Notes & Comments

Coal Barons and Ski Bums: An Unlikely Alliance? Exploring Potential Solutions to Waste Mine Methane

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I. INTRODUCTION

Coal is a necessary part of the twenty-first century global economy. Approximately thirty-six percent of all globally generated power is reliant on coal as a primary fuel source.[1] Cheap and relatively easy to extract and export, coal is the fuel of choice for many developing economies[2] and will continue to be for the foreseeable future.[3] In response to this demand, coal extraction operations will continue to produce coal for the global marketplace.[4]

Found deep within the earth, coal extraction has historically been a dangerous operation[5] in part because all coal seams contain high amounts of methane, a highly explosive and flammable natural gas.[6] Modern mine regulation and safety laws in the United States have evolved over the last 100 years to respond to the dangers that coal bed methane poses to mining operations.[7] Current regulations under the Mine Safety Health Act of 1977 ("Mine Act") require methane to be vented from all active and sealed coal mines to prevent buildup and explosions.[8]

With a few notable exceptions,[9] waste mine methane ("WMM") in the United States is generally vented from all coal mines directly into the atmosphere.[10] Methane is a far more potent greenhouse gas than carbon dioxide[11] and is a major contributor to global climate change.[12] As such, reducing all methane emissions, including WMM, is a target of President Obama's Climate Action Plan.[13] In response to Executive Order 13514,[14]

1. THE INTERNATIONAL ATOMIC ENERGY AGENCY COAL INDUSTRY ADVISORY BOARD, THE IMPACT OF GLOBAL COAL SUPPLY ON WORLDWIDE ELECTRICITY PRICES: OVERVIEW AND COMPARISON BETWEEN EUROPE, THE UNITED STATES, AUSTRALIA, JAPAN, CHINA AND SOUTH AFRICA 8 (2014), https://www.iea.org/publications/insights/insightpublications/ImpactGlobalCoalSupply_WorldwideElectricityPrices_FINAL.pdf.

2. *Id.*

3. Mat Hope, *The Future of Coal in China, India, Australia, the US, EU, and UK,* The Carbon Brief (Jul. 16, 2014, 1:00 PM), http://www.carbonbrief.org/blog/2014/07/the-future-of-coal-in-china-india-the-us-eu-and-uk/.

4. *Id.*

5. *See infra* pp. 47–51.

6. *See* C. Ozgen Karacan et al., *Coal mine methane: A review of capture and utilization practices with benefits to mining safety and to greenhouse gas reduction*, 86 INT'L J. OF COAL GEOLOGY 121 (2011).

7. *See infra* pp. 47–51.

8. *See* Federal Mine Safety and Health Act of 1977, Pub. L. No. 95-164, 91 Stat. 1290 (codified as amended in scattered sections of 30 U.S.C.).

9. *See infra* Section IV.

10. *See infra* Section III.

11. *Id.*

12. *Id.*

13. THE WHITE HOUSE, CLIMATE ACTION PLAN: STRATEGY TO REDUCE METHANE

— itself a part of the Climate Action Plan — the Bureau of Land Management ("BLM") issued an Advance Notice of Proposed Rulemaking on April 29, 2014,[15] to solicit public comments in anticipation of a rule that would address the problem of WMM emissions.

In order to illustrate the competing concerns that the BLM must consider in promulgating its rules and in anticipation of the forthcoming rule, this Note will trace the regulation of WMM in the United States to the present day and explore the effects of WMM on global climate change. This Note will then analyze how concerns about WMM were addressed in an innovative and ambitious project that brought together the Aspen Skiing Company, Oxbow Carbon LLC ("Oxbow Carbon"), and Holy Cross Energy to capture and harness WMM for energy production ("The Elk Creek Project"). The Elk Creek Project harnessed WMM to generate power and in so doing reduced net greenhouse-gas emissions from the mine. This profitable project also made the Aspen Skiing Company the world's first carbon-neutral ski area.

This Note will analyze the concepts, legal issues, and ideals underlying the Elk Creek Project and synthesize them into "the Aspen Strategy" for dealing with WMM. Simply put, this strategy holds that "it is wrong to waste a resource." This Note then proposes that the BLM should consider the Aspen Strategy as a model of what WMM reduction projects should look like in its final rule. Additionally, this Note will examine the challenges the BLM faces in the implementation of the Aspen Strategy through an analysis of the BLM's authority under the Mine Act and the Mineral Leasing Act of 1920 ("Mineral Act"), followed by a discussion of other scientific and economic obstacles inherent to the Aspen Strategy. Finally, this Note will conclude with specific policy proposals that would make the Aspen Strategy more feasible for wider implementation with other coal extraction operations within the United States.

II. THE PROBLEM WITH WASTE MINE METHANE AND ITS REGULATION

Coal, essentially fossilized solar energy[16], has been crucial to human development. However, for all the benefits that coal has provided

EMISSIONS 2 (2014).

14. Exec. Order No. 13514, 74 Fed. Reg. 194 (Oct. 5, 2009).

15. Advanced Notice of Proposed Rulemaking, Agenda Item 1004-AE23, 79 Fed. Reg. 23,923 (proposed Apr. 29, 2014).

16. *What is Coal?*, WORLD COAL ASSOCIATION, http://www.worldcoal.org/coal/what-is-coal/ (last visited Nov. 9, 2014) [hereinafter WORLD COAL ASSOCIATION].

to communities across the globe, the mines that have produced this black rock have also produced tragedy for countless families of miners killed in accidents. Methane is the most dangerous substance found in coal mines and the history of mining has been marked by the struggle to contain and mitigate the risks posed by this dangerous gas. This section will trace the historical evolution of coal mine development to highlight the tension between the need for energy and the need for workplace safety. It will then analyze the current coal mine safety regulatory scheme to illustrate the difficulties any WMM capture project will face in its implementation.

A. The History and Chemistry of Coal

Humans have used coal for domestic purposes for millennia.[17] Archeological evidence suggests that as early as 3490 B.C. early humans were using coal as a source of consistent energy in central China.[18] In the British Isles, coal-mining operations began to emerge around 100 B.C.,[19] and the first recorded legal recognition of a coal-mining operation occurred in the thirteenth century.[20] The altered remains of prehistoric vegetation subjected to intense geologic pressures and temperatures,[21] coal is organic matter composed primarily of carbon, hydrogen, oxygen, sulfur and nitrogen.[22] The high specific energy content of coal[23] has made it desirable throughout human history for energy production.[24]

17. *A Brief History of Coal Use,* U.S. DEPARTMENT OF ENERGY - FOSSIL OFFICE OF COMMUNICATIONS, (Nov. 9, 2014, 10:52 AM), http://www.fe.doe.gov/education/energylessons/coal/coal_history.html [hereinafter U.S. DEPARTMENT OF ENERGY - FOSSIL OFFICE OF COMMUNICATIONS].

18. John Dodson et al., *Use of Coal in the Bronze Age in China*, 24 THE HOLOCENE 525, 526 (2014).

19. U.S. DEPARTMENT OF ENERGY - FOSSIL OFFICE OF COMMUNICATIONS *supra* note 17.

20. King Henry III granted the well-known Newcastle coalfields a royal production charter in 1239. The vast deposits chartered in 1239 are the basis for the idiom "Bringing Coals to Newcastle" describing a foolhardy action. *See* EDWARD ALEXANDER NEWELL ARBER, THE NATURAL HISTORY OF COAL 3 (1912).

21. WORLD COAL ASSOCIATION, *supra* note 16.

22. O. Charon et al., *Variation in Coal Composition*, *a Computational Approach to Study the Mineral Composition of Individual Coal Particles*, Dep't of Chemical Engineering, MASS. INST. TECH., 302, https://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/Volumes/Vol34-2.pdf.

23. Coal, on average, has the specific energy density of 24 Megajoules (MJ)/Kilogram (KG). Compare that to firewood which has the specific energy density of 16 MJ/KG, gunpowder - 3 MJ/KG, or the typical automobile battery 2.6 MJ/KG. *See* Glenn Elert, *The Energy Density of Coal*, THE PHYSICS FACTBOOK, http://hypertextbook.com/facts/2003/JuliyaFisher.shtml (last visited Nov. 9, 2014).

