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MITIGATING AIR EMISSIONS FROM OIL AND GAS PRODUCTION THROUGH BETTER REGULATION AND BMPS

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This white paper is part of a larger body of work in which researchers at Ohio University are examining voluntary best management practices that aim to reduce greenhouse gas emissions from oil and gas production sites across the Northern Appalachian Basin. This work is made possible by Bureau of Land Management-Ohio University cooperative agreement L16AC00190.

Introduction

Unconventional drilling of shale formations is becoming a substantial source of energy in the U.S., especially in the Marcellus and Utica shale regions. As the industry grows, so too does its effect on the environment, local economies and the national U.S. economy. Over the past decades, regulations and guidelines were imposed on the oil and gas industry to mitigate the potential environmental effects that could occur from production, transmission, and distribution operations. However, few federal regulations were in place specifically regarding methane and other greenhouse gas (GHG) emissions released from unconventional resource production (i.e., shale fracking) until 2016. Most have been delayed or postponed due to challenges in court by industry and states.

Because of this regulatory uncertainty, voluntary best management practices (BMPs) in the industry have become resources for creating more economically- and environmentally-palatable outcomes. BMPs are attractive in that they can provide cost savings and better production economics with operational efficiencies that supplement oil and gas regulations mandated by state agencies. BMPs can yield outcomes based upon performance methods that are more market-based, and thus more cost-effective. Select BMPs can also lead to improved environmental conditions for communities within the general vicinity of production.

Current Regulations

The current U.S. EPA regulations on shale production require that certain equipment and methods be used to stay within the legal limits of emissions allowed. These environmental regulations can be found in Title 40 of the Code of Federal Regulations entitled: Protection of Environment. Within Title 40 is the New Source Performance Standard (NSPS) subpart-OOOO Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, including section-60.5402 which states:

> "If, in the Administrator's judgment, an alternative means of emission limitation will achieve a reduction in VOC emissions at least equivalent to the reduction in VOC emissions achieved under any design, equipment, work practice or operational standard, the Administrator will publish, in the Federal Register, a notice permitting the use of that alternative means for the purpose of compliance with that standard. The notice may condition permission on requirements related to the operation and maintenance of the alternative means."

As such, any alternative method that provides equivalent or greater reduced emissions than lawfully required can be implemented if an EPA Administrator's judgement agrees the alternative method will achieve reductions. This clause provides for flexible decision-making by oil and natural gas companies to use BMPs in their production to mitigate emissions and achieve market-based outcomes.

Although unconventional forms of shale gas production including hydraulic fracturing ("fracking") of shale gas reserves are becoming more common, conventional and unconventional methods are widely governed under the same federal policies and regulations which were first enacted or heavily amended in the 1970s. These regulations were originally in place for only conventional oil resources (Kell 2009). Ultimately, the eight governing federal statutes surrounding unconventional oil and gas are as follows:

- Safe Drinking Water Act (SDWA)
- Clean Water Act (CWA)
- Clean Air Act (CAA)
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (Trimble 2012).

Although many of these federal regulations do not directly address unconventional forms of oil and gas extraction, industry must still adhere to the air quality regulations that are in place for conventional oil and natural gas production. Two studies conducted between UC-Davis and Stanford University in conjunction with U.S. Department of Energy's Argonne National Laboratory showed that the level of GHG emissions is similar between traditional crude oil production (conventional) and shale oil production (unconventional) over its lifecycle. However, shale oil production is in fact producing more emissions than it could under augmented regulations (Kunz 2015). For example, as stated by Adam Brandt, lead author of the Bakken (North Dakota) study, "flaring of gas is a key issue in the Bakken, and if flaring were controlled, the Bakken crude would have lower emissions than conventional crude." Because there is little direct policy on unconventional methods of natural gas production, the opportunities for environmental impacts could be much greater than believed, especially because of the flaring of gas (Brandt 2015). Compressor stations raise similar issues of methane releases east of the Mississippi.

More recently in 2016, New Source Performance Standards (NSPS) for the oil and natural gas industry were created specifically to target production and fugitive emissions alike. However, as of 2017, these updated regulations were under review in court and will either be rescinded, postponed, or stayed. The EPA is maintaining great efforts to stay the oil and gas standards for two years, which will heavily limit the initial requirements until these updates can be made. As a result, the monitoring and repair of leaks is the only portion of the requirements that will remain in effect for the duration of the two-year stay, ultimately limiting the effectiveness of the new specific regulations until a later date (USEPA 2017).

