tax is meant to help Mexico meet its target of cutting greenhouse gas emissions 30 percent by 2020 and 50 percent by 2050. The bill would require companies to pay approximately $5 USD per metric ton of carbon dioxide they emit, or surrender an equivalent amount of Certified Emission Reductions (CERs) from CDM projects hosted in Mexico, beginning in 2014. CERs from CMM projects are planned to be used by the mining company Minerales Monclova to avoid the tax (Point Carbon, 2013).

Further Reading

The following links provide additional information:

Mexico GMI Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch21.pdf

2.4. Ukraine

The state typically owns coal mines and coal resources, but many successful mines are leased or are privatized (USEPA, 2010b). As of 2012, 155 mines were operating in Ukraine, 110 of which are state owned and 45 which are privately operated (Yashchenko, 2013). In Ukraine CMM falls into a mineral resource category owned and regulated at the national level, as it falls under the Code of Ukraine on Mineral Resources (USEPA, 2009c).

In early 2009, Ukraine's Parliament passed the first reading of the Law on Gas (Methane) from Coal Beds. In June 2009, Ukrainian President Viktor Yuschenko signed the law which provides that Ukraine's government can issue CMM leases with new coal mining leases to mine operators. Existing mines are required to obtain a permit for CMM exploration and production. It also allows coal mines to sell their rights to CMM, but does not require them to (USEPA, 2009b; Evans, 2009; Maciw et al, 2009). The law specifies that CMM owners can sell their gas into the natural gas transmission system when the gas meets system requirements and also includes a tax exemption for Ukrainian CMM projects (USEPA, 2009a). Starting in 2010 and continuing through January 2020, profits from the production and use of CMM earned by Ukrainian enterprises will no longer be subject to taxation. Additionally, the Ukrainian National Electricity Regulatory Commission (NERC) is authorized to set price limits for methane if its production is funded from the state budget.

Finally, and controversially, the Law on Gas from Coal Beds requires mines to limit CMM emissions according to norms and presents fines for non-compliance. This formerly raised concerns regarding CMM project additionality in carbon reduction schemes such as Joint Implementation (JI) prior to the decline in carbon prices (Emission Reduction Units[18]). JI had been instrumental to the development of Ukraine's large number of implemented CMM projects (Evans, 2009; Evans, 2010; Evans, 2013).

Ukraine has implemented several policies with a negative impact on CMM project potential. In 2012 Ukrainian parliament modified the tax code so that unconventional gas production, including CMM, is

[18] The Emission reduction unit (ERU) is an emissions unit issued under a Joint Implementation project in terms of the Kyoto Protocol. An ERU represents a reduction of greenhouse gases under the Joint Implementation mechanism, where it represents one tonne of CO2 equivalent reduced.

now subject to a production tax which makes CMM projects marginally economic. A number of draft bills are presently being circulated within parliament which may resolve this issue.

On September 25, 2008, Parliament passed the Green Tariff Law which went into effect April 22, 2009. The law provides incentives for electricity produced from alternative sources which was to include CMM; however, the present law excludes CMM-produced electricity. The law would have guaranteed access to the grid for CMM power facilities, as well as provided a feed-in tariff for CMM for 20 years that is about four times the average wholesale power price. Following passing of the Green Tariff Law, NERC issued regulations allowing companies to apply for licenses under the law, which the Zasyadko coal mine did prior to the present version of the law excluding CMM.

In an effort to harmonize Ukrainian policy with European renewable policy, Ukraine is considering legislation to eliminate the category of alternative energy with a move towards renewables only, which would limit tax benefits for CMM-related projects (USEPA, 2009a; Evans, 2010; CoMeth, 2012; Evans, 2013).

Further Reading

The following links provide additional information:

Developments in Ukraine and "Best Practices" for Regulatory Policies (Pacific Northwest National Laboratory):
https://www.globalmethane.org/expo-docs/india10/postexpo/coal_evans.pdf

Coal Mine Methane Activities in Ukraine (Pacific Northwest National Laboratory):
http://epa.gov/cmop/docs/cmm_conference_sept09/16evans.pdf

State Policy of Ukraine in Capturing and Utilizing Coal Mine Methane (Ukraine Ministry of Energy and Coal Industry of Ukraine):
http://www.unece.org/fileadmin/DAM/energy/se/pp/coal/cmm/8cmm_nov2013/7_Ukraine_e.pdf

Ukraine GMI Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch34.pdf

2.5. Australia

In Australia resources are administered by state and territory governments. State governments own all on-shore resources within their jurisdiction and lease these out to exploration and mining companies under mineral/coal and petroleum/gas exploration permits and mining leases. Arrangements vary between each state but essentially petroleum/gas lease holders have ownership of CBM except where coal mine operators extract methane as part of their coal mining operations (CMM). Various regulatory and procedural arrangements are in place to address overlapping petroleum and coal leases (Karas, 2006). CMM projects are primarily in Queensland and New South Wales (NSW) (GMI, 2013).

Queensland

In November 2002, the Queensland government released a new regulatory regime to address issues that arise where CBM and coal exploration and production activities may occur under different tenures

granted over the same area. To formalize the measures, a new Petroleum and Gas (Production and Safety) Act was passed in 2004 to replace the Petroleum Act of 1923. Subsequently, the Mineral Resources Act of 1989, which administers coal licenses, has been amended to clarify a number of issues including management of coal and gas resources. In Queensland, a mining lease for coal provides some rights to CMM; however, generally CMM production is administered under the Petroleum and Gas (Production and Safety) Act of 2004, and requires a production license which can co-exist with a mining lease covering the same area (GMI, 2011).

The Mineral Resources Act of 1989 provides that coal mine lease holders may extract, produce, release or dispose of CMM if it is: 1) a necessary result of coal mining, 2) necessary to ensure a safe mine working environment, or 3) necessary to minimize the fugitive emission of methane during the course of coal mining operations. The coal mining lessee may only use the gas for beneficial uses related to mining such as power generation for onsite use or for heating. The CMM may not be sold, processed, used to generate power for sales, or be transported outside of the area of the mining lease. If a coal mining lessee wishes to utilize CMM for a non-mining purpose such as sales, the coal mine lessee may apply for a petroleum lease under the Petroleum and Gas (Production and Safety) Act of 2004, provided that the mining area does not overlap with an existing petroleum lease (Qld Mineral Resources Act of 1989, Div 8, C18CM, C18CN). If the coal mine lease holder does not wish to use the CMM for its own use and the mining area does overlap with a petroleum lease, the mine may give the petroleum lease holder written notice that the CMM is available. The petroleum lease holder then has 20 business days to accept in writing. The term "give" connotes that no payment will be received. If the petroleum lease holder does not want the gas, the mining lease holder may then flare or vent it, provided the situation meets certain requirements.

The Mineral Resources Act places restrictions on flaring and venting of CMM. Flaring CMM is prohibited if it is commercially or technically feasible to use the CMM for the aforementioned beneficial mining purposes under the mining lease or feasible to use for another purpose under a petroleum lease that the miner might be able to obtain. Venting the CMM is authorized if it is not safe or technically practicable to use the gas for mining or to flare it. Venting CMM is also allowed if the CMM is being used under a greenhouse abatement scheme[19] and the direct or indirect benefit the mining lease holder would otherwise obtain because of the use of the gas under the scheme would be reduced (Qld Mineral Resources Act of 1989, Div 8, C18CO).

