The Great Escape: Addressing the Problem of Fugitive Methane Emissions from the Conventional Natural Gas System Under the Clean Air Act

Caitlin Stafford*

* J.D, University of Colorado Law School. I would like to thank the Colorado Natural Resources, Energy & Environmental Law Review for their edits and feedback on this Note. I would also like to thank my husband, Jason Obold, for his love, patience, and support.

Table of Contents

I. INTRODUCTION

Natural gas production in the United States has steadily increased in recent years.[1] A recent study projected that natural gas development is expected to increase by forty-four percent from 2011 through 2040 and natural gas liquids are likely to see an increase of approximately twenty-five percent through 2019.[2] This upsurge in production is due in large part to the technological advancements in extraction methods.[3] Natural gas is also attractive because it is clean burning and efficient.[4] In many respects, burning natural gas is better than burning coal in terms of potential global warming impacts.[5] However, unburned natural gas that leaks into the atmosphere creates various climate and air quality issues, such as ground-level ozone.[6]

As a result of the growth in emissions from natural gas development, the United States Environmental Protection Agency ("the EPA") promulgated additional New Source Performance Standards ("NSPS") and National Emissions Standards for Hazardous Air Pollutants ("NESHAP") under the Clean Air Act in 2012.[7] These rules are a positive development, but did not include standards for methane, opting to regulate methane as a co-benefit of the new standards. The EPA estimated that once these rules were fully implemented, they would result in an annual reduction of approximately one million tons of methane.[8] However, without performance standards aimed at decreasing the methane that is leaked into the atmosphere due to leaking equipment, the projected overall emissions reduction from the natural gas production and transportation process is merely a hope without consequence. For example, methane is emitted through equipment connection points;

1. *Natural Gas Gross Withdrawals & Production*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/dnav/ng/ng_prod_sum_dcu_NUS_a.htm (last updated Feb. 27, 2015).

2. U.S. ENVTL. PROT. AGENCY, REPORT FOR OIL AND NATURAL GAS SECTOR LEAKS 2, (April 2014) *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415leaks.pdf.

3. AM. PETROLEUM INST., UNDERSTANDING NATURAL GAS MARKETS 2, *available at* http://www.api.org/~/media/files/oil-and-natural-gas/natural-gas-primer/understanding-natural-gas-markets-primer-low.pdf.

4. *Id.*

5. Richard Harris, *Report: Burning Natural Gas Is Better Than Using Coal*, NAT'L PUBLIC RADIO (Feb. 14, 2014, 5:00 AM), http://www.npr.org/2014/02/14/276782467/report-burning-natural-gas-is-better-than-using-coal.

6. *What Will It Take to Get Sustained Benefits from Natural Gas?*, ENVTL. DEF. FUND, http://www.edf.org/energy/methaneleakage (last visited Apr. 6, 2015).

7. New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 Fed. Reg. 49,490 (Aug. 16, 2012) [hereinafter Final Rule for Subpart OOOO].

8. *Id.* at 49,492.

through the operation of valves, pumps, and compressors; through control equipment not operating properly; and as a result of leaks in the pipeline.[9] Without standards driving improvements in these emissions, unburned methane will continue to enter into the atmosphere as a result of leaky equipment and will play a significant role in increased global atmospheric concentrations of greenhouse gases.[10]

This Note discusses the current regulatory landscape and recommends that the federal government promulgate performance standards for methane leaks to significantly curtail upstream fugitive methane emissions. Part II discusses the oil and natural gas industry and the issue of fugitive methane emissions. Part III sets forth the current state and federal regulatory landscape. Part IV argues the thesis of this Note: to effectively control fugitive methane emissions, the EPA must promulgate methane performance standards to effectively address the problem of fugitive methane emissions.

II. WHY WE SHOULD CARE ABOUT FUGITIVE METHANE EMISSIONS

A. An Overview of Natural Gas & Some of Its Equipment

Over the past few decades, the United States has become the world's leading natural gas producer.[11] Initially pursued with the hope of decreasing the national dependence on foreign oil, natural gas has also developed into a relatively low-cost source of energy.[12] However, the natural gas industry has received criticism for air quality issues that have become associated with exploration and production.

---

9. REPORT FOR OIL AND NATURAL GAS SECTOR LEAKS, *supra* note 2, at 3.

10. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE [IPCC], *Climate Change 2014 Synthesis Report: Summary for Policymakers*, *in* IPCC FIFTH ASSESSMENT SYNTHESIS REPORT, at 4, *available at* http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf [hereinafter IPCC 2014 SUMMARY FOR POLICYMAKERS].

11. *U.S. Expected to be Largest Producer of Petroleum and Natural Gas Hydrocarbons in 2013*, U.S. ENERGY INFO. ADMIN. (Oct. 4, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=13251 [hereinafter *U.S. Expected to be Largest Producer*].

12. *How Dependent Are We on Foreign Oil?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/article/foreign_oil_dependence.cfm (last updated May 10, 2013); *Natural Gas Explained: Natural Gas Prices*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energyexplained/index.cfm?page=natural_gas_prices (last updated Jan. 30, 2015).

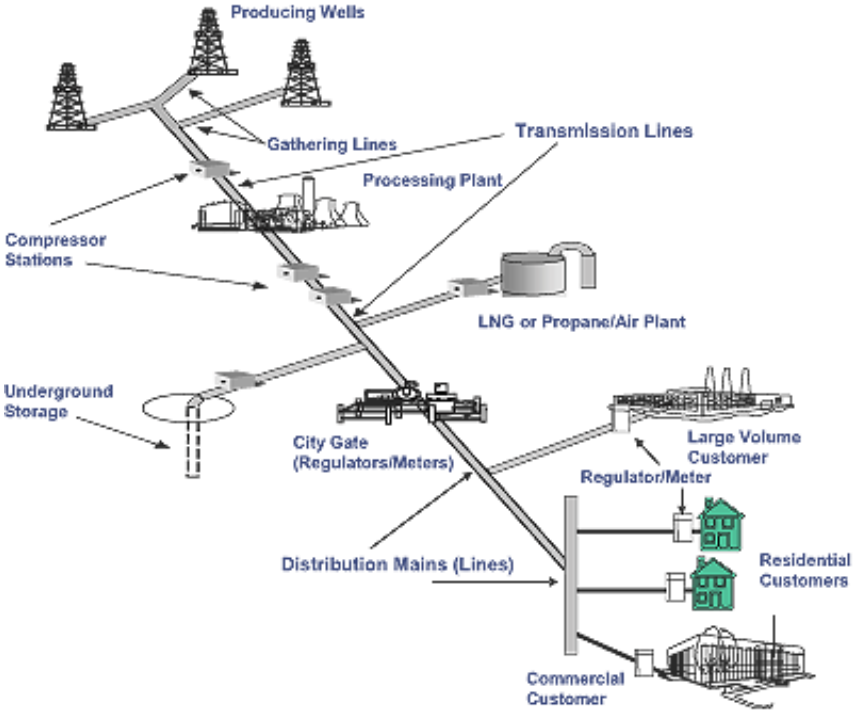
Natural gas development in the United States has increased steadily since the 1990s, when it was heralded as a "golden fuel" because of its low prices and clean air benefits.[13] In 2009, there were approximately 1.1 million oil and gas wells in urban and rural areas of the United States.[14] The oil and natural gas industry is made up of an elaborate system of operational and equipment components designed to facilitate the transfer of natural gas to end-users. The system is comprised of wells, gas gathering and production facilities, storage, and transmission and distribution pipelines, which generally fall into four categories: production, gathering and processing, transmission, and distribution.[15]

13. Fred Bosselman, et al., *Energy, Economics and the Environment: Cases and Materials* 452 (3d ed. 2010).

14. U.S. ENVTL. PROT. AGENCY, PROPOSED AMENDMENTS TO AIR REGULATIONS FOR THE OIL AND NATURAL GAS INDUSTRY: FACT SHEET 2 (July 28, 2011), http://www.epa.gov/airquality/oilandgas/pdfs/20110728factsheet.pdf [hereinafter JULY 20, 2011 PROPOSED RULE FACT SHEET].

15. *Natural Gas STAR Program: Basic Information*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/gasstar/basic-information/ (last visited Feb. 20, 2014).

Figure 1: Oil & Natural Gas Operations[16]



In order for natural gas to be transported through pipelines for end-use, it must be purified to create 'pipeline quality' gas.[17] Natural gas producers utilize processing plants to remove the various impurities contained within natural gas at the extraction stage. These plants perform four main tasks: oil and condensate removal, water removal, separation of natural gas liquids, and sulfur and carbon dioxide removal.[18] Once natural gas has been subjected to these purification processes, it is ready for transport for use in homes and businesses.

