AMIGOS BRAVOS ♦ APPALACHIAN MOUNTAIN CLUB ♦ CALIFORNIANS FOR WESTERN WILDERNESS ♦ CENTER FOR BIOLOGICAL DIVERSITY ♦ CITIZENS FOR A HEALTHY COMMUNITY ♦ CLEAN AIR TASK FORCE ♦ CLEAN WATER ACTION ♦ CONSERVATION COLORADO ♦ DAKOTA RESOURCE COUNCIL ♦ DINE CARE ♦ EARTHJUSTICE ♦ EARTHWORKS ♦ ENVIRONMENT AMERICA ♦ GRAND CANYON TRUST ♦ HECHO – HISPANICS ENJOYING CAMPING, HUNTING AND OUTDOORS ♦ LEAGUE OF CONSERVATION VOTERS ♦ LOS PADRES FORESTWATCH ♦ MONTANA ENVIRONMENTAL INFORMATION CENTER ♦ NATIONAL PARKS AND CONSERVATION ASSOCIATION ♦ NATIONAL WILDLIFE FEDERATION ♦ NATURAL RESOURCES DEFENSE COUNCIL ♦ POWDER RIVER BASIN RESOURCE COUNCIL ♦ SAN JUAN CITIZENS ALLIANCE ♦ SIERRA CLUB ♦ SOUTHERN UTAH WILDERNESS ALLIANCE ♦ U.S.CLIMATE PLAN ♦ UPPER GREEN RIVER ALLIANCE ♦ WESTERN ENVIRONMENTAL LAW CENTER ♦ WESTERN ORGANIZATION OF RESOURCE COUNCILS ♦ WESTERN RESOURCE ADVOCATES ♦ WILDEARTH GUARDIANS ♦ WYOMING OUTDOOR COUNCIL

May 30, 2014

The Honorable Sally Jewell
Secretary
U.S. Department of the Interior
1849 C Street N.W.
Washington, DC 20240

Dear Secretary Jewell,

In March 2014, President Barack Obama issued a Strategy to Reduce Methane Emissions ("Strategy"). The Strategy, implementing a key part of the Administration's March 2013 Climate Action Plan, tasks BLM with modernizing its rules to prevent the waste of methane from the oil and gas supply chain under its purview, primarily upstream production. BLM's responsibilities dovetail nicely with a comprehensive set of methane reduction actions that also include the U.S. Environmental Protection Agency and individual states. These regulatory actions can be coordinated effectively to ensure complementary action to drive the maximum amount of practical and feasible methane emission reductions. The undersigned organizations provide these comments to support and inform that coordinated—and comprehensive—action and focus specifically on BLM's rulemaking to prevent waste.

We do so because effective action regarding methane pollution and waste is essential to achieving the President's goal of reducing greenhouse gas ("GHG") emissions by 17% (using a baseline of 2005) by 2020. More to the point, preventing waste of methane – a climate warming pollutant 86 times more potent than carbon dioxide over a 20-year time period – presents a near-term climate mitigation opportunity to reduce the risk of crossing a 2°C warming threshold and thereby avoid catastrophic climate disruption. Fortunately, methane waste can be prevented or reduced with proven, off-the-shelf technologies. These technologies are often economical, paying for themselves quickly even at today's relatively low natural gas prices. Moreover, these technologies, by increasing the supply of energy that can be sold, increase royalty payments to private mineral owners and to cash-strapped federal and state governments—and the public programs, such as education—that they support.

Put simply, preventing methane pollution and waste achieves a "triple win": first, less methane in the atmosphere means more natural gas to heat our homes, cook our food, and generate electricity; second, less wasted gas means more royalties from natural gas sales for cash-strapped governments and landowners; and third, by reducing the waste of natural gas, we reduce emissions of climate warming methane *and* reduce emissions of other pollutants that degrade local air quality and harm public health.

Relative to BLM's responsibilities, modernizing the agency's waste rules is necessary to comport with the Mineral Leasing Act of 1920. The Mineral Leasing Act requires that the Bureau of Land Management, before granting leases for federally-owned onshore oil and gas resources, ensure that oil and gas producers "use all reasonable precautions to prevent waste of oil or gas developed...." Unfortunately, at present, BLM's outdated, 34-year old waste policies do not effectively prevent waste, as evidenced by the Government Accountability Office's 2010 Report, GAO-11-34, which found that through more robust action BLM could reduce wasteful flaring, leaking, and venting of natural gas by 40%. More recent studies have confirmed that substantial amounts of methane waste can quickly be eliminated at very low cost. Given technological trends, these estimates suggest a pathway towards "zero tolerance" for methane waste and pollution.

This pathway is particularly viable if BLM modernizes its waste policies by harnessing a potent combination of "front-end" planning and management tools with requirements mandating the use of proven, often-cost effective technologies and practices at the "back end" of oil and gas development. BLM's use of its "front-end" planning and management tools also demonstrates how BLM action effectively coordinates with other regulatory action by, e.g., EPA, to drive the maximum amount of practical and feasible methane emission reductions.

These comments are designed to illuminate that pathway for BLM. As background, on January 27, 2014, the signatories to these comments provided BLM with a set of Core Principles. Those Core Principles are incorporated by reference. The undersigned organizations provide these additional comments to build upon our Core Principles and to respond to issues raised at BLM's public forums hosted in Golden, Colorado; Albuquerque, New Mexico; Dickinson, North Dakota; and Washington, D.C. in the Spring of 2014.

We are optimistic that BLM will move forward expeditiously with its rulemaking to curb methane waste and pollution from the development of publicly owned oil and natural gas resources. To inform this process, we welcome the opportunity to discuss our recommendations in more detail.

Sincerely,

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WASTED OIL AND GAS RESOURCES ON FEDERAL LANDS

Comments Submitted To Inform Modernization Of The U.S. Bureau of Land Management's 34-Year-Old Rules

Submitted By:

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May 30, 2014

I. INTRODUCTION

We appreciate the opportunity to provide comments on BLM's rulemaking to prevent methane waste. This rulemaking is a keystone of President Barack Obama's March 2014 Strategy to Reduce Methane Emissions[1] and, more broadly, March 2013 Climate Action Plan. We see great opportunity for BLM to take strong, effective action to secure a triple win: conserved oil and gas resources; increased royalties for federal and state governments to support public programs such as education; and a better safeguarded climate, environment, and public health.

These comments:

- Illuminate a pathway for BLM to secure methane reduction opportunities through a potent combination of "front end" planning and management and "back end" technologies that are proven and often cost effective.

- Augment Core Principles that the signatories to these comments submitted to BLM on January 27, 2014.

- Augment and respond to comments and issues raised during the BLM-hosted public forums conducted in the Spring of 2014.

At the outset, we emphasize that the case for BLM to take effective, immediate action to prevent methane waste has only strengthened since we provided the agency with our Core Principles just a few months ago.

In the wake of President Obama's Strategy to Reduce Methane Emissions, forty-nine members of Congress wrote the administration to express their support for executive action to control methane pollution and waste. *See* Letter from U.S. Congress members to President Obama (May 14, 2014) (attached as Exhibit 1). In addition, several new studies demonstrate that methane pollution and waste from oil and gas development may be significantly higher than "bottom up" estimates calculated by the U.S. Environmental Protection Agency. In particular:

- A peer-reviewed analysis conducted by the National Oceanic and Atmospheric Administration and University of Colorado published in May 2014 found that oil and gas operations in Colorado's Denver-Julesberg Basin leaked nearly three times as much methane as reported to EPA by facility operators in that area, or about 4% of the natural gas produced in the area.[2] This study reinforces concerns raised by a prior 2011 study of the

[1] Available at http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.

[2] Petron, G., *et al*., (2014) "A new look at methane and non-methane hydrocarbon emissions from oil and natural gas operations in the Colorado Denver-Julesburg Basin" *J. Geophys. Res. Atmospheres.* Available online at: http://onlinelibrary.wiley.com/doi/10.1002/2013JD021272/abstract. See also: http://cires.colorado.edu/news/press/2014/airbornemeasurements.html.

Denver-Julesberg Basin by the same authors that found that oil and gas operations lost 2.3-7.7% of all methane to the atmosphere. The authors also found that benzene emissions from oil and gas operations were seven times higher than expected from inventory estimates. While our comments focus on wasteful practices that emit methane, we note this striking result as an example of the detrimental emissions of other substances beyond methane from wasteful oil and gas operations. The measures we discuss below, without exception, would reduce emissions of multiple harmful substances, including benzene, in addition to methane.

- An analysis published in *Science* in February 2014 reviewed almost twenty measurement studies of methane emissions from component level to nationwide. The review found that methane emissions are underestimated by a large amount, with the natural gas and oil sectors as important contributors to the unaccounted-for methane.[3]

- A 2013 study of Utah's Uinta Basin found methane loss rates from 6-12%. [4]

- A 2013 study analyzing air samples collected from tall towers and research aircraft found that oil and gas methane emissions may be fifty-percent higher than EPA estimates.[5]

The evidence all points to methane waste and emissions levels from oil and gas development greater, and perhaps far greater, than estimates generated by EPA's "bottom-up" source counts and emissions factors. Moreover, in the comments below, we provide additional analysis demonstrating that methane emissions in basins such as the Green River, Piceance, San Juan, Uinta—where there are large amounts of federal land and BLM oversight is critical—are disproportionately high, suggesting unacceptably sub-par efforts to prevent methane waste. By exposing serious waste and risks from oil and gas development, in particular from BLM-managed oil and gas resources, this evidence underscores the need for immediate, thoughtful action to reduce methane waste.

The Comments below are divided into seven sections.

Section I: Introduction

Section II: Synthesizes and summarizes our recommendations.

Section III: Recommends that BLM issue immediate guidance to ensure that existing waste policies—though imperfect—are implemented and enforced at the

[3] Brandt, A.R., *et al.* (2014) "Methane Leaks from North American Natural Gas Systems," *Science,* 343, 733. Available online at: https://www.sciencemag.org/content/343/6172/733.summary

[4] http://onlinelibrary.wiley.com/doi/10.1002/grl.50811/abstract

[5] http://www.pnas.org/content/early/2013/11/20/1314392110.abstract

state and field level pending completion of new waste rules.

Section IV: Summarizes the legal basis for BLM action to prevent methane pollution and waste by integrating "front end" planning and management with "back end" technologies.

Section V: Elaborates on ways that BLM should design its new waste rules to take advantage of "front end" planning and management tools to prevent methane pollution and waste.

Section VI: Provides specific comments regarding BLM's use of "back end" technologies to prevent methane pollution and waste.

These comments illuminate a pathway for BLM to maximize methane emission reductions through a potent combination of "front end" planning and management and "back end," technologies that are proven and often cost effective. These comments thus reflect and build upon the Core Principles submitted to BLM on January 27, 2014. These comments also respond to issues raised during the BLM-hosted public forums conducted in the Spring of 2014.

II. SYNTHESIS AND SUMMARY OF RECOMMENDATIONS

Given the complexity of the comments contained herein, we felt that it would be helpful to provide a concise synthesis and summary of our recommendations.

- BLM should craft a new methane waste rule that recognizes that federal onshore oil and gas resources are publicly-owned resources managed in trust for the long-term benefit of the American people.

- BLM should consider an interim directive to prevent methane waste pending a new waste rule to ensure that existing waste rules and policies are implemented and enforced.

- BLM should design its new waste rule to harness a combination of "front end" planning and "back end" technologies as the best means to prevent methane waste.

- BLM should ensure that its new methane waste rule prevents waste from both existing and future oil and gas leases and development.

- BLM should prevent methane waste—and consider the economics of methane waste—at a broad basin or field-level scale to: (a) ensure consistent action across a basin or field; (b) identify basin or field level economic barriers that contribute to methane waste; and (c) to identify opportunities, with good planning and management action, to overcome those barriers.

- BLM's new methane waste rule should mandate that oil and gas lessees and operators prepare "gas capture and marketing plans" before development projects are approved.

- BLM should review "gas capture and marketing plans" to ensure that all reasonable precautions to prevent methane waste have been taken and to ensure conformity with higher-level plans, decisions, and lease stipulations.

- BLM's new methane waste rule—as implemented through planning and management decisions—should provide meaningful, geographically-specific criteria and guidance to BLM's field-level supervisors to ensure effective oversight of oil and gas operations to prevent methane waste.

- BLM's new methane waste rule should impose an absolute, "strict liability" requirement that a lessee or operator obtain prior approval to vent or flare and ensure that documentation of such approval is readily and easily available to the public.

- BLM's new methane waste rule should mandate all reasonable action to prevent methane waste, not just action that oil and gas lessees or operators deem sufficiently profitable.

- BLM's new methane waste rule should ensure, to the degree that economics inform action, that the *total* production of oil and gas is used to gauge what is or is not economic.

- BLM's new methane waste rule should consider the true and full costs involved in oil and gas development, not just the narrow costs projected or incurred by oil and gas lessees or operators. This includes the costs that methane waste imposes on the climate, public health, water, wildlife, and other resources and values.

- BLM's new methane waste rule should consider abandoning the distinction between "avoidably" and "unavoidably" lost gas in favor of a distinction premised on whether oil and gas development is at the exploratory, delineation, or production stage

- BLM's new methane waste rule should identify situations where methane waste is "undue" and development, absent mitigation, should be prohibited.

- BLM's new methane waste rule should charge royalties on all lost and wasted gas, including, to the degree the distinction is preserved, an effective royalty rate of 100% on all "avoidably" lost or wasted methane.

- BLM's new methane waste rule should incorporate enhanced penalty provisions that would provide for the cancellation or suspension of leases, and a prohibition against the acquisition of new leases, for repeated or egregious waste.

- BLM's new methane waste rule should identify what elements of the new waste rule, if violated, would constitute a "major" versus "minor" violation as defined in 43 C.F.R. § 3160.0-5.

- BLM's new methane waste rule should strengthen remedies and civil penalties provisions in 43 C.F.R. § 3163.1 and § 3163.2. Core Principles at 30.

- BLM's new methane waste rule should consider higher national minimum acceptable bids to better encourage more efficient use of existing leases rather than the acquisition of new leases.

- BLM's new methane waste rule should be coordinated with other agency authorities and responsibilities, such as duties to protect water, wildlife, and other resources to best identify mutually reinforcing measures to prevent methane waste and protect the environment.

- BLM's new methane waste rule should use the agency's existing planning and management framework to:

    - Identify criteria or circumstances where the waste of methane is "undue" and, accordingly, where development should be prohibited unless and until action is taken to constrain methane waste within acceptable limits.

    - Impose controls on the timing, pace, and location of development—i.e., "phased development."

    - Provide that methane must be marketed, not just captured by synchronizing upstream production operations with midstream gathering, compression, and processing capacity.

    - Require that that oil and gas lessees and operators submit "gas capture and marketing plans" to inform drilling-stage planning and management decisions.

- BLM's new methane waste rule should mandate that oil and gas lessees and operators use a minimum set of technologies—to be expanded upon and refined as the agency works through its planning and management framework—to prevent methane waste including:

    - Leak Detection and Repair: BLM must require operators to control leaks by regularly conducting instrument-based Leak Detection and Repair surveys and timely repair of leaks that are discovered.
    - Liquids Unloading: BLM must require operators to utilize technologies to eliminate or reduce wasteful venting; if operators claim that doing so is infeasible for particular wells, they must supply specific information that demonstrates this to BLM, and BLM must describe quantitative criteria that it will use to evaluate any such claims.

- Natural Gas-Driven Pneumatic Equipment. BLM must not allow existing high-bleed controllers to continue wasteful, excessive venting on well pads and compressor stations subject to BLM jurisdiction, and BLM must also consider measures to limit emissions from intermittent-bleed controllers.
- Compressors: For reciprocating compressors, BLM must extend the NSPS Subpart OOOO requirement for regular replacement of rod packing seals to existing compressors, for centrifugal compressors BLM must address wasteful emissions from wet-seals by requiring replacement with dry seals or retrofitting with oil degassing units and routing to a vapor recovery unit.
- Venting and Flaring of Gas From Oil Wells: BLM must address waste in its resource planning and require and participate in planning by oil and gas producers and midstream companies to ensure that adequate infrastructure is in place before wells are completed so all natural gas produced is utilized and flaring and venting of associated gas, an inherently wasteful practice, is ended. Reduced emissions completions for oil wells with hydraulic fracturing must be required. In addition to traditional gas gathering systems, BLM and operators should consider the use of alternative approaches to utilize or transport associated gas, such as recovering natural gas liquids, compressing gas in the field for transporting to markets, and generating electric power for powering field equipment or for sale to the grid.

III. BLM SHOULD CONSIDER AN INTERIM DIRECTIVE TO PREVENT METHANE WASTE PENDING A NEW WASTE RULE

In our January 27, 2014 Core Principles, we recommended that BLM issue an interim directive by July 1, 2014 to ensure that NTL 4A and associated existing waste rules and policies are fully implemented and enforced pending completion of new methane waste rules. We reiterate that recommendation here.

While BLM's existing waste prevention rules and policies are imperfect, they must still be fully implemented and enforced to minimize near-term methane waste from the nearly 12.5 million acres of federal oil and gas resources already under production and from pending leasing and drilling proposals. Today, methane is being wasted due to the lack of effective BLM oversight and sloppy drilling practices by industry, and BLM has the authority and responsibility—*right now*—to do something about it by ensuring that existing waste prevention rules and policies are fully implemented and enforced. Taking near-term action to prevent methane waste will also help BLM build credibility with all stakeholders, identify issues and opportunities pertinent to BLM's rulemaking process, and help speed the learning curve for BLM state and field offices that will be charged with implementing and enforcing new methane waste rules.