Voluntary Practices and Programs

New voluntary programs have come online to facilitate the reduction of emissions from oil and gas production. With increased uncertainty of regulations in the oil and gas industry, it is becoming more acceptable to be a signatory to a voluntary program, and many shareholders now come to expect such action from their production companies. One such program is the Environmental Partnership,[1] a voluntary program comprised of natural gas and oil industry companies working to improve the environmental performance of the industry. This initiative aims to specifically tackle methane emissions and volatile organic compounds (VOCs) by utilizing three voluntary performance programs based on industry experience and known cost-effective methods. The first is to employ better detection equipment for natural gas and oil leaks, including optical gas imaging cameras. The second is the

[1] https://theenvironmentalpartnership.org/

replacement, removal, or retrofitting of high-bleed pneumatic controllers—a major component of emissions in the natural gas and oil industry. It is hoped that low- or zero-emission pneumatic controllers can replace the current controllers to greatly reduce emissions. The third is to implement BMPs regarding the liquid unloading process which would limit the temporary venting of associated gases. The partner companies can select which of the three measures to incorporate into their own policies. The company makes a subsequent commitment to annual reporting on their progress to increase visibility and accountability (Milito 2017). Environmental Partnership participants include such industry majors as Chevron, Shell, Western Gas, Chesapeake Energy, and more. The Environmental Partnership believes that addressing environmental impacts will help maintain the long-term prospects of the natural gas and oil industry.

Another recent industry commitment to lessen environmental impact was announced in the Fall of 2017. A set of "Guiding Principles on Reducing Methane Emissions across the Natural Gas Value Chain"[2] (Guiding Principles) were developed in collaboration with the Environmental Defense Fund, the International Energy Agency (IEA), the International Gas Union, the Oil and Gas Climate Initiative Climate Investments, the Rocky Mountain Institute, the Sustainable Gas Institute, The Energy and Resources Institute, and United Nations Environment. Eight major oil and gas companies signed onto the Guiding Principles including BP, Eni, ExxonMobil, Repsol, Shell, Statoil, Total and Wintershall. The Guiding Principles document binds the signatories to, in part, continue to reduce methane emissions, advocate regulation and policy on methane emissions, transparency in operations, and improved accuracy in methane data collection for use. The Guiding Principles were founded on the idea that minimizing methane emissions is essential to limit the effects of climate change and grow the natural gas industry to meet future energy needs. This is a group that understands the uncertainty of regulations in the industry and as a result, seeks transparency, certainty and consistency in regulation for planning purposes and a stable production market. The initiative presents a great emission reduction opportunity, as Tim Gould, head of the supply division at IEA stated, "the opportunity is considerable—implementing all of the cost-effective methane abatement measures worldwide would have the same effect on long-term climate change as closing all existing coal-fired power plants in China" (Penn Energy Ed. 2017).

[2] http://ccacoalition.org/en/resources/reducing-methane-emissions-across-natural-gas-value-chain-guiding-principles

Incentivizing BMPs

In most business models, cost-effectiveness in production is paramount. However, historic environmental regulations are mainly prescriptive. They do not promote the most profitable method of production to achieve the desired outcome, which in turn makes them less effective (Hasaneen 2017). New BMPs may bridge that gap to provide cost-effective and environmentally-sensitive solutions to companies, fostering an environment where new BMPs will increasingly be used in the future. BMPs also serve to fill the regulatory void in unconventional production seeking a balance between economic, environmental, and public interests. As referenced above, the clause in NSPS Subpart OOOO would allow a company to request an EPA Administrator's judgement on an emission reductions technique or equipment investment that would save them money while additionally achieving more desirable outcomes.