After processing, 'pipeline quality' gas enters the natural gas mainline transmission system.[19] Transmission focuses on the delivery of natural gas from the wellhead and processing plant to city gate stations or

16. *Id.*

17. *Processing Natural Gas*, NATURALGAS.ORG, http://naturalgas.org/naturalgas/processing-ng/ (last visited Feb. 18, 2015).

18. *Id.*

19. *About U.S. Natural Gas Pipelines – Transporting Natural Gas*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/process.html (last visited Mar. 20, 2014).

industrial end-users.[20] A number of compressor stations are located along the transmission system between the producers and end-users, which enable the gas to travel through pipelines and maintain the efficiency of the pipeline.[21] These stations typically contain one or more compressor units that are designed to maintain the flow of natural gas along the transmission system by increasing gas pressure and rate of flow.[22] Control of the system's gas load is critical to each compressor's operation.[23] Any slight variation or added stress may lead to leaks in the various components of the compressor, which include the flanges, valves, open-ended lines, pressure relief valves, blowdown vent lines, and compressor seal and rod packing.[24]

Since compressors and compressor stations are such a key component to the natural gas system, it is no surprise that they are also one of the largest sources of fugitive emissions along the natural gas transmission network.[25] A 2009 study estimated that fugitive methane emissions from the more than 40,000 compressors in operation accounted for approximately thirty-three percent of methane emissions in the United States.[26] Methane losses typically emanate from wet seals of centrifugal compressors, while leaks in the rod packing system are responsible for fugitive emissions in reciprocating compressors.[27] To these combat leaks, the EPA promulgated rules in 2012 mandating that equipment in these compressors be upgraded on specific timelines to avoid the wearing that often results in leakage.[28] While these rules are a step in the right direction, there is more that can be done.

---

20. *Natural Gas STAR Program: Basic Information*, *supra* note 15.

21. *See, e.g.*, *Compressor Stations: What They Do, How They Work, and Why They are Important*, STIGROUP, Jan. 21, 2014, http://setxind.com/midstream/compressor-stations-what-how-why/.

22. *About U.S. Natural Gas Pipelines*, *supra* note 19.

23. *Id.*

24. *Id.*; *see also* MATTHEW R. HARRISON, URS CORP., PRELIMINARY RESULTS FROM FUGITIVE EMISSION MEASUREMENTS OF SELECTED COMPONENTS AT COMPRESSOR STATIONS (2010), *available at* http://www.epa.gov/ttn/chief/conference/ei19/session3/harrison.pdf.

25. U.S. ENVTL. PROT. AGENCY, LESSONS LEARNED FROM NATURAL GAS STAR PARTNERS: DIRECTED INSPECTION AND MAINTENANCE AT COMPRESSOR STATIONS 1 (2003), *available at* http://epa.gov/gasstar/documents/ll_dimcompstat.pdf.

26. U.S. ENVTL. PROT. AGENCY, METHANE SAVINGS FROM COMPRESSORS: LESSONS LEARNED FROM THE NATURAL GAS STAR PROGRAM 3 (MAY 2009), *available at* http://www.epa.gov/gasstar/documents/workshops/okcity2009/icf_compressors.pdf.

27. *Id.* at 4. Natural Gas STAR is a joint venture between EPA and various energy companies.

28. Final Rule for Subpart OOOO, *supra* note 7, at 49,492.

The vast and expansive natural gas system is also a significant source of volatile organic compounds ("VOCs").[29] VOCs are specific organic compounds containing carbon that contribute to atmospheric photochemical reactions and assist in the formation ground-level ozone (also known as 'smog').[30] Exposure to ozone is linked to various health issues, including aggravated asthma.[31] Methane (CH_4), one of the world's most common hydrocarbons, is not included in the EPA's definition of VOCs because the agency's scientists concluded that it has negligible photochemical activity.[32]

B. An Overview of Fugitive Methane Emissions

Methane is the primary component of natural gas[33] and a potent greenhouse gas ("GHG") that is more than twenty times stronger than carbon dioxide (CO_2) over a 100-year time horizon.[34] This means that methane's level of heat-trapping potency is much higher than that of carbon dioxide, even though it has a shorter lifespan in the atmosphere.[35] Unburned methane reacts in the atmosphere to form ozone, which scientists have confirmed is a major threat to public health and welfare.[36] Therefore, not only is unburned methane damaging to the climate on its own, it is also harmful as an ozone precursor.[37] Though methane accounts for ten to twelve percent of all GHG emissions in the United States, the clean-burning benefits natural gas provides are significantly outweighed by the detrimental effects that unburned methane poses to the Earth's atmosphere.[38]

---

29. *Oil and Natural Gas Pollution Standards*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/airquality/oilandgas/basic.html (last updated Oct. 28, 2014).

30. 40 CFR § 51.100(s) (2014); JULY 20, 2011 PROPOSED RULE FACT SHEET, *supra* note 14, at 3.

31. *Oil and Natural Gas Pollution Standards*, *supra* note 29.

32. BOSSELMAN, *supra* note 13, at 443; 40 CFR § 51.100(s)(1) (2015).

33. *Overview of Greenhouse Gases*, U.S. ENVTL. PROT. AGENCY, http://epa.gov/climatechange/ghgemissions/gases/ch4.html (last updated May 7, 2015).

34. *Id.*; *see also U.S. Expected to be Largest Producer*, *supra* note 11; JAMES BRADBURY, ET AL., WORLD RESOURCES INST., CLEARING THE AIR: REDUCING UPSTREAM GREENHOUSE GAS EMISSIONS FROM U.S. NATURAL GAS SYSTEMS 11 (Apr. 2013), http://pdf.wri.org/clearing_the_air_full.pdf.

35. *Overview of Greenhouse Gases*, *supra* note 33.

36. BRADBURY ET AL., *supra* note 34, at 12.

37. *Id.* at 12–13.

38. Jim Pierobon, *Fugitive Methane Emissions: The Achilles' Heel of the Natural Gas Push?*, THE ENERGY COLLECTIVE (June 17, 2013), http://theenergycollective.com/jimpierobon/238831/fugitive-methane-emissions-achilles-heal-natural-gas-push.

'Fugitive emissions' refer to the "intentional or unintentional release of greenhouse gases . . . during the extraction, processing, and delivery" of fossil fuels.[39] For the purposes of this Note, 'fugitive emissions' denote leakage in the natural gas producing, processing, and transportation system.[40] These types of emissions are intermittent, dispersed, or inconsistent in flow, concentration, or occurrence.[41] In the national hazardous air pollutant standards, 'fugitive emissions' means "those emissions from a stationary source that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening."[42] Most of the fugitive methane emissions in natural gas processing are a result of accidental leaks and routine venting.[43] Fugitive methane emissions are not only harmful to the environment, but also represent a huge cost to natural gas companies.[44] Because natural gas is comprised of such a high concentration of methane, leaks in the system translate to lost profits. Analysts estimate that the natural gas industry loses in excess of $2 billion dollars per year as a result of methane leaks and venting.[45]

The potential and actual effects of fugitive methane emissions have been reverberating around the world for years. Because of methane's heat-trapping capabilities, increases in the amount of methane in the atmosphere have played a significant role in the record temperatures experienced around the globe.[46] Methane emissions have also contributed to decreasing air quality as a prime contributor to ground-

39. John N. Carras et al., *Fugitive Emissions*, *in* 2 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES 4.1, 4.6, *available at* http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf.

40. BRADBURY ET AL., *supra* note 34, at 2.

41. VERDEO GROUP, FUGITIVE METHANE EMISSIONS FROM THE OIL AND NATURAL GAS SECTOR: A VALUABLE OFFSET PROJECT TYPE UNDER A U.S. CLIMATE CHANGE PROGRAM 2 (2009), http://sindicatum.com/downloads/verdeo/pdf-value-of-oil-gas-fugitive-offsets-032009.pdf.

42. 40 C.F.R. § 63.2 (2014).

43. *See, e.g.*, James Bradbury & Michael Obeiter, *A Close Look at Fugitive Methane Emissions from Natural Gas*, WORLD RESOURCES INST. (Apr. 2, 2013), http://insights.wri.org/news/2013/04/close-look-fugitive-methane-emissions-natural-gas.

44. *See, e.g.*, James Bradbury & Michael Obeiter, *5 Reasons Why It's (Still) Important to Reduce Fugitive Methane Emissions*, WORLD RESOURCES INST. (MAY 6, 2013), http://insights.wri.org/news/2013/05/5-reasons-why-its-still-important-reduce-fugitive-methane-emissions.

45. *Id.* (citing SUSAN HARVEY, ET AL., LEAKING PROFITS: THE U.S. OIL AND NATURAL GAS INDUSTRY CAN REDUCE POLLUTION, CONSERVE RESOURCES, AND MAKE MONEY BY PREVENTING METHANE WASTE (Mar. 2012), *available at* http://www.nrdc.org/energy/leaking-profits.asp).