If BLM does not ensure the implementation and enforcement of existing waste rules and policies, in particular through planning and management decisions, BLM's oil and gas management decisions will be vulnerable to challenge as arbitrary and capricious. 5 U.S.C. § 706(2). While some BLM field offices are to be applauded for taking action—such as the Tres

Rios Field Office in Colorado—others are not taking *any* action, period, to prevent methane waste. For example, the Vernal Field Office in Utah is considering the massive 5,700-well "Monument Buttes" drilling project in Utah's Uintah Basin but is not considering measures to prevent methane waste. Numerous RMPs are in the process of being rewritten, and many current drafts propose taking action to prevent methane waste, including the Buffalo Field Office RMP, which envisions 15,000 new oil and gas wells, including 3,865 new shale oil wells that often have high rates of flaring. Failure to address methane in planning—as well as the high degree of inconsistency between field offices—is unacceptable and inconsistent with BLM's statutory duties.

We therefore direct your attention to Core Principle No. 2, where we explained that an interim directive should:

(a) Underscore BLM's existing authority, responsibility, and opportunity to prevent natural gas waste as per the MLA, the MLA's implementing rules, and NTL 4A;

(b) Require that BLM Field Offices address waste through oil and gas-related planning and decision-making processes;

(c) Signal to lessees and operators that they must reduce vented, flared and leaked methane and significantly step up methane waste prevention efforts; and

(d) Encourage Field Offices to mandate the use of specific technologies and management practices to prevent waste in their planning, leasing, and permitting activities.

Core Principles at 18-19. Regarding (a)—BLM's existing waste policies—we emphasized, and emphasize again, the need for much better implementation and enforcement of NTL 4A, specifically NTL-4A's:

- Section I provisions, in the context of Section II's definitions, regarding oversight and approval of well venting, flaring, and leaks throughout the natural gas supply chain.

- Section III(B) and III(c) limits on "short-term" venting or flaring during well purging, well evaluation, and initial production tests.

- Section IV(A) and IV(B) limits on venting and flaring, including prohibitions against venting or flaring, except as provided by Sections II(C) and III or as explicitly authorized by the "Supervisor" in Section IV(B) for oil well gas. This includes Section IV(B)'s requirement that a lessee or operator to submit an "action plan" that "will eliminate venting or flaring of the gas within 1 year from the date of the application," and meaningful review of that application by the "Supervisor" to determine whether venting or flaring is "justified."

- Section V tracking and reporting of avoidable and unavoidable losses of gas, including making this information more easily available to the public.

- Section VI computation and enforcement of royalty due when the "Supervisor" determines that gas is lost due to lessee or operator negligence or failure to take all reasonable measures to prevent or control methane losses.

IV. BLM SHOULD EXERCISE ITS EXPANSIVE AUTHORITY AND RESPONSIBILITY TO PREVENT METHANE WASTE THROUGH A COMBINATION OF "FRONT END" PLANNING AND MANAGEMENT AND "BACK END" TECHNOLOGIES

BLM's duty to prevent waste is expansive: "[a]ll leases of lands containing oil or gas ... shall be subject to the condition that the lessee will, in conducting his explorations and mining operations, use all reasonable precautions to prevent waste of oil or gas developed in the land...." 30 U.S.C. § 225; *see also* 30 U.S.C. § 187 ("Each lease shall contain...a provision...for the prevention of undue waste...."). BLM is also required "to promote the orderly and efficient exploration, development and production of oil and gas." 43 C.F.R. § 3160.0-4. As the MLA's legislative history teaches, "conservation through control was the dominant theme of the debates." *Boesche v. Udall*, 373 U.S. 472, 481 (1963) (citing H.R.Rep. No. 398, 66th Cong., 1st Sess. 12-13; H.R.Rep. No. 1138, 65th Cong., 3d Sess. 19 ("The legislation provided for herein...will [help] prevent waste and other lax methods....")).

The MLA's mandates empower the agency to craft a new methane waste rule that harnesses a potent combination of "front-end" planning and management with "back-end" methane reduction technologies to drive the maximum amount of methane pollution and waste reductions.[6] In the aggregate, this legal framework underscores six key points. In understanding these key points, we underscore the fact that they apply to both existing and future leases and development, as we explained in our Core Principles.[7]

A. BLM Should Prevent Methane Waste At The Basin Or Field Level Through The Agency's Existing Planning and Management Framework

BLM has a duty to prevent methane waste at a broad basin or field-level scale. This reflects the MLA's plain language while furthering BLM's responsibility to manage public lands and resources in accord with the spirit and intent of the Federal Land Policy and Management Act

[6] By "front end" we mean BLM's basic obligation to plan for, manage, and review the impacts of proposed actions *before* leases are executed and development projects approved. By "back end" we mean the application of specific technologies or practices to specific oil and gas development projects *after* BLM has determined the general timing, pace, and location of development projects and at the point lessees and operators are developing specific drilling projects. "Back end" technologies can, of course, be mandated in advance of those projects and imposed either by rule, plan, lease stipulation, or condition of approval.

[7] Core Principles at 22-23 (Core Principle No. 4).

("FLPMA") and, specifically, with Resource Management Plans ("RMPs"). 43 U.S.C. §§ 1701, 1712. Fixating on site-specific oil and gas development proposals—such as individual applications for permits ("APDs") to drill—to the exclusion of basin and field level development plans and action is contrary to BLM's authority and responsibility to take "all reasonable precautions to prevent waste of oil and gas" 30 U.S.C. § 225, and "to promote the orderly and efficient exploration, development, and production of oil and gas." 43 C.F.R. § 3160.0-4.

Indeed, BLM's oil and gas planning and management framework—from RMPs and geographically-specific Master Leasing Plans ("MLPs"), through lease execution and unitization, on down to master development plans ("MDPs") (sometimes referred to as "Plans of Development") and ultimately to APD approvals—is presumably designed "to promote orderly and efficient" oil and gas activity at the basin and field level, ensuring that site-specific activity, such as APDs, are only approved in accord with broader basin or field level plans. This also facilitates BLM addressing environmental impacts through sequentially tiered reviews, ensuring that the agency focuses on the most important issues at the most relevant geographic and decision-making scales.

Integrating waste prevention into this framework is thus pragmatic, making use of existing agency tools and assuaging risk that lax regulatory oversight may operate to passively acquiesce or contribute to methane waste. It also comports with an axiom of administrative law: that an agency, to pass muster under the arbitrary and capricious standard, must articulate "a rational connection between facts found and conclusions made." *W. Watersheds Project v. Kraayenbrink*, 632 F.3d 472, 481 (9th Cir. 2011); 5 U.S.C. § 706(2)(A), (D). Integrating waste prevention into the planning and management framework gives BLM the ability to provide the requisite "rational connection" and thereby support a finding that the agency—and oil and gas lessees and operators—have taken all "reasonable precautions" to prevent methane waste and reconcile any tensions with other resource areas that may arise. 5 U.S.C. § 706(2)(A), (D); 30 U.S.C. § 225.

As detailed in section V below, and to improve the efficacy of BLM's planning and management framework, BLM's methane waste rule should also mandate that oil and gas lessees and operators prepare "gas capture and marketing plans" governing exploration, delineation, and production operations consistent with RMPs, MLPs, and lease stipulations. These "gas capture and marketing plans" must necessarily conform to RMPs, MLPs, and lease stipulations, would be subject to additional conditions of approval imposed by BLM, and would be approved by BLM before any drilling operations are approved and could commence.

Our recommendations regarding planning and decision-making underscore why we are frankly troubled by BLM's presentations at the public forums in the Spring of 2014. BLM was clear that no proposal was on the table and that the public forums were being held with the express purpose of soliciting public input before such proposals were formally crafted and released for review. Nonetheless, BLM's presentations did suggest the agency's basic direction regarding how a proposed waste rule would be structured.

BLM identified particular sources of methane waste (e.g., "liquids unloading," "casinghead and associated gases," "storage vessel/tank emissions"); articulated current BLM policy that addressed that particular source; and provided potential options to better prevent waste from that source. Absent from the presentation was any sense of how BLM's efforts to prevent waste would be integrated with the agency's state and field office-level "front-end" planning and management framework. This is a serious problem. It is not enough to state that site-specific oil and gas development projects necessarily conform to higher level plans and decisions if such plans and decisions do not integrate waste mitigation measures; such conformity must be affirmatively demonstrated in the record for those site-specific decisions and drilling approvals, e.g., for APDs. *W. Watersheds Project*, 632 F.3d 472, 481; 5 U.S.C. § 706(2)(A), (D).

It bears to remember that NTL-4A—as concluded by the Government Accountability Office's 2010 report (GAO-11-34)—is poorly implemented and enforced. In large part this is precisely because the agency's efforts to prevent waste are segregated from the agency's front-end planning and management framework and, therefore, often forgotten by BLM's state and field office personnel as they go about their day-to-day management of the oil and gas resource. To the degree NTL-4A is implemented and enforced, BLM appears to only do so *after* RMPs and MLPs are completed, *after* leases executed, *after* unitization agreements put in place, *after* MDPs and APDs crafted and approved, and *after* wells are drilled. Absent specific direction set in place by RMP and MLP measures, specific stipulations, specific unitization measures, and MDP and APD level COAs, methane waste is simply not foremost in—and is often absent from—state and field personnel's minds. Thus, BLM fails to take advantage of critical points to plan for, manage, and prevent methane waste. This segregation not only results in BLM passively acquiescing or contributing to methane waste, but also undermines the transparency, accountability, and credibility of BLM's decisions.

These problems are exacerbated by the fact that existing BLM waste rules and policies do not provide meaningful criteria or guidance to BLM's field-level supervisors. This undermines the supervisor's authority, rendering the supervisor vulnerable to pressure from oil and gas lessees and operators who are not inclined, as a matter of expediency, to change development plans to accommodate methane prevention actions that were not vetted through and required in advance by BLM's planning and management framework.

B. BLM Should Impose An Absolute Requirement That Prior Approval Be Obtained To Vent Or Flare Methane

The MLA requires a clear and strong framework to implement methane waste prevention efforts. BLM should therefore impose an absolute requirement that a lessee or operator obtain prior approval to vent or flare (except in cases where venting or flaring is necessary for safety purposes), and ensure that documentation of such approval is readily and easily available to the public. Such prior approval, which should be limited to circumstances discussed below in Section VI, will help ensure conformity to BLM plans and management decisions, including lease stipulations.

Where prior approval is not obtained, and venting or flaring is not otherwise allowed, vented or flared gas would be automatically categorized, regardless of economics or other rationales, as "lost or wasted" gas for purposes of royalties and any other consequences. Current BLM policy— which we understand to be articulated in Instruction Memoranda 87-652 and 92-91 – that effectively allows oil and gas lessees to flaunt BLM authority by not seeking prior approval for venting and flaring, and imposes a far too heavy burden on BLM to demonstrate that a lessee or operator has caused waste, should be abandoned. Imposing an absolute requirement to obtain prior approval to vent or flare—to the degree that venting or flaring is even allowed—is consistent with proven permitting systems, such as the Clean Water Act's National Pollution Discharge Emission System permit system, which impose strict liability on entities that fail to get required permits. *See* 33 U.S.C. §§ 1311(a), 1342.

C. BLM's Authority And Responsibility To Prevent Waste Is Not Constrained By Measures That Are Cost-Effective To A Particular Lessee Or Operator

BLM's authority and responsibility to prevent methane waste—as provided by the MLA and reinforced by the Federal Land Policy and Management Act ("FLPMA")—is not delimited by what is cost-effective (i.e., has net negative costs) for a particular oil and gas lessee or operator. The MLA instead mandates that "*all reasonable* precautions to prevent waste" are taken, not just those precautions that oil and gas lessees or operators deem sufficiently profitable. 30 U.S.C. § 225 (emphasis added). This authority and responsibility is expansive, compelling action to prevent waste even where it would cause oil and gas companies to incur net positive costs or, even, where it would forbid development pending satisfaction of certain conditions imposed on drilling authorizations.

The MLA and FLPMA impose a framework mandating that BLM manage the publicly owned oil and gas resource in trust for the long-term benefit of the American people, a duty that overrides the narrow economic interests of oil and gas lessees and operators. This framework is distinct from the one used by lessees and operators in the context of privately owned oil and gas resources or in their own financial assessments. Indeed, the hurdle rates that oil and gas producers apply to risk-adjusted returns on investment may be orders of magnitude higher than the returns appropriate for development of public resources.

Economics are, of course, a relevant (though not dispositive) factor in gauging the propriety of particular waste prevention actions. However, such analyses should be completed at the basin or field level, not at an individual facility. As discussed in more detail below in Section VI, there are, of course, myriad methane reduction technologies—proven by industry itself—that are, in fact, quite cost effective for oil and gas lessees and operators and provide a payback on up-front capital investments in very short time periods (e.g., under a year).[8] However, basin or field level economic analysis provides a reasoned and informed basis for consistent methane

[8] *See*, *e.g.*, EPA Natural Gas STAR Recommended Technologies and Practices (breaking down estimated payback period for methane reduction actions) (http://www.epa.gov/gasstar/tools/recommended.html).

waste prevention action across a particular basin or field. It also provides a reasoned and informed basis for identifying basin or field level economic barriers that contribute to methane waste—as well as opportunities, with good planning and management action, to identify economies of scale and to overcome those barriers (economies and opportunities that may not be apparent at the MDP or APD level).

The basin or field level scale also best ensures that BLM, in assessing the economics of waste prevention action, considers—consistent with current NTL-4A policy—the *total* production of oil and gas in gauging what is or is not economic (rather than considering the oil or gas resource individually and in isolation). Put differently, BLM should ensure that profits from oil and natural gas liquids sales, as well as natural gas sales, are considered in the aggregate to gauge the economic viability of methane capture and marketing measures. BLM should not allow lessees and operators to gauge the economic viability of methane capture and marketing by looking at only well-level production in isolation. By considering total production—at the basin and field level—BLM furthers existing rules to ensure the "the maximum ultimate recovery of oil and gas with minimum waste and with minimum adverse effect on the ultimate recovery of other mineral resources." 43 C.F.R. § 3161.2. We therefore support the spirit of BLM's presentation, as we understand it and with the caveats and recommendations provided herein, to use total oil and gas production and "[f]ield-wide economics for gas capture and transportation regardless of operator." Presentation at Slide 15.

The use of economics to gauge the propriety and efficacy of methane waste prevention action must, furthermore, consider the true and full costs involved in oil and gas development, not just the narrow costs projected or incurred by oil and gas lessees or operators. BLM should, as we explained in our Core Principles, therefore ensure that economics to gauge action to prevent methane waste consider the total cost to the public of wasting methane production on public lands, including the costs to nonmarket resources such as water, public health, and wildlife.[9] BLM should also consider economics with an eye towards optimizing the long-term value of oil and gas resources—and the lands and resources that overlie those resources—to the public.

Economic quantification of the true and full costs of development—with an eye on long-term value to the publicly owned oil and gas resources—provides important data to evaluate what are or are not "reasonable precautions" to prevent methane waste. 30 U.S.C. § 225. This not only furthers the MLA's prohibition against waste, but also harmonizes BLM's efforts to prevent waste with the agency's core mandates to manage for multiple use and the broad public interest. Such quantification also ensures that economics, to the degree it is appropriately considered in agency decisions, does not falsely and arbitrarily assume that the costs of oil and gas leasing and drilling to the atmosphere and other non-market resources, like water, public health, and wildlife, are zero.

[9] *See* Core Principles at 27-29 (Core Principle No. 8); BLM, Instruction Memorandum No. 2013-131 (Guidance on Estimating Nonmarket Environmental Values).

Support for consideration of the true and full costs of development is found in FLPMA's plain language. FLPMA explicitly provides that BLM must manage the public lands not simply as a resource for exploitation, but:

> in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, *air and atmospheric*, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition, that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.

43 U.S.C. § 1701(a)(8) (emphasis added). BLM must also manage the oil and gas resource to "best meet the present and future needs of the American people" and ensure that management of the oil and gas resource "takes into account the long-term needs of future generations for…non-renewable resources, including….minerals." 43 C.F.R. § 1702(c). Furthering these objectives, RMPs must, *inter alia*, specifically "use and observe the principles of multiple use and sustained yield," "consider present and potential uses of the public lands," and "weigh long-term benefits to the public against short-term benefits." 43 U.S.C. §§ 1712(c)(1), (5), (7). Inherent in this framework is identifying, in the words of Gifford Pinchot, who laid the philosophical basis for multiple use, "the greatest good for the greatest number in the long run."[10]

Additional support for this approach to economic analysis is found in the National Environmental Policy Act ("NEPA"). NEPA mandates that BLM take a hard look at the direct, indirect, and cumulative impacts of actions on the "human environment." 40 C.F.R. §§ 1502.16(a), (b); 1508.25(c). Methane waste causes a variety of impacts to the "human environment": the loss of oil and gas resource itself, climate impacts, public health impacts, increased pressure to lease and drill additional lands to meet demand for oil and gas, etc. NEPA also specifically mandates that BLM address, as part of the required hard look, "[e]nergy requirements and conservation potential of various alternatives and mitigation measures," "[n]atural or depletable resource requirements and conservation potential of various alternatives and mitigation measures," and "[m]eans to mitigate adverse environmental impacts (if not fully covered under 1502.14(f))." 40 C.F.R. §§ 1502.16(e), (f), (h). This hard look, in turn, informs BLMs consideration of alternatives, helping the agency "sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decision maker and the public." 40 C.F.R. § 1502.14. In completing NEPA analyses, BLM routinely completes an analysis of economic impacts, and this analysis would be dramatically improved if BLM addressed the true and full costs of agency action—not just costs to lessees or operators. Indeed, we submit that economic analyses that fail to consider the true and full costs of methane waste (and oil and gas development in general) are arbitrary and capricious, falsely assuming, as noted above,

[10] http://www.eoearth.org/view/article/155245/

that the costs of oil and gas leasing and drilling to the atmosphere and other non-market resources, like water, public health, and wildlife, are zero. 5 U.S.C. §§ 706(2)(A), (D).