Despite the new regulatory regime of the Petroleum and Gas (Production and Safety) Act and the amendments to the Mineral Resources Act, Queensland is proposing to replace the State's five current Acts with the single Common Resources Act by 2016. The Act will include multiple resource-specific regulations and will envelop the Mineral Resources Act, the Petroleum and Gas Act, the Petroleum Act, the Greenhouse Gas Storage Act, and the Geothermal Energy Act (Smith and Cansdale, 2013).

New South Wales

The Mining Act of 1992 is the principal legislation governing mineral exploration in NSW. The Mining Act holds that a coal lessee may apply for inclusion of petroleum, or gas, in the mining lease. The application may be refused if the land is subject to a petroleum exploration license or a petroleum mining lease under NSW's petroleum legislation, the Petroleum (Onshore) Act 1991 (NSW Mining Act of

[19] Greenhouse abatement scheme means(a) the Electricity Supply Act 1995 (NSW), part 8A; or (b) the Commonwealth's Greenhouse Gas Abatement Program; or (c) another scheme about the abatement of greenhouse gases prescribed under a regulation.

1992, Part 5, Div 4, Section 78). The Mining Act stipulates that royalties are to be paid on the petroleum recovered by the holder of a coal mining lease who successfully applies for inclusion of petroleum in their mining lease (NSW Mining Act of 1992, Part 14, Div 3, Section 286). The now repealed Coal Mines Regulation Act 1982 formerly provided for the ability of the miner to extract methane from the coal seam for purposes associated with mining coal (Breaden and Alexander, 2002); however, the succeeding Coal Mine Health and Safety Act 2002 and Coal Mine Health and Safety Regulation 2006 are silent on this. Both the Mining Act 1992 and Petroleum (Onshore) Act 1991 specify that royalties payable on petroleum recovered from a coal mining lease do not apply to methane recovered in conjunction with coal mining operations, indicating that CMM is exempt from royalties in NSW while CBM is leased through the Petroleum Act and subject to royalty payments (NSW Petroleum (Onshore) Act 1991, Part 7, Section 85; NSW Mining Act of 1992, Part 14, Div 3, Section 286).

Incentives and Policies

Australia implemented the Greenhouse Gas Abatement Program (GGAP) in 2000 which provided $400 million over 4 years to assist Australia in meeting its commitment under the Kyoto Protocol. The GGAP provided grants up to $43.47 million AUD to support CMM power stations (Karas, 2010; Franklin, 2010).

Effective July 1, 2012 Australia implemented a carbon tax with the Clean Energy Act 2011. The scheme requires entities which emit over 25,000 tonnes per year of CO2e and which are not in the transport or agriculture sectors to surrender emissions permits. Initially the price of a permit for one metric ton of carbon was fixed at $23 AUD for the 2012–13 financial year, with unlimited permits being available from the Government. The fixed price has risen to $24.15 AUD for 2013-14. The government has announced a transition to a flexible price emissions trading scheme in 2014–15, where the available permits will be limited in line with a pollution cap (CER, 2013). Fugitive methane emissions from active coal mines are included in the cap.

In August 2012, the Australian Government and the European Commission announced their intention to link their emissions trading schemes. An interim one-way link is scheduled to start by July 1, 2015, under which Australian liable entities can surrender European Union allowances for compliance with their Australian carbon price liabilities. This will be followed by a full two-way link by July 1, 2018 (Australian Government, 2013).

Further Reading

The following links provide additional information:

Financial and Regulatory Incentives for U.S. Coal Mine Methane Recovery Projects (page 14):
http://www.epa.gov/cmop/docs/cmm-financial-regulatory-incentives.pdf

Australian Coal Sector Update at the 18th Session of the GMI Coal Subcommittee:
https://www.globalmethane.org/documents/4_Australia-%20Coal%20Subcommittee.pdf

Policies and Programs to Address Fugitive Emissions from Coal Mining in Australia (Australian Government, Department of Resources, Energy and Tourism):
https://www.globalmethane.org/expo-docs/canada13/coal_01_Murphy.pdf

GMI Australia Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch2.pdf

2.6. Canada

In Canada, surface rights and mineral rights came with the purchase of land until the early 1900s. Since then, mineral rights have been government-owned and cannot be purchased, only leased, by individuals or companies. As a result, the mineral rights on more than 90 percent of Canada's land are currently owned by governments (Crown-owned).

In Canada, as in Australia, resources are administered by provincial governments. There are no CMM projects in Canada yet; however, CBM activity has commenced in Alberta, British Columbia, and Nova Scotia and coal deposits containing gas exist in Saskatchewan as well. In all three active provinces, CBM is managed through petroleum leasing.

Alberta

In Alberta, all mineral and petroleum leases are administered through the Mines and Minerals Act (MMA) (Revised Statutes of Alberta 2000, Chapter M-17).

In 1991, the Alberta Energy Utilities Board and the Alberta Department of Energy published *IL-91-11*, a joint Information letter on CBM. IL 91-11 sets forth the position that CBM is a form of natural gas and that under the MMA natural gas and coal are treated as distinct substances and are leased separately. Natural gas may exist in a variety of reservoir rocks, including coal seams. In 2003, the Government of Alberta amended the MMA to specifically address CBM beneath government-owned lands (Crown lands). Section 67(1) added to the MMA states that a "coal lease grants the right to the coal that is the property of the Crown in the location in accordance with the terms and conditions of the lease but subject to subsection (2), does not grant any rights to natural gas, including CBM." Ownership issues between coal and natural gas interests persisted on privately-owned or "freehold" lands. The Government of Alberta passed Bill 26 into law on December 2, 2010. Bill 26 added section 10.1 to the MMA and states that CBM "is hereby declared to be and at all times to have been natural gas" (Salmon and Wong, 2011).

Section 67(2) does, however, stipulate that "The Minister, on the recommendation of the Alberta Energy Regulator that it is necessary to do so for safety or conservation reasons, may authorize the lessee of a coal lease to recover natural gas, including coalbed methane, contained in a coal seam in the location of the coal lease" (Revised Statutes of Alberta 2000, Chapter M-17, Section 67(2)).

British Columbia

In 2003, British Columbia enacted the Coalbed Gas Act, which stipulates that CBM is natural gas owned by the party who holds the natural gas rights (Woodside, 2011; BC Coalbed Gas Act, 2003). British Columbia's Ministry of Energy and Mines (MEM) has issued an information letter, *Titles 05-02: Managing Co-existing Coal and Petroleum and Natural Gas Rights*, which outlines the policy for reducing conflicts and managing development where coal and CBM leases (tenures) overlap. The policy states that the MEM will inform tenure holders of coexisting coal or CBM tenures, when issuing new tenures, in order to make tenure holders aware of potential conflicts and to enable them to plan for exploration and development. All exploration and development activity, even of privately-owned (freehold) minerals, requires regulatory approval from the MEM for coal and the Oil and Gas Commission (OGC) for CBM. Before applying for approvals for coal or oil and gas activities, Crown and freehold rights holders must make reasonable efforts to confirm if there are coexisting rights holders. Where coexisting coal or CBM rights exist, rights holders must make reasonable efforts to negotiate and develop compatible resource exploration, development and production programs between themselves. If the parties cannot

develop collaborative work programs or resolve conflicts, a three-member review panel from MEM and OGC will examine the issues and facts associated with the development of the resources and recommend a resolution to the appropriate decision maker which is the Director of the Project Assessment Branch of the OGC for CBM applications and the Chief Inspector of Mines of the MEM, for coal activity permits (BC MEM, 2005).