24. U.S. DEPARTMENT OF ENERGY - FOSSIL OFFICE OF COMMUNICATIONS, *supra* note 17.

Explorers first discovered coal in the United States in 1673, and the first commercial mining operations began in the 1740s in what was then the Virginia Colony.[25]

Due to the abundance of wood, water, and animal fuel in the veritable Eden that was pre-Revolutionary America, there was little need to exploit the vast colonial coal reserves, and coal use was limited to primarily domestic uses.[26] It was not until the discovery of anthracite coal[27] in the early nineteenth century and the advent of advanced transportation technology, coupled with the insatiable energy appetite of the rapidly industrializing American economy, that coal production began to boom.[28] In just forty years, the annual American coal production increased from 240,000 tons to 32,904,000 tons,[29] a 13,610 percent increase.

The seemingly limitless[30] supply of coal found throughout the eastern United States was close to the surface and easy to extract. Easy extraction and the availability of relatively cheap immigrant labor, made coal mining an extremely profitable industry.[31] Coal extraction techniques and practices during the nineteenth century were designed to extract the maximum amount of coal as quickly as possible, even at the expense of safety.[32] In addition to the man-made hazards nineteenth

25. *Id.*

26. As a result of the limited demand for coal and the transportation difficulties, the nascent US coal industry saw limited growth potential. *See* Sean P. Adams, *The U.S. Coal Industry in the Nineteenth Century*, ttp://eh.net/encyclopedia/?article=adams.industry.coal.us (last visited Nov. 9, 2014).

27. Anthracite coal has higher carbon content, fewer impurities, higher energy density, and is harder and more compact than bituminous coal, making it ideal for transportation and industrial uses. Anthracite coal has an average energy density of less than 32.5 MJ/KG. *See* U.S. DEPARTMENT OF ENERGY - FOSSIL OFFICE OF COMMUNICATIONS, *supra* note 17; Adams, *supra* note 26; Elert, *supra* note 23.

28. Adams, *supra* note 26.

29. This increase occurred from 1829–1869. *See id.* at tbl. 1. In Ohio alone, coal production increased from 320,000 tons to 1,300,000 million tons in just three years (1850-1853). *See id.*

30. Coal was so abundant in the nineteenth century that the city planners of Philadelphia considered using anthracite coal to pave the city streets. *See id*.

31. Mark Aldrich, *History of Workplace Safety in the United States*, (Nov. 9, 2014 1:46 PM), http://eh.net/encyclopedia/history-of-workplace-safety-in-the-united-states-1880-1970-2/.

32. *See id.* American coal deposits were near the surface and were often mined using "room and pillar" techniques, which used timber and coal pillars to support the roof of the mine. The unstable construction of mines, the decentralized nature of mining with foremen and miners operating in different parts of the mine (which diminished oversight of the operations), the use of blasting techniques, and the mineworkers' lack of emphasis on safety (who were paid by the ton and had little incentive to stop production in light of a safety concern) created an unreasonably dangerous work environment in which the average mortality rate for an American miner was nearly three times as high as a miner in Great Britain.

century miners faced, there were other equally dangerous hazards found in the earth itself.

Coal seams, trapped underground for millions of years, are filled with noxious and highly explosive gases, including methane which is the most dangerous.[33] Methane is a colorless and odorless gas that can cause asphyxiation in relatively modest amounts and explosions in atmospheric concentrations as low as six percent.[34] In virgin coal seams, the methane permeates the rock and can exist in concentrations in excess of sixty to ninety-five percent.[35] Methane must be vented from the mine. If not continuously monitored, it can often build up to dangerous concentrations.[36] Methane explosions can happen before, during, and after coal production has occurred, and coal miners have been struggling to mitigate this risk since the modern underground mining techniques emerged in the eighteenth century.[37]

B. Early American Coal Mining Operations

Before the advent of sophisticated atmospheric monitoring equipment, miners often used animals, such as a canary[38] or mule[39] to ensure their safety. However, these animals were often an imperfect monitoring system and methane explosions were an inherent risk in the operation of a coal mine. Methane explosions are hypothesized to be the cause of the deadliest mining accidents in history, including the Honkeiko Colliery Mining Disaster, which killed 1,549 miners in China, the Courrieres Mining Disaster, which killed 1,099 miners in France, and the Monongah Mining Disaster, the deadliest mining tragedy in United States history, which killed 362 miners.[40]

33. Karacan et al., *supra* note 6, at 121, 123.

34. *Id.* at 122.

35. *Id.*

36. *Id.*

37. *Id.* at 123.

38. The canary would die by asphyxiation before the miners if the methane or carbon monoxide levels were too high in the mine atmosphere. The use of canary is the basis of the idiom "a canary in a coal mine" describing an object which warns of greater coming danger. *What Does it Mean to be a "Canary in a Coal Mine",* WISEGEEK, CLEAR ANSWERS FOR COMMON QUESTIONS, http://www.wisegeek.org/what-does-it-mean-to-be-a-canary-in-a-coal-mine.htm (last visited Oct. 16, 2015).

39. Miners would send a mule carrying an open flame into the mine before the work day began to see if any methane built up overnight. If the miners heard an explosion or saw a smoking mule running out of the mine, they knew the coast was clear. *Coal Mining in Appalachia*, THE MOONLIT ROAD: STRANGE TALES OF THE AMERICAN SOUTH, http://themoonlitroad.com/coal-mining-appalachia/ (last visited Nov. 9, 2014).

40. *The World's Worst Coal Mining Disasters*, MINING-TECHNOLOGY.COM, (May 16, 2014), http://www.mining-technology.com/features/feature-world-worst-coal-mining-disasters-china/.

Although miners and mine operators did take steps to minimize accidents, mining accidents and methane explosions remained widespread and an accepted part of the industry.[41] These risks were further exacerbated in nineteenth century mines because few incentives for safety existed.[42] Because American common law had yet to develop any substantive employer liability laws for workplace safety violations,[43] it was relatively cheap for operators to mitigate liability for mining accidents. The family of a miner killed in a workplace accident could only sue on a tort theory of negligence, but the employer was able raise the defenses of assumption of risk,[44] fellow servant,[45] and/or contributory negligence.[46] These defenses made the burden of proof extraordinarily high for plaintiffs and as such, it was often difficult for victims' families to recover from a mine operator. As a result, most claims were settled out of court for an amount substantially lower than that sought in the initial claim.[47] Furthermore, many miners killed in workplace accidents had other family members working in the mine who were threatened with retaliation if the family pursued suit, making recovery even more difficult. This legal framework within which nineteenth century mines operated provided little incentive for mine operators to focus on safety concerns such as the venting of methane or the sealing of abandoned sections of the mine.

Legislation and regulation of coal mine operations to require methane ventilation was slow to follow the boom in coal production that began in the early nineteenth century. It was not until 1891 that the federal government passed the first federal mine safety statute[48]

41. PRICE FISHBACK & SHAWN KANTOR, A PRELUDE TO THE WELFARE STATE: THE ORIGINS OF WORKERS' COMPENSATION 28 (2000).

42. *Id.*; *see also* Aldrich, *supra* note 31.

43. FISHBACK & KANTOR, *supra* note 41, at 29.

44. Under an assumption of risk theory, the employer can escape liability if the accident was caused by factors ordinary to that that type of work (in the case of a death caused by an explosion, explosions would be considered ordinary) or extraordinary if the risks were known and understood by the employee when he or she took the job (i.e. asphyxiation). *Id.* at 30–31.

45. Under a fellow servant defense, the family would be barred from recovery against the mine operator if the accident was caused by a coworker (i.e. the collapse of a support column caused by another miner). The family could pursue a suit against the miner responsible for the accident, but these miners had little assets and were effectively judgment-proof in practice. *See id*. at 31.

46. Under the defense of contributory negligence, any negligent act of the employee that contributed to the accident (i.e. blasting when there was a safety concern) could block recovery against the mine operator. *See id*.

47. *Id.* at 29–30.