D. BLM Should Prevent Waste Based On Distinctions Between Exploration, Delineation, And Production Stages

BLM's expansive authority and responsibility to prevent methane waste allows it to use far stronger remedial measures and, more broadly, to rethink the basic structure governing how methane waste is prevented. In our January 27, 2014 Core Principles, specifically Core Principle No. 9, we identified several options.[11] In particular, we suggested that BLM charge royalties for *all* lost oil and gas, not simply oil and gas that is "avoidably" (versus "unavoidably") lost.

As an initial matter, we are troubled by the distinction that BLM makes between "avoidably" and "unavoidably" lost gas because it does not reflect how oil and gas development proceeds on the landscape. We recommend that BLM therefore consider whether this distinction should be abandoned in favor of a distinction premised on whether oil and gas development is at the exploratory, delineation, or production stage. In general, the intensity and scale of oil and gas development is lower at the exploratory stage. The intensity and scale increases through the delineation and, ultimately, the production stages. At each stage, the engineering and economic dimensions of methane waste prevention are different. Crafting a rule that reflects this progression is therefore practical, allowing the agency to tailor waste prevention actions to each stage of the development process. Further, it bolsters BLM's authority and responsibility to prohibit development where such development would cause undue waste or impacts. 30 U.S.C. § 187; 43 U.S.C. § 1732(b). This authority and responsibility is not clearly apparent in NTL-4A, which only keys in on whether oil or gas is "avoidably" or "unavoidably" lost or wasted—i.e., whether the loss or waste of oil or gas was "unnecessary" or "necessary" (not whether it is "undue").

Venting and flaring should, of course, be minimized if not prevented at every stage of the development process. However, we recognize that, given the more limited intensity and scale of development, there may be engineering, economic, or other limitations making this difficult at the exploratory or delineation stages. We are emphatic, however, that once development gets to the production stage, anything that results in waste from venting and flaring at levels above those represented by the solutions discussed in Section VI – which represent what we believe constitutes the bare minimum of "reasonable precautions"--should be flatly prohibited as causing 'undue' waste. Accordingly, at the production stage, oil and gas lessees and operators should capture and market all recoverable methane as allowed by such solutions. If oil and gas lessees and operators cannot capture and market the methane by using the solutions, then production-stage operations should not be approved and development should

[11] Core Principles at 29-31.

be deferred until such "reasonable precautions" will be used.[12] Preventing "undue" waste in this fashion reflects and is supported by the principle, in accord with the MLA and FLPMA, that the natural gas resource is a publicly owned resource managed in trust for the long-term benefit of the American people.

That said, if BLM decides to retain the distinction between "avoidably" and "unavoidably" lost oil and gas, or layers that distinction on a more practical set of rules that distinguish between the exploration, delineation, and production phases, we ask that BLM explicitly build into its rule a provision empowering it to prohibit "undue" waste, for example, and most egregiously, the flaring of associated gas from oil wells. 30 U.S.C. § 187; 43 U.S.C. § 1732(b). We recommend that the mitigation measures discussed below in Section VI serve as minimum distinctions between undue (avoidable) and unavoidable waste.

We also refer you to our Core Principles, specifically Core Principle No. 9.[13] There, we explained that, by not charging royalties on "unavoidably" lost methane, BLM improperly shifts (i.e., externalizes) a cost of production onto the shoulders of the American public in the form of the lost natural gas resource and lost natural gas sale royalties.[14] If BLM, as we recommended in our Core Principles and recommend here, charges royalties on all lost oil and gas, we explained that it would internalize that cost and thereby create a (modest) disincentive for lessees and operators to waste natural gas.[15]

Charging royalties on all lost or wasted gas, whether such loss was avoidable or unavoidable, is supported by the plain language of the MLA, which forbids waste and authorizes the levy of royalties. 30 U.S.C. §§ 187, 225. It is also authorized—if not compelled—by the Federal Oil & Gas Royalty Management Act of 1982 which broadly states that "[a]ny lessee is liable for royalty payments on oil or gas lost or wasted from a lease site when such loss or waste is due to negligence on the part of the operator of the lease, or due to the failure to comply with any rule or regulation, order or citation issued under this chapter or any mineral leasing law." 30 U.S.C. § 1756. This language provides that BLM levy royalties for oil and gas "lost or wasted" without distinguishing between oil and gas that is avoidably or unavoidably "lost or wasted." *Id*.

While it has been BLM policy and practice to waive royalties for unavoidably lost oil and gas, it should be quite apparent—*see*, *e.g*., GAO-11-34—that such policy and practice effectively

[12] This can be furthered through effective front-end planning and management, which, incidentally, addresses concerns regarding lessee surface use rights. 43 C.F.R. § 3101.1-2. For example, lease terms can be extended where leases are part of a unitized field (43 C.F.R. § 3107.3-1) or where suspended "in the interest of conservation of resources…." (30 U.S.C. § 209; 43 C.F.R. § 3135.2).

[13] Core Principles at 29-31.

[14] *Id*.

[15] *Id*.

subsidizes oil and gas drilling practices (including sloppy practices); fails to accommodate current conditions, changed circumstances, and new science; and does not prevent methane waste. Accordingly, it should be abandoned and BLM's new methane waste rule should charge royalties for *all* lost or wasted oil.

BLM, notably, is not bound by prior policy or practice, even if oil and gas lessees have relied on such policy and practice in acquiring or investing in leases. As the Supreme Court teaches, "[e]ven with respect to vested property rights, a legislature generally has the power to impose new regulatory constraints on the way in which those rights are used, or to condition their continued retention on performance."[16] *U.S. v. Locke*, 471 U.S. 84, 104 (1985). That legislative power extends to BLM's authority to revise and promulgate rules in accord with such legislative power, in particular where such authority is designed to prevent the waste of publicly owned oil and gas resources held in trust for the American people. 30 U.S.C. § 189 ("The Secretary of the Interior is authorized to prescribe necessary and proper rules and regulations and to do any and all things necessary to carry out and accomplish the purposes of this chapter…"). Thus, so long as BLM promulgates a methane waste rule that is consistent with the MLA's expansive authority and mandate to prevent waste, lessees cannot complain of new requirements even where such requirements alter how the lessee may exercise their surface use rights.

In our Core Principles, we also recommended, and recommend herein, that BLM—to the degree it retains the distinction—institute strict standards concerning what loss is truly unavoidable and differentiate between avoidably and unavoidably lost natural gas by setting distinct royalty rates for each. Only loss that literally cannot and could not have been prevented should be royalty free – and the BLM should define this exemption in the narrowest sense. We also recommend that BLM increase the royalty rate for calculating compensation due for avoidably lost oil and gas. *See* Core Principles, No. 9, at 30. We did not, however, specify a particular royalty rate. *Id*.

Upon review, we suggest that BLM set an effective royalty rate of 100 percent for undue waste. Charging a 100 percent royalty rate: (1) better disincentivizes waste; (2) ensures a full and fair return to the American public for the loss of publicly-owned domestic energy resources; and (3) best ensures that oil and gas lessees do not treat the atmosphere like a waste dump by unnecessarily wasting oil and gas. The MLA, notably, only sets a floor—*not* a ceiling—for royalty rates, empowering BLM to charge a 100% royalty rate on avoidably lost oil and gas. 30 U.S.C. § 226(b)(1)(A) (providing that royalties be set "at a rate of not less than 12.5 percent in amount

[16] While lease rights may convey property rights, leases do not convey an absolute right to develop and, further, the proper vehicle for a lessee to protect such rights is not a takings action but, rather, a contract action. *See*, *e.g.*, *Castle v. U.S.*, 301 F.3d 1328, 1342 (Fed Cir. 2002). Given the MLA's expansive prohibition against waste, which lessees were clearly aware of when they acquired their leases, potential claims that BLM would breach a lessee's surface use rights (43 C.F.R. 3101.1-2) if it applied a new waste rule to existing leases are, while necessitating contextual analysis, likely to fail. *See* 30 U.S.C. § 189; *Boesche v. Udall*, 373 U.S. 472, 477-78 (1963) (explaining that "Congress under the [MLA] has…subjected the lease to exacting restrictions and continuing supervision by the Secretary…In short, a mineral lease does not give the lessee anything approaching the full ownership of a fee patentee, nor does it convey an unencumbered estate in the minerals).

or value of the production removed or sold from the lease"); 43 U.S.C. § 1701(a)(9) (providing that it is U.S. policy to "receive fair market value of the use of the public lands and their resources….")

Beyond royalties, BLM should also consider a complementary set of measures including:

- Enhanced penalty provisions that would provide for the cancellation or suspension of leases, and a prohibition against the acquisition of new leases, for repeated or egregious waste;

- Identification of what elements of the new waste rule, if violated, would constitute a "major" versus "minor" violation as defined in 43 C.F.R. § 3160.0-5; and:

- Strengthened remedies and civil penalties provisions in 43 C.F.R. § 3163.1 and § 3163.2. Core Principles at 30.

BLM should also consider higher national minimum acceptable bids to better encourage optimization of existing leases rather than the acquisition of new leases. *See* 30 U.S.C. § 226(b)1)(B) (providing authority to Secretary to raise minimum bids "based upon a finding that such action is necessary: (i) to enhance financial returns to the United States; and (ii) to promote more efficient management of oil and gas resources on Federal lands"). There is, as we noted in our Core Principles, a significant disconnect between the acreage leased by BLM for oil and gas—nearly 38 million acres as per BLM Public Lands Statistics—and the acreage actually in production—12.5 million acres.[17] Finally, while adoption of these measures will provide a strong signal that BLM is striving for zero tolerance toward methane waste, they are not a substitute for BLM's "front-end" planning obligations or the methane capture technologies and practices we view as the primary mechanisms to reduce methane waste in the revised waste rule.

E. BLM Must Ensure That It Fulfills Its Authority And Responsibility To Prevent Waste By Promulgating, Implementing, And Enforcing A New Waste Rule

BLM's authority and responsibility is distinct from the authority and responsibility of other regulatory agencies, and cannot be shunted aside pending action by other agencies, whether at the federal or state level. As should be evident from our comments, we see a great opportunity for BLM to work in concert with other federal and state regulators to ensure the maximum amount of methane emission reductions and welcome the ongoing interagency coordination regarding methane set in motion by the White House through its Climate Action Plan.

BLM is in the distinctive position to prevent waste by using its planning and management authorities to control the timing, location, and pace of development. While BLM certainly has the authority to protect air quality and, therefore, to complement whatever action EPA or state

[17] Core Principles at 22, 31.

air quality regulatory authorities requires, the agency's ability to actually plan for and manage the oil and gas resource—versus simply regulating its pollution within acceptable levels—is a powerful, chronically underused tool to prevent waste. By governing how oil and gas development proceeds, BLM's distinctive planning and management authorities can also help overcome existing economic barriers to methane reduction action by sparking investment in upstream methane capture (e.g., green completions, low-bleed pneumatics, leak detection and repair) and midstream methane marketing (gathering lines, compressor power, and processing capacity) infrastructure.

BLM can also serve a critical role by filling gaps left by other regulatory agencies. For example, EPA's 2012 New Source Performance Standards for oil and gas did not control for methane emissions directly, failed to apply to existing oil and gas infrastructure, and did not cover oil production. While EPA has more recently released a set of "white papers" for review and comment, EPA has not committed to any actual rulemaking that would fill these gaps.[18] Even if they had, EPA rules would not obviate or weaken the imperative for BLM action. BLM has the authority to impose additional technological requirements above and beyond what EPA would require to account for site-specific conditions and comply with the BLM's independent duty to prevent waste as well as its broad duty to protect "air and atmospheric" resources. 43 U.S.C. § 1701(a)(8).

Emerging state-level rulemakings also have major gaps, namely because they do not cover all BLM lands or methane waste sources. Instead, state-level rulemakings cover, by definition, only the state in question; differ in scope and efficacy from BLM's authorities and responsibilities; and do not reflect that federal oil and gas resources should be subject to the highest standards given that these resources are held in trust for the long-term benefit of the American people.

F. BLM's Authority And Responsibility To Prevent Waste Is Complemented By Authorities And Responsibilities To Protect The Environment And Public Health

BLM's authority and responsibility to prevent methane waste in accord with the MLA and FLPMA is complemented by myriad other authorities and responsibilities that we spelled out in our January 27, 2014 Core Principles.[19] These additional authorities and responsibilities reinforce our call for BLM to integrate its waste prevention efforts into the agency's front-end planning and management framework given the obvious overlap between efforts to prevent methane waste and efforts to protect the environment, in particular the climate. By considering these authorities and responsibilities in a coordinated fashion, BLM can best identify mutually reinforcing measures to minimize methane waste in a way that benefits our economy *and* environment. We emphasize, here, the following authorities and responsibilities:

[18] http://www.epa.gov/airquality/oilandgas/whitepapers.html

[19] *See* Core Principles at 14-18.

- **Secretarial Order 3289 (Dept. Int. Sept. 14, 2009).** Secretarial Order 3289, in section 3(a), provides that BLM "must consider and analyze climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multi-year management plans, and making major decisions regarding potential use of resources under the Department's purview."

- **The National Environmental Policy Act ("NEPA").** Pursuant to NEPA, BLM must take a hard look at direct, indirect, and cumulative impacts. 40 C.F.R. §§ 1502.16(a), (b); 1508.25(c). BLM must also "sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decision maker and the public." 40 C.F.R. § 1502.14. BLM must, therefore, "[r]igorously explore and objectively evaluate all reasonable alternatives" and specifically "[i]nclude the alternative of no action." 40 C.F.R. §§ 1502.14(a), (d). BLM, in engaging the NEPA process, must, of course, also provide for public participation. 40 C.F.R. § 1506.6.

V. FRONT END PLANNING AND MANAGEMENT IS A KEY ELEMENT OF EFFORTS TO PREVENT METHANE WASTE AND POLLUTION

We have repeatedly emphasized—above, in the January 27, 2014 Core Principles, and at BLM's public forums—the importance of BLM's "front-end" planning and management framework as a means of preventing methane pollution and waste. Specifically, BLM's new waste rule should harness its planning and management framework by requiring that:

- RMPs and MLPs are expressly designed to prevent waste by identifying: (1) mandatory methane waste reduction requirements; (2) stipulations to be added to future leases; (3) COAs to be added to approvals for APDs on existing leases; and by (4) controlling the timing, pace, and location of development; (5) synchronizing upstream production operations with midstream operations to ensure that methane is captured *and* marketed; and (6) prohibiting, if not already provided by rule, development that would cause unnecessary or, in particular, undue methane waste.

- Leases are executed with stipulations specifying the measures necessary to prevent waste—thus informing unitization agreements and conditioning the surface use rights (43 C.F.R. § 3101.1-2) afforded to the lessee—or, where such stipulations cannot be identified because of a need to better understand more geographically specific engineering, geologic, or other conditions—fully reserving the right to identify and impose such measures at the MDP or APD stages.

- Unitization agreements are crafted consistent with BLM's waste rule, RMPs, MLPs, and lease stipulations, and are expressly designed to foster both the capture and marketing of methane, thereby identifying economies of scale and opportunities to overcome barriers that impede methane waste prevention efforts (efficiencies and opportunities that may not be apparent at the MDP and APD stages).

- MDPs and APDs are designed and approved consistent with BLM's waste rule, RMP and MLP waste prevention measures, lease stipulations, and augmented by "gas capture and marketing plans" and COAs to ensure that all site-specific "reasonable precautions" to prevent waste not otherwise required by prior planning or management stages have been taken. APDs submitted to BLM for approval should also certify that all "reasonable precautions" have been taken to prevent methane waste.

Effective use of BLM's planning and management framework—as recommended here to prevent methane waste—would provide clear guidance and direction to state and field offices as they work to prevent methane waste. It also would provide clear guidance and direction to oil and gas lessees and operators, ensuring that they are more fully aware of and can better coordinate their responsibilities to prevent methane waste. And, it also would help to aggregate anticipated oil and gas development activities to identify economies of scale and, accordingly, opportunities to overcome economic barriers that impede efforts to prevent methane waste.

Such guidance and direction should be developed and mandated before leases are executed, when BLM's authority to prevent methane pollution and waste, and to control the timing, pace, and location of drilling to facilitate methane capture and marketing, is at its apex. Once leases are executed, BLM may impose additional "reasonable measures" in the form of conditions of approval ("COAs"), but COAs are constrained by "surface use rights" granted to the lessee. *See* 43 C.F.R. 3101.1-2. COAs are therefore not a substitute for strong, effective lease stipulations and should only be used to augment waste prevention measures already imposed through stipulation or by higher-level, pre-lease planning and management stages. This ensures that BLM does not unwittingly hamstring its own authority to prevent waste—or hand recalcitrant lessees and operators an argument that they can exploit or leverage (rightly or wrongly) to stymie methane waste prevention. This reinforces our comments, above, expressing concern regarding the lack of meaningful criteria or guidance provided to BLM supervisors by the agency's current waste rules and policies. *See* Section IV(A).