Nova Scotia

Nova Scotia administers coal leases under the authority of the Mineral Resources Act 1990. Petroleum, or oil, natural gas, and CBM or coal gas agreements are administered under the Petroleum Resources Act 1989.

Nova Scotia refers to "coal gas" as *methane occurring naturally in coal seams and associated strata and includes methane obtainable by methane extraction* in the Petroleum Resources Act 1989. In the case of existing leases in a given area, before entering into a coal gas agreement, the government will notify all holders of rights[20] in or adjacent to the area granted allowing them to make representations concerning the proposed coal gas agreement. The government may add to, vary or remove any terms or conditions of any petroleum, mineral or gas storage lease in order to coordinate and maximize public benefit from petroleum and mineral resource development (Nova Scotia Petroleum Resources Act. R.S., c. 342, s. 17).

With respect to coal mining, the Act forbids coal mine operators from disposing of any coal gas without the written approval of the government. The government may also attach terms to the approval such as conditions for conservation and utilization of gas (Nova Scotia Petroleum Resources Act. R.S., c. 342, s. 18).

Incentives and Policies

Under Alberta's Greenhouse Gas Reduction Program, Alberta requires facilities that emit more than 100,000 tonnes of greenhouse gases per year to reduce emissions intensity by 12 percent, as of July 1, 2007. These reductions may be achieved by making improvements to their operations, purchasing Alberta-based offset credits, contributing to the Climate Change and Emissions Management Fund, or by purchasing or using Emission Performance Credits (EPCs). EPCs are generated by facilities that have gone beyond the 12 percent mandatory intensity reduction. Payments made to the Climate Change and Emissions Management Fund will be invested in projects and technology to reduce greenhouse gas emissions in Alberta (Government of Alberta, 2013).

British Columbia passed the Carbon Tax Act in May 2008. The Act puts a price on greenhouse gas emissions, providing an incentive for sustainable choices that produce fewer emissions. British Columbia started to phase in the escalating revenue neutral carbon tax on July 1, 2008. When introduced in 2008, the tax was initially set at $10 CAD per tonne of carbon dioxide equivalent (CO2e). It was designed to rise by $5 per year thereafter until it reached $30 per tonne in 2012 where it is frozen for five years (Elgie and McClay, 2013). The tax is estimated to cover 70 percent of British Columbia's greenhouse gas emissions; however, the tax excludes fugitive emissions such as CMM emissions, stating that they "cannot currently be accurately measured."

[20] Rights granted pursuant to the Petroleum Act, the Mineral Resources Act (coal, for example) and/or the Gas Storage Exploration Act

Further Reading

The following links provide additional information:

Canada GMI Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch6.pdf

2.7. Germany

In Germany, according to the legal framework adopted at the federal level, the Federal Mining Authority is responsible for the administration of activity related to CMM exploration, extraction, and processing. CMM ownership rights are transferred to a coal mining company for the duration of a coal mining license, after which the capture and utilization of CMM requires a gas license for the subsequent 30 year period (USEPA, 2010b). The Federal Mining Authority considers an application for license after the applicant has submitted a utilization program which clearly demonstrates that "planned activities are sufficient and within an acceptable time frame for the type, scope and purpose of the methane extraction." A license can be refused or withdrawn if found to be inadequate with respect to legislatively fixed factors, including the availability of sufficient funds, feasibility of a proposed extraction technology within a given timeframe and public interests (World Bank, 2007).

Incentives and Policies

Germany's primary policy incentive for CMM recovery and use projects is through a feed-in tariff for CMM used to generate power under the Renewable Energy Sources Act of 2004 (RESA). The RESA requires electric grid system operators to connect plants generating electricity from mine gas to their systems and guarantee priority purchase and transmission of all electricity from such plants. RESA provides a guaranteed fixed payback tariff for 20 years through feed-in tariffs or fees paid for electricity produced from mine gas (USEPA, 2011).

Further Reading

The following links provide additional information:

Financial and Regulatory Incentives for U.S. Coal Mine Methane Recovery Projects (page 15):
http://www.epa.gov/cmop/docs/cmm-financial-regulatory-incentives.pdf

Renewables and Coal Mine Methane in German Legislation: Recommendations for Ukraine
https://www.globalmethane.org/documents/Backhaus_CMM-Utilisation_Germany_eng.pdf

Germany GMI Country Profile:
https://www.globalmethane.org/documents/toolsres_coal_overview_ch14.pdf

2.8. Summary of International CMM Ownership and Policies

Table 4: Summary of CMM Ownership and Policies in Key Countries

Country	CMM Ownership	CMM Policies/Incentives
United States	Predominantly federal in the West; Private in the East Historically not included with coal; however, IBLA decision has allowed a coal lessee to use CMM if desired	CMM emissions are not limited by regulations; however, reporting of greenhouse gases is required and permits are necessary in some instances; Projects can provide offsets under voluntary schemes as well as the state of California's mandatory greenhouse gas cap and trade program; CMM is included as an alternative energy source in numerous state portfolio standards
China	Federally owned Coal and CBM are licensed separately but may overlap; Surface pre-mine drainage requires CBM license (administered as oil and gas); Recovery of VAM, in-mine drained, gob drained CMM etc. does not require a CBM license	Required to use or flare drained CMM >30% CH4; 0.2 yuan/cubic meter subsidy for CMM utilization and a 0.25 yuan/kWh subsidy for CBM/CMM-fueled power generation; Exemptions for prospecting and licensing fees as well as VAT on equipment
Mexico	Federally owned Recovery and use of CBM/CMM for on-site usage by coal mining concessionaires or for gas sales to government-owned gas company is allowed	Carbon tax on fossil fuel use expected to be implemented starting in 2014. CERs from Mexico-hosted CDM projects (including CMM) may be used to avoid the tax.
Ukraine	Federally owned Government can issue CMM leases with new coal mining leases to mine operators; Existing mines are required to obtain a permit for CMM exploration and production; Mines may sell their rights to CMM	CMM project profits are not subject to taxation; Mines are required to limit CMM emissions; Recent tax code change made unconventional gas production, including CMM, subject to a production tax which makes CMM projects uneconomic
Australia	State owned Queensland: CMM utilization by mines is allowed on-site, off-site sales requires petroleum lease New South Wales: Coal lessee may apply for inclusion of petroleum, or gas, in the mining lease provided the area is not	 Queensland: Flaring CMM is prohibited if it is commercially or technically feasible to use the CMM New South Wales: Methane recovered in conjunction with coal mining is exempt from royalties (CBM leased through

Country	CMM Ownership	CMM Policies/Incentives
	already under a petroleum lease	Petroleum Act is subject to royalties) Carbon tax requires entities which emit over 25,000 tonnes per year of CO2e (transport or agriculture) to surrender emissions permits and includes fugitive emissions from coal mines
Canada	Mineral resources ~90% federally owned, administered provincially Alberta: Coal lessee may recover CMM with government approval, if necessary for safety or conservation reasons; otherwise, CMM/CBM treated as natural gas British Columbia: Coal and CBM tenures may overlap; government has outlined process for mitigating conflicts Nova Scotia: Coal and CBM rights may overlap; government will notify existing rights holders before issuing overlapping rights and may alter existing lease to maximize resource development	Alberta: Greenhouse Gas Reduction Program requires facilities emitting > 100,000 tonnes CO2e/ year to reduce emissions intensity by 12 percent, as of July 1, 2007 British Columbia: Carbon tax excludes CMM
Germany	Federally owned Government transfers CMM rights to coal company for duration of coal license with option for a gas license after coal mining ceases.	Feed-in tariff for CMM used to generate power under the Renewable Energy Sources Act of 2004

3. Options for New or Revised CMM Legislation or Regulations

The following sections discuss considerations and options for developing laws and policies that prevent ownership conflicts, mitigate perceived legal risks for project developers, and incentivize CMM utilization. These options are based on successful laws and policies in key CMM-producing countries.