46. *See generally Overview of Greenhouse Gases*, *supra*, note 33.

level ozone.[47] Therefore, reducing the amount of fugitive methane emissions in the atmosphere will help chip away at the damage that has already been done.

C. What Does the Data Say?

Historically, the lack of conclusive data on methane emissions from natural gas production has stymied the EPA's ability to improve upon existing regulations and develop new emission factors.[48] Consequently, the lack of clear data has also resulted in varied estimates of total current and projected fugitive emissions.[49] One of the major factors contributing to the glut of inconsistent data is the different measurement techniques employed in each study. Currently, measurement and estimation occurs in two primary ways: through "bottom-up" GHG inventories and through "top-down" methods.[50] Additionally, state and local agencies are not required to provide emission measurement data to the EPA, making data collection difficult and limited.[51]

In addition to techniques and reporting, various other inconsistencies plague data methane emission collection. In some studies, researchers focus on different portions of the natural gas production, processing, transmission, and storage sectors.[52] In other studies, researchers attempt to account for all leak emissions across the oil and gas sectors by employing different equipment counts and emissions factors from other studies.[53] This fragmented system makes it difficult for the agency to comprehend the actual emissions from the natural gas system and to keep accurate measurements on file. Even with the variation in emissions data available, one thing is clear: it is extremely likely that the growing concentration of methane in the

47. *See generally* J. JASON WEST, OZONE AIR QUALITY MANAGEMENT BY REDUCING METHANE EMISSIONS: GLOBAL HEALTH BENEFITS (2006), *available at* http://www.htap.org/meetings/2006/2006_01/posters/West_methane.pdf.

48. *See, e.g.*, OFFICE OF THE INSPECTOR GENERAL, U.S. ENVT'L PROT. AGENCY, EPA NEEDS TO IMPROVE AIR EMISSIONS DATA FOR THE OIL AND NATURAL GAS PRODUCTION SECTOR 12, 16 (2013) [hereinafter INSPECTOR GENERAL'S 2013 REPORT].

49. *See generally* OBAMA ADMINISTRATION, CLIMATE ACTION PLAN: STRATEGY TO REDUCE METHANE EMISSIONS 11–14 (Mar. 2014), *available at* http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf [hereinafter CLIMATE ACTION PLAN]. Bottom-up inventories "focus on the specific source or activity causing emissions," while top-down methods "infer emissions from measurements of atmospheric methane concentrations. *Id.*

50. INSPECTOR GENERAL'S 2013 REPORT, *supra* note 48, at 12.

51. *Id.*

52. REPORT FOR OIL AND NATURAL GAS SECTOR LEAKS, *supra* note 2, at 4.

53. *Id.*

atmosphere has been a dominant cause of the observed changes in the Earth's climate system.[54]

There is considerable uncertainty over the exact amount of fugitive methane emitted from the natural gas system. As natural gas production has increased, some studies have suggested that the growth rate of methane present in the atmosphere has decreased substantially.[55] A recent study organized by the Environmental Defense Fund revealed that natural gas production companies are making strides in reducing fugitive methane emissions that escape into the atmosphere.[56] The study found that overall methane leakage from natural gas production (which included conventional and nonconventional natural gas) was 0.42 percent of all produced gas.[57] Oil and natural gas groups have also self-reported data that suggests overall methane emissions are lower than once thought.[58]

Other available studies suggest that fugitive methane emissions have been grossly underestimated in the atmosphere. For example, the EPA estimates that more than 6 million metric tons of fugitive methane leaked from natural gas systems in 2011.[59] Additionally, in a study authored by the National Oceanic and Atmospheric Administration's ("NOAA") Earth Systems Research Laboratory, researchers found that nine percent of the methane produced from drilling sites in Utah's Uintah Basin escaped.[60] Utilizing an atmospheric mass balancing technique, the NOAA researchers concluded that the data collected from aircraft measurements of atmospheric gases was a clear indication of a large

54. *Climate Change 2014 Synthesis Report: Summary for Policymakers*, *supra* note 10, at 4.

55. Piers Foster, et al., *Changes in Atmospheric Constituents and in Radioactive Forcing*, *in* Climate Change 2007: THE PHYSICAL SCIENCE BASIS: CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 129, 142 (S. Solomon et al. eds., 2007), http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf.

56. David T. Allen, et al., *Measurements of Methane Emissions at Natural Gas Production Sites in the United States*, 110 PROCEEDINGS OF THE NAT'L ACAD. OF SCIENCES 17768, 17769–70 (2013).

57. *Id.*

58. *See generally Natural Gas STAR Program: Accomplishments*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/gasstar/accomplishments/index.html#three (last visited Feb. 18, 2015).

59. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2011 3-61–62 (Apr. 12, 2013), http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf.

60. Cooperative Institute for Research in Environmental Sciences [CIRES], *NOAA Observe Significant Methane Leaks in a Utah Natural Gas Field*, CIRES.COLORADO.EDU (Aug. 5, 2013), http://cires.colorado.edu/news/press/2013/methaneleaks.html.

methane problem in the Uintah Basin.[61] In another study, published in February 2014, researchers suggest that official inventories consistently underestimate actual methane emissions from the natural gas sector, which includes emissions due to leakage.[62]

With such varying data concerning methane leaks in the natural gas supply chain in the United States, the EPA's past reluctance to take action on fugitive methane emissions is not surprising. However, with the publication of additional studies showing high concentrations of methane in the atmosphere, the Obama administration published its Climate Action Plan in March 2014. The Climate Action Plan cited the natural gas sector to a key contributor of methane emissions and outlined the administration's strategy to reduce methane emissions from a variety of sources.[63] The administration's plan has been welcomed by environmentalists and criticized by industry. When the EPA promulgates its methane emissions standards, it could open the agency to legal challenges from industry and unreceptive state governments. However, if the EPA does not act, the agency leaves itself open to challenges from environmental groups and other states that have started to feel tangible effects of climate change.

III. THE CURRENT REGULATORY LANDSCAPE

The Clean Air Act ("CAA" or "the Act") governs the regulation of air quality in the United States and it is one of the most complex federal statutes in American law.[64] The Act includes a wide variety of regulatory schemes, vests the EPA with management and enforcement responsibilities, and divides regulatory responsibilities between federal and state governments.[65] Over the past few years, the EPA has engaged in various rulemakings to revise emissions standards pertaining to the oil and natural gas industry. Individual states have also begun to promulgate regulations to deal with methane emissions from the natural gas system. For example, Colorado became the first state in the nation to enact

61. *Id.*

62. *See* A. R. Brandt et al., *Methane Leaks from N. American Natural Gas Systems*, 343 SCIENCE MAG. 733 (Feb. 2014), *available at* http://www.sciencemag.org/content/343/6172/733.full.

63. CLIMATE ACTION PLAN, *supra* note 49.

64. *See generally* 42 U.S.C. §§ 7401–7431 (2012).

65. THE CLEAN AIR ACT HANDBOOK: THE SECOND EDITION 5–7 (Robert J. Martineau, Jr. & David P. Novello eds., 2004); *see also* Nathan Richardson, GREENHOUSE GAS REGULATION UNDER THE CLEAN AIR ACT: DOES *CHEVRON V. NRDC* SET THE EPA FREE? 2–3 (Dec. 2009), *available at* http://www.rff.org/documents/RFF-DP-09-50.pdf.

methane leakage standards for oil and gas operations.[66] This move has pushed states with vast natural gas operations, including Wyoming and Ohio, to take similar regulatory measures over the past year.[67]

A. The Federal Clean Air Act

During the 1960s, the federal government began taking steps to curtail the declining quality of the nation's air. Congress passed the CAA of 1970 with the purpose of protecting the health and welfare of United States citizens through pollution prevention.[68] The CAA authorizes comprehensive state and federal regulations to limit air pollution from stationary sources and mobile sources under four major regulatory programs: the National Ambient Air Quality Standards ("NAAQS"), State Implementation Plans ("SIP"), New Source Performance Standards ("NSPS"), and National Emissions Standards for Hazardous Air Pollutants ("NESHAP").[69] Sections 108 through 110 of the Act allow the EPA to set NAAQSs, which states are then expected to integrate into their respective regulatory schemes through SIPs.[70] Under Section 111, the EPA has the authority to set NSPSs to mandate implementation of pollution-control systems for new, modified, and existing sources.[71] Section 112 of the Act vests the EPA with the authority to regulate HAPs, which have been determined to be exceptionally dangerous to human health and the environment.[72] In 1977 and 1990, Congress majorly revised the CAA, enacting Prevention of Significant Deterioration ("PSD") standards, and substantially increased the authority and responsibility of the federal government to enforce the Act.[73]

66. Neela Banerjee, *Colorado Proposes Reducing Methane Leaks from Energy Production*, L.A. TIMES, Nov. 18, 2013, http://articles.latimes.com/2013/nov/18/nation/la-na-nn-colorado-methane-leak-reduction-20131118.