Substantively, BLM's waste rule should leverage the agency's planning and management framework with the following four elements.

First, to the degree not specifically identified by the waste rule itself, BLM should identify criteria or circumstances where the waste of methane is "undue" and, accordingly, where development should be prohibited unless and until action is taken to constrain methane emissions within acceptable limits. 30 U.S.C. § 187; 43 U.S.C. § 1732(b). As we recommended above in Section IV(D), production-stage venting, flaring, or leakage should be considered "undue waste" and, therefore, prohibited until measures are taken to capture and market methane produced from the leasehold. We also make recommendations in Section VI on circumstances and conditions which we view as establishing the line between undue and unavoidable waste.

Second, BLM should impose controls on the timing, pace, and location of development—i.e., "phased development." Such controls "promote the orderly and efficient exploration, development and production of oil and gas." 43 C.F.R. § 3160.0-4. Specifically, such controls can reduce the footprint of oil and gas production infrastructure and thus reduce the number and magnitude of potential sources of methane waste. Such controls can also help coordinate and harmonize BLM's waste prevention efforts with the agency's broader set of responsibilities to protect, e.g., the climate; ecological health and connectivity; water and air quality; public health; and wildlife. Thus, BLM can and should not only reduce the footprint of oil and gas development to prevent methane waste, but locate and constrain such development to avoid conflicts with other resources. This should, notably, extend beyond public lands to avoid conflicts with private farms, ranches, and communities.

Where conflicts cannot be effectively remedied—and it bears emphasis that oil and gas development cannot always be managed to mitigate impacts within acceptable limits, e.g., in special, sensitive, or beloved lands or where there are lack of resources or knowledge to do so—BLM should not authorize oil and gas leasing or development, period. We note, for example, tensions between efforts to reduce methane waste and to address serious water issues related to fracking through use of nitrogen foam fracking cocktails proposed for use in New Mexico's Mancos shale formation. This formation rests within the infinitely rich cultural and ecological landscape of the Chaco region that is beloved by many and sacred to the descendants of the ancestral puebloans. While this technique is touted as a water conservation measure, it also apparently causes methane waste by preventing the capture and, in particular, the marketing of methane produced in association with the oil. BLM should avoid these situations, by obligating oil and gas lessees to incur costs that ensure that not only is water conserved, but that associated gas is captured and marketed. If this is not possible, BLM should prohibit development outright because of unacceptable resource tradeoffs that cause unnecessary or undue impacts (in particular given the proposed development's location). 43 U.S.C. § 1732(b).

Third, to comply with the MLA's prohibition against waste, methane must be marketed, not just captured. EPA's Natural Gas STAR Program, notably, explains that, relative to associated gas, the "Gold" protocol is to "[r]ecover for beneficial use all associated gas produced from the reservoir, regardless of well type, except for gas produced from wildcat and delineation wells or as a result of system failures and emergencies" and specifically states that "[b]eneficial use does not include flaring."[20]

Accordingly, BLM should synchronize upstream production operations with midstream gathering, compression, and processing capacity. This will help obviate the need for upstream venting or flaring. While BLM may not have jurisdiction over the siting and permitting of midstream operations that do not fall on public lands, this is no excuse: inherent in the MLA's

[20] EPA, Gas STAR Gold Protocol: Proposed Framework, Appx A, Protocol 1 (May 8, 2014) (http://www.epa.gov/gasstar/documents/Gas_STAR_Gold_proposedframework.pdf).

prohibition against waste is BLM's authority and responsibility to condition the approval of upstream production operations on sufficient midstream gathering, compressor, and processing capacity. It is only by synchronizing upstream and midstream operations that BLM can satisfy the MLA's prohibitions against waste by ensuring that methane captured at the production stage is marketed. BLM can thus require that upstream production operations be located with access to midstream gathering, compressor, and processing capacity and, further, control the magnitude and pace of upstream production operations to ensure that they do not overwhelm midstream gathering, compressor, and processing capacity. BLM can further this requirement by ensuring that it addresses both upstream and midstream activities through effective planning and management.

It makes little sense for BLM to impose requirements to capture methane if that methane cannot be marketed, leaving it to be vented or flared—i.e., wasted—to the atmosphere (or, as we recommend, requiring BLM to prohibit development). This is a very real problem: haphazard, poorly planned and managed development in the Bakken play of North Dakota has led to the waste of associated gas produced, with flaring rates still in excess of 35% or over 300 million cubic feet per day.[21] This haphazard dynamic must not be replicated elsewhere. Existing waste rules rightly compel action to not just capture, but market, the oil and gas resource, mandating "that all [oil and gas] operations be conducted in a manner which…*results in the maximum ultimate recovery of oil and gas with minimum waste and with minimum adverse effect on the ultimate recovery of other mineral resources*." 43 C.F.R. § 3161.2 (emph. added). These provisions should be reinforced and strengthened, both in the new methane waste rule and in BLM plans and management decisions.

Fourth, BLM should require, via the methane waste rule—and in conformity with the RMPs, MLPs, lease stipulations, and unitization agreements—that oil and gas lessees and operators submit "gas capture and marketing plans" ("GCMPs") to inform drilling-stage planning and management decisions such as MDPs. BLM's Spring 2014 presentations to the public suggested an iteration of these plans and we support GCMPs as defined herein. GCMPs should be required for each stage of the development process, from exploration, to delineation, and onwards to production; there are actions available at each stage to capture and market methane. The exploration and delineation stages also create a foundation for actual production. GCMPs are therefore important tools to prevent methane waste from exploration and delineation activities, although we emphasize that they are an imperative for production stage operations. By rule and in conformity with RMPs, MLPs, and lease stipulations, BLM would require:

- The inclusion of GCMPs by lessees and operators as part of MDP and APD submissions.

[21] North Dakota Industrial Commission, NDPC Flaring Task Force Report at (January 2014) (http://www.ndoil.org/latest-news/news-release-industry-to-increase-natural-gas-capture-to-85-percent-within-two-years-and-90-percent-in-six-years/).

- That the lessee or operator submitting GCMPs take action to capture and market methane consistent with higher-level planning and management decisions—like RMPs, MLPs, and lease stipulations, and unitization agreements (so long as they address and are designed to prevent methane waste)—by refining higher-level methane capture and marketing measures in the context of specific oil and gas production-stage activities for defined geographic areas.

- That GCMPs identify specific production equipment and technologies, including methane capture technologies, as well as estimates of oil and gas production.

- That GCMPs identify the midstream gathering, compression, and processing capacity that will be needed to ensure that captured gas can be marketed.

- That BLM use GCMPs to gauge the accuracy of prior estimates of reasonably foreseeable development (see discussion below) to assess whether these higher-level planning and management decisions remain accurate or must be updated through revisions or amendments.

- That BLM use GCMPs to ensure an objective, level-playing field to facilitate coordination between upstream producers and midstream operators—and thus synchronize upstream and midstream activities—to capture *and* market all methane released from the subsurface mineral estate by drilling operations.

These ideas are pragmatic and supported by BLM's own experience. For example, BLM's proposed RMP/FEIS for the Colorado River Valley Field Office illustrates how front-end planning and management can facilitate both methane capture and marketing, as well as avoid and mitigate impacts to other resources:

> In areas of federal and mixed mineral ownership, an exploratory unit can be formed before a wildcat exploratory well is drilled. The boundary of the unit is based on geologic data and attempts to consolidate the interests in an entire structure or geologic play. The developers of the unit enter into an agreement to develop and operate as a single entity, regardless of separate lease ownerships. Costs and benefits are allocated according to agreed-upon terms. *Development in a unitized field can proceed more efficiently than in a field composed of individual leases because competition between lease operators and drainage considerations is not a primary concern. Unitization also can reduce surface use requirements because all wells are operated as though under a single lease, and operations can be planned for more efficiency. Duplication of field processing facilities is eliminated, and consolidation of facilities into more efficient systems is probable. Unitization can also involve wider spacing than usual, or spacing based on reservoir factor rather than a set rule, which could result in fewer wells and higher recovery efficiency. Through planning, access roads are usually*

shorter and better organized, facilities are usually consolidated, and well efficiency is maximized to a degree not seen in individual lease operations.[22]

Further, many oil and gas companies have expressed support for gas capture planning as a way to reduce the excessive flaring occurring in the Bakken region of North Dakota. Such support was evident at an April 22, 2014 Gas Flaring Hearing of the North Dakota Industrial Commission.[23] *See* Excerpts from testimony demonstrating this industry support for gas capture planning (attached as Exhibit 2). Gas capture planning can be equally effective at reducing methane waste and getting gas to market beyond the Bakken region, and such plans should be an integral part of the revised BLM waste rule.

To help further each of these four elements, BLM should make good use of Reasonably Foreseeable Development Scenarios ("RFDS"); RFDS provide a critical, data-driven tool to inform "front end" planning and management and to advance our recommendations.[24] RFDS are, according to agency guidance:

- A reasonable technical and scientific approximation of anticipated oil and gas activity based on the best available information.

- Includes all interrelated and interdependent oil & gas activities in a defined area regardless of land ownership or jurisdiction; and

- Should be scientifically credible and presented in a technical report that may be subject to professional peer review. [25]

Further, according to agency RFDS guidance, "[a] scientifically based and well-documented [RFDS] is *the* critical component of information necessary for performing thorough cumulative effects analysis of oil and gas activities that could occur as a result of leasing."[26] Agency RFDS guidance also notes that "an [RFDS] is a vital and necessary tool for serving as a context for more localized site-specific decisions on proposed exploration or development projects." [27] Linking to our recommendations above, agency RFDS guidance also explains that "[g]as

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[22] BLM, Colorado River Valley Field Office, Proposed RMP/FEIS, Appx. P at 9 and 10 (April 2014) (emphasis added).

[23] https://www.dmr.nd.gov/oilgas/dockets/2014/docket043014info.pdf

[24] BLM, FS, EPA, and FWS Interagency Reference Guide, *Reasonably Foreseeable Development Scenarios and Cumulative Effects Analysis For Oil and Gas Activities On Federal Lands In the Greater Rocky Mountain Region* (June 2003) ("IRG").

[25] *Id*.

[26] *Id*. at 12 (emphasis original).

[27] *Id*. at 12.

production rates in excess of local gathering and transmission capacity may require the construction of pipelines and associated infrastructure," a need that is informed by the RFDS' requirement that it address "all interrelated and interdependent oil & gas activities in a defined area regardless of land ownership or jurisdiction."[28] That is, in addition to pipelines, the RFDS must address additional infrastructure that can also be the source of methane waste, including pneumatic devices, dehydrators, storage tanks, compressors, and gas processing facilities that may be needed to minimize waste.

An RFDS, by providing an informed understanding of how oil and gas development is projected to advance, can also help deal with issues caused by steep production decline curves commonly seen in development of shale resources. For example, typical horizontal shale oil well production in the Permian Basin declined by 66% after the first year and by 83% over three years.[29] Typical horizontal shale oil well production in the Bakken play declined by 70% in the first year and by 84% over three years.[30] These steep declines indicate that a significant amount of natural gas resources could be lost if methane waste minimization, capture, and marketing measures are not in place when oil or gas wells are completed. These steep declines may also suggest that BLM should account for the rate of depressurization of oil and gas wells and consider modulating that rate of depressurization. This is because, if a lessee or operator depressurizes a well too quickly to produce oil or natural gas liquids, it may degrade the amount of ultimately recoverable oil and gas, contribute to waste, and undermine the recovery of the natural gas resource. 43 C.F.R. § 3161.2.

An RFDS, by informing agency planning and management, can thus provide an effective basis to account for the impacts of oil and gas production activity and thereby ensure that methane emissions are minimized, captured, *and* marketed. An RFDS should, therefore, operate as binding constraint on oil and gas lease development in a particular area, and BLM should promulgate its methane waste rule accordingly. When an RFDS becomes outdated, inaccurate, or is exceeded, then BLM should complete a new RFDS and revisit and revise or amend its plans and decisions accordingly. Otherwise, BLM cannot credibly prevent methane waste by minimizing, capturing, and marketing natural gas, in particular where development is driven not by natural gas, but by oil or natural gas liquids or credibly contend that it has properly planned for and acceptably managed the impacts of oil and gas development.

See section VI.B.5. for a further discussion of technological alternatives to flaring.

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[28] *Id*. at 11.

[29] The Shale Revolution, Myths and Realities, First Energy Capital Energy Growth Conference, 2013, at slide 50 (http://legacy.firstenergy.com/UserFiles/HUGHES%20First%20Energy%20Nov%2019%202013.pdf).

[30] *Id*. at slide 54. See also David Hughes, *Drill Baby Drill*, Post-Carbon Institute (2013) (http://www.postcarbon.org/drill-baby-drill/report)

VI. PROVEN, OFTEN COST-EFFECTIVE TECHNOLOGIES PROVIDE AN EFFECTIVE MEANS TO CAPTURE METHANE AND ENSURE THAT IT IS NOT POLLUTED AND WASTED TO THE ATMOSPHERE

A. General Principles

The solutions presented below in Section VI(B) constitute minimum technological requirements to ensure responsible development and to comply with BLM's statutory mandate to minimize waste.[31] These "back end' technological requirements should be read in conjunction with our recommendations, above, regarding "front-end" planning and management. As background, BLM's current definition of "waste" provides:

> any act or failure to act by the operator that is *not sanctioned by the authorized officer as necessary for proper development and production* which results in:
>
> (1) A reduction in the quantity or quality of oil and gas ultimately producible from a reservoir under prudent and proper operations; or
>
> (2) *avoidable surface loss of oil or gas.*"

43 C.F.R. § 3160.0-5 (emphasis added). Though "avoidable surface loss" is not defined, the current definition of "avoidably lost" provides insight:

> the *venting or flaring of produced gas without the prior authorization, approval, ratification or acceptance of the authorized officer* and the loss of produced oil or gas when the authorized officer determines that such loss occurred as a result of:
>
> (1) Negligence on the part of the operator; or
>
> (2) The failure of the operator to take all reasonable measures to prevent and/or control the loss; or
>
> (3) The failure of the operator to comply fully with the applicable lease terms and regulations, applicable orders and notices, or the written orders of the authorized officer; or
>
> (4) Any combination of the foregoing.

Id. (emphasis added).

[31] We recognize that certain emergency situations may require or result in unavoidable, short-term venting or flaring. While we do not suggest that such emergencies should be included in waste, we believe they should be extremely limited in their duration.

These provisions should be strengthened in accord with the recommendations provided above, in particular in Section IV. We simply observe that, by definition of the current rules, no venting or flaring of gas is "avoidably lost" if BLM authorizes it, nor may any other BLM-sanctioned acts qualify as "waste"—no matter the quantity of recoverable gas that is lost or means by which such acts are taken. Although, in light of BLM's authority and responsibility to prevent "undue" waste, BLM is prohibited from authorizing acts that are "waste" in the practical (and statutory) sense, 30 U.S.C. § 187; 43 U.S.C. § 1732(b), this regulatory framework provides too little guidance to inform individual BLM actors in determining whether to authorize certain conduct.

Furthermore, even if venting or flaring is not approved or sanctioned, it is still not "avoidably lost" under this definition unless BLM supervisors make an affirmative determination that one, or a combination, of three conditions were met, problematically shifting the burden far too heavily onto BLM, rather than the oil and gas lessee or operator, to demonstrate whether or not reasonable precautions have been taken to prevent waste.[32] Thus, whether an operator's actions are deemed wasteful is far too dependent on whether BLM approves or sanctions the acts, an effort that is hampered by the lack of meaningful criteria or guidance to review and decide upon such approvals.

To comply with the MLA's prohibitions against waste, BLM must—in addition to harnessing the agency's "front end" planning and management framework—specifically explain what acts (or failures to act) it will not approve or sanction because they cause waste. Merely obtaining BLM's approval to waste is not what Congress intended when it required all leases to include the condition to "use all reasonable precautions to prevent waste."[33] In the sections that follow, we delineate what these acts are relative to specific technological elements involved in the oil and gas development process.

We make these recommendations in light of the fact that methane emissions from oil and gas facilities that BLM oversees are *higher* than typical onshore US facilities. In 2010, the General Accounting Office reported that between 4.2 percent and 5 percent of natural gas produced at onshore federal leases was vented or flared, which was is far higher than the 0.13 percent reported by operators to the BLM. The GAO found that operators did not report operational sources such as venting from oil storage tanks, pneumatic valves, or glycol dehydrators; and they inconsistently reported venting from intermittent events like completions, liquid unloading,

[32] And even within these conditions, there is no indication about what BLM would consider negligent or "reasonable measures."