48. *History of Mine Safety and Health Legislation*, U.S. DEPARTMENT OF LABOR, http://www.msha.gov/MSHAINFO/MSHAINF2.HTM (last visited Nov. 9, 2014) [hereinafter U.S. DEPARTMENT OF LABOR].

establishing methane ventilation requirements for coal mines located in U.S. territories but not in the states themselves.[49] For the most part, however, during this era, the federal government was largely silent in the area of mine health and safety.[50] As a consequence of this silence, safety regulation was largely left to the states and the shortcomings of tort law.[51] From 1900 to 1910, the number of coal mine fatalities averaged over 2,200 annually,[52] with 3,242 deaths in 1907,[53] the year of the Monongah Mining Disaster.[54]

In 1910, the federal government, responding to the catastrophic mine disasters—most of which were caused by methane explosions—of the previous twenty years, created the United States Bureau of Mines ("USBM") as an agency within the Department of Interior.[55] While the USBM did not initially have any authority to inspect mine operations,[56] it was charged with investigating mining methods and setting recommendations in relation to "the safety of miners, and the appliances best adapted to prevent accidents; possible improvement of the conditions in which mining operations are carried on… the use of explosives… [and] the prevention of accidents."[57] Although the USBM had no regulatory or enforcement power for almost thirty years,[58] USBM's creation and subsequent study of mitigate methane explosions was the first significant step in the federal regulation of coal mine methane.[59]

49. *Id.* While the 1890 Act did create ventilation requirements, however, it only applied to U.S. territories and did not apply to the states where the majority of the mining operations were occurring.

50. Robert F. McLaughlin, *Mine Safety Legislation: A History of Neglect*, 11 B.C.L. REV. 31, 31–32 (1969).

51. *See* FISHBACK & KANTOR, *supra* note 41.

52. *Coal Fatalities for 1900 Through 2014,* UNITED STATES DEPARTMENT OF LABOR MINE SAFETY AND HEALTH ADMINISTRATION, http://www.msha.gov/stats/centurystats/coalstats.asp (last visited Oct. 16, 2015).

53. *This Day In History: Dec 6, 1907 The Monongah Coal Mine Disaster*, THE HISTORY CHANNEL, http://www.history.com/this-day-in-history/the-monongah-coal-mine-disaster (Nov. 9, 2014).

54. *Id.*

55. Act of May 6, 1910, 36 Stat. 369.

56. This wouldn't occur until 1941 when Congress amended the statute to authorize the USBM to enter into and inspect mines. *See* McLaughlin, *supra* note 50, at 31-32.

57. FRED WILBUR POWELL, THE BUREAU OF MINES: ITS HISTORY, ACTIVITIES AND ORGANIZATION 4–5 (1922).

58. *See infra* note 61.

59. *See* POWELL, *supra* note 57, at 16.

C. The Emergence of Modern Coal Mine Safety Legislation and Regulation

Congress subsequently expanded the USBM's authority in 1941[60] and 1947[61] but did not give the USBM real regulatory enforcement powers until the passage of the Federal Coal Mine Safety Act of 1952 ("the 1952 Act").[62] Under the 1952 Act, the USBM could force mines to comply with its regulations—including methane ventilation requirements—through issuing civil penalties for noncompliance.[63] While these fines were somewhat insignificant,[64] the real power the USBM possessed was the ability to issue withdrawal orders, forcing a mine to cease operations if an inspection revealed that methane concentrations were at a dangerous level.[65] However, the 1952 Act was limited in scope. The 1952 Act limited the USBM's assessment of penalties, did not require any annual inspections of mining sites, and gave the USBM the authority to issue regulations to address the prevention of only "major disasters." While this legislation began to address the safety issues of modern coal extraction operations, it would be nearly twenty years until modern coal mine safety legislation was passed.[66]

Congress strengthened the 1952 Act with the Federal Coal Mine Health and Safety Act ("Coal Act") of 1969,[67] which created the modern regulatory agency for coal mine regulation and the Mine Enforcement and Safety Administration ("MESA"). The Coal Act required the MESA to inspect all underground mines at least four times a year for compliance, issue mandatory civil penalties for any safety violations, and establish criminal penalties for willful violations.[68] Congress retooled the Coal Act eight years later with the passage of the Federal Mine Safety &

60. McLaughlin *supra* note 50.

61. *Id.* at 32. In response to a methane explosion in 1947, an Illinois mine explosion left 111 dead, the federal government expanded the authority of the USBM and required mine operators and state mining agencies to report their compliance with USBM guidelines and mine safety recommendations. However, the USBM could not issue civil penalties for non-compliance. *See also* 115 Cong. Rec. 2249-50 (daily ed. Mar. 4, 1969) (statement of Russell E. Train, Undersecretary of the Interior).

62. *See* 30 U.S.C. §451 et seq. (1964).

63. *See* U.S. DEPARTMENT OF LABOR, *supra* note 48.

64. *See infra* note 66, § 480.

65. *See* U.S. DEPARTMENT OF LABOR, *supra* note 48.

66. *See* 30 U.S.C. §§ 471–483 (1964) (defining "major disasters" as those which "result in the deaths of five or more men at one time." While explosive methane levels would most certainly fall under a "major disaster," the maximum penalty set forth in the law for explosive methane levels was only $2,000 (~$17,000 dollars in 2014)). *See also* McLaughlin, *supra* note 50, at 32.

67. *See* Federal Coal Mine Health and Safety Act, Pub. L. No. 91–173, Dec. 30 1969.

68. *Id.*; *See also* U.S. DEPARTMENT OF LABOR, *supra* note 48.

Health Act of 1977[69] ("Mine Act"), under which all current mining regulations operate.[70]

Indicative of the evolution from the treacherous conditions that were found in coal mines just a few decades earlier, Congress declared in the Mine Act that "the first priority and concern of all in the coal or other mining industries must be the health and safety of its most precious resource—the miner."[71] The Mine Act renamed MESA the Mine Health and Safety Administration ("MHSA"), strengthened the enforcement power of MHSA, transferred the MHSA from the Department of Interior to the Department of Labor, and consolidated all federal health and safety regulations of the coal mining industry under a single statutory scheme.[72] The MHSA and the evolution of safety technology, including methane ventilation methods, were responsible for coal mining fatalities dropping from 272 in 1977 to forty-two in 2013[73] despite "significant increases in productivity, more adverse mining conditions, and changes in mining methods."[74]

WMM concentrations are currently regulated by the MHSA pursuant to its authority under the Mine Act.[75] The latest rule promulgated by the MHSA caps methane levels to one percent in any mine atmosphere where work is being performed by either humans or equipment. The rule further requires the cessation of all work if WMM levels exceed 1.5 percent in any given area, and requires all individuals to leave the affected area until methane levels return below one percent.[76] While MHSA regulations and modern technology have made coal mining a much safer job, the unpredictable nature of WMM can still cause tragedy such as the 2006 Sago Mining Disaster, the worst mining disaster in West Virginia in nearly forty years.[77]

69. *See* Federal Mine Safety and Health Act of 1977, Pub. L. No. 95-164, 91 Stat. 1290 .

70. Note that Congress has since passed the Mine Improvement and New Emergency Response Act (MINER Act), *see* Pub. L. No. 109–236, 120 Stat. 493 (2006), in a 2006 response to the Sago Mine Disaster, *see infra* note 77. The MINER Act amended the Mine Act by requiring mine operators to have greater emergency disaster response plans in place, establishing a new mine safety office in the National Institute for Occupational Safety and Health, and granting the MHSA greater power to levy civil and criminal penalties on non-compliant mine operators.

71. Federal Mine Safety & Health Act of 1977, 30 U.S.C. 801.

72. U.S. DEPARTMENT OF LABOR, *supra* note 48.

73. Mine Safety and Health at a Glance, UNITED STATES DEPARTMENT OF LABOR (July 20, 2015), http://www.msha.gov/MSHAINFO/FactSheets/MSHAFCT10.asp.

74. G.S. ESTERHUIZEN ET AL., COAL MINE SAFETY ACHIEVEMENTS IN THE USA AND THE CONTRIBUTION OF NIOSH RESEARCH 2.

75. *See* 30 U.S.C. § 811 (2012).

76. 30 C.F.R. § 75.323 (2012).

77. In 2006, methane from an abandoned and sealed section leaked into the active Sago Mine, creating atmospheric methane concentrations between 8 and 16 percent. The

III. WASTE MINE METHANE AS A GREENHOUSE GAS

While WMM must be vented for safety, methane is also a highly potent greenhouse-gas[78] that must be addressed in any potential solution to global climate change. Any rule the BLM will promulgate must balance the issues of mine safety with the overall negative effect of methane in the atmosphere. This section will detail the negative impact that methane has on the atmosphere and will examine the steps that the United States has taken to limit the emission of methane.