67. Matt Watson, *Leading States Tackling Fugitive Emissions Problem Head-On*, ENVTL. DEF. FUND (Apr. 10, 2014), http://blogs.edf.org/energyexchange/2014/04/10/leading-states-tackling-fugitive-emissions-problem-head-on/.

68. 42 U.S.C. § 7401–7671 (2012).

69. *History of the Clean Air Act*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/air/caa/amendments.html (last visited Apr. 3, 2015).

70. 42 U.S.C. §§ 7408–10.

71. *Id.* § 7411.

72. *Id.* § 7412; *see also* Richardson, *supra*, note 65, at 3.

73. *History of the Clean Air Act*, *supra* note 69.

1. Section 111 –Performance Standards

Section 111 of the CAA requires the EPA to promulgate a list of categories of stationary sources and to set standards of performance for new stationary sources that "cause[], or contribute[] significantly to, air pollution which may reasonably be anticipated to endanger health or welfare."[74] These standards apply to new, modified, and existing stationary sources that emit or may emit any air pollutant.[75] A "new source" refers to a stationary source whose construction commenced following the publication of regulations prescribing a standard of performance.[76] while a modified source is a source that is already in existence, but has experienced either a physical change or a change in its method of operation that results in an increase in the emission of any air pollutant.[77] Ultimately, the Act gives the EPA discretion to determine what qualifies as a stationary source and whether such source is "major" based on the authority delegated to the agency under the Act.

Under Section 111, the Administrator of the EPA has a specific timeline in which to prescribe regulations and standards of performance for each source category.[78] The new source performance standards ("NSPS") are national uniform technology-based emissions standards. A NSPS sets a federal baseline for emissions by covered facilities, reflecting the degree of emissions limitations achievable through the "best system of emission[s] reduction.[79] Therefore, when a NSPS is established for any new or modified source category, the affected source must, at minimum, meet the standard.[80] As part of the rulemaking process for a NSPS, federal regulators rely on the best technological system for continuous emission reduction in order to prevent new air pollution, as well as to prevent any worsening of existing ambient air quality.[81]

While the EPA is directly responsible for setting NSPSs, the standards for existing sources are generally the responsibility of state governments through SIPs.[82] Under this system, each state must submit

74. *See* 42 U.S.C. § 7411(b) (2012).

75. *Id.* The term "stationary source" means any building, structure, facility, or installation that emits or may emit any air pollutant.

76. *See id.* § 7411(a).

77. *Id.*

78. *See id.* § 7411(b)(1)(B).

79. *See id.* § 7411(a)(1).

80. *See* 40 C.F.R. 430.55 (2014); *see also* 42 U.S.C. § 7411(e) ("[A]fter the effective date of standards of performance . . . it shall be unlawful . . . to operate such source in violation of any standard of performance applicable").

81. *A Close Look at Fugitive Methane Emissions from Natural Gas*, *supra* note 43.

82. *See* 42 U.S.C. § 7411(d).

their plan of enforcement of performance standards relating to existing sources to the EPA for review.[83] Following receipt of the plan, the EPA must work with the state to approve, disapprove, or propose edits which, if incorporated, will result in the agency's approval.[84] If a state fails to submit a plan, or the state's proposed revision of its initial plan is unsatisfactory to the EPA, the Administrator may prescribe a plan for the state, known as a Federal Implementation Plan.[85] Ultimately, the Act as currently written mandates a compromise between federal and state regulators prior to the promulgation of performance standards for existing sources.[86]

In addition to performance standards, Section 111 also provides a legal framework for the technology-forcing program of the NSPS. The Section was intended to encourage the use of the best system of emission reduction while also creating incentives for the development of new technology.[87] As the D.C. Circuit has explained, "[s]ection 111 looks toward what may be fairly projected for the regulated future, rather the state of the art at present, since it is addressed to standards for new plants."[88] The technology required by Section 111 need not "be in actual routine use somewhere;" rather the standard concerns "whether the [required] technology would be available for installation in new plants."[89] When setting a NSPS, the EPA may consider cost to the industry, but only such costs of control that would be "greater than the industry could bear and survive."[90]

2. Rule Promulgation and Recent Actions Regarding Methane Emissions

When promulgating a new or revised rule, the EPA engages in notice-and-comment rulemaking. The proposed rules promulgated by the EPA are published for public comment in the Federal Register and, when finalized, codified in the Code of Federal Regulations. Title 40 of the

83. *Id.*

84. *Id.*

85. *See id.* (providing that the Administrator will establish procedures similar to that which is provided in § 7410).

86. *See* 42 U.S.C. § 7411(d).

87. *See, e.g.*, U.S. ENVTL. PROT. AGENCY REGION 9, BACKGROUND ON ESTABLISHING NEW SOURCE PERFORMANCE STANDARDS (NSPS) UNDER THE CLEAN AIR ACT 1 (Nov. 5, 2013), *available at* http://www.epa.gov/region9/air/listening/BackgroundEstablishingNewSourcePerformanceStds.pdf [hereinafter BACKGROUND ON ESTABLISHING NSPS]

88. *See* Portland Cement Ass'n v. Rickelshaus, 486 F.2d 375, 391 (D.C. Cir. 1973).

89. *See, e.g.*, Portland Cement v. Train, 513 F.2d 506, 508 (D.C. Cir. 1975).

90. Lignite Energy Council v. EPA, 198 F.3d 930, 933 (D.C. Cir. 1999) (citing New York v. Reilly, 969 F.2d 1147, 1150 (D.C. Cir. 1992)).

Code of Federal Regulations contains the regulations pertaining to the protection of the environment and Part 60 deals with the NSPSs. The NSPS for crude oil and natural gas production is listed under Subpart OOOO, which also lists the emissions standards and compliance schedules for control of VOCs and SO_2 emissions from affected facilities.[91] As discussed in Part II.A, methane is specifically exempted from the definition of VOC.

In July, the EPA proposed rules aimed at revising certain aspects of the emissions standards for the oil and natural gas industry pursuant to its authority under Section 111.[92] The rules proposed cost-effective standards to reduce emissions of smog-forming VOCs and other air toxics.[93] While the rules did not propose a direct regulation of fugitive methane emissions, the EPA determined that methane emissions would be reduced as a co-benefit of reducing VOCs.[94] After soliciting and extending the public comment period, the EPA issued its final rules in April 2012.[95] The final rules took no action to directly regulate fugitive methane emissions. Instead, the EPA announced that the agency "intend[ed] to continue to evaluate the appropriateness" of directly regulating methane.[96]

The final subpart OOOO rules established requirements for various processes and equipment at natural gas processing and transmission facilities.[97] For example, the rules set out requirements for centrifugal compressors and reciprocating compressors. Centrifugal compressors are equipped with either wet seal or dry seal systems, which serve as barriers to prevent emissions of VOCs and other air toxics.[98] Due to changes in technology, dry seals have emerged as the preferred standard for centrifugal compressors largely because wet seals use oil to minimize leakage of compressed gas.[99] Under the new rule, the EPA required a ninety-five percent reduction in VOC emissions from compressors with wet seal systems and declined include centrifugal compressors with dry

91. *See* 40 C.F.R. § 60.5630 (2012).

92. *See* Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 76 Fed. Reg. 52,738, 52,792 (proposed Aug. 23, 2011) [hereinafter Proposed Rule for Subpart OOOO].

93. *See id.*

94. *Id.* at 52,792.

95. *See* Final Rule for Subpart OOOO, *supra* note 7.

96. *Id.* at 49,513.

97. *See generally id.*

98. *Id.* at 49,499–500. *See also* U.S. ENVTL. PROT. AGENCY, SUMMARY OF REQUIREMENTS FOR PROCESSES AND EQUIPMENT AT NATURAL GAS PROCESSING PLANTS 1 (Apr. 17 2012), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20120417summaryprocessing.pdf.