[33] *See* H.R. Rep. No. 206, 65th Cong., at 9 (1917) (Then-Secretary of the Interior Franklin Lane, in a report to the entire House of Representatives, noting that, if the MLA passed, "it [would] obviate some of the abuses which [then] exist[ed] with respect to the development of the oil and gas lands, among them the sapping of oil deposits from adjacent lands and the destruction of same through lack of care of the wells.")

or releases after equipment failures.[34] The GAO further found operators could economically reduce venting and flaring by forty percent using control technologies that were available in 2010.[35] The GAO made several recommendations to the Secretary of the Interior, including:

- The BLM should take steps to develop more complete data on lost gas
- The BLM should revise its guidance to operators to ensure that they use technologies to reduce vented and flared gas where they can be adopted economically, and
- The BLM should expand the use of infrared cameras to improve reporting of emissions and identify opportunities to reduce lost gas.[36]

More recent data submitted to the US Environmental Protection Agency's (EPA) Greenhouse Gas Reporting Program ("GHGRP") by oil and gas producers shows that methane emissions are disproportionately large from four high-producing Western US oil and gas basins where most, or almost all, of the oil and gas production is from Federal lands or mineral estate and production is overseen by BLM. As shown below in Table 1, these basins—Green River, Piceance, San Juan, and Unita—produced 14.5 percent of US onshore natural gas and only 2.7 percent of US onshore oil in 2012,[37] but accounted for 27.1 percent of all the methane emissions reported from nationwide onshore oil and gas production in that year.[38]

[34] GAO Report. 2010. FEDERAL OIL AND GAS LEASES: Opportunities Exist to Capture Vented and Flared Natural Gas, Which Would Increase Royalty Payments and Reduce Greenhouse Gases
GAO-11-34: Published: Oct 29, 2010. pgs. 10-12. Available at: http://www.gao.gov/assets/320/311826.pdf

[35] GAO report. 2010. Pg. 19.

[36] GAO report. 2010. Pgs. 33-34.

[37] For a description of the analysis methodology used to extract the information shown here and below on production and emissions from these basins, *see* Description of Methodology for Determining Methane Emissions from Production Basins and Sources (hereafter "Description of Methodology," attached hereto as Exhibit 3).

[38] See Description of Methodology. Not all methane emissions from oil and gas production facilities are reported to the GHGRP, due to limitations such as a reporting threshold that exempts smaller operators. However, we are not aware of any reason why these omitted emissions would skew the comparisons of GHGRP data for these basins and the US as a whole that we present here.

Table 1 – Oil and Gas Production and Reported Methane Emissions from Four Western US Basins with High Proportions of BLM Jurisdiction[39]

Basin	Percentage of U.S. Gas Production	Percentage of U.S. Oil Production	Percentage of Reported U.S. Methane Loss
Green River	5.3%	0.8%	4.8%
Uinta	1.7%	1.3%	3.3%
San Juan	4.4%	0.1%	14.5%
Piceance	3.2%	0.4%	4.6%
Total for 4 Basins	**14.5%**	**2.7%**	**27.2%**

Furthermore, analysis of GHGRP data shows that emissions from a number of key sources are also disproportionately high in these basins, as shown in Table 2. For example, reported emissions from these four basins account for over 58 percent of nationwide reported emissions from liquids unloading and almost 35 percent of emissions from pneumatic controllers and pumps. Through its public forums, BLM has sought input on measures to reduce waste of natural gas from these sources, and as we discuss below, emissions from these sources can readily be reduced for very low (in some cases negative) cost.

Table 2 – Percentage of Nationwide Emissions for Specific Sources Occurring from the Green River, Unita, San Juan, and Piceance Basins[40]

Emissions Source		Percentage of National Emissions for Specific Source
Fugitives / Leaks		21.1%
Liquids Unloading		61.7%
Pneumatics	Pneumatic Controllers	33.6%
	Pneumatic Pumps	30.1%
Compressors	Reciprocating Compressors	42.6%
	Centrifugal Compressors	26.4%

These disproportionate emissions, far in excess of the portion of nationwide oil and gas production occurring in these basins, show that operations in these basins, including wells and facilities managed by BLM, are significantly worse than standard practice (let alone best practice). Quite simply, operations that BLM is managing are using wasteful practices that needlessly emit harmful pollutants, despite the Bureau's clear mandate to prevent such waste.

BLM must recognize that the following solutions are necessary for proper oil and gas development and production, clearly describe them as such, and include them in the revised

[39] See Description of Methodology.

[40] See Description of Methodology.

waste rule. Further, these technologies and work practices must be revised regularly to ensure that the minimization of waste is based on the most up to date practices.[41]

B. Methane Reduction Technologies

1. Leak Detection and Repair ("LDAR")

Oil and gas producers in the Green River, Piceance, San Juan, and Unita Basins reported to the GHGRP that over 4.5 *billion* cubic feet (BCF) of gas leaked from their facilities in 2012.[42] This type of waste is characterized by the unintentional (or neglected) escape of natural gas from static components such as connectors, valves, regulators, and hatches throughout the oil and natural gas sector. On public lands, such waste is widespread and includes components found on well pads, at processing plants, and throughout transmission and storage infrastructure. Moreover, there is no single cause for these leaks. Changes in a component's exposure to new stresses (e.g., thermal or mechanical) can lead to deterioration of the integrity of certain parts, as can human error via improper installation or maintenance. Additionally, normal operations and exposure to weather conditions can break down certain equipment. Ultimately, the occurrence of waste due to leaks is virtually impossible to prevent.

We note that the Greenhouse Gas Reporting Program (GHGRP) requires oil and gas producers to report emissions from equipment leaks. But, the reported emissions are not based on measurements of leaks from facilities or even on proxies for leaks such as counting the number of leaking components at facilities and assuming standard leak rates for those leaking components. Rather, reporters simply count *all* components at their facilities and use standard leak rates, as prescribed by the GHGRP rules.[43] This is particularly important because, as noted above, a number of peer-reviewed studies have concluded that methane emissions from oil and gas facilities are significantly underestimated in the US EPA Greenhouse Gas Inventory.[44] Furthermore, many studies have recognized that infrequent but very high-emitting "super-emitters" are critical contributors to methane emissions from oil and gas facilities, and they are very likely a major source of the methane observed in methane measurement studies that is missing in official inventories.[45] For example, an extensive study of emissions from five gas processing plants found the 58 percent of the emissions from leaks from over 70,000 components came from just the top ten leaks at each plant (fewer than one component in a

[41] *See* Executive Order 13563 (calling for federal agencies to develop and submit plans to facilitate periodic review of significant regulations).

[42] *See* Description of Methodology.

[43] 40 C.F.R. § 98.232 (c)(21), and § 98.233(r).

[44] *See* Petron *et al* (2014) and Brandt *et al* (2014) and references therein.

[45] *See* Brandt *et al* (2014) at 734; Alvarez, R.A. *et al* (2012) "Greater focus needed on methane leakage from natural gas infrastructure," *Proc.Natl.Acad.Sci.U.S.A.,* 109, 6435.

thousand), and 35 percent of the emissions from all the leaks at all five plants came from the top ten leaks at just one plant.[46] Because these large, wasteful emissions are occurring from such a small fraction of components, they are very difficult to account for in component-by-component measurements such as those used by EPA to calculate standard leak rates.

In other words, the above GHGRP figures *almost certainly substantially underestimate the volume of gas emanating from leaks from oil and gas facilities*. And, much of those emissions are coming from "super-emitters" which, as a rule, are improperly operated or maintained equipment. Examples noted in the literature include worn-out seals, hatches left open, rust holes in equipment, etc.[47] *These emissions are clearly wasteful*. BLM must ensure that facilities on Federal land, and facilities producing hydrocarbons from Federal mineral estate, are not wasting gas due to this type of negligence.

BLM must require operators to control leaks by regularly conducting instrument-based Leak Detection and Repair (LDAR) surveys. Based on EPA's documentation for its 2012 NSPS, monthly instrument-based LDAR surveys of oil and gas facilities can reduce leaking gas by 80 – 87 percent.[48]

Recent studies have shown that instrument-based LDAR programs are a very cost effective way to reduce wasteful leaks. A recent study of LDAR surveys by Carbon Limits,[49] for example, showed that the cost of surveys is quite reasonable (for example, surveys of wellsites cost about $400, with the cost rising somewhat for larger facilities) and once leaks are identified, it is in the operator's economic interest to repair them in almost every instance.[50] Carbon Limits analyzed data from over 4,000 LDAR surveys of oil and natural gas facilities in Canada and the U.S. which identified nearly 40,000 leaks. The surveys in this study were performed with infrared (IR) cameras, which can rapidly scan components to locate hydrocarbon gas emissions.

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[46] National Gas Machinery Laboratory, Clearstone Engineering, Innovative Environmental Solutions, (2006) *Cost-Effective Directed Inspection and Maintenance Control Opportunities at Five Gas Processing Plants and Upstream Gathering Compressor Stations and Well Sites* (EPA, 2006). Available at: http://www.epa.gov/gasstar/tools/related.html#four

[47] For example: *Id.* at table 7; *City of Fort Worth Natural Gas Air Quality Study Final Report*, July 13, 2011, Figure 3.7-1. Thief Hatch Left Open, p. 3-99. Figure 3.7-5. Hole in Tank Roof - Miscellaneous Emission Source, p. 3-102. Available at: http://fortworthtexas.gov/uploadedFiles/Gas_Wells/AirQualityStudy_final.pdf

[48] *See* EPA, *Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, Background Technical Support Document for the Proposed Rules,* July 2011 ("2011 TSD") at 8-22, Table 8-12 (available at http://epa.gov/airquality/oilandgas/pdfs/20110728tsd.pdf).

[49] Carbon Limits is an independent consultancy experienced in climate change policies and emission reduction project identification and development, particularly in the oil and gas sector.

[50] Carbon Limits, *Quantifying Cost-Effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras*, at 5. The report focuses on LDAR surveys of compressor stations, gas plants, and well sites/well batteries. Available at: http://www.catf.us/resources/publications/view/198

Once identified, the leaks were measured with a high-volume sampler or were estimated. Carbon Limits then assessed the net present value (NPV) of repairing the identified leaks based on the estimated costs of repair and the value of the gas that was conserved by the repair.[51] The conclusions are striking: even using a very low value of conserved gas of $3/Mcf, over 97 percent of the identified emissions were from leaks that had a positive repair NPV (i.e., repairing the leak cost less than the value of the gas conserved). Even after taking into account the cost of performing a survey, the aggregate NPV of performing the surveys in the database and repairing the identified leaks was generally positive.[52] While many LDAR surveys had a small net cost (the survey and repair costs were slightly larger than the value of the conserved gas), this was outweighed by the net benefit of performing the survey and repairing the leaks at the leakier facilities. These aggregate costs are a measure of the net costs a firm with multiple facilities on Federal land, or all firms operating on Federal land, would bear if BLM required LDAR at facilities on those lands.

Moreover, because much of the data from this study is from Canada, where LDAR surveys have been required for years,[53] it is safe to assume that the Carbon Limits study underestimates the quantity of leak abatement that LDAR surveys will accomplish in the U.S., where in most jurisdictions surveys are not required. As a result, the study almost certainly underestimates the net value of leak surveys. (Leaks at U.S. facilities, which have been building up in some cases for years, will be higher, and therefore surveys will find more waste that can be avoided through repair, making the surveys more lucrative than the Canadian surveys in the Carbon Limits dataset.)

The surveys in the Carbon Limits dataset were largely performed annually. As some states have recognized (see below), the costs of LDAR surveys are low enough, and the avoided waste / emissions are large enough, to justify requiring more frequent LDAR surveys for larger facilities. Carbon Limits calculated the costs of performing LDAR more frequently for various facility types, and found that using quarterly and monthly LDAR is a cost-effective way to reduce emissions of VOC and methane. For example, monthly LDAR at all types of facilities reduces methane emissions at net costs to operators that are below recent estimates by EPA economists of the societal cost of a metric ton of methane emissions ($970) due to its detrimental effects on

[51] *Id.* at 16.

[52] *Id.* at 18.

[53] *See* Alberta Energy Regulator Directive 060 at 8.7; http://www.aer.ca/documents/directives/Directive060.pdf

climate.[54] This estimate of the "social cost of methane" is certainly *below* the true damage to society caused by a ton of methane emissions.[55]

Recognizing the low cost and high value of LDAR surveys, several states have taken steps to reduce waste from leaks by requiring regular surveys. In February 2014, Colorado revised its oil and gas regulations to require instrument-based LDAR surveys for well production facilities as well as at natural gas gathering compressor stations.[56] Facilities must perform LDAR surveys at compressor stations and well production facilities at a frequency that is dependent on the VOC emissions from that facility.[57] The frequencies required span from one time, for well production facilities with the smallest annual uncontrolled emissions, to annual, quarterly, and monthly, for facilities with successively larger annual uncontrolled emissions. Similarly, the required frequency for gathering compressor stations may be annual, quarterly, or monthly, depending on uncontrolled annual emissions.[58] The Colorado rules also require the repair to be made promptly, unless a shutdown is required (in which case it must be made during the next scheduled shutdown).[59] Colorado also requires the repaired leak to be re-monitored within 15 days of the repair, in order to confirm that the leak was indeed fixed.[60]

Colorado's rule was supported by several oil and gas producers in that state.[61] Those firms submitted data, based on their own experience performing LDAR surveys, during the Colorado rulemaking process. These data show that firms can perform LDAR surveys at even lower cost than the figures used in the Carbon Limits study described above, as shown below in Table 3:

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[54] This value is the calculated damage from methane emitted in 2015 using a 3% discount rate, the same parameters (and using the same methodology) used by the White House Office of Management and Budget to calculate the social cost of carbon dioxide. *See* Marten, A.L., and Newbold, S.C. "Estimating the social cost of non-CO_2 GHG emissions: Methane and nitrous oxide." *Energy Policy* **51** (2012): 957 (available at: http://tinyurl.com/kdbbf4z).

[55] *See, e.g.,*: http://costofcarbon.org/reports.

[56] *See* 5 C.C.R. § 1001-9 XVII.F (2014).

[57] *Id.* at Tables 3, 4.

[58] *Id.* at Table 3.

[59] *See id.* XVII.F.7.a (the first attempt to repair that leak must be made within 5 days; if the necessary parts must be ordered, or other good cause delays the attempt, a repair must be made within 15 days of either receipt of the parts of the cause of delay ceases to exist).

[60] *Id.* XVII.F.7.b.

[61] Finley, Bruce. "Colorado pitches new rules to cut oil and gas industry air pollution," The Denver Post, 11/18/2013. (available at: http://www.denverpost.com/environment/ci_24548337/proposed-colorado-air-pollution-regs-clamp-down-oil).

Table 3 – LDAR Survey Costs

Facility Type	Cost per Inspection		
	Carbon Limits	Anadarko Petroleum Corporation[62]	Noble Energy Incorporated[63]
Compressor Station	$2,300	$1,250 – $5,150	
Multi well batteries	$1,200	$450 - $800	$263 - $431
Single well batteries	$600		
Well site	$400		

Colorado's Department of Public Health and Environment (CDPHE) also produced estimates of total program cost and cost-effectiveness (cost per ton of avoided pollution) that are in line with the results of Carbon Limits' analysis. For example, the CDPHE analysis found that repair costs are less than the value of the gas conserved by the repairs, consistent with the results we discuss above on the NPV of repairs.[64]

Several other states require some or all oil and gas facilities to conduct instrument-based LDAR surveys regularly in order to obtain a permit or general permit. These include Pennsylvania,[65] Wyoming,[66] and Ohio.[67] The base frequency of the LDAR requirement for affected facilities in

[62] ftp://ft.dphe.state.co.us/apc/aqcc/PRESENTATIONS/Noble%20Energy%20Inc%20&%20Anadarko%20Petroleum%20Corporation/Anadarko.pdf

[63] ftp://ft.dphe.state.co.us/apc/aqcc/PRESENTATIONS/Noble%20Energy%20Inc%20&%20Anadarko%20Petroleum%20Corporation/Noble.pdf

[64] Cost-Benefit Analysis, Submitted Per § 24-4-103(2.5), C.R.S. Pp. 21-22. Available at: ftp://ft.dphe.state.co.us/apc/AQCC/COST%20BENEFIT%20ANALYSIS%20&%20EXHIBITS/CDPHE%20Cost-Benefit%20Analysis_Final.pdf

[65] Department Of Environmental Protection, Air Quality Permit Exemptions, Category No. 38. Available at http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-96215/275-2101-003.pdf

[66] Quarterly instrument-based LDAR is required in the Upper Green River Basin for new and modified facilities. *See* Wyoming Department of Environmental Quality (2013), *Oil and Gas Production Facilities Chapter 6, Section 2 Permitting Guidance* at 22 and 27 (available at: http://deq.state.wy.us/aqd/Oil%20and%20Gas/September%202013%20FINAL_Oil%20and%20Gas%20Revision_UGRB.pdf).

[67] Ohio General Permit 12 for oil and gas production sites requires quarterly instrument-based LDAR, although it contains provisions for less frequent LDAR for facilities with manageable leak frequencies (if less than 2% of components are leaking, the next survey can be skipped). *See* Ohio General Permit 12.1(C)(5)(c)(2) (available at http://epa.ohio.gov/dapc/genpermit/oilandgaswellsiteproduction.aspx). We do not support these "step-down" provisions in LDAR rules as they incentivize operators to not find leaks, increase the complexity of the rule and compliance efforts, and the record shows that facilities can have leak frequencies below 2% and still waste copious amounts of natural gas. *See Sierra Club, et al., Rebuttal Prehearing Statement for Colorado Oil and Gas 2014 Rulemaking* at 8-11. (available at: ftp://ft.dphe.state.co.us/apc/aqcc/REBUTTAL%20STATEMENTS,%20EXHIBITS%20&%20ALT%20PROPOSAL%20REVISIONS/Conservation%20Group/Conservation%20Groups%20-%20REB.PDF).