3.1. Ownership Options

Ill-defined gas property rights, lack of clarity regarding the ownership of the CBM/CMM and permitting process in many developed countries serve as obstacles to the development of gas utilization projects (USEPA, 2009c). As the international case studies show, there are numerous opportunities for conflict to arise in the absence of clear CBM and CMM ownership rules, particularly where coal and gas rights overlap. As is shown by the situation in Jincheng, China conflicts may take years to resolve.

As CMM projects require coal mine cooperation and are often initiated by coal companies, giving coal mines first priority for CMM exploration and development activities as in Ukraine and Germany, provides the most straight forward ownership solution. A step further to encouraging CMM utilization is to solicit coal mining areas as potential CBM concessions should the coal mine decline to explore for and/or develop the resource after a given time period.

3.2. Policy Options

A number of policy options exist to encourage CMM recovery and utilization. Several financial policies such as royalty relief, feed-in tariffs, and tax incentives have been successful, while conflicting tax policies such as Ukraine's recent tax on unconventional gas make CMM projects uneconomic. Renewable portfolio standards that are expanded to alternative sources such as CMM are also effective in promoting CMM-based power.

An important consideration in developing policies is to ensure that safety regulations take precedence and that unsafe activities are discouraged. Policies requiring CMM capture and use, particularly over a given concentration, such as China's standard requiring operators of CMM drainage systems with greater than 30 percent methane concentration to use or flare the gas, may encourage operators to maintain gas concentrations below 30 percent by dilution, ignoring best practices and safety standards.

Financial Incentives

Royalties

In addition to safety regulations for issues such as mine air methane concentration, options exist to encourage safer CMM development practices. Pre-drainage is the only means of reducing gas flow directly from the worked seam, which can be important if the seam being extracted is the main gas emission source. Because the drainage is undertaken before mining, the collection systems are not likely to be disturbed by ground movement, and, if feasible, relatively high purities of gas can usually be extracted. Concentrations of 60 percent methane and higher should be achievable from pre-drainage methods, thus producing gas well out of the explosive range (UNECE, 2010). Incentives such as royalty relief for pre-drained gas could be administered to encourage this method of degasification over other methods. Royalty relief has been successful as an incentive in the US by encouraging pre-drainage of gas prior to surface mining in the PRB.

Feed-in Tariffs

Feed-in tariffs can promote CMM projects through higher prices for alternative electricity on the electricity market. Feed-in tariffs such as Ukraine's Green Tariff Law, if it included CMM, and China's subsidies for CMM utilization and CBM/CMM-fueled power generation provide grid access for CMM-based electricity and make CMM projects more economic.

Tax Incentives

Tax exemptions may provide an incentive to develop CMM projects. China provides exemption from VAT on CMM project equipment and Ukraine provides tax exemption for CMM project profits.

Renewable or Alternative Portfolio Standards

As countries, states, and provinces work towards meeting climate change goals, many have adopted renewable or alternative portfolio standards, requiring a certain portion of energy to come from renewable sources such as solar and wind. A number of these standards include alternative energy sources such as CMM. Considering CMM as an alternative energy source in future portfolio standards gives additional value to CMM projects for utilities.

Outreach and Education

Education and information dissemination play an important role in the development of CMM recovery and utilization projects. There are CMM clearinghouses and information centers in such countries as China, India, and Russia. In 1994, the Chinese government and the USEPA founded the first of these institutions, the China Coalbed Methane Clearinghouse, housed within the China Coal Information Institute. The Russian International Coal and Methane Research Center (Uglemetan) began operating in 2002 and the India CMM Clearinghouse in 2008. Polish institutions that play important roles in CMM dissemination practices include the Central Mining Institute of Katowice, AGH University of Science & Technology, and the Mineral & Energy Economy Research Institute of the Polish Academy of Sciences. Many organizations such as GMI, the International Energy Agency, and the United Nations Economic Commission for Europe (UNECE) as well as the USEPA have been actively participating in the development of CMM recovery dissemination practices through technical information sessions, development of documents and tools, and participation in international events (USEPA, 2009c). Events such as USEPA's annual US CMM Conference bring coal mines, project developers, government representatives, and technology providers together to foster ideas for further CMM project development.

References

APEC (2012): Permitting Issues Related to Carbon Capture and Storage for Coal-Based Power Plant Projects in Developing APEC Economies, Asia-Pacific Economic Cooperation Energy Working Group, September, 2012. http://www.egcfe.ewg.apec.org/projects/Issues%20Related%20to%20Carbon%20Capture%20and%20Storage%20for%20Coal-Based.pdf

ARB (2014): Air Resources Board approves amendments strengthening California's cap-and-trade regulation, adds new offset protocol, California Air Resources Board, April 25, 2014. http://www.arb.ca.gov/newsrel/newsrelease.php?id=602

Aspen Skiing Company (2012): Methane Energy Project, November 9, 2012. https://www.facebook.com/media/set/?set=a.10151247204932042.487276.106030702041&type=3

Australian Government (2013): Starting Emissions Trading on 1 July 2014 Policy Summary, July, 2013. http://www.climatechange.gov.au/sites/climatechange/files/files/reducing-carbon/carbon-pricing-policy/cef-policy-summary-moving-ets.PDF

Bassett et al (2009): U.S. Laws and Policies Regarding Capturing Methane Gas, Robert A. Bassett, James H. Holtkamp, Rebecca Ryon, Holland & Hart LLP, Presented at 2009 U.S. Coal Mine Methane Conference, September 30, 2009. http://www.epa.gov/cmop/docs/cmm_conference_sept09/02bassett_white_paper.pdf

BC Coalbed Gas Act (2003): Coalbed Gas Act [SBC 2003] Chapter 18. http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_03018_01

BC MEM (2005): Titles 05-02: Managing Co-existing Coal and Petroleum and Natural Gas Rights, British Columbia Ministry of Energy and Mines, April 8, 2005. http://www.empr.gov.bc.ca/TITLES/OGTITLES/INFOLETTERS/ISSUEDATE/Pages/TITLES-05-02.aspx

BHP (2012): San Juan Mine Title V Application Package – 20.2.70.200.A NMAC. June 29, 2012. Available from New Mexico Environment Department, Air Quality Bureau. http://www.nmenv.state.nm.us/aqb/permit/documents/App_SJCoal_with_Rev_P260_30Jan14.pdf