99. *See* Proposed Rule for Subpart OOOO, *supra* note 92, at 52,746.

seals as "affected facilities."[100] The EPA posited that the new requirements could be accomplished through flaring, or by routing captured gas back to a compressor suction or fuel system.[101] However, the EPA declined to finalize standards for compressors in the transmission segment of the natural gas industry citing a need for additional information.[102] For these compressors, the final rule included standards requiring the replacement of the compressors' rod packing systems.[103] These systems can wear over time, leaking gas and VOCs into the atmosphere.[104] The final rule provided two options for timing the periodic replacement of the rod packing systems: every 26,000 hours of operation or every thirty-six months.[105]

Following the publication of the final rules, the EPA issued final amendments to the NSPSs in December 2014. These amendments included a third option for reciprocating compressors: allowing emissions to be vented through a closed system back into the intake of the engine to augment fuel supply.[106] Operators could therefore skirt the rod-packing replacement requirements if they had this closed system technology in place. Under the EPA's theory, increased regulations on these two compressor systems would indirectly assist in curbing methane leakage into the atmosphere.[107]

The final 2012 rules also set NSPS reporting requirements for a variety of other gas processing and transmission equipment. For example, continuous bleed limits were reduced for new and modified pneumatic controllers—automated instruments typically used for

100. Final Rule for Subpart OOOO, *supra* note 7, at 49,500

101. SUMMARY OF REQUIREMENTS FOR PROCESSES AND EQUIPMENT AT NATURAL GAS PROCESSING PLANTS, *supra* note 98, at 1. Flaring is the "controlled burning of natural gas produced in association with oil in the course of routine oil and gas production operations. INT'L ASSOC. OF OIL & GAS PRODUCERS, FLARING & VENTING IN THE OIL & GAS EXPLORATION & PRODUCTION INDUSTRY 1 (2000), *available at* http://www.ogp.org.uk/pubs/288.pdf [hereinafter FLARING & VENTING REPORT].

102. *See* U.S. ENVTL. PROT. AGENCY, SUMMARY OF REQUIREMENTS FOR EQUIPMENT AT NATURAL GAS PROCESSING PLANTS 1 (Apr. 17, 2012), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20120417summarycompressor.pdf.

103. Final Rule for Subpart OOOO, *supra* note 7, at 49,500.

104. SUMMARY OF REQUIREMENTS FOR PROCESSES AND EQUIPMENT AT NATURAL GAS PROCESSING PLANTS, *supra* note 98, at 1–2.

105. *Id.*

106. Reconsideration of Additional Provisions of New Source Performance Standards, 79 Fed. Reg. 79,018, 79,019, 79,022 (Dec. 19, 2014). Venting is "the controlled release of gasses into the atmosphere in the course of oil and gas production operations" and can include natural gas or other hydrocarbon vapors. FLARING & VENTING REPORT, *supra* note 101, at 2.

107. *See* SUMMARY OF REQUIREMENTS FOR PROCESSES AND EQUIPMENT AT NATURAL GAS PROCESSING PLANTS, *supra* note 98, at 1–2.

maintaining conditions like liquid level, pressure, and temperature—depending on their location in the transmission and storage systems.[108] Additionally, the final rules attempted to strengthen the LDAR requirements, storage vessel requirements, and air toxics requirements for glycol dehydrators.[109] While the final rules target mainly VOCs and air toxics, the EPA maintains that the rules will have the co-benefit of reducing methane from new and modified sources, making direct regulation unnecessary.[110] Regulation as a co-benefit is progress, but it is a dangerous gamble to base regulation on this type of theory rather than introducing rules that directly restrict the known sources of fugitive methane emissions. Based on the clear threat that atmospheric methane poses to human health and welfare, regulation as a co-benefit is not enough.

B. State Regulations

While the CAA has sharply increased federal authority to regulate with the goal of improve the nation's air quality, Section 107 of the Act provides that "[e]ach [s]tate shall have the primary responsibility for assuring air quality within the entire geographic area comprising such [S]tate."[111] Prior to 1970, each state decided whether they would seek to attain any specified air quality standards. Following the adoption of the CAA, no such option remained available. In the current regulatory scheme, the federal air quality standards are the baseline and while states may set standards at or above the federal guidelines, they may not promulgate lower standards.[112]

States have historically played a prominent role in regulating oil and natural gas development.[113] Rulemaking efficiency and priorities vary by state, resulting in a patchwork of policies across the nation.[114] State policy leadership has been crucial in persuading the oil and natural gas sector to implement new ideas for pollution reduction.[115] States like Colorado with strong leadership and efficient governing practices, balance robust energy economies with stringent regulatory schemes that protect their citizens from the harm of unbridled development.

---

108. Final Rule for Subpart OOOO, *supra* note 7, at 49,492.

109. *Id.* at 2–3.

110. BRADBURY ET AL., *supra* note 34, at 31.

111. 42 U.S.C. § 7407(a) (2012).

112. *See supra* note 80 and accompanying text.

113. BRADBURY ET AL., *supra* note 34, at 33.

114. *Id.* at 30.

115. *Id.*

Most state-level oil and gas regulations concern issues of safety and local air quality, or encourage methane capture for use as an energy source.[116] While states typically write and enforce their own regulations and permitting requirements, they are also responsible for implementing federal environmental rules where the EPA has delegated such authority through a state SIP.[117] Most states have declined to set air emissions standards that are more stringent than the federal baseline.[118] As a result, state regulators defer to the EPA's standards, especially in those instances where the state's legislatures have explicitly prohibited state regulators from exceeding the federal requirements.[119]

Recently, state governments have been working with the oil and gas industry to identify and work toward best practice regulations. For example, STRONGER (State Review of Oil and Natural Gas Environmental Regulations) is a state-federal-industry partnership that documents and reviews state regulations on natural gas production in order to help improve their efficacy.[120] One major challenge with this type of partnership is that it is dependent on states volunteering time and resources to invite scrutiny of their regulatory processes.[121] However, if done properly, these partnerships benefit both parties by driving efficiencies that improve both the industry's bottom line and the public health.

Against this backdrop, Colorado became the first state in the nation to announce plans to directly regulate the detection and reduction of methane emissions associated with oil and natural gas development in November 2013.[122] State officials worked with leading operators in the oil and natural gas industry throughout the regulatory process.[123] Following a public comment period, the Colorado Air Quality Control

116. *See State Methane Policies*, NAT'L CONFERENCE OF STATE LEGISLATURES, http://www.ncsl.org/research/environment-and-natural-resources/state-methane-policies.aspx (last updated Feb. 11, 2014).

117. BRADBURY ET AL., *supra* note 34, at 33.

118. *Id.*

119. *Id.*

120. *Id.* at 34.

121. *Id.*

122. Press Release, Gov. John Hickenlooper, Colorado Set to Become First State to Regulate Detection, Reduction of Methane Emissions Associated with Oil and Gas Drilling (Nov. 18, 2013), *available at* http://www.colorado.gov/cs/Satellite/GovHickenlooper/CBON/1251648046456 [hereinafter Hickenlooper Press Release].

123. Bruce Finley, *Colorado Adopts Tougher Air Rules for Oil, Gas Industry*, DENVER POST (Feb. 25, 2014), http://www.denverpost.com/environment/ci_25213661/colorado-adopts-tougher-air-rules-oil-gas-industry.

Commission voted to adopt the methane regulations in February 2014.[124] The rules focus on identifying and repairing leaks in the oil and gas sector,[125] thereby improving the state's public health, environment, and economy by reducing the waste and increasing use of natural gas.[126] Generally, Colorado's rules require companies to utilize air pollution-control systems to limit VOC emissions and require leak detection and repair regardless of the date of construction of the affected facility.[127] This means that Colorado's regulations encompass both newly constructed (or modified) facilities as well as existing facilities.[128] It is estimated that Colorado's new regulations will reduce emissions by approximately 65,000 tons of methane and 90,000 tons of VOCs each year.[129]

While Colorado has taken an important step in tackling fugitive methane emissions, the debate regarding the appropriate regulatory roles for states and the federal government in regulating emissions from the natural gas industry continues. The industry typically argues that state governments are best suited to regulate the sector because of state personnel's familiarity with local geology and hydrology.[130] Alternatively, proponents of federal management argue that a larger federal role, consistent with national, minimum protections for public health, is more appropriate especially when considering the important implications for the global climate.[131]

IV. TO EFFECTIVELY CURB EMISSIONS, THE FEDERAL GOVERNMENT SHOULD ADOPT METHANE LEAK SOURCE PERFORMANCE STANDARDS

The direct regulation of methane leaks is the most effective way to reduce fugitive methane emissions in the natural gas system. Private industry actors argue that the best way to curtail emissions resulting from

124. COLO. DEP'T OF PUBLIC HEALTH & ENV'T, REVISIONS TO COLORADO AIR QUALITY CONTROL COMMISSION'S REGULATION NUMBERS 3, 6, AND 7: FACT SHEET 1 (Mar. 5, 2014), *available at* https://www.colorado.gov/pacific/sites/default/files/003_030614-729AM-R3-6-7-fact-sheet-003_1.pdf [hereinafter REGS. 3, 6, AND 7 FACT SHEET].

125. *Id.*

126. Hickenlooper Press Release, *supra* note 122.

127. *See* 5 COLO. CODE REGS. § 1001-9-XXII, XVII (2014).