Wyoming and Ohio is quarterly. These rules demonstrate the feasibility of reasonable LDAR rules, but USEPA and the vast majority of states producing significant amounts of natural gas, including most states with significant Federal lands and mineral estate, do not require LDAR for oil and gas production facilities or gas gathering and transmission compressor stations. The lack of rules to require LDAR surveys of most oil and gas facilities on public lands has led to large scale, wasteful, and detrimental leaks. BLM must address this by requiring LDAR surveys.

Because leaks, by definition, are unintentional, any leak on public lands must be classified as "waste" that accrues royalties. To minimize such waste, BLM should adopt in its revised waste rule regular instrument-based surveys on all oil and gas facilities on public lands. We support the tiered approach that Colorado has taken to LDAR frequency, which requires more frequent surveys for larger facilities likely to leak more. However, we do not support the exemption from *regular* LDAR that the Colorado rules provide for smaller well productions facilities by only requiring a single, non-repeated survey. While there is value in a single survey, leaks will inevitably arise after the survey is performed, and given the very low costs for LDAR surveys at smaller facilities demonstrated by data from Carbon Limits, Noble Energy, and Anadarko Petroleum, the exemption from regular surveys is not warranted. Even the smallest oil and gas facilities should be inspected for leaks with appropriate instruments at least annually.

Once leaks are discovered, the rule should require that the first attempt to repair them must be made within 5 days, with actual repair occurring no more than 30 days after discovery unless exigent circumstances are present (such as ordering parts or shutdown is required). After repairs are made, operators must confirm within 15 days that repairs have in fact fixed the leaks.

2. Plunger Lifts and other Solutions to Eliminate or Minimize Venting During Liquids Unloading

Methane emissions from liquids unloading represent another significant source of waste. According to GHGRP data, almost 10 BCF of natural gas was vented during liquids unloading during 2012 from wells in the Green River, Piceance, San Juan, and Unita basins. This represents over 62 percent of all liquids unloading venting *nationwide*, and 27 percent of the methane emissions from all sources within oil and gas production from these basins.[68]

The need for liquids unloading arises when water and other liquids accumulate in a mature well, slowing (or stopping) gas production for that well. In order to maintain production, operators remove, or "unload", these liquids through a variety of methods, some of which vent gas to varying degrees. These methods include installing pumps to lift liquids; injecting soaps or other additives into the well to foam the liquids or installing smaller diameter production tubing in a well to increase the velocity of gas up the well, both of which enable the gas flow to better entrain liquids; and installing a plunger lift, a simple device that efficiently lifts a column of

[68] *See* Description of Methodology.

liquid out of a well.[69] Unfortunately, some operators will forego these proven, affordable approaches to liquids unloading and crudely "blow down" the well by opening it to the atmosphere. Since atmospheric pressure is lower than the pressure in gathering pipelines, this can increase the flow rate in the well, allowing some portion of the liquids to reach the surface entrained with the high gas flow. However, this approach is extremely wasteful, as it vents large quantities of gas but only removes a small portion of the liquids in the well.[70] While plunger lifts may be configured to vent gas while unloading wells, the quantity of venting will generally be much less for a given well if a plunger lift is used than if the well is unloaded using a crude blow down approach.

The need to unload liquids is not a surprise to operators; almost every well will need to unload at least once during its productive lifetime, and some require many liquids unloading events every year. Unfortunately, many operators on federal lands do not adequately plan and invest in technologies for liquids unloading, due in part to BLM's lenient policy. As BLM has applied its current regulations and policies, the agency has permitted and not collected royalties on this intentional, predictable wasting of natural gas, provided that the liquids unloading event does not last more than 24 hours.[71] To our knowledge, BLM has not codified any numeric limitations on the frequency of venting during liquids unloading. The very high, disproportionate emissions from liquids unloading in the basins with high numbers of Federal wells shows that large scale waste of gas is occurring from these wells due to the operators' approach to liquids unloading, resulting not only in lost resources but also in harmful pollution.

BLM's choice to ignore the waste caused by blowing down a well is egregious given that there are better approaches that can be used to unload wells, and that the venting results from a predictable stage in the wells' life-cycle. As mentioned above, avoiding or minimizing wasteful venting from liquids unloading is very low-cost. According to Natural Gas STAR documentation, capital costs for a relatively routine plunger lift installation can range from $1,900 to $10,400 per well.[72] These installations can reduce venting of natural gas 70-90 percent.[73] Smart automation of plunger lifts can reduce venting more than 90 percent from baseline emissions with no plunger lift, at total capital costs of $7,600 to $28,000 per well.[74] Because the gas that

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[69] *See* USEPA, *Lessons Learned from Natural Gas STAR Partners, Options for Removing Accumulated Fluid and Improving Flow in Gas Wells."* hereafter "Lessons Learned – Options," (available at http://www.epa.gov/gasstar/documents/ll_options.pdf).

[70] *See* USEPA, *Lessons Learned from Natural Gas STAR Partners, Installing Plunger Lift Systems in Gas Wells,"* hereafter "Lessons Learned – Plunger Lifts," p. 1. (available at: http://epa.gov/gasstar/documents/ll_plungerlift.pdf).

[71] NTL-4A, Sec. III.B.

[72] Lessons Learned – Plunger Lifts, pp. 3-4.

[73] Lessons Learned – Options, p. 5.

[74] Lessons Learned – Options, Exhibit 9.

would otherwise be wasted is being recovered instead, the operator will see increased revenue from the sale of that recovered gas. Moreover, there are additional benefits. Well blow downs require operational costs in the form of labor costs from manual blow downs and workover costs as a result of remediating poor conditions from liquids build-up. Installing plunger lifts will not only reduce these costs, but they will also increase the productivity of the well more effectively (and in a more timely manner) than blow-downs.[75] Accordingly, the up-front costs of plunger lifts can be quickly recouped through reduced maintenance associated with blow downs as well as increased revenue from increased gas production and minimizing (or eliminating) wasteful venting. As a result, plunger lift installations typically have payback periods of 9 months or less.[76]

The emission figures for liquids unloading from western basins with high fractions of Federal wells is striking, and illustrates the severity of waste that is occurring under BLM's oversight. Producers in the San Juan basin reported 6.4 BCF was emitted just from liquids unloading in 2012; in the Piceance basin the figure was 2.6 BCF.[77] *No other basin in the nation reported emissions higher than 1.1 BCF, including several basins that produce far more gas than either of these basins*.[78] These very high, outlier emissions indicate that standard, proven technologies such as plunger lifts have not been installed – apparently operators are not choosing to invest in these commonsense methods. In its revised waste rule, BLM must require operators to utilize technologies to eliminate or reduce wasteful venting; if operators claim that doing so is infeasible for particular wells, they must supply specific information that demonstrates this to BLM, and BLM must describe quantitative criteria that it will use to evaluate any such claims. Since plunger lifts can reduce venting from wells during liquids unloading by 70 percent or more, these simple rules could reduce waste of billions of cubic feet of natural gas per year.

3. Zero-Bleed and Low-Bleed Natural Gas-Driven Pneumatic Equipment

Natural gas-driven pneumatic controllers and pumps are ubiquitous equipment that vent a large amount of methane on public lands. Methane venting from pneumatic equipment comprise 53 percent of total methane emissions from oil and gas sources in the Green River, Piceance, San Juan, and Unita Basins. Pneumatic valve controllers vent 17 BCF on public lands, and pneumatic pumps vent 2.4 BCF in these basins.[79] Again, the emissions from this source are disproportionately high in these basins, where most wells are on Federal lands or producing from Federal mineral assets. While these basins produce 14.5 percent of US onshore gas,

[75] Lessons Learned – Plunger Lifts, p. 9.

[76] Lessons Learned – Plunger Lifts, p. 1.

[77] *See* Description of Methodology.

[78] Greenhouse Gas Reporting Program data, see Appalachian Basin.

[79] *See* Description of Methodology.

reported emissions from pneumatic controllers and pumps in these basins account for just under 35% of all reported emissions from this equipment, nationwide.

Gas-driven pneumatic equipment uses the pressure energy of natural gas in pipelines to do work, such as control, open, and shut valves or pump a liquid into a pipeline under pressure. By design, this equipment vents natural gas to the atmosphere without first combusting it as part of normal operations. Since the gas is not combusted, methane and other pollutants are released, and the chemical energy content of the gas is lost. The methane and other pollutants then degrade air quality and warm the climate.

Pneumatic valve controllers. These devices, which account for most of the emissions from pneumatic equipment, can be classified based on how rapidly they vent or "bleed" natural gas. High-bleed controllers are those that continuously vent more than 6 standard cubic feet per hour (scfh), while low-bleed controllers continuously vent less than 6 scfh.[80] Additionally, intermittent-bleed controllers – which vent irregularly – typically vent natural gas at a rate (averaged over periods when the controller is venting and not venting) higher than the low-bleed cutoff of 6 scfh, but lower than a typical high-bleed controller. Finally, "zero-bleed" equipment is available that either uses compressed air instead of natural gas, or electrical power instead of compressed gas, but in either case vents no natural gas. Some devices can be powered just with solar-generated power; others require more electrical power (from the grid or an on-site generator) or air compressed with a natural gas-powered engine.

US EPA greatly limited the use of high-bleed controllers for new installations as part of NSPS Subpart OOOO (high-bleed controllers may only be newly installed "based on functional needs, including but not limited to resonse time, safety and positive actuation").[81] However, Federal rules do not affect the hundreds of thousands of existing high bleed controllers that were installed before August 23, 2011, the effective data for these provisions of Subpart OOOO.[82] Colorado, on the other hand, required operators to replace existing high-bleed controllers in the urban portions of the Denver-Julesberg (D-J) basin in 2009[83], and earlier this year required operators to replace all high-bleed controllers statewide by 1 May 2015.[84] Colorado found that replacement of a high-bleed controller with a low-bleed controller pays for itself, from the

[80] *See* USEPA, *Lessons Learned from Natural Gas STAR Partners, Options For Reducing Methane Emissions From Pneumatic Devices In The Natural Gas Industry,"* p. 2. (available at: http://epa.gov/gasstar/documents/ll_pneumatics.pdf).

[81] 40 C.F.R. § 60.5390(a).

[82] *Id.* § 60.5365(d).

[83] *See* 5 C.C.R. § 1001-9 XVIII (2009) (available at https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=2772&fileName=5%20CCR%201001-9).

[84] 5 C.C.R. § 1001-9 XVIII.C.2.b (2014).

value of the conserved gas, in fourteen months (see below).[85] It is notable that Colorado's existing rule for the urban parts of the D-J basin contained provisions allowing operators to keep high-bleed controllers in service, if they showed that doing so was necessary for "safety and/or process purposes."[86] No operator requested such an exemption,[87] and there is no evidence in the record that these requirements have caused any operational problems. Clearly, replacing high-bleed controllers with equipment that vents less natural gas is very low cost and quite feasible. BLM, in the revised rule, must not allow existing high-bleed controllers to continue wasteful, excessive venting on well pads and compressor stations subject to BLM jurisdiction.

BLM must also consider measures to limit emissions from intermittent-bleed (IB) controllers. Analysis of GHGRP data shows that emissions from IB controllers are considerably higher than emissions from either low-bleed or high bleed controllers, including in basins with large numbers of Federal wells, as shown in Table 4.

Table 4 - Vented gas from pneumatic valve controllers (2012) in western producing basins

MMcf	Pneumatic Controller Type		
Basin	**High-Bleed**	**Intermittent-Bleed**	**Low-Bleed**
Green River	1,272	2,094	81
Piceance	240	2,145	53
San Juan	3,203	5,555	82
Uinta	384	1,347	316

In all four basins, emissions from IB controllers are much higher than emissions from the other types of controllers. Recent measurements of emissions from pneumatic valve controllers conducted by the University of Texas show that the problem may be even worse than the GHGRP data shows. They found the emissions from low-bleed and IB controllers are 270 and 29 percent higher, respectively, than the emissions factors used in the GHGRP,[88] suggesting that the venting figures shown above are substantially underestimated.[89] (They did not measure emissions from high-bleed controllers).

[85] Cost-Benefit Analysis. Submitted per § 24-4-103(2.5), C.R.S. For proposed revisions to Colorado Air Quality Control Commission Regulation Number 3 (5 CCR 1001-5) and Regulation Number 7 (5 CCR 1001-9), p. 32. (available at: ftp://ft.dphe.state.co.us/apc/aqcc/COST%20BENEFIT%20ANALYSIS%20&%20EXHIBITS/CDPHE%20Cost-Benefit%20Analysis_Final.pdf.).

[86] 5 C.C.R. § 1001-9 XVIII.C.3 (2009).

[87] Email from Daniel Bon, CDPHE, to David McCabe, Clean Air Task Force, 1 November 2013.

[88] Allen, D., *et al,* (2013) "Measurements of methane emissions at natural gas production sites in the United States," *Proc. Nat. Acad. Sci. USA*, 110**,** 17,768, *available at:* http://www.pnas.org/content/110/44/17768.

[89] As discussed above, *all* emissions figures cited in this document from the GHGRP are underestimates of actual emissions, most importantly due to the fact that smaller oil and gas producers are not required to report their emissions to the program.

Continuous bleed controllers, including low-bleed controllers, and IB controllers serve similar and in many cases identical purposes. The American Petroleum Institute (API) has stated: "Achieving a bleed rate of < 6 SCF/hr [*i.e.,* the average vent rate required of new, continuous-bleed controllers] with an intermittent vent pneumatic controller is quite reasonable since you eliminate the continuous bleeding of a controller."[90] Pneumatic controllers emitting less than 6 scfh (both continuous-bleed and IB) can serve many of the functions of higher-emitting intermittent devices, which thus could be replaced with low-bleed controllers. There are a wide variety of applications of pneumatic controllers, and also a wide variety of parameters for the design of controllers – pressure, extreme temperature performance, response time, flow rates, corrosiveness of fluids, etc. As such, there are many controllers of both continuous-bleed and IB design on the market, including many emitting below 6 scfh.[91]

The use of any pneumatic valve controller, new or existing, that emits more than 6 scfh is a wasteful practice that BLM must prohibit, except when technically necessary. BLM has the authority and the duty to require existing lessees to replace all pneumatic valve controllers emitting more than 6 scfh, whether continuous bleed or IB, with controllers that emit below that threshold (again, continuous bleed or IB), or with zero-bleed technology. While exemptions should be attainable in certain circumstances where high-bleed devices are technically necessary, experience in Colorado shows this will be rare. Indeed, BLM has already required this in areas that are heavily impacted by oil and natural gas drilling, confirming that operators can perform such replacements at low cost.[92]

We present two estimates of costs for replacing high emitting controllers, based on USEPA data from the 2012 NSPS Subpart OOOO rulemaking and on Colorado data from their recent rulemaking effort. Both estimates show that replacing wasteful high emitting devices is a very low cost approach to reducing harmful emissions, with the extra revenue from sales of gas that would otherwise be wasted paying for the replacement in a few years.

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[90] API, Technical Review of Pneumatic Controllers by David Simpson, P.E. (October 14, 2011), cited in Rebuttal Statement Of The Sierra Club, Natural Resources Defense Council, Earthworks Oil And Gas Accountability Project And Wildearth Guardians. (available at: ftp://ft.dphe.state.co.us/apc/aqcc/REBUTTAL%20STATEMENTS,%20EXHIBITS%20&%20ALT%20PROPOSAL%20REVISIONS/Conservation%20Group/Conservation%20Groups%20-%20REB%20Exhibits.pdf).

[91] For discussion of low-bleed devices, including some specific low-bleed devices, see *Lessons Learned – Options*.

[92] *See* Tres Rios FEIS at 376 ("Operators would either replace or retrofit high-bleed controllers, positioners, and transducers with low-bleed, no-bleed, or air-driven devices….The cost to inventory and replace high-bleed pneumatics with low-bleed pneumatic devices on existing oil and gas wells located on federal land is not high compared to the value of [methane] gas lost to the atmosphere. Most replacement costs are recouped in under 1 year, resulting in a large economic benefit for industry.").

USEPA estimated in the NSPS rulemaking analysis that an average new low-bleed pneumatic controller costs $2,553.[93] We add $500 in labor costs, which is easily sufficient to cover the labor needed for a typical controller switch-out. Annualizing the total cost of $3,053 over 10 years at 7 percent (even though controllers last far longer than ten years), produces a yearly cost per controller of $434. The annual value of conserved gas for high-bleed pneumatics is approximately $1,100, and the value for intermittent-bleed pneumatics is approximately $430, which translates to a 3- and a 7-year payback period for high- and intermittent-bleed pneumatics, respectively. Colorado estimated the equipment cost of replacing a high (continuous)-bleed controller with a low-bleed at $1,033, and the labor cost is $387, leading to a total annualized cost per controller of $169.[94] Using the same value of conserved gas as above, this translates to a 2- and a 6-year payback period for high- and intermittent-bleed pneumatics, respectively.

Pneumatic Pumps. Pneumatic pumps serve two main purposes in natural gas production. Chemical injection pumps are used to inject additives that prevent corrosion or formation of ice-like hydrates in gas pipelines. Pneumatic pumps are also used to pressurize and circulate chemicals used to dehydrate gas.