Although BMPs could allow for a lower cost of production, many companies do not want to switch over to a different system due to high upfront hurdle costs of installing new systems and retraining workers on new processes. First hurdle capital costs and lower market derating for production purposes are strong economic disincentives in the short term as oil and gas prices are at historic lows. To avoid this issue in the future, one potential option would be to offer tax incentives or environmental abatement credits to companies that switch to certain BMPs. Higher royalty payments might be made for the first three years of production to recoup verifiable BMP costs and reduce first hurdle barriers. By lessening the burden of the upfront costs by providing higher royalties or tax incentives, it makes the BMP option more economically feasible and therefore more likely to be used (Hasaneen 2017). In the past, this method has been used to stimulate natural gas production. For example, during the natural gas shortages in the 1960s and 1970s, tax incentives were established to encourage finding and producing new forms of natural gas extraction (Wang 2013).

Conclusion

Although there are many reasons a company would voluntarily adopt a BMP, cost-effectiveness and economic viability may be the most prominent. Market-based pricing conditions and incentives are important and likely will augment adoption of BMPs rather than sole reliance on prescriptive regulatory regimes. Regulatory uncertainty within the industry and the financial community is also a strong motivator. Adopting BMPs bridges shifting political tides and regulatory uncertainty, and creates a sense of preparedness and proactive experience. Finally, goals for corporate social and environmental responsibility and wider access to capital sources can drive adoption of BMPs

to mitigate the environmental impacts of oil and gas production. All approaches have the potential to enhance local community support and recognize market-based leadership for these forward-thinking companies.

Works Cited

Brandt A.R., Yeskoo T., Mcnaily S., Vafi K., Cai H., Wang M.Q. (October 15th, 2015). Energy Intensity and Greenhouse Gas Emissions from Crude Oil Production in the Bakken Formation: Input Data and Analysis Methods. Systems Assessment Group, Energy Systems Division, Argonne National Laboratory

Hasaneen Rasha, El-Halwagi (May 2017). Using integrated process and microeconomic analyses to enable effective environmental policy for shale gas in the USA. Clean Techn Environ Policy 19:1775–1789

Kell S (2009) Modern shale gas development in the United States: a primer. U.S. Department of Energy-Office of Fossil Energy, Washington

Kunz, Tona (October 15th, 2015). Analysis shows greenhouse gas emissions similar for shale, crude oil. http://www.anl.gov/articles/analysis-shows-greenhouse-gas-emissions-similar-shale-crude-oil

McKenzie, L.M., Witter, R.Z., Newman, L.S., Adgate, J.L., (2012). Human Health Risk Assessment of air emissions from development of unconventional natural gas resource. Sci. Total Environ. 424, 79-87.

Milito, Erik. Guidry, Greg. Berg, Mark (December 5th, 2017) Launch Press Call Remarks for the Environmental Partnership. http://www.api.org/news-policy-and-issues/testimony-and-speeches/2017/12/04/launch-press-call-environmental-partnership

Moore, C.W., Zielinska, B., Petron, G., Jackson, R., (2014). Air impacts of increased natural gas acquisition, processing, and use: a critical review. Environ. Sci. Technol. 48 (15), 8349-8359

Penn Energy Ed. (November 22nd, 2017) Eight energy companies commit to reduce methane emissions within natural gas industry. http://www.pennenergy.com/articles/pennenergy/2017/11/eight-energy-companies-commit-to-reduce-methane-emissions-within-natural-gas-industry.html

Rawlins, R., (2013) Planning for fracking on the Barnett shale: soil and water contamination concerns, and the role of local government. Environ. Law 44, 135-199.

Trimble David (September 2010). Unconventional Oil and Gas Development Key Environmental and Public Health Requirements. Retrieved from United States Government Accountability Office, http://www.gao.gov/assets/650/647782.pdf

USEPA (2013a) EPA needs to improve Air Emissions Data for the Oil and Natural Gas Production Sector. Report No. 13-P-0161. EPA Office of Inspector General.

USEPA (June 2017) Proposed Stays of Certain Requirements in the 2016 New Source

Performance Standards. https://www.epa.gov/sites/production/files/2017-07/documents/proposed_og_stays_draft_fact_sheet.pdf

Wang Z, Krupnick A (2013) A retrospective review of shale gas development in the United States: what let to the boom? In: R.f.t. Future (ed) Resources for the future. http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-13-12.pdf

Zeiger, Stacy (2017). The Cost Benefit Evaluation and Cost Effectiveness Evaluation Methods. http://smallbusiness.chron.com/cost-benefit-evaluation-cost-effectiveness-evaluation-methods-34485.html