A. The Problem with Methane

While methane naturally occurs in the atmosphere, methane concentrations have increased by a factor of 2.5 since the Industrial Revolution to their highest levels in over 800,000 years.[79] Methane has a global warming potential of twenty-eight to thirty-six[80] which means that over a 100-year span, methane will trap twenty-eight to thirty-six times more heat than the same amount of carbon dioxide in the atmosphere. When adjusted for the length of time methane exists in the atmosphere relative to carbon dioxide, methane is approximately twenty-one times as potent as carbon dioxide.[81] According to the most recent estimates by the Environmental Protection Agency, sixty percent of methane emissions are anthropogenic.[82] Of all global methane emissions, eight percent are caused by WMM[83] and, after factoring in the potency of methane compared to other greenhouse gases, WMM is responsible for seventeen percent of all anthropogenic greenhouse-gas emissions.[84]

As global coal demand has increased over sixty percent from 1990 to 2011,[85] mining operations striving to meet these demands are emitting

resulting explosion was the worst mining disaster in West Virginia in nearly forty years, and resulted in the death of 12 of the 13 miners trapped by the explosion. *See US Army Corps of Engineers Draft Report "CFD Study and Structural Analysis of the Sago Mine Accident",* U.S. DEP'T OF LABOR - MINE SAFETY AND HEALTH ADMIN. (Dec. 7, 2007) http://www.msha.gov/sagomine/CFDSagoReport.pdf).

78. *Overview of Greenhouse Gases*, U.S. ENVTL. PROT. AGENCY, http://epa.gov/climatechange/ghgemissions/gases/ch4.html (last visited Nov. 9, 2014).

79. *Summary for Policy Makers in: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment of the Intergovernmental Panel on Climate Change* 11 (2013).

80. *Overview of Greenhouse Gases*, *supra* note 78.

81. Karacan et al., *supra* note 6, at 122.

82. *Overview of Greenhouse Gases*, *supra* note 78.

83. Karacan et al., *supra* note 6, at 123.

84. *Id.*

85. *See* Hope, *supra* note 3.

more WMM. Although coal production is projected to peak in 2035,[86] coal power is and will continue to be a necessity in the twenty-first century global economy. China burned 4.2 billion tons of coal in 2011 and the United States uses coal to generate approximately forty percent of its power.[87] Although China and the United States bilaterally agreed to reduce their greenhouse-gas emissions, China's emissions—the majority of which are caused by coal consumption—are not expected to peak until around 2030.[88] As a consequence of this increasing demand, mine operations are expanding and WMM needs to be continually vented from these active and exhausted mines that are operating to meet this demand. It is important to note, however, that even after mining operations cease, safety considerations and federal regulations[89] require WMM to continue to be vented.

B. The Response to Limit Methane Emissions

As scientists warn of the impending climate disaster that could occur if global temperatures rise by two degrees Celsius,[90] major industrialized economies are responding with strategies to reduce greenhouse-gas emissions. In response to these concerns, President Obama issued Executive Order 13514 in 2009 directing federal agencies to reduce greenhouse-gas emissions in all activities and study opportunities for greenhouse-gas reduction in applicable government contracts and regulations.[91] Furthering this commitment to reduce atmospheric greenhouse-gas emissions, President Obama also issued the White House Climate Action Plan in 2013, setting forth a series of executive actions to curb carbon emissions.[92] An essential part of the Climate Action Plan is the reduction of all methane emissions, including methane emitted from coal mines as WMM. The White House Strategy to Reduce Methane Emissions — itself a part of the Climate Action Plan — notes that coal mines currently emit the methane equivalent of fifty-six million tons of carbon dioxide annually[93] and sets forth strategies to

86. *Id.*

87. *Id.*

88. Coral Davenport, *Deal on Carbon Emissions by Obama and Xi Jinping Raises Hopes for Upcoming Paris Climate Talks,* N.Y. TIMES (Nov. 12, 2014).

89. 30 C.F.R. § 75.323 (2012).

90. *See* Davenport, *supra* note 88 ("[a global temperature rise of 2 degrees Celsius]… is the point where scientists say the planet will tip into a future of dangerous and irreversible warming, which will include the loss of vast stretches of arable land, rapid melting of arctic sea ice, rising sea levels, extreme droughts, storms and flooding.").

91. *See* Exec. Order No. 13514, 74 Fed. Reg. 194 (Oct. 5, 2009).

92. THE WHITE HOUSE, CLIMATE ACTION PLAN: STRATEGY TO REDUCE METHANE EMISSIONS, at 2 (March 2014).

93. *Id.* at 5.

reduce the emission of WMM from both active and abandoned mines.[94]

While methane emissions are a major problem in the global climate change cycle, methane reduction through combustion technology has enormous economic and environmental benefits. As a natural gas that has nearly twice the energy density of coal,[95] methane can be used to generate power.[96] The combustion of methane generates energy with carbon dioxide and water remaining as a byproduct.[97] By burning methane that would normally escape into the atmosphere and effectively turning it to carbon dioxide, the potential exists to create energy that reduces potency of greenhouse-gas emissions by a factor of thirty.[98]

In response to Executive Order 13514, the Climate Action Plan, the Strategy to Reduce Methane Emissions, and the scientific concerns set forth above, the BLM, which administers coal mining leases,[99] issued an Advance Notice of Proposed Rulemaking ("ANPRM") on April 29, 2014. This ANPRM sought public comment on a proposed rule that would establish "a program to capture, use, or destroy waste mine methane that is released into the mine environment and the atmosphere as a direct consequence of underground mining operations on federal leases for coal and other minerals."[100]

IV. THE ASPEN STRATEGY – AN UNLIKELY ALLIANCE

Aspen, Colorado is known for its glamor, wealth, and world-class skiing. With a year-round population of a little over 6,500[101] that plays

94. *See generally id.*

95. Methane has an energy density of 55.6 MJ/KG. Ulf Bossel & Baldur Eliasson, *Energy and the Hydrogen Economy* 4, http://www.afdc.energy.gov/pdfs/hyd_economy_bossel_eliasson.pdf (last accessed Oct. 16, 2015).

96. Charles E. Ophardt, *Combustion of Fossil Fuels*, ELMHERST COLLEGE VIRTUAL CHEMBOOK (2003) http://elmhcx9.elmhurst.edu/~chm/vchembook/511natgascombust.html.

97. *Id.*

98. "Methane is roughly 30 times more potent as a heat-trapping gas" SCIENCE DAILY (Mar. 27, 2014), http://www.sciencedaily.com/releases/2014/03/140327111724.html.

99. While the Department of Labor through MHSA administers the operations that take place in the coal mine itself, the Department of the Interior through the Bureau of Land Management administers all coal, oil, and natural gas leases pursuant to its authority under the Mineral Leasing Act of 1920. *See* 30 U.S.C. §181 *et seq*.

100. Waste Mine Methane Capture, Use, Sale, or Destruction, 79 Fed. Reg. 2393 (proposed April 29, 2014).

101. *Aspen, CO State & County Quick Facts*, UNITED STATES CENSUS BUREAU (Nov. 14, 2014, 11:17 AM) http://quickfacts.census.gov/qfd/states/08/0803620.html.

host to over 40,000 people during the busiest times of the winter,[102] Aspen, like most mountain resort towns, is almost entirely dependent on tourism to sustain its economy.[103] As a part of the 67 billion dollar snow sports industry,[104] the Aspen Skiing Company owns and operates four ski resort areas in the upper Roaring Fork valley and is well aware of the economic implications that global climate change has on the ski industry.[105] In the 2013-2014 ski season, approximately 1.4 million[106] of the 59.8 million annual skier visits[107] occurred at one of the four resorts owned and operated by the Aspen Skiing Company. Aspen Skiing Company is an industry leader in combating global climate change and focuses its efforts on not only reducing its own carbon footprint through traditional waste reduction strategies, but also through political lobbying and innovative carbon reduction strategies.[108] As Auden Schendler, Aspen Skiing Company's Director of Sustainability puts it, "we have serious skin in the game."[109]

The modern ski industry is a highly energy-intensive industry that has a relatively large carbon footprint.[110] The amount of energy required to power minimum resort operations at the four Aspen Skiing Company mountains—i.e. lifts, mountain facilities, and equipment—is responsible for the emission of approximately 28,000 tons of carbon dioxide

102. Mountain Travel Research Program, *Aspen Snowmass Transient Lodging Inventory Study* (July 1, 2012).

103. Ben Adler, *Will Climate Change Ruin Aspens Economy?,* GRIST.ORG (Aug 12, 2014) (Nov. 14, 2014 12:37 PM), http://grist.org/climate-energy/will-climate-change-ruin-aspens-economy/.