128. *See id.* § 1001-9-XVII

129. REGS. 3, 6, AND 7 FACT SHEET, *supra* note 124, at 1.

130. Bradbury, *supra* note 34, at 34.

131. *Id.*

leakage is to periodically replace aging equipment and voluntarily install leak detection and repair systems. They call additional regulations "redundant, costly, and unnecessary."[132] However, regulations are valueless without firm metrics and penalties for failure to meet those requirements. There are significant public health and welfare reasons to regulate methane leaks directly rather than as a co-benefit of other air quality rules. Additionally, regulations aimed at controlling methane leaks could wind up saving the oil and natural gas industry more money in the long run.[133]

A. The Pros and Cons of Leak Detection and Repair

The EPA has determined that leaking equipment is the largest source of emissions of VOCs and HAPs from the oil and gas industry.[134] As a result of this determination, the EPA issued regulations that require operators of oil and gas processing and transmission equipment to maintain systems that will monitor for leaks and to fix leaking equipment on a routine basis.[135] These systems are typically referred to as leak detection and repair ("LDAR"). LDAR is a "work practice designed to identify leaking equipment so that emissions can be reduced through repairs."[136] If an equipment component is subject to LDAR, it must be monitored at specific, regular intervals to determine whether or not there is a leak.[137] The leaking component must then be repaired or replaced within a specific time frame set forth by the governing regulation.[138]

The LDAR regulations are set forth in many NSPSs, NESHAPs, and SIPs.[139] Under these standards, a facility may have equipment subject to multiple NSPS and NESHAP equipment leak standards.[140]

---

132. Coral Davenport, *Obama is Planning New Rules on Oil and Gas Industry's Methane Emissions*, N.Y. TIMES (Jan. 13, 2015), http://www.nytimes.com/2015/01/14/us/politics/obama-administration-to-unveil-plans-to-cut-methane-emissions.html?_r=0.

133. David McCabe, *Methane from Oil and Gas: Low-Hanging Fruit that EPA Must Pick*, CLEAN AIR TASK FORCE BLOG, (Dec. 5, 2011, 9:41AM), http://www.catf.us/blogs/ahead/2011/12/05/methane-from-oil-and-gas-low-hanging-fruit-that-epa-must-pick-3/.

134. U.S. ENVTL. PROT. AGENCY, LEAK DETECTION AND REPAIR: A BEST PRACTICES GUIDE 2 (Oct. 2007), *available at* http://www.epa.gov/compliance/resources/publications/assistance/ldarguide.pdf.

135. *See generally* 40 C.F.R. part 60 (2014).

136. LEAK DETECTION AND REPAIR, *supra* note 134, at 3.

137. *Id.*

138. *Id.*

139. *Id.* at 6.

140. *Id.*

Therefore, facilities must ensure that they are complying with a variety of proper equipment leak regulations. All LDAR programs consist of five main elements, though specific requirements among the regulations vary.[141] The five elements are: (1) identifying components; (2) leak definition; (3) monitoring components; (4) repairing components; and (5) recordkeeping.[142] Each element has its own requirements, common problems, and best practices.[143]

While the LDAR requirements have been codified into the various federal air quality regulations, there are added business incentives for companies to implement their own, more stringent LDAR best practices. Unburned gas escaping from the natural gas production and transportation processes translates into lost revenue for the natural gas company.[144] Therefore, emissions reductions from implementing an LDAR program will translate into the industry having more product to sell.[145] Emissions reductions resulting from LDAR also increase safety for workers and operators, decrease exposure of the surrounding community, reduce emissions fees, and help facilities avoid enforcement actions.[146] The EPA has identified the LDAR program as a national focus, meaning that facilities can expect an increased number and frequency of compliance inspections, as well as heightened review of compliance reports, in an effort by the agency to assess each program's effectiveness and identify potential problems.[147] Facilities with effective LDAR programs decrease the chance of being targeted for enforcement actions, thus avoiding additional costs associated with violations and litigation.[148]

These LDAR programs can be relatively effective tools for the EPA to monitor emissions from natural gas companies. However, compliance with LDAR is generally determined by a records review or visual walkthrough of the facility.[149] Generally, these reviews do not demonstrate whether monitoring procedures are being followed or if a company is employing improper monitoring practices.[150] As the EPA has recognized, "each leak that is not detected and repaired is a lost

141. LEAK DETECTION AND REPAIR, *supra* note 134, at 9.
142. *Id.* at 9–14.
143. *Id.*
144. *Id.* at 8.
145. *Id.* at 7.
146. LEAK DETECTION AND REPAIR, *supra* note 134, at 7.
147. *Id.* at 8.
148. *Id.*
149. *Id.* at 15.
150. *Id.*

opportunity to reduce emissions."[151] LDAR programs have the potential to contribute to industry's understanding of emissions problems and assist in the reduction of leaks, but they are not the only methods that should be employed to address excess methane in the atmosphere.

B. A Federal Methane Standard to Control Fugitive Emissions is the EPA's Best Course of Action

The EPA must use its authority under Section 111 of the CAA to set methane performance standards for natural gas sources. While Section 111 of the CAA authorizes the EPA to set performance standards for GHG emissions, methane remains unregulated under the current NSPS. The federal government could most effectively control fugitive methane emissions by directly regulating methane leaks through the promulgation of additional, stringent performance standards. While the CAA was not originally enacted with climate change in mind,[152] the CAA has consistently been used to regulate major sources of GHG emissions since the EPA's 2009 endangerment finding that greenhouse gas emissions endanger the public health and welfare.[153] In 2012, the EPA identified Section 111(b) of the CAA as the "basis for a proposed NSPS for [GHG] emissions from new power plants."[154] The EPA should use this same argument in finding its regulatory authority to directly regulate methane leaks from stationary sources.[155]

Environmental organizations have long championed a national methane standard as the most feasible way to combat the problem of fugitive methane emissions.[156] These organizations argue that the EPA has an obligation to regulate each dangerous pollutant emitted by sources in the natural gas industry in more than *de minimis* quantities.[157] As discussed in Part III.A, the EPA declined to promulgate new methane regulations as part of their 2012 NSPS for the oil and natural gas industry, reasoning that the regulation as promulgated would result in

151. LEAK DETECTION AND REPAIR, *supra* note 134, at 15.

152. F. WILLIAM BROWNELL, ET AL., CLEAN AIR HANDBOOK 189 (4th ed. 2015).

153. BRADBURY ET AL., *supra* note 34, at 32; *see EPA's Endangerment Finding for Greenhouse Gas Pollution: Overview*, ENVTL. DEF. FUND (Sept. 2011), *available at* http://www.edf.org/sites/default/files/epa-endangerment-finding-overview.pdf.

154. BRADBURY ET AL., *supra* note 34, at 32.

155. *Id.*

156. *See, e.g.*, Technical Comments from the Clean Air Task Force to the U.S. Envtl. Prot. Agency, at 72 (Nov. 30, 2011), http://www.catf.us/resources/filings/oil_and_gas/20111130-CATF_et_al_Oil_and_Gas_NSPS_Comments.pdf.

157. *Id.*

significant reductions in methane emissions as a co-benefit.[158] However, there is no guarantee of a co-benefit. Rather than gamble, the EPA should recognize what a dangerous pollutant methane is and take direct action that ensures its potential release into the atmosphere is significantly reduced.

Directly regulating methane leaks from stationary sources in the natural gas system will not be a simple task, but the value of the result greatly outweighs the cost. To begin, the EPA should remove methane from its list of pollutants that do not qualify as VOCs.[159] Removal requires the EPA to engage in notice-and-comment rulemaking, a process that can take months and even years to complete. Furthermore, the EPA will have to set forth additional compliance methods for achieving reductions in methane leaks. These methods should include the use of plunger lift systems at new and existing systems during liquids unloading operations; fugitive methane leak monitoring and repair at new and existing well sites, processing plants, and compressor stations; or replacing existing high-bleed pneumatic devices with low-bleed equivalents throughout natural gas systems.[160]

Regulating fugitive methane emissions directly rather than as a co-benefit of addressing VOCs or HAPs will more effectively achieve GHG emissions reductions from all segments of the natural gas supply chain.[161] Climate scientists have concluded that cutting methane emissions in the near-term could slow the rate of global temperature rise over the next several decades.[162] Therefore, reducing fugitive methane emissions is an essential step toward reducing overall GHG emissions and slowing the rate of global warming. None of these changes will take place overnight, so the EPA should start the process sooner than later if it wants to slow the growing impact methane is having on global warming and the public health.

Recognizing the need for action, the Obama Administration recently published its own strategy to reduce methane emissions.[163] Aside from implementing targeted regulations, the plan proposes to invest in the development of advanced pipeline inspection technologies and help "speed development of technologies for leak detection and

158. Final Rule for Subpart OOOO, *supra* note 7, at 49,513.

159. *See* 40 C.F.R § 51.100(s) (2012).