BLM (2001): Results of Competitive Oil and Gas Lease Sale Held by the Colorado State Office, Bureau of Land Management, August 9, 2011. http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2000-2004/sale_results.Par.70841.File.dat/August%202001.pdf

BLM (2003): Policy and Guidance on Conflicts between Coalbed Natural Gas (CBNG) and Surface Coal Mine Development in the Powder River Basin, Bureau of Land Management, August 21, 2003. http://www.blm.gov/wy/st/en/programs/energy/CAZ/im2003-253.print.html

BLM (2006): Policy and Guidance on Conflicts between Coalbed Natural Gas (CBNG) and Surface Coal Mine Development in the Powder River Basin, Bureau of Land Management, May 18, 2006. http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2006/im_2006-153__.html

BLM (2010): Record of Decision and Approved Kemmerer Resource Management Plan, Bureau of Land Management, May 2010. http://www.wyomingoutdoorcouncil.org/html/what_we_do/public_lands/pdfs/armp_rod.pdf

BLM (2011): Trona, Kemmerer Wyoming Field Office, Bureau of Land Management, February 7, 2011. http://www.blm.gov/wy/st/en/field_offices/Kemmerer/trona.html

BLM (2012): Preliminary Environmental Assessment, August Oil and Gas Lease Sale, Bureau of Land Management, March, 2012. Attachment F. http://www.blm.gov/pgdata/etc/medialib/blm/co/information/nepa/uncompahgre_field/12-09_august_og_lease.Par.0849.File.dat/12-09%20AUG%20Lease%20Sale%20EA%20Draft%20EA%2007Mar2012.pdf

BLM (2014): BLM to Examine Steps to Reduce Methane From Mining Operations on Public Lands, Bureau of Land Management, April 24, 2014. http://www.blm.gov/ut/st/en/info/newsroom/2014/april/blm_to_examine_steps.html

Breaden and Alexander (2002): Project finance for coal seam methane developments – An Australian bank perspective, Phil Breaden and John Alexander, Westpac Institutional Bank, Presented at The Australian Coal Seam and Mine Methane Conference June 25-26, 2002. http://www.hpconsult.com.au/DLoad/CSM%20Conference%202002.pdf

CER (2013): About the carbon pricing mechanism, Australia Government Clean Energy Regulator, January 15, 2013. http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/Pages/default.aspx

China Daily (2013): Carbon market helps cut emissions, China Daily, Vol. 33, No. 10367, July 29, 2013.

COGCC (2002): Hawksnest Federal 13-90 #1-2, API # 05-051-06050, Surface Location Data, Colorado Oil and Gas Conservation Commission. http://oil-gas.state.co.us/cogis/FacilityDetail.asp?facid=05106050&type=WELL

COGCC (2011): Oxbow Mining LLC #1, API # 05-051-06111, Unit Configuration Map, Colorado Oil and Gas Conservation Commission. http://ogccweblink.state.co.us/DownloadDocument.aspx?DocumentId=2933991

CoMeth (2012): Ukraine Energy Laws, Legal Aspects for CMM Projects, "Coal Mine Methane - New Solutions for Use of CMM - Reduction of GHG emissions (CoMeth) Wiki, June, 2012. http://wiki.umsicht.fraunhofer.de/cometh-wiki/images/4/4c/Ukraine_energy_laws.pdf

DSIRE (2012): West Virginia Incentives/Policies for Renewables & Efficiency, Alternative and Renewable Energy Portfolio Standard, Database of State Incentives for Renewables and Efficiency, November 29, 2012. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WV05R&re=0&ee=0

Elgie and McClay (2013): BC's Carbon Tax Shift After Five Years: Results, Dr. Steward Elgie and Jessica McClay, University of Ottawa, July 2013. http://www.sustainableprosperity.ca/dl1026&display

Evans (2009): Coal Mine Methane Activities in Ukraine, Meredydd Evans, Presented at 2009 U.S. Coal Mine Methane Conference, October 1, 2009. http://www.epa.gov/cmop/docs/cmm_conference_sept09/16evans.pdf

Evans (2010): Developments in Ukraine and "Best Practices" for Regulatory Policies, Meredydd Evans, Presented at Methane to Markets Expo, New Delhi, India, March 3, 2010. https://www.globalmethane.org/expo-docs/india10/postexpo/coal_evans.pdf

Evans (2013): Personal communication with Meredydd Evans. August, 2013.

Evans and Roshchanka (2013): Energizing the Electricity Market for Methane, Meredydd Evans and Volha Roshchanka, Pacific Northwest National Laboratory (PNNL), Presented at GMI Expo Coal Subcommittee Meeting, March 2013. http://www.globalmethane.org/expo-docs/canada13/coal_11_Evans_Presentation.pdf

Franklin (2010): Global Overview of Policies Affecting Coal Mine Methane (CMM) Recovery and Utilization, Presented by Pamela Franklin, Methane to Markets Partnership – Mongolia CMM Project Development Workshop, Ulaanbaatar, Mongolia, August 30-31, 2010. http://www.globalmethane.org/documents/events_coal_20100830_franklin.pdf

Gearino (2004): Proposal would suspend oil, gas drilling in trona area, Jeff Gearino, Casper Star Tribune, April 16, 2004. http://trib.com/news/state-and-regional/proposal-would-suspend-oil-gas-drilling-in-trona-area/article_2e434ef0-888a-5f88-ac50-4c18e0048542.html

Gorte et al (2012): Federal Land Ownership: Overview and Data, Ross Gorte, Carol Hardy Vincent, Laura A. Hanson, Marc R. Rosenblum, Congressional Research Service, February 8, 2012. http://www.fas.org/sgp/crs/misc/R42346.pdf

Government of Alberta (2013): Greenhouse Gas Reduction Program, 2013. http://environment.alberta.ca/01838.html

GMI (2011): Australian Coal Action Plan, Global Methane Initiative, 2011. https://www.globalmethane.org/documents/coal_cap_australia.pdf

GMI (2013): Global Methane International Coal Mine Methane Projects Database. Accessed July, 2013. http://www2.ergweb.com/cmm/index.aspx

Haderlie (2010): CASE NOTE ENERGY LAW—Finding the Appropriate Authority for Federal Coal Mine Methane Leasing; Vessels Coal Gas, Inc., 175 I.B.L.A. 8 (2008), Nicholas T. Haderlie, University of Wyoming College of Law, Wyoming Law Review Volume 10, No. 2, 2010. http://www.uwyo.edu/law/wyoming-law-review/archives.html

Huang (2012): Preferential Policy and International Action of CBM/CMM Development in China, Huang Shengchu, China Coal Information Institute, presented at the Coal Mine Methane Abatement Seminar, Australia, September 4-5, 2012. https://www.globalmethane.org/documents/events_coal_120904_qinggang.pdf

IEA (2009): Coal Mine Methane in China: A Budding Asset with the Potential to Bloom, International Energy Agency, February, 2009. http://www.iea.org/publications/freepublications/publication/china_cmm_report.pdf

Karas (2006): Information received from John Karas, Manager, Coal Industry Section, Australia Department of Industry, Tourism, and Resources, 2006

Karas (2010): Australia's Experience and its Impact on Coal Mine Methane Project Development, John Karas, Presented at the Methane to Markets Partnership Expo New Delhi, India March 2-5, 2010. https://www.globalmethane.org/expo-docs/india10/postexpo/coal_karas.pdf