The use of electrically powered pumps, instead of natural-gas powered pneumatic pumps, eliminates this source of vented natural gas. For example, solar-powered chemical injection pumps are ubiquitous at Marcellus Shale wellpads in Pennsylvania. These pumps are used to inhibit hydrate formation – a problem which occurs only in the winter – and the successful use of this approach in a northern location with significant winter cloud cover suggests that it is a generally applicable technology. In revising its waste rule, BLM must consider whether the use of natural gas-driven pneumatic chemical injection pumps is wasteful, given the existence of non-venting options that can work on wellpads that are not connected to the grid. BLM should also investigate options for avoiding emissions from natural gas-driven pneumatic pumps associated with dehydrators.

4. Minimizing Compressor Emissions

Another source of waste on public land is gas compressors. Operators in the Green River, Piceance, San Juan, and Uinta basins reported nearly 590 MMCF of leaks and vented emissions from compressors to USEPA's GHGRP.[95] These figures include emissions from both

[93] *See* 2011 TSD at 5-15, Table 5-7. Note that this figure appears to be quite high. *See, e.g.,* the costs of controllers cataloged in Appendix B, and Exhibit 4, in EPA Gas STAR's *Lessons Learned* document on PCs (available at http://www.epa.gov/gasstar/documents/ll_pneumatics.pdf).

[94] *See Initial Economic Impact Analysis for Proposed Revisions to Colorado Air Quality Control Commission Regulation No. 7.,* available at http://www.colorado.gov/cs/Satellite/CDPHE-AQCC/CBON/1251647985820. Table 30.

[95] *See* Description of Methodology.

reciprocating and centrifugal compressors. While this is smaller than sources such as pneumatic equipment, liquids unloading, and leaks, most production compressors are not located on wellpads, but instead are located at gathering compressor stations. These facilities do not report emissions to the GHGRP.[96] Thus, the 590 MMCF figure represents a small fraction of the gas which leaks and vents from compressors on public land. Finally, the relatively small 590 MMCF emissions reported from these four basins still represents 41 percent of all reported emissions from compressors at oil and gas production facilities, nationwide. As discussed below, it is very feasible to substantially reduce emissions from these compressors.

For a reciprocating (piston) compressor, emissions occur primarily from worn out packing seals on connecting rods that transmit motion into the high-pressure cylinders. Over time these seals wear and if not regularly replaced, emissions can become very large. In other words, the more worn out these seals are, the more they waste natural gas.

Emissions from centrifugal (turbine) compressors also originate from seals, but in a different manner. These compressors are generally configured with one of two types of seal for the main shaft of the compressor. Dry (*i.e.,* oil-free) seals are designed in a way that minimizes leaks across the seal. Wet seals, in contrast, use oil to seal a narrow gap between the shaft and its housing. This oil absorbs significant amounts of the high-pressure natural gas which must be removed from the oil before it is re-circulated into the seal. Typically, the gas removed from the seal oil is vented, and these emissions are substantial: a typical wet-seal centrifugal compressor vents nearly 19,000 MCF per year.[97]

Quite simply, there are two clear wasteful practices here that are easily remedied. First, waste from reciprocating compressors occurs when operators fail to properly maintain them by regularly replacing rod packing seals. The solution, then, is easy: require proper maintenance practices to minimize waste. EPA's 2012 NSPS Subpart OOOO requires operators of certain *new* compressors to replace rod packing every 36 months or 26,000 hours of operation.[98] Notably, in addition to all compressors existing before August 23, 2011, the rule exempts *new* compressors on wellpads.[99] The exemption of existing compressors in Subpart OOOO stems from the specific approach that the Clean Air Act takes to reducing pollutants such as VOCs, which Subpart OOOO regulates; it does not reflect any judgment by EPA that reducing

[96] USEPA, Petroleum and Natural Gas Systems 2012 Data Summary, Greenhouse Gas Reporting Program, at 3, (available at: http://www.epa.gov/ghgreporting/documents/pdf/2013/documents/SubpartW-2012-Data-Summary.pdf).

[97] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012*, Annex 3, Table A-128. (available at http://epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2014-Annex-3-Additional-Source-or-Sink-Categories.pdf).

[98] 40 C.F.R. § 60.5385(a).

[99] *See id*. § 60.5365(c) (NSPS applies only to compressors between the wellhead and the point of custody transfer to the transmission and storage segment that were installed after August 23, 2011).

emissions from existing compressors would not be cost-effective or feasible. In fact, maintaining an existing reciprocating compressor costs the same as maintaining a new compressor, and EPA found in the Subpart OOOO rulemaking that maintaining a gathering compressor, as required by that rule, would cost less than $130 per ton of avoided methane emissions.[100]

The BLM, to comply with its duty to minimize *all* waste on public lands, must extend this requirement for proper maintenance to apply to existing sources as well. It does not make sense to require operators to keep good maintenance practices for new sources while the same practices are just as cost-effective and applicable for eliminating waste from existing sources. Emissions from existing gathering and boosting reciprocating compressors would decline by more than half if the standards for new compressors were extended to existing compressors.[101] Wellpad compressor emissions can be reduced eighty percent.[102]

Second, BLM must address wasteful emissions from wet-seal centrifugal compressors. While replacing wet seals with dry seals is possible, it is generally less expensive to route gas from the oil degassing unit (which would otherwise be vented) to the natural gas inlet of the compressor. According to the EPA's 2012 NSPS, retrofitting oil degassing emissions from wet seal centrifugal compressors to a vapor recovery unit can reduce venting by 95 percent.[103] The EPA has estimated that the capital cost to route seal oil degassing emissions to fuel gas or compressor suction is $22,000,[104] and due to the substantial amount of gas captured, the payback period for this option is 3 months.[105]

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[100] Calculated from data from EPA, *Regulatory Impact Analysis for Proposed New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry* (July 2011) at 3-16, Table 3.3. (available at: http://www.epa.gov/ttn/ecas/regdata/RIAs/oilnaturalgasfinalria.pdf).

[101] *See* 2011 TSD at 6-10, Table 6-5; 6-15, Table 6-6.

[102] *Id*.

[103] *See* 2011 TSD, Section 6.4.4.2.

[104] EPA, *Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, Background Technical Support Document for the Final New Source Performance Standards,* April 2012, 2011 ("2012 TSD")at Section 6.2 (available at: http://www.epa.gov/airquality/oilandgas/pdfs/20120418tsd.pdf).

[105] Calculated based on a 90% abatement from initial 19,000 mcf emissions, and a $4/mcf price for gas.

5. Venting and Flaring of Gas From Oil Wells

There are three distinct sources of natural gas waste from oil wells:

- The venting of associated natural gas, containing large quantities of methane, during well completions after hydraulic fracturing of oil wells

- The flaring of associated natural gas from oil wells during the production phase, due to lack of investment in infrastructure

- The venting of associated natural gas (often called "casinghead gas venting") from oil wells during production, which is also due to lack of investment in infrastructure

In each case, whether it is vented or flared, natural gas is wasted by operators despite the fact that cost effective technologies currently exist to capture the gas and put it to beneficial use, either on-site or via pipelines. As described above in Sections IV and V, BLM has the opportunity, and authority, to ensure through "front-end" planning that such wasteful practices do not occur on public land.

As a general matter, BLM cannot allow this type of waste to take place. As explained in more detail above, *see* Section IV.A, BLM's duty to minimize waste exists on a basin-wide level. As such, the Bureau must require proper planning during the RMP stage so that sufficient infrastructure to capture natural gas and bring it to beneficial use[106] is in place before wells are drilled, ensuring that the waste of natural gas will be minimized. Moreover, though economics are a factor, they should be viewed on a basin or field level. *See* Section IV.C. Doing so provides BLM with a reasoned basis for determining whether the natural resource as a whole is being wasted.

As it currently stands, the GHGRP does not cover these emissions sources as thoroughly as the sources described in Sections VI.B.1–4. For example, well completion emissions from hydraulically fractured *oil* wells are not covered by the GHGRP. As a result, nationwide emissions are challenging to estimate and we are unable to provide emissions estimates specific to the western basins dominated by public lands. Nevertheless, as documented below, the information we do have on current emissions shows it is clear that the magnitude of waste from each of these oil well sources are significant.

Below we also note that while traditional natural gas gathering systems are the most effective means of preventing waste from these sources, there are also several technologies that provide alternative means of productively utilizing associated gas beyond such traditional systems. We very briefly describe some of those technologies below. With these alternatives available, and

[106] "Beneficial use" here and below refers to capturing associated gas from oil wells and either transporting it to market via pipelines *or* utilizing the gas on-site as an energy source for useful work.

as discussed more fully in Section IV.D, BLM must issue rules that prohibit development on public lands unless operators are able to utilize the solutions we describe below.

a. Venting of gas during flowback following hydraulic fracturing of oil wells

EPA's NSPS Subpart OOOO addresses emissions of gas during well completion (flowback) of hydraulically fractured or re-fractured *gas* wells. Beginning on 1 January 2015, gas that flows to the surface during flowback from most gas wells must be separated and directed into pipelines.[107] Wells exempt from this requirement, such as exploration, delineation, and low-pressure wells, must flare the gas instead of venting it, or capture it and direct it into pipelines.[108] Before 1 January 2015, all wells not capturing gas for sale must flare it.[109]

Unfortunately, this requirement does not extend to hydraulically fractured oil wells.[110] Furthermore, oil and gas producers are not required to report emissions during this process to the GHGRP.[111] However, analysis of multiple datasets by the Environmental Defense Fund has shown oil wells produce 6 – 200 metric tons of methane completion / re-completion flowback.[112] One source they analyzed (GHGRP reports of well completions which appear to be *oil* well completions, despite the gap in the GHGRP mentioned above) shows that this gas is vented, instead of being captured for sale or flared, in a significant fraction of oil well completions, and only rarely is it captured for sale. Of the 957 completions and re-completions with clear data on the handling of the gas produced during completion, 467 were vented and only 186 were captured.[113] Given the recent distinct shift in drilling activity to unconventional oil formations,[114] it is certain that thousands of oil well completions with hydraulic fracturing

[107] 40 C.F.R. § 60.5375(a)(1)-(4).

[108] *Id.* § 60.5375(a)(3), (4).

[109] *Id.*

[110] *Id.* § 60.5365(a) (each *gas* well is subject to this subpart); § 60.5430 (defining "gas well" as "an onshore well drilled principally for production of natural gas").

[111] *See* 40 C.F.R. § 98.232(C)(6), (8) (requiring completion events at gas wells to report emissions to the GHGRP, but neglecting to include any requirements for completion events at oil wells). *See also id.* § 98.238 (defining "oil well" as a well that produces "hydrocarbon liquids and do[es] not meet the definition of a gas well.").

[112] Environmental Defense Fund (2014), *Co-Producing Wells as a Major Source of Methane Emissions: A Review of Recent Analyses* at Table 1. Available at: http://blogs.edf.org/energyexchange/files/2014/03/EDF-Co-producing-Wells-Whitepaper.pdf.

[113] *Id* at Table 3.

[114] See for example: Weeden, S. (2013), "Oklahoma reverses 25-year decline in oil production," *E&P Magazine*. Available at: http://www.epmag.com/item/Oklahoma-reverses-25-year-decline-oil-production_110957; Durham, L.S. (2013), "*Unconventional Uteland Butte Sparks New Utah Activity*" Available at: http://www.aapg.org/Publications/News/Explorer/Emphasis/ArticleID/2491/Unconventional-Uteland-Butte-Sparks-New-Utah-Activity.

will be occurring on public lands in the near future (if that is not the case already). With high potential emissions per well completion and an industry pattern of venting a significant portion of these completions, BLM's new waste rule clearly must address significant waste of resources on public land from oil well completions.

Fortunately, there are clear, low-cost, and effective waste mitigation measures for this source. The same Reduced Emissions Completions (REC) approach, whereby natural gas is captured with specialized equipment, instead of allowing it to escape into the air, and directed into pipelines, can be applied to associated gas from oil wells. According to the EPA's 2012 NSPS rulemaking, RECs can reduce completion emissions by 95 percent,[115] and recent research suggests that when properly carried out the emissions reduction can be better still.[116] As described above, BLM must also ensure through planning processes that gathering lines and other infrastructure are in place prior to well completion, or that other alternative technologies are in place to utilize the associated gas (see below).

b. Flaring of associated natural gas during oil production

In the last several years, the volume of natural gas flared from onshore operations in the US has risen quite dramatically due to the practice of producing oil from wells without adequate infrastructure in place to capture the gas produced by those wells. For example, about one-third of the gas produced in North Dakota is currently flared – in 2013, this was over 90 *billion* cubic feet of gas, enough to heat almost 1.3 million homes.[117] This occurs in part because wells go into production with no gas pipeline in place, but roughly half of the gas flared in North Dakota in 2013 was flared from wells already hooked up to pipelines. This "connected well flaring" occurs because there is insufficient infrastructure on wellpads (compressors), in the gathering system (insufficiently sized pipelines, and lack of facilities such as drip stations and pig stations to keep pipelines flowing consistently), and at processing plants. Simply put, due to poor planning, investment in the gas gathering and processing infrastructure has not kept pace with the enormous investment being made in drilling and completing oil wells.

BLM shares responsibility for this wasteful, environmentally detrimental situation. Wells on Federal and Tribal land are flaring similar portions of the gas they produce as wells on private or state land in North Dakota, as shown below in Table 5.

[115] *See* 2012 TSD, section 5.1.

[116] Allen, D., et al (2013).

[117] Clean Air Task Force calculations based on data from North Dakota Industrial Commission (see https://www.dmr.nd.gov/oilgas/stats/Gas1990ToPresent.pdf) and US Energy Information Administration.

Table 5 – Flared Portion of Natural Gas Produced on North Dakota Federal, Tribal, and non-Federal Lands

	Little Missouri National Grassland	Other Federal Land	Fort Berthold Indian Reservation*	Private and State Land
Number of Wells	870	175	936	6700
Portion of Produced Gas that is Flared:				
From wells hooked up to pipelines	22%	6%	31%	21%
From wells not hooked up to pipelines	7%	14%	13%	8%
Total Portion Flared	29%	20%	44%	29%

Source: Clean Air Task Force analysis of data from North Dakota Industrial Commission. Data is from August 2013 – January 2014 inclusive.
*Not all wells within FBIR are on Trust land. Portions shown in this table are for all wells within FBIR.

As described above, BLM must not allow this detrimental waste to continue. Front-end planning must ensure that not only are wells hooked up to pipelines, but also that sufficient pipeline and processing capacity exists to get all gas produced to market, before wells are completed. Since well production is highest in first few months after completion and then declines quite steeply (see Section V *supra*), it is essential that wells not be completed without this infrastructure actually in place.

Alternatively, as discussed below, other technologies can be used to transport or utilize associated gas. BLM must ensure that either with traditional gathering systems or alternative technologies, all associated gas is utilized, and none is wasted via flaring (or venting).

c. Venting of associated natural gas during oil production

In some cases, producers are venting associated "casinghead" gas from oil wells, instead of flaring it. Oil producers in the Green River, Piceance, San Juan, and Unita Basins reported venting about 83 MMCF of casinghead gas in 2012.[118] While this is a relatively small figure, it is a particularly egregious type of waste, since unlike venting from other sources (such as pneumatic equipment), no useful work *at all* is done with this gas. Further, when gas is not even flared, the environmental harm from the methane, VOC, and toxic constituents of the gas is utterly unabated.

This waste can entirely be prevented by ensuring that sufficient infrastructure is in place to capture all gas produced by oil wells, as discussed above.

[118] See Description of Methodology.

d. Alternative means of utilizing or transporting associated gas

Typically associated gas from oil wells, including gas from well completions, is transported to processing plants in gathering pipelines. When wells are isolated or other issues limit the capacity of gathering systems, other technologies can make it feasible to utilize associated gas locally or get it to market for beneficial use.

In the coming weeks, Clean Air Task Force will release a report by Carbon Limits on alternative technologies to utilize associated gas in these situations, and communicate this report to BLM. The report highlights several technologies:

- Natural gas liquids (NGL) recovery – separating NGLs (heavier hydrocarbon which can be stored as liquids under pressure) from raw associated gas at wellpads, so that NGLs can be trucked to market. The residual lean associated gas can be utilized further with other technologies, and NGL recovery may make the gas more suitable for those technologies. The residual lean gas is also smaller in volume, therefore relieving some capacity when gathering systems are approaching capacity, and has a lower dew point. The latter property is important because if NGLs are not recovered from associated gas at wellpads, they often condense out of the gas in gathering pipelines and pool in low spots, restricting or clogging the pipeline.
- Compressed natural gas (CNG) trucking – compressing associated gas at wellsites and trucking to consumers, processors, gathering systems, etc.
- Electric power generation for local use (powering drilling rigs, frac pumps, artificial lift pumps, etc, or off-pad local use).
- Electric power generation for sale to grid.

Each one of the above options is a mature technology, having been deployed commercially more than once in tight oil developments. These technologies can also be scaled up or down depending on the size of the development. Finally, many of the technologies are portable: they can be moved from well to well. For example, a technology can be deployed at a well in the first few months, when gas production is very high, and dismantled or scaled down once a pipeline is in place and can handle the full volume of production from the well. These solutions represent practices that are feasible today at costs that are not prohibitive.

BLM must carry out its statutory mandate to ensure that lessees of public land are subject to the condition that they will use "*all* reasonable precautions to prevent waste of oil or gas" developed on public land. With the availability of these technologies and proper front-end planning procedures, flaring and venting of associated gas clearly constitutes waste. BLM must adopt a rule to prevent this waste by not allowing venting or flaring of associated gas.