160. BRADBURY ET AL., *supra* note 34, at 39.

161. *Id.*

162. *Id.* at 10. *Accord.* IPCC 2014 SUMMARY FOR POLICYMAKERS, *supra* note 54, at 4 ("Anthropogenic greenhouse gas emissions," including carbon dioxide, methane, and nitrous oxide, "have increased since the pre-industrial era. . . and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century.")

163. *See generally* CLIMATE ACTION PLAN, *supra* note 49.

monitoring."[164] As part of the Administration's strategy, the EPA was tasked with producing several technical white papers to find the most efficient ways for the agency to further methane reductions.[165] Following the publication of these white papers and a review of the numerous comments transmitted to the agency, the EPA is set to promulgate proposed methane regulations in 2015, with final regulations ready in 2016.[166] As of this writing, these methane regulations have not yet been published.

C. The EPA Leaves Itself Open to Future Legal Challenges if It Fails to Promulgate Comprehensive Methane Regulations

1. Massachusetts v. EPA *Provides a Strong Foundation for Potential Challengers to the Status Quo*

In *Massachusetts v. EPA*, the Court determined that the CAA's sweeping definition of "air pollutant" included "any air pollution agent or combination of such agents" and that methane fell within those characteristics.[167] Accordingly, the Court held that because GHGs fit well within the Act's definition of "air pollutant," the EPA has statutory authority to regulate the emissions of such gases.[168] The Court also found that once the EPA Administrator makes an "endangerment finding," the CAA requires the EPA to regulate emissions.[169] Therefore, the EPA should use *Massachusetts* as the agency's foundational argument as they pursue a broad methane regulatory strategy.

Following the Supreme Court's decision, an extensive public comment period, and an exhaustive review of the sciences underpinning climate change research, the EPA made explicit findings that methane is a component of air pollution that endangers public health and welfare within the meaning of the CAA.[170] The Endangerment Finding concluded that the projected concentrations of methane, among other

164. *Id.* at 10.

165. The White Papers are currently hosted on the EPA's website, which also includes peer review comments to the papers. *White Papers: Oil and Natural Gas Air Pollution Standards*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/airquality/oilandgas/whitepapers.html (last updated Oct. 28, 2014).

166. Davenport, *supra* note 132.

167. Massachusetts v. EPA, 549 U.S. 497, 529 (2007) (the definition embraces all airborne compounds of whatever stripe, and repeated use of the word 'any' underscores that intent).

168. *Id.* at 532.

169. *Id.* at 533.

170. *See generally* Endangerment and Cause or Contribute Findings for Greenhouse Gases, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

well-known GHGs, "threaten the public health and welfare of current and future generations."[171] Under the holding of *Massachusetts*, the EPA is ultimately required to regulate methane.[172]

In August 2012, the EPA issued a final rule revising some aspects of NSPS Subpart OOOO, including those that deal with oil and natural gas operations. The EPA stated that no final action would be taken with respect to methane emissions and that the EPA "intend[ed] to continue to evaluate the appropriateness of regulating methane with an eye toward taking additional steps."[173] The EPA noted further that its ongoing evaluation would include an assessment of emission data over time, but did not set any timetable for issuing a decision relating to the regulation of methane emissions.[174]

In December 2012, the attorneys general from seven northeastern states, including Massachusetts and New York (the "Northeastern states"), filed a notice of intent to sue the EPA for its failure to promulgate a performance standard for methane.[175] The Northeastern states argued that, under Section 111 of the CAA, the EPA is required to "complete a thorough review" of air quality criteria and to issue a decision on methane regulation at the end of that process.[176] They also argued that the EPA is required, as part of the eight year NSPS review, to undertake "mandatory" review of new pollutants (including methane) which have previously been determined to endanger public welfare.[177] Finally, the Northeastern states argued that the EPA has unreasonably delayed its decision of whether standards for methane emissions are appropriate.[178]

In response the attorneys general of thirteen western and mid-western states, including Oklahoma, Texas, and Indiana, sent a cautionary letter to the EPA in May 2013.[179] The letter warned the EPA not to engage in negotiations with the Northeastern states.[180] This

171. *Id.* at 66,496.

172. *See* Massachusetts, 549 U.S. at 533.

173. Final Rule for Subpart OOOO, *supra* note 7, at 49,513.

174. *Id.*

175. Letter from Eric T. Schneiderman, N.Y. Atty. Gen., to Lisa P. Jackson, Administrator, U.S. Envtl. Prot. Agency (Dec. 11, 2012), *available at* http://www.ag.ny.gov/pdfs/ltr_NSPS_Methane_Notice.pdf.

176. *Id.*

177. *Id.*

178. *Id.*

179. Letter from E. Scott Pruitt, Okla. Atty. Gen., to Bob Perciasepe, Acting Administrator, U.S. Envtl. Prot. Agency (May 2, 2013), *available at* http://www.oag.ok.gov/oagweb.nsf/3e67f1cee13bc090862572b2005ad559/23b407a5f6b5131886257b600077acf1/$FILE/FINAL%20-%20EPAMethane050213.pdf

180. *Id.* at 1.

thirteen-state contingent expressed a "very great concern" that the EPA may "succumb to pressure" to negotiate with the Northeastern states to resolve the notice of intent to sue under the CAA over the EPA's decision not to regulate methane emissions from oil and gas operations under the NSPS program.[181] They argued that the Northeastern states' threatened lawsuit was without merit and that any negotiations should, at a minimum, include states that "actually have oil and gas operations and facilities."[182] Additionally, the May 2013 letter pointed to the CAA Section 111, arguing that permissive language like "if appropriate" does not compel the EPA to take action regarding NSPS standards for methane.[183] As of this Note's publication, neither bloc of states has taken any further action to sue the EPA.

In the meantime, the Supreme Court has decided various challenges to the EPA's authority to regulate GHGs like methane under the CAA. The Court's recent decisions in *EPA v. EME Homer City Generation*[184] and *Utility Air Regulatory Group v. EPA*[185] have generally upheld the EPA's authority to regulate GHGs through the CAA. While the *Utility Air Regulatory Group* decision reversed the EPA's Tailoring Rule, it also reiterated that GHGs could still be subject to regulation under the CAA.[186] These reaffirmations of the *Massachusetts* decision provide the EPA with a strong foundation to draft any future federal methane regulations.

2. The Administration's Current Methane Proposal

Following the publication of a series of white papers, the Obama administration issued its goal to cut methane emissions by forty to forty-five percent by 2025.[187] In their proposal, the administration has tasked the EPA with promulgating standards for methane and VOC emissions from new and modified sources, as well as production and transmission sources, by 2016.[188] While specifics of the proposed regulations have not yet been released, the administration's methane strategy contains some promising first steps.

---

181. *Id.* at 1, 3.

182. *Id.* at 1–3.

183. *Id.* at 3.

184. 572 U.S. ____, 134 S. Ct. 1584 (2014).

185. 573 U.S. ____, 134 S. Ct. 2427 (2014).

186. *Id.* at 2441.

187. News Release, Office of Air and Radiation, U.S. Envtl. Prot. Agency, Fact Sheet: Administration Takes Steps Forward on Climate Action Plan by Announcing Actions to Cut Methane Emissions (Jan. 14, 2015) [hereinafter EPA News Release].

188. *Id.*

Building on its approach with the 2012 NSPS, the EPA intends to develop these new methane standards by focusing on in-use pollution-control technology and current industry practices to promulgate standards that will meet public health and safety needs well into the future.[189] For example, the EPA intends to develop cost-effective performance standards by working with industry, states, and tribal governments.[190] Additionally, the EPA plans to lean heavily on states for help with developing approaches the agency should consider when implementing a monitoring and reporting regime.[191] While these steps are encouraging, they fall short of addressing the entire problem and raise concerns as to how the agency intends to proceed on existing sources.

Although a strategy that does not include a proposal to regulate methane emissions from existing sources is at best incomplete, the Act as currently written likely does not provide the EPA with broad authority to initiate such standards. Existing sources are not only the greatest source of fugitive methane emissions, but also account for much of the current equipment at thousands of natural gas sites across the country.[192] However, as discussed in Part III.A.1, authority rests with each state to initiate performance standards that will apply to existing sources under Section 111(d). The structure of Section 111 is both a notable example of federalism and an illustration of the compromise that was necessary to pass the 1970 amendments to the Act.[193] The federal government does not have broad authority to set performance standards for existing sources outright and may not compel any state to initiate rulemaking.[194] It is hard to see how the administration will meet its goals unless it effectively lobbies for a change to the Act to address the greatest source of fugitive methane emissions.

Even though the responsibility to set performance standards for existing sources rests with each state, the EPA does have ultimate authority in approving a state's proposed performance standards.[195] If the EPA finds a state's plan to be unsatisfactory after a period of joint review, the agency may set standards through a federal implementation

189. *Id.*

190. *Id.*

191. *Id.*

192. *See, e.g.*, Alan Neuhauser, *EPA Emissions Regs Ignore 1.1 Million Existing Sources*, U.S. NEWS (Jan. 14, 2015).