Kelefant (2011): Outlook for CMM in Mexico and Colombia, presented by John Kelefant, Advanced Resources International and the 2011 U.S. CMM Conference, Park City, UT, October 19-20, 2011. http://www.epa.gov/cmop/docs/cmm_conference_oct11/Kelafant.pdf

KOGAS (2010): Global KOGAS Newsletter 2010. Korean Gas. Vol 4 No 3. August 25, 2010. http://www.kogas.or.kr/kogas_eng/down/news_201008.pdf

Lin (2011): China's Evolving Energy Governance: A Case Study of Mining Rights Disputes, Energy Governance Case Study #14, Lin Yanmei, Centre on Asia and Globalization, Lee Kuan Yew School of Public Policy, National University of Singapore, December 2011. http://www.spp.nus.edu.sg/docs/energy-case/%2314-China.pdf

López-Velarde and Almaraz (2011): New regulations for coal-bed methane permits, Rogelio López-Velarde and Ruben Almaraz, International Law Office, June 27, 2011. http://www.internationallawoffice.com/newsletters/detail.aspx?g=191e141d-cdfd-4583-8181-54723feec18f

Maciw et al (2009): Ukraine: New Regime For Coalbed Methane, Christina Maciw, Tetyana Budyakova, Vitaliy Radchenko and Inna Saakova, June 15, 2009. http://www.mondaq.com/x/81176/Oil+Gas+Electricity/New+Regime+For+Coalbed+Methane

Martin (2011): Bureau of Land Management Waste Mine Methane Reduction Program Summary and Status, Presented by Frank Martin at the 2011 U.S. Coal Mine Methane Conference, October 18, 2011. http://www.epa.gov/cmop/conf/index.html

Mexico Mining Law 2006. http://www.economia.gob.mx/files/comunidad_negocios/industria_comercio/ley_minera_mining_law.pdf

NMENV (2013): Public Notice for Air Quality Operating Permit for San Juan Mine of BHP Billiton - San Juan Coal Company. New Mexico Environment Department, Air Quality Bureau. November 26, 2013. http://www.nmenv.state.nm.us/aqb/permit/documents/Public_Notice_BHP_San_Juan_Coal_Mine_

P260_26Nov13.pdf
Nova Scotia Petroleum Resources Act. R.S., c. 342.
http://nslegislature.ca/legc/statutes/petrol.htm
NSW Petroleum (Onshore) Act 1991.
http://www.legislation.nsw.gov.au/maintop/view/inforce/act+84+1991+cd+0+N
NSW Mining Act of 1992.
http://www.legislation.nsw.gov.au/maintop/view/inforce/act+29+1992+cd+0+N
Ohio PUC. Ohio's Renewable and Advanced Energy Portfolio Standard.
http://www.puco.ohio.gov/puco/index.cfm/industry-information/industry-topics/ohioe28099s-renewable-and-advanced-energy-portfolio-standard/
Ohio Revised Code, Title 49, Chapter 4928. 4928.01 Competitive retail electric service definitions.
http://codes.ohio.gov/orc/4928.01
Perciasepe (2013): EPA Denial of EarthJustice Petition. April 30, 2013.
http://www.eenews.net/assets/2013/05/01/document_gw_02.pdf
Point Carbon (2013): Mexican Senate agrees to allow firms to pay CO2 tax with offsets. Carbon Market North America. Volume 08 Issue 41. November 1, 2013.
PUC (nd): AEPS Fact Sheet. Pennsylvania Public Utilities Commission.
http://www.puc.state.pa.us/general/consumer_ed/pdf/AEPS_Fact_Sheet.pdf
Qld Mineral Resources Act of 1989.
https://www.legislation.qld.gov.au/LEGISLTN/CURRENT/M/MineralReA89.pdf
Quiñones (2013): New EPA permitting system moves forward haltingly for coal mines. Manuel Quiñones, E&E Publishing. December 5, 2013. http://www.eenews.net/stories/1059991363
Refsdal and Dean (2012): Solvay Chemicals Trona Gob Vent Gas Project, Presented by Larry Refsdal and Daniel Dean, Solvay Chemicals, at the 2012 U.S. Coal Mine Methane Conference, September 24, 2012. http://epa.gov/cmop/docs/cmm_conference_sep12/07_Refsdal.pdf
Revised Statutes of Alberta 2000, Chapter M-17.
http://www.qp.alberta.ca/1266.cfm?page=m17.cfm&leg_type=Acts&isbncln=9780779755608&display=html
Salmon and Wong (2011): EnCana Corporation v. ARC Resources Ltd.: ownership of CBM within freehold Alberta lands, Karen A. Salmon and Adrienne Wong, Borden Ladner Gervais LLP, July 19, 2011.
http://www.lexology.com/library/detail.aspx?g=bf0567eb-4c60-4e8d-b7a2-db3c080c5a25
SEC (2005): Storm Cat Energy Form 6-K Report of Foreign Issuer Pursuant to Rule 13a-16 and 15d-16 Under the Securities Exchange Act of 1934. United States Securities and Exchange Commission. July 2005.
http://www.sec.gov/Archives/edgar/data/1178818/000121716005000124/stormcat6kforjuly2005.htm
Smith and Cansdale (2013): Australia: Major reforms to Queensland's resources legislation proposed, Andrew Smith and Ben Cansdale, Clayton Utz, February 5, 2013.
http://www.mondaq.com/australia/x/219362/Oil+Gas+Electricity/Major+reforms+to+Queenslands+resources+legislation+proposed
Suñé (2006): Information received from Dr. Francisco Querol Suñé, Director General de Promoción Minera, Coordinación General de Minería, Secretaría de Economía, 2006.
Taylor (2013): Tony Abbott insists carbon tax will end on 1 July – even if Senate blocks repeal. Lenore Taylor, theguardian, October 15, 2013.
http://www.theguardian.com/environment/2013/oct/15/tony-abbott-insists-carbon-tax-will-end-on-1-july-even-if-senate-blocks-repeal
Taylor and Dyer (2006): Methane Leasing on Federal Lands, Ryan Taylor of USFS and Desty Dyer of BLM,

Presented at Second Western States Coal Mine Methane Recovery and Use Workshop 26 – 27 September, 2006. http://www.epa.gov/cmop/conf/index.html

UNECE (2010): Best Practice Guidance for Effective Methane Drainage and Use in Coal Mines. ECE ENERGY SERIES No.31. United Nations Economic Commission for Europe and Methane to Markets. New York and Geneva. February, 2010. http://www.unece.org/fileadmin/DAM/energy/se/pdfs/cmm/pub/BestPractGuide_MethDrain_es31.pdf

USEPA (2009a): Ukraine makes progress on CMM legislation and green electricity tariff, CBM Extra May 2009, pp.1–3. U.S. Environmental Protection Agency, Coalbed Methane Outreach Program. http://www.epa.gov/cmop/docs/spring_2009.pdf

USEPA (2009b): Ukraine passes coal mine methane legislation, CBM Extra September 2009, p.8. U.S. Environmental Protection Agency, Coalbed Methane Outreach Program. http://www.epa.gov/cmop/docs/september_2009.pdf

USEPA (2009c): Analysis of International Best Practices for Coal Mine Methane Recovery and Utilization, U.S. Environmental Protection Agency, January, 2009. http://www.epa.gov/cmop/docs/analysis_best_practices.pdf