104. "Snow-based recreation in the United States is estimated to contribute $67 billion annually to the US economy and supports over 900,000 jobs." *See About Us*, POW – PROTECT OUR WINTERS (Nov. 14, 2014, 11:55 AM), http://protectourwinters.org/about.

105. Global temperature rise is the single biggest existential threat to the ski industry. Low snowfall years have cost the ski resort industry over 1 billion dollars and 27,000 jobs from 1999 to 2010. If temperatures continue to rise at their current rate by the end of the century, only 14 ski resorts in the northeast will be able to profitably exist while snowpack on Aspen Mountain will be confined to the top quarter of the mountain. Most alarmingly, Park City, Utah, which on average receives over 400 inches of snowfall and attracts over 3 million visitors annually, is projected to lose all mountain snowpack. *See* ELIZABETH BURAKOWSKI & MATTHEW MAGNUSSON, CLIMATE IMPACTS ON THE WINTER TOURISM ECONOMY IN THE UNITED STATES, REPORT TO THE NATURAL RESOURCES DEFENSE COUNCIL AND PROTECT OUR WINTERS (December 2012); *See* Porter Fox, *The End of Snow?,* NY TIMES (Feb. 7, 2014); *See Climate and Snow*, POW – PROTECT OUR WINTERS (Nov. 14, 2014 12:28 PM), http://protectourwinters.org/climate-snow.

106. *Winter Saw Most Skier Visits Since '97-'98,* THE ASPEN DAILY NEWS (Jun. 13, 2014), http://www.aspendailynews.com/section/home/162607.

107. BURAKOWSKI & MAGNUSSON, *supra* note 105, at 3.

108. Adler, s*upra* note 103.

109. Interview with Auden Schendler, Vice President of Sustainability, Aspen Skiing Company, in Aspen, Colo. (Sept. 19, 2014) (recording on file with author).

110. *Id.*

annually.[111] To reduce its carbon footprint, the Aspen Skiing Company began to install solar panels at the Aspen Highlands Ski Area and built a utility scale solar plant in Carbondale, Colorado. However, as Schendler puts it, "that's nothing compared to our energy use."[112] These projects, as well as a micro-hydroelectric power station on the Snowmass Ski Area, offset approximately 280 tons—about one percent—of the carbon dioxide generated by the resort annually.[113] In its efforts to develop a solution, Aspen Skiing Company developed a unique and innovative approach to this problem through the Elk Creek Project.

A. The Elk Creek Project

In 2005, Schendler and the Aspen Skiing Company began to look for a large-scale project to reduce its carbon footprint. The concept of generating electricity by burning WMM from coal mines came up in discussions with energy analysts.[114] Although Schendler concedes that WMM is not a renewable resource per se, the Aspen Skiing Company considers it a pressing problem in the global climate change discussion and was willing to take a risk by funding a project.[115]

In selecting the site, the Aspen Skiing Company was looking for a gaseous mine that had access to an electrical grid, but it took nearly five years to find a coal mine willing to consider Schendler's proposal because it was "so crazy and so out there."[116] Regulations promulgated under the Mine Act as well as MHSA inspections have caused mine operators to be "extremely wary of opening the mine to any outsiders," and the Aspen Skiing Company had little success in convincing any mine operators to partner with them.[117] As Schendler puts it, "some of these mines are making a million dollars a day on coal, and we, a bunch of clowns from a ski resort, are looking to make a million dollars a year jacking around on the property. Mine operators are already extremely concerned with safety and inspections, and when a bunch of ski resort guys approach them and say they want to cap and burn their methane, an

111. Aspen Skiing Company, *Aspen Skiing Company 2013 Consumption Baseline/CO2 Emissions,* http://www.aspensnowmass.com/-/media/Sustainability/Carbon_Dioxide_Footprints.pdf (last visited Nov. 14, 2014) (Note this figure does not consider greenhouse-gas emissions from guests in their travel or stay at the resort and does not factor in carbon dioxide emissions from sources such as airplane travel to the resort or lodging at the resort).

112. Schendler, *supra* note 109.

113. Aspen Skiing Company, *supra* note 111.

114. Schendler, *supra* 109.

115. *Id.* The Aspen Skiing Company invested approximately 5.5 million dollars in the project.

116. *Id.*

117. *Id.*

explosive, safety, and human health hazard? Mine operators were like 'no way.'"[118]

In 2010, after a five-year search, Schendler met with representatives from Holy Cross Energy, a rural electric co-op that operates in Garfield, Eagle, and Pitkin Counties, and Oxbow Carbon, a mining company owned by billionaire William Koch that owns and operates the Elk Creek Mine in Somerset, Colorado.[119] What brought Oxbow Carbon and the Aspen Skiing Company together was their shared belief that "*it was wrong to waste a resource*."[120]

While the companies shared a moral belief that brought them together, substantial economic benefits incentivized Oxbow Carbon and Holy Cross to partner with Aspen Skiing Company as well. In addition to sharing in the profits from the project, Oxbow Carbon was also able to reduce its tax liability through Section 29 of the IRS Code, which provides tax credits for "producing fuel from a nonconventional source,"[121] just by capturing and burning the methane they were already venting form the Elk Creek Mine. Additionally, Holy Cross was interested in purchasing the power generated from this project because of its self-imposed goal of deriving twenty percent of their power from renewable sources by 2015.[122]

In 2011, the Aspen Skiing Company installed three eighteen-cylinder diesel engines modified to run on methane gas pumped from the mine to the Aspen Skiing Company site.[123] Once the methane is purified, the engines burn it, spinning a generator, and the electricity created is transferred to a utility substation, installed by the Aspen Skiing Company

118. *Id.*

119. Bob Ward, *How Aspen Skiing Co. Became a Power Company*, ASPEN TIMES (Nov. 17, 2013), http://www.aspentimes.com/news/obituaries/8936430-113/methane-mine-coal-power).

120. Schendler, *supra* note 109.

121. 26 U.S.C. § 45k (2012). It should be noted that this tax credit is significant and allows for Oxbow Carbon to take a credit for $3 multiplied by the barrel of oil equivalent for all energy produced for the year from the Elk Creek Project. Oxbow Carbon, and other actors wishing to capture and burn methane for power production have the potential to reduce their tax liability significantly to help offsetting any initial capital investment costs and/or associated transaction costs associated with these projects.

122. Ward, *supra* note 119. The status of Holy Cross' status as a rural electric co-op is also significant. According to Mark Safty, adjunct Professor of Law at the University of Colorado Law School, "because of their ownership structure, rural electric co-ops are often at the forefront in innovative power generation projects." Mark Safty, Adjunct Professor of Law, University of Colorado Law School, Class Lecture at the University of Colorado Law School (Feb. 6, 2015). Additionally, Holy Cross was required under Colorado law to develop a portfolio that derived thirty percent of the power it sold to retail from renewable sources. *See* Colo. Rev. Stat. § 40-2-124(d).