193. *See, e.g.*, Bruce M. Kramer, *The 1970 Clean Air Amendments: Federalism in Action or Inaction?*, 6 Tex. Tech L. Rev. 47, 65 (1974) (discussing the bill that emerged from the conference committee ahead of the December 31, 1970 vote).

194. *See, e.g.*, New York v. United States, 505 U.S. 144, 161 (1992).

195. 42 U.S.C. § 7411(d).

plan.[196] The success of this approach, however, largely depends upon the timely participation of each state and the availability of agency resources. Essentially, the EPA will have to expend valuable time and significant resources to ensure that each state submits a proposal, evaluate the state's plans, and propose revisions before it is able to set an existing source performance standard for methane. With Republicans controlling both of the houses, the option is becoming more and more a paper tiger as Congress chooses not to fund the agency.[197]

Unfortunately, the longer it takes to promulgate comprehensive standards in place for methane, the worse the problem becomes. The EPA is set to propose NSPSs for methane and VOC emissions this summer.[198] While the current proposal falls short without any current plan to regulate existing sources, the limitations of Section 111 essentially ties the EPA's hands. Accordingly, based on an analysis of Section 111(d), there is little opportunity for the EPA initiate methane performance standards for existing sources.

3. What If the EPA Ultimately Had Refused to Take Action?

If the EPA had not decided to take action on performance standards for methane leaks, such action would likely have not withstood a court challenge under the reasoning supplied *Massachusetts v. EPA*. The EPA has authority under the CAA to regulate methane emissions from previously listed natural gas infrastructure.[199] The 2009 endangerment finding also provides the EPA with a strong argument in favor of regulation. Though the endangerment finding was made in response to a challenge under Section 202 of the CAA, it had much broader implications for the regulation of GHGs, triggering a requirement in the Act that applied to the regulation of stationary sources. In its recent 2012 NSPS, the EPA acknowledged that the oil and gas industry was the "single largest contributor to United States anthropogenic methane emissions."[200]

196. *Id.*

197. *See, e.g.*, Puneet Kollipara, *The GOP's Plan to Stop Environmental Protections: Attack Science*, WASH. POST (Jan. 28, 2015), http://www.washingtonpost.com/news/energy-environment/wp/2015/01/28/the-gops-plan-to-stop-environmental-protections-attack-science/; Kelly Phillips Erb, *With Shutdown Avoided, Who are Winners (and Losers) in 2015 Budget?*, FORBES.COM (Dec. 14, 2014; 12:07 PM), http://www.forbes.com/sites/kellyphillipserb/2014/12/14/with-shutdown-avoided-who-are-winners-and-losers-in-2015-budget/.

198. EPA News Release, *supra* note 187.

199. *See* BACKGROUND ON ESTABLISHING NSPS, *supra* note 87, at 1.

200. Proposed Rule for Subpart OOOO, *supra* note 92, at 52,792 (citing U.S. ENVTL. PROT. AGENCY, 2011 U.S. GREENHOUSE GAS INVENTORY REPORT EXECUTIVE SUMMARY (2011)).

A decision not to act on methane would be difficult for the Agency to defend in court. Under the analysis put forth in *Massachusetts v. EPA*, the most important question on the merits would have been whether the Act authorizes EPA to regulate.[201] The Court determined that methane was included in the Act's broad definition of air pollutant because the CAA's definition of air pollutant "embraces all airborne compounds of whatever stripe, and underscores that intent through repeated use of the word 'any.'"[202] This type of statutory definition indicates that Congress intended Section 111 to address a broad range of potential air pollution, including many GHGs. As a result of the Court's decision, the EPA subsequently found that GHGs in the atmosphere "may reasonably be anticipated both to endanger public health and endanger public welfare."[203]

If the EPA were sued before their proposal to regulate methane was announced, a court would almost certainly have found that the CAA authorizes the EPA to regulate methane emissions. The broad purpose of the CAA is to prevent such a decline in air quality that threatens the public health and welfare.[204] The EPA made its own findings that methane is a potent GHG that is a direct threat to the atmosphere and, ultimately, public health.[205] Therefore, the agency's prior decisions not to regulate methane failed to apply the EPA's own criteria and ran counter to most of the evidence the agency received on the record.

Because a court would most likely have found that the EPA had the statutory authority to regulate methane under the provisions of the CAA, the second question in *Massachusetts v. EPA* is whether the agency offered a reasoned explanation for its refusal to regulate methane.[206] While the Act conditions the EPA's exercise of authority upon its "judgment," such judgment must relate to whether or not a pollutant causes or contributes to air pollution.[207] If the EPA makes a clear finding, it must exercise discretion as prescribed by the CAA statutory limits.[208] A 'clear finding' includes an endangerment finding. The EPA could have argued that while its 2009 endangerment finding[209]

201. Mass. v. EPA, 549 U.S. 497, 528 (2007).

202. *Id.*

203. Endangerment and Cause or Contribute Findings for Greenhouse Gases, *supra* note 170.

204. 42 U.S.C. § 7401 (2012).

205. Endangerment and Cause or Contribute Findings for Greenhouse Gases, *supra* note 170, at 66,516.

206. Mass. v. EPA, 549 U.S. at 532–33.

207. *Id.*

208. *Id.*

209. Endangerment and Cause or Contribute Findings for Greenhouse Gases, *supra* note 170, at 66,516.

establishes that GHGs have negative public health and welfare effects, the emissions from oil and gas operations are not sufficient enough to "cause or contribute" to these effects. The defensibility of this argument rests largely on the size and extent of the emissions, which remains a matter of controversy because of the varied data sets available on methane emissions.[210] Uncertainty regarding the sources and degree of fugitive methane emissions could have caused a court to find that allowing the EPA to delay action was the best course of action. However, this delay could not have been indefinite.

As Justice Stevens made clear in *Massachusetts v. EPA*, the EPA is required to regulate once it makes a finding of endangerment.[211] Because the EPA readily admits in its endangerment finding that methane poses a threat to the public health and welfare, the agency will put itself in an untenable position if it changes course and refuses to promulgate rules. Though the EPA does have "significant latitude as to the manner, timing, content, and coordination of its regulations. . . its reasons for action or inaction must conform to the authorizing statute."[212] Under the terms of the CAA, the Agency can avoid taking further action only if it determines that GHGs do not contribute to climate change and do not pose a danger to the public welfare.[213] Because the EPA has made its 2009 endangerment finding with regard to methane, it is obligated to take action to regulate. The Agency cannot avoid its statutory obligation by merely noting uncertainty surrounding available methane data,[214] which is especially problematic in light of the EPA's stated recognition that the oil and gas sector "emit[s] significant amounts of methane."[215] The EPA's actions with regard to their endangerment finding, coupled with Agency's statements concerning methane emissions in the oil and natural gas industry, weigh in favor of any challenger to the agency's decision not to regulate methane.

Direct regulation of methane through the promulgation of performance standards is necessary in order to control the problem of fugitive methane emissions. It is the best solution because it directly regulates methane, rather than regulating it as a co-benefit. While the administration's current proposal takes important steps to control methane emissions from new sources, a path forward with regard to existing sources is necessary. If the EPA continued to refuse to regulate methane, such action may not have survived a legal challenge under

210. *See supra* Part II.C.

211. Mass. v. EPA, 549 U.S. at 532.

212. *Id.* at 533.

213. *Id.*

214. *Id.* at 534.

215. Proposed Rule for Subpart OOOO, *supra* note 92, at 52,756.

Massachusetts v. EPA due in large part to the agency's endangerment findings, as well as other statements it has made regarding air quality and public health problems associated with excess methane in the atmosphere.

V. CONCLUSION

Fugitive methane emissions from leaks in the natural gas production and transportation system have exploded in recent years along with the industry's exponential growth in domestic production, affecting public health and welfare. Currently, there are no federal performance standards that directly regulate these methane emissions. Today, the EPA regulates methane indirectly, relying upon performance standards for other hazardous materials to reduce methane emissions rather than directly regulating the gas because it believes that industry self-regulation is sufficient absent more reliable data points. Rather than continuing to propose regulations that do not address the heart of the issue, the EPA must set methane performance standards for stationary sources in order to effectively and definitively solve the problem of fugitive methane emissions.

While the EPA has the authority to set standards for new and existing sources, the agency will have to work closely with state regulators in order to achieve emissions reductions from existing sources. Without proper follow through on its current proposal and forthcoming regulations, EPA will almost certainly find itself on opposite sides of a courtroom with coastal states already affected by climate change. Should the agency be sued by a state or states, precedent suggests that the courts are highly likely to rule against EPA for its inaction on methane regulations. The EPA and the Obama administration are wise to take action to regulate methane now, rather than taking their chances in court.