USEPA (2010a): Clean Air Act Permitting for Greenhouse Gas Emissions – Final Rules Fact Sheet. December 23, 2010. http://www.epa.gov/NSR/ghgdocs/20101223factsheet.pdf

USEPA (2010b): Coal Mine Methane Country Profiles, United States Environmental Protection Agency, December, 2010. https:/www.globalmethane.org/tools-resources/coal_overview.aspx

USEPA (2011): Financial and Regulatory Incentives for U.S. Coal Mine Methane Recovery Projects, United States Environmental Protection Agency, August, 2011. http://www.epa.gov/cmop/docs/cmm-financial-regulatory-incentives.pdf

USEPA (2012a): Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030, United States Environmental Protection Agency, December, 2012. http://www.epa.gov/climatechange/EPAactivities/economics/nonco2projections.html

USEPA (2012b): Opening Statement of Regina McCarthy, Assistant Administrator for Air and Radiation, US Environment, Hearing on EPA Regulation of Greenhouse Gases Subcommittee on Energy and Power Committee on Energy and Commerce, U.S. House of Representatives. June 29, 2012. http://www.epa.gov/ocir/hearings/pdf/2012_GHG_testimony_final.pdf

USEPA (2012c): China Energy Markets: Anhui, Chongqing, Henan, Inner Mongolia, and Guizhou Provinces, United States Environmental Protection Agency, December 2012. http://www.epa.gov/cmop/docs/ChinaEnergyMarketsUpdate-Dec2012.pdf

USEPA (2013a): Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act. November, 2013. http://www.epa.gov/climatechange/endangerment/

USEPA (2013b): Regulatory Initiatives. United States Environmental Protection Agency. September, 2013. http://www.epa.gov/climatechange/EPAactivities/regulatory-initiatives.html

USEPA (2013c): Prevention of Significant Deterioration (PSD) Basic Information. December 11, 2013. http://www.epa.gov/NSR/psd.html

USEPA (2013d): Counting GHG Fugitive Emissions in Permitting Applicability. Office of Air Quality Planning and Standards. December 19, 2013. http://www.epa.gov/Region7/air/nsr/nsrmemos/ghgfeqa.pdf

USEPA (2014a): Learn About Carbon Pollution from Power Plants. United States Environmental Protection Agency. January 27, 2014. http://www2.epa.gov/carbon-pollution-standards/learn-about-carbon-pollution-power-plants#CAP

USEPA (2014b): Carbon Pollution Standards: What EPA is Doing. March 16, 2014. http://www2.epa.gov/carbon-pollution-standards/what-epa-doing

Utah State Legislature (2010): H.B. 19 Renewable Energy - Methane Gas -- Watkins, C.

http://le.utah.gov/~2010/htmdoc/hbillhtm/hb0192.htm
Utech (2014): A Strategy to Cut Methane Emissions. Dan Utech, Special Assistant to the President for Energy and Climate Change. March 28, 2014. http://www.whitehouse.gov/blog/2014/03/28/strategy-cut-methane-emissions
Wallace (2009): Coal in Mexico, Robert-Bruce Wallace, Informa Economía de la Universidad Nacional Autónoma de México, Issue 359, July-August, 2009. English. http://www.economia.unam.mx/publicaciones/econinforma/pdfs/359/brucelish.pdf
Waxman and Whitehouse (2013): Rep. Waxman and Sen. Whitehouse Urge EPA to Reconsider Decision Not to Regulate Methane Emissions from Coal Mines. May 7, 2013. http://democrats.energycommerce.house.gov/index.php?q=news/rep-waxman-and-sen-whitehouse-urge-ep a-to-reconsider-decision-not-to-regulate-methane-emissions
Webb (2010): Methane: A useful problem, Dennis Webb, Grand Junction Daily Sentinel, March 14, 2010. http://www.rmcstores.com/FOC_031410_06A_N.pdf
White House (2014): FACT SHEET: Opportunity For All: Improving the Fuel Efficiency of American Trucks – Bolstering Energy Security, Cutting Carbon Pollution, Saving Money and Supporting Manufacturing Innovation, White House, February 18, 2014. http://www.whitehouse.gov/the-press-office/2014/02/18/fact-sheet-opportunity-all-improving-fuel-efficiency-american-trucks-bol
Woodside (2011): No need for a canary, Alberta defines coalbed methane! David M. Woodside, Miller Thompson LLP, February 16, 2011. http://www.lexology.com/library/detail.aspx?g=8354cf3d-cfae-4db8-861c-d83ee3b93a9d
World Bank (2007): A Strategy for Coalbed Methane (CBM) and Coal Mine Methane (CMM) Development and Utilization in China, Energy Sector Management Assistance Program, 2007, Formal Report 326/07, World Bank, Washington, DC.
WV Legislature (2009): H.B. 408, §24-2F-3, §24-2F-4, §24-2F-5 and §24- 2F-9 of the Code of West Virginia, Passed November 20, 2009. http://www.legis.state.wv.us/Bill_Status/bills_text.cfm?billdoc=hb408%20ENR.htm&yr=2009&sesstype=4X&i=408
Yashchenko (2013): Status of Coal Mine Methane Degasification and Utilization in Ukraine, Igor Yashchenko, Presented at the Methane Expo 2013, Vancouver Canada, March 12-15, 2013. https://www.globalmethane.org/expo-docs/canada13/coal_09%20Ukraine.pdf

Annex 1: BLM Instruction Memorandum on Conflict Administration Zones

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
May 11, 2006

In Reply Refer To:
3100 (310) P
EMS TRANSMISSION 05/18/2006
Instruction Memorandum No. 2006-153
Expires: 09/30/2007
To: State Directors, Wyoming and Montana

From: Director

Subject: Policy and Guidance on Conflicts between Coalbed Natural Gas (CBNG) and Surface Coal Mine Development in the Powder River Basin

Program Area: Coalbed natural gas development and surface coal mining Powder River Basin

Purpose: Provide direction concerning development conflicts between surface coal mining and CBNG operations on federal leases in the Powder River Basin and to clarify the actions the Bureau of Land Management (BLM) can and will take, if necessary.

Policy / Action: The BLM will seek to achieve the following goals in resolving development conflicts between CBNG and surface coal mining on federal coal and federal oil and gas leases. This policy supersedes all other directives on this subject.

- Optimize the recovery of both resources in an endeavor to secure the maximum return to the public in revenue and energy production.
- Prevent avoidable waste of the public's resources utilizing authority under existing statutes, regulations and lease terms.
- Honor the rights of each lessee, subject to the terms of the lease and sound principles of resource conservation.
- Protect public health and safety, and mitigate environmental impacts.

It is the policy of the BLM to encourage oil and gas and coal companies to resolve conflicts between themselves and when requested, the BLM will assist in facilitating agreements between the companies. The BLM will also exercise authority provided in the leases, applicable statutes, and regulations to manage federal mineral development in the public's best interest.