123. Schendler, *supra* note 109.

and operated by Holy Cross Energy.[124] Holy Cross buys the power, at a subsidized price, and transports that power to the grid.[125] Another key factor influencing the production of energy from WMM is the concentration of methane vented from the mine.[126] Coal geologists hold that medium to-high-grade methane—concentrations between thirty to one hundred percent—is ideal for power generation.[127] The Elk Creek Mine generators were designed to burn at twenty-five to forty percent concentrations.[128]

Since going online in 2012, the operation's three megawatt power plant has reduced greenhouse-gas emissions by approximately 22,000 tons of carbon dioxide annually, offsetting Aspen Skiing Company's annual power usage, essentially making them the world's first carbon-neutral ski resort.[129] The Elk Creek Project also has a thermal-oxidizing plant, which burns or "flares" any excess methane not captured by the generators, resulting in a further net reduction of Aspen Skiing Company's carbon footprint.[130] The power generated is sold for a profit,[131] and the project is expected to generate a twelve percent return on investment.[132]

Once the Aspen Skiing Company is paid back its initial 5.5 million

124. *Id.*

125. *Id.* In his interview, Schendler notes the difficulties that Holy Cross faced in buying and transporting the power. Holy Cross subsidizes the power generated from the Elk Creek Project by paying slightly higher rates than what a utility company would pay for power generated from other forms of natural gas. While the rates are similar to rates paid by utilities for other green energy projects (i.e. wind or solar), Holy Cross was only willing to buy the power for the more expansive rate because of their state-imposed requirement to have twenty percent of their energy come from "green" sources by 2020. The substation at the Elk Creek Mine also transports power to a different grid and this power has to be rerouted five times before it reaches the appropriate grid. Other utilities charge fees to "wheel" the power through their grids, but the utilities involved were sympathetic to the Elk Creek Project and "wheeled" the power for a reduced rate.

126. *See generally* Karacan et al., *supra* note 6.

127. *Id.* at 146.

128. Schendler, *supra* note 109. The concentration of methane in coal mines varies based upon the geology of the coal seam. Some mines have very high concentrations of methane, such as the Cedar Cove Field in Alabama, which has methane in high enough concentrations that allows it to be piped out similar to traditional natural gas wells. It should also be noted that the modern mining technique of "longwall" mining has been shown to increase the concentration of atmospheric WMM, suggesting that concentrations can be raised to economically viable levels for power production based upon the mining activity itself. *See generally* Karacan et al., *supra* note 6.

129. Aspen Skiing Company, *supra* note 111.

130. Schendler, *supra* note 109.

131. *Note:* While the project is profitable, it is initially subsidized by the higher rates that Holy Cross Energy pays Aspen Skiing Company for its power. Holy Cross will recoup this subsidy after the 5.5 million dollar investment by Aspen Skiing Company is paid off. *See supra* note 125.

132. Ward, *supra* note 119.

dollar capital investment, it will share the profits from the project with Holy Cross Energy and Oxbow Carbon.[133] The agreements between the companies set the term at fifteen years; however, the parties agree that based on the geology of the mine, the project will likely be operational for another fifteen years after the initial term.[134] Because the project is profitable, as Schendler puts it, "after the project is paid off, it will essentially be a free money bank for the three companies for about fifteen years."[135]

B. Challenges to the Elk Creek Project

While the economic and environmental benefits of the Elk Creek Project are obvious, there are also key obstacles that this project and other similar prospective projects face. The largest concern is the geology and geography of the mine itself as it is extremely inefficient to generate power from mines that have low atmospheric methane concentrations below approximately twenty percent WMM.[136]

Additionally, many coal mines are also located far from interconnection point on power grids, minimizing the energy companies that may be willing to buy the power and incur the costs associated with "wheeling" the power to their respective grids.[137] Those costs have the potential to make transmission of power impracticable or impossible. However, under the Public Utility Regulatory Policies Act of 1978 ("PURPA"),[138] which requires utilities to buy power produced by a qualifying facility ("QF"), if certain conditions are met,[139] some of these power generation projects could potentially have a commercial path to sell electricity directly to the grid in rural areas that are dominated by a single energy utility in a non-restructured market—as most western states with coal mining operations are. Additionally, as states begin to

133. *Id.*

134. Schendler *supra* note 109.

135. *Id.*

136. *See* Karacan et al., *supra* note 6.

137. *See supra note* 125.

138. *See generally* Public Utilities Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117.

139. To qualify as a QF under PURPA and the Energy Policy Act of 2005, Pub. L. No. 109-58, the power generation facility must have a generating capacity of under eighty megawatts produced from renewables, be in an area where a wholesale market for power generation does not exist, and be capable of selling the power to a utility at an *avoided cost rate* (the cost to the utility if it had to purchase the power from another source). Laurel Glassman, *Qualifying Facilities in the Post-EPAct World*: *Challenges and Opportunities for QFs Part I*, ELECTRIC LIGHT AND POWER (Jan. 1, 2007), http://www.elp.com/articles/print/volume-85/issue-1/sections/finance/qualifying-facilities-in-the-post-epact-world.html.

require utilities to develop renewable portfolio benchmark standards,[140] increased demand by utilities seeking to comply with state law could increase the commercial viability of these power generation projects.

In addition to the obstacles facing Aspen Skiing Company's transmission of the power,[141] Aspen Skiing Company is also at the mercy of the mine operator, who can shut down the operation at any given time in response to safety concerns.[142] This occurred shortly after the Elk Creek Project became operational when a fire shut down the mine and the power plant.[143] Once the fire was contained, the mine was not able to resume operations and was sealed. However, the Elk Creek Project was able to restart a few months later on methane vented from the now-sealed mine.[144]

Another obstacle to the Elk Creek Project is that, unlike for mine operators of the past,[145] workplace accidents are no longer cheap. A major negotiation point in the Elk Creek Project was the apportionment of liability and the indemnification obligations of the parties.[146] While a project that involves power generation, methane venting, thermal oxidation, coal mine safety, and corporate actors would likely make any personal injury attorney salivate, the indemnity and insurance requirements add to the transaction costs of the project and slow development. To address the Elk Creek Mine's liability, the agreement granted the Aspen Skiing Company a lease on the property where the methane capture equipment is located, which effectively cuts off MHSA inspections of the site because Aspen Skiing Company is not considered the mine operator.[147]

140. U.S. Energy Information Administration, *Today in Energy: Most States Have Renewable Portfolio Standards*, (Feb 3, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=4850.

141. Glassman, *supra* note 139.

142. Schendler, *supra* note 109.

143. *Id.*

144. *Id.* (Note that even though the mine was "sealed" after the fire, methane was still vented and the Elk Creek Mine Project was able to restart. Once the mine was sealed, WMM concentrations began to increase and the Elk Creek Mine Project now burns WMM at approximately a sixty percent concentration which Schendler notes "has actually made the engines run better").

145. *See* FISHBACK & KANTOR, *supra* note 41.

146. Schendler, *supra* note 109.

147. *Id. See also* 29 C.F.R. 1903.3 (2014) ("Compliance Safety and Health Officers [MHSA inspectors] of the Department of Labor are authorized to enter without delay and at reasonable times any factory, plant, establishment, construction site, or other area, workplace or environment where work is performed by an employee of an employer."). Because the Elk Creek Mine employees do not operate on the Aspen Skiing Company site, MHSA inspectors are effectively barred from inspecting the methane capture project as long as the methane is being properly vented from the mine.

C. The Aspen Strategy

Notwithstanding the high transaction costs involved with methane power generation, for many coal mines a WMM generating plant could potentially be a beneficial operation. As the BLM considers a potential rule to address the problem of WMM, the Aspen Strategy should be considered. As its core guiding principle, the Aspen Strategy furthers Oxbow Carbon and the Aspen Skiing Company's core belief that "it is wrong to waste a resource."[148] Simply put, the Aspen Strategy holds that WMM is an energy resource that needs to be safely captured and utilized to its maximum capacity and destroyed if there are no economically feasible uses for it.

The Aspen Strategy is not just prospective, it is also retroactive and should apply not to just future mines but to both current and sealed mines. Because it is inspired by private actors, the Aspen Strategy is motivated by both economic and environmental concerns and is flexible enough to allow individual mine operators and energy utilities to act in their own economic self-interest in determining which utilization would be the best for their particular situation.

Much like the Elk Creek Project, the Aspen Strategy also emphasizes long-term economic gain and requires mine operators to consider not just the economic practicality of short-term utilization but also to focus on the long-term economic potential of WMM utilization. For example, under the Aspen Strategy, a mine with high-methane concentrations could contract to capture the WMM and distribute through a pipeline similar to how current natural gas wells operate,[149] while in other circumstances it might only be feasible for a remote mine to capture WMM and use it for on-site off-grid generation. At a minimum, the Aspen Strategy requires that all mine operators destroy their methane both during mining operations and after such operations have ceased through thermal oxidation.[150] While the embrace of the Aspen Strategy may seem burdensome on coal mine operators, the fact that the Aspen Strategy has proven to be economically and environmentally successful for the parties involved, despite the numerous setbacks and barriers the Elk Creek Project has faced, proves willing private actors incentivized by smart government policies can overcome these barriers.

148. Ward, *supra* note 119.

149. *E.g.* the Deerlick Creek Field in central Alabama.

150. Flaring is a cost effective way to effectively destroy vented WMM. In the traditional thermal oxidizing procedure, the mine operator burns the excess WMM vented from the mine. This converts the methane into carbon dioxide effectively reducing the greenhouse-gas emissions from the mine by a factor of thirty. *See* SCIENCE DAILY, *supra* note 98.

V. EMBRACING THE ASPEN STRATEGY IN THE BLM'S FINAL RULE

The BLM has the legal authority to administer the leases for coal and methane production on approximately 570 million acres[151] of United States owned-land through the Mineral Act.[152] Leases are typically granted to coal mine operators on a twenty-year term, require an annual rent payment, and obligate operators to pay the BLM a royalty of eight percent for all subsurface mining operations.[153] Pursuant to its authority under the Mineral Act, the BLM can unilaterally revoke the lease of any operator who fails to "comply with the provisions of the Mineral Leasing Act of 1920, as amended, or fails to comply with any applicable regulations, lease terms, or stipulations."[154]

Under the Mineral Act, the Secretary of the Interior has the statutory duty to promulgate "such rules for the safety and welfare of the miners and for the prevention of *undue waste* [emphasis added]."[155] Furthermore, the Mineral Act also authorizes the Secretary of Interior to "prescribe necessary and proper rules and regulations and to do any and all things necessary to carry out and accomplish the purposes of this Act."[156] In the BLM's Advance Notice of Proposed Rulemaking, the BLM cites these sections of the Mineral Act as a basis for statutory authority to promulgate a rule regarding WMM.[157]

To effectively address the problem of WMM, the Aspen Strategy requires the BLM to consider waste mine methane for what it actually is—waste. By classifying WMM as undue waste which the Secretary of the Interior is required to regulate, the BLM can effectively begin implementing the Aspen Strategy through all of the leases it administers.

A. Challenges

Under the Administrative Procedures Act of 1946, any regulation that is a general statement of future applicability must go through a notice and comment rulemaking process to give interested and affected parties the right to submit comments that the agency will have to address

151. *Coal Operations*, BUREAU OF LAND MANAGEMENT (last updated Aug. 22, 2014), http://www.blm.gov/wo/st/en/prog/energy/coal_and_non-energy.html.

152. Mineral Leasing Act, 30 U.S.C. § 187 (1978).

153. *Coal Operations*, *supra* note 151.

154. *Id.*

155. Mineral Leasing Act, 30 U.S.C. §187 (1978).

156. *Id.* § 189.

157. Advanced Notice of Proposed Rulemaking, Agenda Item 1004-AE23, 79 Fed. Reg. 23,923 (proposed Apr. 29, 2014).

in its final rule.[158] This is one of the key areas where the implementation of the Aspen Strategy will likely face the most pushback.

The ANPRM was closed for comments on June 30, 2014, and the twenty-eight comments submitted reflect a wide range of views on how the BLM should approach the capture, sale, or destruction of WMM.[159] Industry operators, such as Mountain Coal Company, came out against the proposed rules, arguing that any further requirements would not be economically feasible[160] due to the intensive capital investments associated with the instillation of power production facilities and/or thermal oxidizing stacks on certain leases they operate.[161] Other industry groups echoed similar sentiments due to the additional expenses and liabilities that they could potentially incur from dealing with the unpredictable timing of emissions from WMM.[162]

If the BLM does decide to promulgate a rule classifying WMM as undue waste and requires mine operators to invest in WMM destruction technology as a condition of their leases, it may also face challenges to its authority to do so. In its submitted comment, the National Mining Association questioned the BLM's authority to promulgate rules regarding the capture, sale, or destruction of WMM in light of the Supreme Court's ruling in *Amoco Production Company v. Southern Ute Indian Tribe* ("*Amoco*").[163] In *Amoco,* the Supreme Court held that when coal is leased pursuant to the Mineral Act, the lease only applies to the coal itself and does not apply to the trapped gas within the seam[164] which is leased under a separate provision of the Mineral Act.[165] Because this dichotomy exists, the National Mining Association has questioned the BLM's statutory authority to regulate WMM under the same provisions

158. 5 U.S.C. §553 (2012); *See also Ethyl Corp. v. EPA,* 6 Envtl. L. Rep. 20,267 (D.C. Cir. 1976) which holds in part that an agency's final rule must adequately address the evidence found in the record, which includes submitted comments.

159. Advanced Notice of Proposed Rulemaking, Agenda Item 1004-AE23, 79 Fed. Reg. 23,923.

160. The average thermal oxidizing tower is estimated to cost between $300,000-$500,000 and it is estimated that the cost to install power generation facilities is approximately $1,500,000 per megawatt of output. Tom Vessels, Vessels Coal and Gas, Comments on Proposed Rule: Waste Mine Methane Capture, Use, Sale, or Destruction, http://www.regulations.gov/#!documentDetail;D=BLM-2014-0001-0021 (last updated July 1, 2014).

161. Letter from Weston Norris, Manager of Engineering and Environmental Affairs for the Mountain Coal Company to the Bureau of Land Mgmt. (June 27, 2014), http://www.regulations.gov/#!documentDetail;D=BLM-2014-0001-0018.

162. Vessels, *supra* note 160.

163. Letter from Kate Sweeny, General Counsel for the National Mining Association to the Bureau of Land Mgmt. (June 30, 2014), http://www.regulations.gov/#!documentDetail;D=BLM-2014-0001-0025.

164. Amoco Production Co. v. Southern Ute Indian Tribe, 526 U.S. 865, 879 (1999).

165. *See* 30 U.S.C. § 226(6)(1)(A) (2012).

that grant it the authority to regulate coal leases.[166]

However, this interpretation is suspect. Although the trapped gas is not part of the coal lease under *Amoco*, this does not mean that the BLM cannot classify the trapped gas as undue waste pursuant to its authority under the Mineral Act. For the BLM to prevail, it will need to establish that its interpretation of WMM as undue waste is entitled to *Chevron* deference under the now-famous two-step test set forth in *Chevron U.S.A., Inc. v. Natural Resources Defense Council* ("*Chevron*").[167] Under *Chevron*, the reviewing court "will analyze whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress."[168] However, if "the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute."[169] Essentially, as applied, *Chevron* holds that the reviewing court will support the BLM's interpretation of its authority to regulate WMM if Congressional intent for the BLM to do so is clear, or if the BLM's interpretation of "undue waste" to include WMM is reasonable and the intent of Congress is ambiguous.

The Supreme Court recognized in *Amoco* that coal bed methane has become a "valuable energy source."[170] If the court finds that the intent of Congress was clear "to prevent undue waste" in the Mineral Act, then it is likely that a court would consider congressional intent to be explicit, namely because the waste of a valuable energy commodity is undue waste and therefore should be regulated by the BLM. Thus, the BLM's interpretation of "undue waste" may not even be necessary, as it is conceivable that Congress would want it to be regulated. However, if the Court finds that ambiguity does exist, it is likely that the BLM would prevail. The BLM would be successful in a *Chevron* analysis as any interpretation would likely be considered permissive under *Chevron*, it is reasonable and there has been sufficient public input on the proposed rule.

The BLM may also be granted *Chevron* deference under the test set forth in *The City of Arlington, Texas v. Federal Communications Commission.*[171] In *Arlington*, the Supreme Court held that courts should

166. Sweeny, *supra* note 163.

167. Chevron U.S.A., Inc. v. Natural Resources Defense Council, 67 U.S. 837 (1984).

168. *Id.* at 858.

169. *Id.* at 843.

170. *Amoco*, 526 U.S. at 865.

171. City of Arlington, Texas v. Federal Communications Commission, No. 11–1545, slip op. at 1 (U.S. May 20, 2013).

grant *Chevron* deference to an agency's interpretation if the agency is simply interpreting the scope of their own jurisdictional limits.[172] Because the BLM has the authority to administer both gas leases and coal leases, the distinction made between the two in *Amoco* may be moot if the BLM is simply interpreting the limits of its jurisdiction. In essence, if the record shows that the BLM is analyzing its own authority to create rules in furtherance of these leases, then its analysis would be granted *Chevron* deference and any challenge to its interpretation would be unsuccessful.