Conflict Resolution or Cooperative Development Agreements: The policy set forth in this memorandum requires, if requested by the lessees, the Authorized Officer (AO) to review and/or approve conflict resolution or cooperative development agreements between oil and gas and coal lessees. The BLM will advise, review and/or approve such an agreement only after reviewing all terms and conditions of the agreement to ensure that the provisions are consistent with this policy, applicable regulations, and statutes. The BLM's approval provides assurances to the parties that the agreement is consistent with lease obligations, regulations, statutes, requirements of conservation of the resources, and the provisions of this policy. The BLM's approval of the agreement reduces the risk of delays, disapproval of permits, or the issuance of operating orders inconsistent with actions required under the agreement.

Conflict Administration Zone: The BLM will establish a Conflict Administration Zone (CAZ) around each active coal mine or Lease-By-Application (LBA) area that has a potential for conflict with CBNG development; in order to provide timely notice to the coal and CBNG lessees or operators. This will

provide more certainty to both oil and gas and coal lessees or operators as to the need for the prevention and resolution of such conflict.

A. The BLM will establish an expected 10-year mine-out zone around each surface mine where CBNG development is already underway or is anticipated. The zone will be used to designate a CAZ.
B. The BLM may include within a CAZ all or part of an approved LBA. The purpose is to anticipate and mitigate, if not prevent, future conflicts on coal tracts that may be leased.
C. Each CAZ must be reviewed annually to adjust its boundary.

Once the CAZ is identified, the CBNG lessees or operators will be notified immediately that their oil and gas lease is within the CAZ. Specifically, the oil and gas lessee or operator will be notified of near-future mining activities, BLM's authority to require the proper and timely development of leased resources, the prevention of waste and proper abandonment of wells, and the potential availability of incentives such as a royalty rate reduction to encourage development. Upon establishment of a CAZ around a coal mine, lease modification, or LBA tract, the BLM will review the status of all oil and gas leases within the CAZ for CBNG development and take the following actions:

A. For each oil and gas lease that is producing CBNG, the Authorized Officer (AO) will send a letter of notification to the lessee and operator that the lease is within the CAZ.
B. For leases that are not producing CBNG or for leases that are not being diligently developed for CBNG, the AO will, in the letter of notification, request to either immediately drill and produce all previously approved Applications For Permit to Drill (APDs), immediately submit APDs for approval, or show cause why the lessee or operator should not be required to produce the CBNG in such a manner that will maximize recovery of the federal natural gas prior to the removal of the coal. The letter of notification should also require the lessee or operator to provide in writing a response to the AO within a designated timeframe.
C. Lessees or operators who reply that it is uneconomical to drill one or more CBNG wells on the lease and, therefore, do not intend to develop the CBNG resources must supply satisfactory proof supporting their assertion to the AO. This proof must factor in a royalty rate reduction of 50 percent.
D. Lessees or operators who do not respond within the requisite timeframe or cannot demonstrate that drilling CBNG wells is uneconomical will be ordered to drill wells, consistent with good economic operating practices, pursuant to 43 CFR 3162.2-1(b) and provisions of the lease requiring prevention of waste. Lessees or operators who fail to comply with the order to drill wells are subject to the full range of sanctions for noncompliance with an order of the AO.

Prompt compliance will accelerate the recovery of the cost of drilling and operating a well and help to maximize the return to the lessee. All APDs submitted within a CAZ will be given a high priority for processing. This will allow extraction of as much of the CBNG resource as possible before a conflict with the advancing mine.

Incentive to Accelerate Natural Gas Production: To avoid the bypass of federal coal resources or to avoid waste of or to conserve the CBNG resources, the BLM may offer a royalty rate reduction to oil and gas lessees. This incentive is to encourage CBNG operators to drill wells and extract as much CBNG as possible in the time available to allow uninterrupted coal mining operations. This conflict policy does not apply to oil and gas wells which produce from zones deeper than those coal seams being mined.

To qualify for a royalty rate reduction the oil and gas lessee must agree to expedite CBNG production in a manner that will maximize the recovery of the resource before required abandonment, and to cease operations and abandon wells and facilities at BLM's request prior to the arrival of mining operations in the area of the wells. The BLM will notify the oil and gas operator at least 180 days prior to the date when the well should be abandoned. Any royalty rate reduction offered pursuant to this policy will be in the interest of optimizing both the coal and CBNG recovery. Those oil and gas lessees who agree to these conditions will be afforded the following:

A. Any CBNG well located on a federal oil and gas lease and that is within a CAZ, including existing wells, will be eligible for a 50 percent royalty rate reduction on CBNG production for the remaining life of the well. The BLM has determined that in absence of such royalty reductions, recoverable CBNG within the CAZ is likely not to be produced and further that such reductions are necessary to maximize the recovery of valuable coal deposits.
B. To receive such a reduction the applicant must:
    1. Submit a plan acceptable to BLM for maximum efficient production of CBNG during the period preceding the anticipated commencement of coal mining operations; and
    2. Agree that, upon the order of the AO, it will cease operations to enable the commencement of coal mining operations, and take such measures to plug well bores, reclaim production pads, and remove production equipment as may be directed by the AO.

Interim Abandonment/Reclamation: Abandonment and reclamation of wells, production pads and related ancillary facilities must be approved by the AO in coordination with the coal lessee. In most cases, permanent reclamation of the well sites, access roads, pipeline rights of way, etc. may not be required, but only stabilized sufficiently to prevent erosion or other negative environmental impacts.

Existing Royalty Relief: Nothing herein is intended to limit the availability of royalty reductions to either the oil and gas or coal lessees under other circumstances that would qualify for such relief under existing regulations and guidance.

1. Coal Royalty Rate Reduction: Requests for royalty relief from coal lessees, as a result of costs associated with resolution of CBNG and surface coal mine development conflicts, will be handled on a case-by-case basis consistent with current guidance addressing the unsuccessful operations or expanded recovery/extension of mine life: financial test categories in BLM Manual 3485.
2. Oil and Gas Royalty Rate Reduction: Regulations and guidance for royalty relief for oil and gas under existing regulations can be found in 43 CFR 3103.4 and 43 CFR 3103.4-1.

Background: As development of CBNG accelerates inherent conflicts with nearby surface coal mining will continue to exist. In a majority of cases in the Basin, the oil and gas leases were issued first with a reservation of the right to the government "to dispose of any resource in such lands which will not unreasonably interfere with operations under this lease." In such cases, the coal leases were issued subject to the condition that coal mining not unreasonably interfere with operations under a preexisting oil and gas lease. The BLM issued an Instruction Memorandum (IM) 2000-081, February 22, 2000, to help BLM offices to manage this issue, however, concerns with potential and actual conflicts continue. It is important that all lessees and operators are made aware that BLM has statutory and regulatory authority over all phases of federal oil and gas production and over Maximum Economic Recovery on federal coal production, and that the BLM will exercise and enforce these authorities, up to and including lease cancellation, should lease terms and regulations not be met. The BLM's actions will maintain the overriding goal of conserving the resource and maximizing the return to the public in both revenue and energy production, and protecting public health and safety while mitigating environmental impacts. This policy may be considered for other coal basins in the future. Conflicts with underground coal mines may also be considered in the future.

Timeframe: This Instruction Memorandum is effective immediately.

Budget Impact: Some redirection of BLM field office personnel may be required which might impact existing workload priorities.

Manual/Handbook Sections Affected: None.

Coordination: This was coordinated with the Wyoming and Montana BLM State Offices: the BLM Washington Offices of Fluid Minerals, Solid Minerals, and the Department of the Interior Office of the Solicitor.

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