It is further worth noting that although the proposed rule would be a general statement of *future* effect, the BLM may also have the authority to require current leaseholders to address the issue of WMM in their own operations as well. Under the Mineral Act, the term of all initial leases is twenty years.[173] Pursuant to Section 7(a) of the Mineral Act, all existing leases are renewable on ten-year terms when the initial term expires, but the terms and conditions of these leases are subject to readjustment by the BLM.[174] This readjustment authority could provide the basis to enforce on mine operators any new regulation concerning WMM after the then-current term expires.

B. Proposals for the Final Rule

There are other issues that must be addressed if the BLM truly wants to embrace the Aspen Strategy. Because the Aspen Strategy is motivated by economics as well as ideals, the BLM's rule needs to address the economic concerns of mine operators. Because the Aspen Strategy considers these operators as partners in addressing the problem of WMM, these new regulations should not be onerous on these operators.

To deal with the difficult nature of capturing and storing WMM,[175] any proposed WMM capture project should have a very quick and streamlined approval process. Once the final project is approved, the operator should also have the flexibility to make adjustments to the location and technology in order to capture the methane and account for the unpredictability of methane flows.

Under the Mineral Act, all coal leases are subject to a competitive bidding process and royalties.[176] During this competitive bidding process

172. *Id.* at 1.

173. 30 U.S.C. § 207(a) (2012).

174. *Id.*

175. WMM can migrate easily underground and vent in areas not previously thought possible, which will require operators to relocate any capture equipment very quickly. Vessels, *supra* note 160, at 2.

176. 30 U.S.C. § 226(b)(1)(A).

for a new mine, the BLM should require coal bed operators to conduct an economic and geologic feasibility study to assess the site's potential for power generation or a capture and transport project.[177] This feasibility study should be subject to approval by the BLM, and if the BLM disagrees with the findings of the study, it should be able to reject the bid entirely. However, if the BLM does approve the feasibility study, it should give preference to bids that will most beneficially utilize the WMM.[178] Through this process, the BLM can leverage its authority to administer leases in an effort to encourage competition amongst individual operators to install and operate the most efficient methane capture projects. If it is not feasible to capture and transport the methane or use it for power generation, then, at a minimum, the BLM should require that all WMM be thermally oxidized.

The BLM must also consider the distinction between its authority to administer coal leases and its authority to administer natural gas leases. Under the current Mineral Act, all methane from coal beds is subject to a competitive bidding process—similar to the competitive bidding process for a natural gas well—and separate royalty payments are due. In developing the Elk Creek Project, Aspen Skiing Company recognized first hand the obstacles that this distinction creates.[179] As Schendler notes, "Right now, we know we owe the BLM royalties from the gas we are using under the law; however, the BLM isn't sure what we owe it and neither are we because this hasn't been done before."[180]

Having to acquire the rights to extract both the coal and the natural gas within the coal bed is an undue burden on the coal mine operators that serves only to increase the transaction costs associated with mineral leases. To further the Aspen Strategy, the BLM's final rule should address this distinction and grant a waiver to the mine operator from having to acquire the rights to the coal bed methane trapped in the seam, provided the operator acquires the rights to the coal lease itself through a competitive bidding process.

Additionally, many operators are reluctant to invest in WMM technology, because they have to pay separate royalties for the WMM they are using. It makes no sense to require mine operators who want to utilize and/or thermally oxidize WMM to pay royalties but to require no such payment if the operator elects to vent it into the atmosphere. By requiring royalty payments under the current system of natural gas leases, it makes it much cheaper for operators to emit greenhouse gases

177. *I.e.* a pipeline.

178. This Note proposes the BLM should give preference to methane capture projects that will capture and transport the methane or will use it for power generation over other projects such as thermal oxidizing.

179. Schendler, *supra* note 109.

180. *Id.*

into the atmosphere by venting WMM. The Aspen Strategy holds that these mine operators be given incentives, not disincentives, to address WMM. To reduce the impact of these unintended consequences caused by a law nearly 100 years old, this Note proposes that the BLM grant a waiver to mine operators from all natural gas royalty payments due to their use of WMM. Furthermore, the BLM should consider implementing a fine to be phased in over the term of the lease to provide even more-incentive for operators to install this WMM capture equipment quickly.

Finally, as Schendler noted, because of safety concerns, mine operators are weary of increasing their liability by undertaking these projects themselves.[181] The BLM should be flexible and allow mine operators to partner with third-party vendors to build, install, own, and operate this equipment—and ultimately assume liability or shared liability for the project—if the mine operator desires to limit liability and insurance premiums.

While mine operators will be able to collect significant tax credits under Section 29 of the IRS Code,[182] they should be given additional economic incentives because this final rule would require additional capital investments, as well as higher insurance premiums paid by operators, which could potentially contribute to rising energy costs. The BLM should grant mine operators who operate existing leases temporary relief from the eight percent royalty rate currently imposed under the Mineral Act to offset these costs. This does not mean that the royalty payments should stop entirely throughout the lease, but operators should be given relief from them until the investments are paid off.

Currently, the BLM collects approximately 1.2 billion dollars annually in royalties from coal leases, which are paid to the federal treasury and the states.[183] By granting some form of royalty relief until the capital investments from existing leases are paid off, the BLM can effectively reduce global greenhouse-gas emissions and ensure energy prices remain stable. Assuming the BLM reduces royalty rates anywhere in the range from one-fourth to one-half, the cost of implementing this program will cost taxpayers an estimated 300-500 million dollars annually in lost revenue, or about the same cost of an F-22 Raptor.[184]

181. *See supra* p. 61.

182. 26 U.S.C. § 45K.

183. U.S. GOV'T ACCOUNTABILITY OFF., GAO-14-140, COAL LEASING: BLM COULD ENHANCE APPRAISAL PROCESS, MORE EXPLICITLY CONSIDER COAL EXPORTS, AND PROVIDE MORE PUBLIC INFORMATION 1 (2013), http://www.gao.gov/assets/660/659801.pdf.

184. UNITED STATES AIR FORCE, AIRCRAFT PROCUREMENT: AIR FORCE VOLUME 1: FISCAL YEAR 2011 BUDGET ESTIMATES 27 (2010), http://www.saffm.hq.af.mil/shared/media/document/AFD-100128-072.pdf.

VI. CONCLUSION

Coal bed methane is a highly explosive and dangerous gas that humans have struggled with since the early days of subterranean coal mining operations. Responsible for the majority of accidental deaths in coal mines, it is first and foremost a safety concern that all mines must address to protect its most valuable resource—the miner. However, as global temperatures continue to rise and threaten the ecologic and economic health of the planet, policymakers must confront the destructive effect that greenhouse gases are having on the environment. Methane emissions are a key-contributing factor in global climate change and must be controlled and curtailed in any potential solution. This has created a unique challenge that mine operators and policymakers now face, namely how to control WMM emissions while simultaneously protecting human life without significantly affecting energy costs.

As Winston Churchill famously said: "A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty." While the WMM dilemma has plagued policymakers and mine operators for decades, there is a unique opportunity to be found in this challenge, as the Aspen Skiing Company has realized. Partnering with innovative companies and guided by the ethical principle that "it is wrong to waste a resource," the Aspen Skiing Company has been able to impact the discussion of WMM by being a leader in global climate change discussion. The Aspen Strategy recognizes the efficacy of individual actors such as Schendler and the Aspen Skiing Company can have and seeks to create change through creative solutions to difficult problems. Furthermore, the Aspen Strategy is compatible with the notion that individual actors can profit from addressing a global problem and, in fact, strives to create profit-based incentives to encourage private actors to act in the greater global good.

This Note proposes that the BLM adopt this innovative approach by implementing rules and regulations that encompass the spirit of the Aspen Strategy and treat waste mine methane for what it actually is—waste. By recognizing the power of the market and individual actors in determining the most efficient allocation of resources to solve this problem, the Aspen Strategy provides an intellectual framework within which the BLM can operate to encourage other private actors to see opportunity in the challenge that WMM presents. The BLM is confronted with the same opportunity that the Aspen Skiing Company saw in the Elk Creek Project and should take this occasion to become a leader in addressing the problem with coal bed methane.