VII. CONCLUSION

We hope that BLM gives these core principles due consideration and that they are of service in informing the agency's efforts to modernize its 34-year old waste rules. As we have noted, BLM has made steady progress acknowledging and remedying methane emissions and waste but that this progress must be accelerated and intensified. This will go far in ensuring that BLM is, in fact, ensuring the responsible development of this country's onshore oil and natural gas resources.

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EXHIBIT 1

Congress of the United States
Washington, DC 20515

May 14, 2014

President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

Dear President Obama:

Thank you for releasing the *Climate Action Plan Strategy to Reduce Methane Emissions* on March 28th. We are encouraged that the Department of Energy, Department of the Interior, and Environmental Protection Agency are poised to take action to significantly reduce methane emissions from the oil and gas sector. Both the Environmental Protection Agency (EPA) and the Department of the Interior (DOI) should use their existing authority to enact policies that will decrease methane emissions across the oil and gas sector.

Curbing methane emissions will reduce harmful greenhouse gases and benefit the health of our citizens. Methane is a greenhouse gas commonly leaked and vented from oil and natural gas operations. According to EPA, methane is more than 20 times as potent as carbon dioxide. Moreover, the methane and volatile organic compounds (VOCs) emitted from oil and gas facilities can interact with sunlight to produce ozone or "smog," which has been found to trigger asthma attacks and aggravate conditions of people with bronchitis and emphysema.

The good news is that methane emissions from the oil and gas sector can be controlled with existing, cost-effective technology that is available and already being used by some operators. In February, Colorado became the first state to require such controls. Colorado's new regulations serve as a model for balanced oil and gas development, and we urge the EPA and DOI to consider similar policies to reduce such methane emissions.

According to EPA's most recent Greenhouse Gas Inventory, the oil and gas industry emitted 8.4 million metric tons of methane in 2011, roughly equivalent to carbon emissions from 60 coal-fired power plants. In 2012, EPA updated its air pollution standards for natural gas wells; these standards will help reduce volatile organic compounds emissions and methane gas. These new standards are a laudable step, but the rule does not apply to oil wells and the agency did not address existing infrastructure that emits large quantities of methane and, in many cases VOCs and air toxics as well. We urge the EPA, acting within its existing authority, to more broadly address methane emissions from new and existing oil and gas facilities across the supply chain.

With approximately 14 percent of U.S. onshore gas production and 8.5 percent of U.S. onshore oil production taking place on federal lands, DOI is uniquely positioned to make meaningful progress in reducing emissions and minimizing waste of a natural resource. Operators on public lands regularly vent and flare methane, wasting publicly owned natural gas resources. DOI should take appropriate steps to implement "best management practices" for reducing air pollution and methane leaks at oil and gas facilities on federal lands.

The Government Accountability Office estimates that 40 percent of gas that is currently lost to the atmosphere where it fuels dangerous climate change could instead be cost-effectively captured, generating new royalties of $23 million and cutting 16.5 million tons of CO2-e annually. These common sense steps to improve oil and gas production on federal lands benefit the environment and the taxpayer.

To enhance our nation's energy security and reliability and to protect our environment, methane emissions must be reduced. Proper oversight investments in critical infrastructure will help to achieve that goal. We appreciate your attention to this issue, and look forward to working with you as federal agencies implement their obligations under the methane strategy.

Sincerely,

Jerry McNerney
Member of Congress

Jared Polis
Member of Congress

Peter A. DeFazio
Member of Congress

Chris Van Hollen
Member of Congress

Zoe Lofgren
Member of Congress

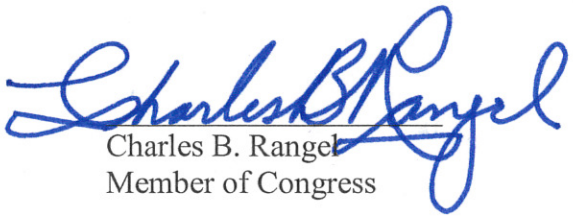
William R. Keating
Member of Congress

Rush Holt
Member of Congress

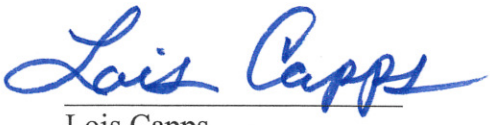
Paul Tonko
Member of Congress

George Miller
Member of Congress

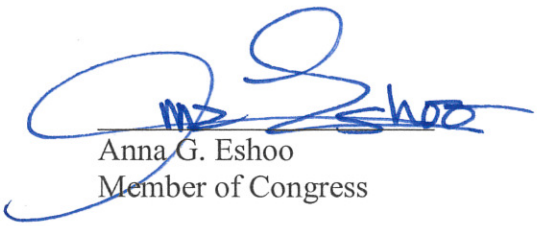
Gerald E. Connolly
Member of Congress



Charles B. Rangel
Member of Congress



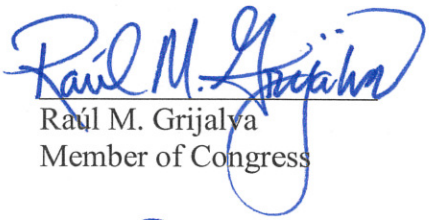
Lois Capps
Member of Congress



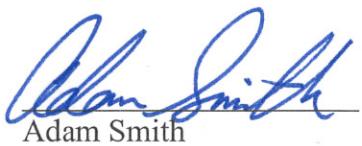
Anna G. Eshoo
Member of Congress

James P. Moran
Member of Congress

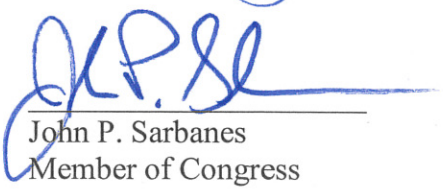
Michael M. Honda
Member of Congress



Raúl M. Grijalva
Member of Congress

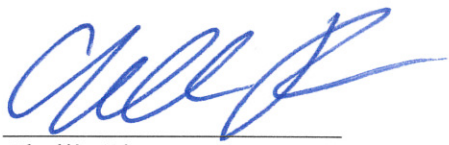


Adam Smith
Member of Congress



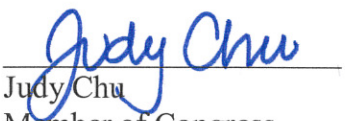
John P. Sarbanes
Member of Congress

Bradley S. Schneider
Member of Congress

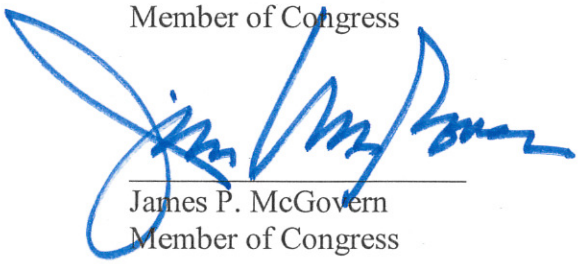


Chellie Pingree
Member of Congress

Steve Cohen
Member of Congress



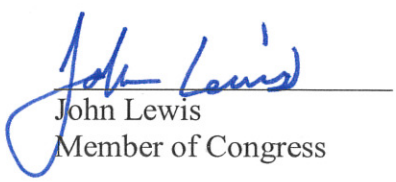
Judy Chu
Member of Congress



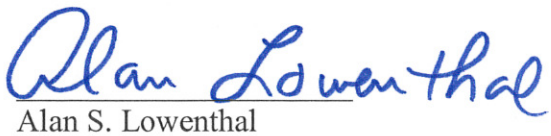
James P. McGovern
Member of Congress

James R. Langevin
Member of Congress

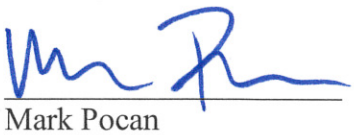
Niki Tsongas
Member of Congress



John Lewis
Member of Congress

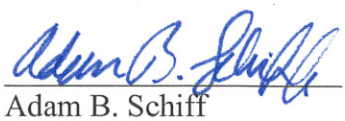


Alan S. Lowenthal
Member of Congress

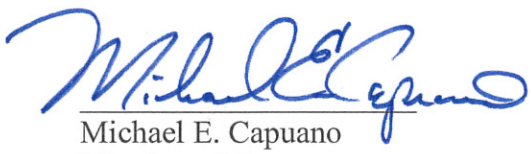


Mark Pocan
Member of Congress

Ann McLane Kuster
Member of Congress



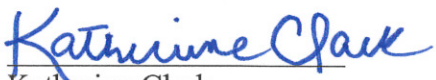
Adam B. Schiff
Member of Congress



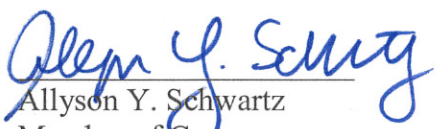
Michael E. Capuano
Member of Congress

Matt Cartwright
Member of Congress

Scott Peters
Member of Congress



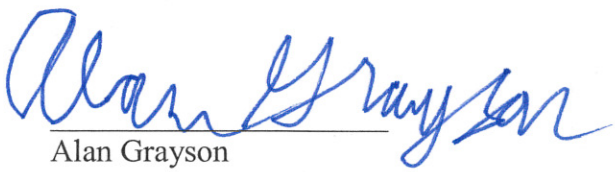
Katherine Clark
Member of Congress



Allyson Y. Schwartz
Member of Congress

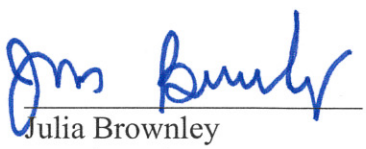
Jackie Speier
Member of Congress

Janice D. Schakowsky
Member of Congress

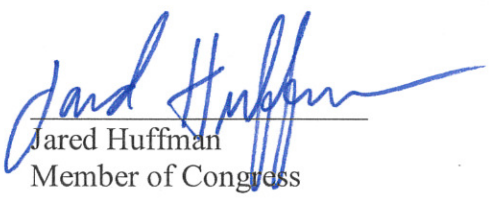


Alan Grayson
Member of Congress

Lucille Roybal-Allard
Member of Congress



Julia Brownley
Member of Congress



Jared Huffman
Member of Congress

Keith Ellison
Member of Congress

Michael H. Michaud
Member of Congress

Tim Ryan
Member of Congress

Mike Quigley
Member of Congress

Robert C. "Bobby" Scott
Member of Congress

John F. Tierney
Member of Congress

Daniel Lipinski
Member of Congress

Carol Shea-Porter
Member of Congress

cc: Administrator Gina McCarthy

Secretary Sally Jewell

Secretary Ernest Moniz

EXHIBIT 2

Excerpts from Testimony by Oil and Gas Companies in Support of Gas Capture Planning in North Dakota North Dakota Industrial Commission Hearing 4/22/14*

North Dakota Petroleum Council (500 member industry organization)

- Upstream, Midstream, Surface Owners and Government Agencies must work together to achieve the [flaring reduction] goal.
- Statewide capture targets can be achieved through proper planning and stakeholder cooperation.
- Midstream companies will have increased pressure for investment to meet the targets, but will have much improved forecasts for planning and obtaining capital.

ConocoPhillips

Several years ago, ConocoPhillips established an ongoing dialogue with third party mid-stream companies to provide specific well location and flowrate estimates during the planning process, before applying for drill permits, to minimize flaring as the wells were brought on line. As a result of these proactive, cooperative initiatives, ConocoPhillips has established an internal goal for having 100% of our Bakken operated wells tied into a gas gathering system prior to first production through permanent facilities. We have also established a process and built necessary equipment to capture initial gas volumes during well clean-up and flow-back, with temporary tie-ins to the gas gathering system. We strongly support the reduction of flared gas volumes within the Bakken, and have worked with our competitors, through the North Dakota Petroleum Council's leadership, to submit an action plan to the NDIC for achieving this goal. We believe the action plan establishes reasonable targets and timelines for the industry and balances the reality of infrastructure construction lead-time with the urgency to reduce flaring.

Enerplus Resources

- For a company without specifically owned Midstream assets, like Enerplus, this requires operators and gas gatherers to work closely together to calculate the demand and build out the necessary infrastructure to handle the supply

Hess Oil

Hess applauds the NDIC for adopting the Gas Capture Plan recommendation put forth by the Flaring Task Force earlier this year. We believe this will be a powerful tool for regulators, while also promoting greater accountability for operators and midstream service providers. One of the most important aspects of Gas Capture Plan required for any new permit to drill is that it will ensure that operators are communicating with midstream providers before any new wells come on line ... Over the long term, we believe the Gas Capture Plans will have a dramatic effect on infrastructure planning and increase the industry's efficiency for capturing gas.

Oneok Partners [Midstream]

The Flaring Task Force has facilitated increased communication between producers and midstream companies, which will result in better planning in the years to come. The rapid

development of the Bakken/Three Forks play has challenged existing midstream infrastructure, and it will take some time to build out the necessary facilities in these early years of the development. Increased visibility into producers' plans and projections for the area allow midstream companies to get out front and better understand timing and capacity needs.

Petro-Hunt [Midstream]

As a midstream gatherer and processor, upon obtaining a party's drilling plans, we review (with that party) the location and number of wells (single/multiple) to be drilled, the proposed spud dates, and how much volume we might expect at each connection point. We then model the throughputs to quantify the existing gathering line(s) and field and plant compression capacities. After modeling, we prepare a cost estimate for the gathering line(s) and other appurtenant facilities, and when necessary, obtain quotes from (multiple) compressor companies and the closest electric power provider. Once all the information is compiled, (this process takes up to two (2) months), we submit the cost estimate for the project to and discuss the information with the producer. Upon reaching a mutual agreement regarding the estimated costs, we place an order for all required facilities that we do not have in inventory and commence right of way acquisition. (Right of way acquisition averages three (3) months.) On average, we connect ninety percent (90%) of the wells prior to first production.

Petro-Hunt, L.L.C. [Exploration & Production]

All of our North Dakota leases are now dedicated under gas processing contracts with three (3) midstream companies. We provide these companies our drilling schedules up to three (3) years in advance and our fracking schedules one (1) month in advance. This is done to allow these companies to model their systems and have our wells connected in a timely manner.

SM Energy

- Collaboration between the NDIC, operators and midstream companies is essential
- SM Energy proposes that the best way to manage gas capture targets is on a system basis
    - Limitations on the drilling of new wells, or curtailment of production, should be managed on a system (area) basis
    - A system is defined as a booster station(s) and associated gathering facilities

Statoil

- Support NDPC's proposal, so let the GCP's work

Whiting Petroleum

- Reduce the number of APD's that are approved to operators that are continuing to flare their gas contrary to their GCP's.

WPX Energy

- Our commitment to capturing gas drove us to construct our own gathering system on the Van Hook peninsula at investment cost of over $50 million. In addition we have

made a $10 million investment for well head compression as well as investing over $100 million in well connections.

- Although we have many constraints WPX does support the use of the Gas Capture Plan for flaring reduction.
- WPX is confident that the GCP program can be successful in reducing gas flaring.

*Testimony available in pdf from the North Dakota Industrial Commission
https://www.dmr.nd.gov/oilgas/

EXHIBIT 3

Exhibit 3: Description of Methodology for Determining Methane Emissions from Production Basins and Sources

We estimated emissions on Federal Jurisdiction lands by summing emissions from four American Association of Petroleum Geologists (AAPG) basins that have large percentages of Federal land: Green River, Uinta, San Juan, and Piceance. Production in these four basins makes up 19% and 5% of total U.S. gas and oil production, respectively:

Basin Name	Gas Production (BCF)	% US Gas Production	Oil / Liquids (MBbl)	% US Oil Production
Green River Basin	1,463	5.3%	14,974	0.8%
Uinta Basin	461	1.7%	23,220	1.3%
San Juan Basin	1,201	4.4%	2,589	0.1%
Piceance Basin	883	3.2%	7,957.5	0.4%
Total in Selected Basins	**4,008**	**14.5%**	**7,958**	**2.7%**
Total in US.	**27,576**		**1,788,942**	

The oil and gas production, by AAPG basin, data underlying this table was compiled from county-level data from the HPDI database.[1] We thank Environmental Defense Fund for providing this basin production data.

To calculate emissions reported to AAPG from individual sources in these AAPG basins, we accessed Greenhouse Gas Reporting Program data using the EPA's Envirofacts website.[2] From that site, data from "Petroleum and Natural Gas Systems" (Subpart W) reported by individual facilities, tagged by emitting facility, emissions source (e.g., pneumatic controllers), and greenhouse gas (e.g., methane, CO_2) is available. Facilities are sorted into AAPG basins by cross-referencing this data with the "Onshore Oil and Gas" Facility information in EPA's summary spreadsheet of greenhouse gas emitters.[3] Only methane emissions are used in this analysis. We converted the emissions data downloaded from the GHGRP in units of metric tons of CO_2e to metric tons of methane by dividing by the GWP EPA uses to date in the GHGRP, 21. We then converted these data to natural gas volumes (MMCF, BCF, etc.) by assuming that the natural gas is 79% methane and carrying out standard conversions.

Not all of the oil and gas wells in these basins are located on federal land, and we are not able to apportion emissions from those basins to wells on Federal land. However, given the very high fraction of wells within these basins that are Federal and the striking contrast between these basins and other basins, it is clear that the facilities on Federal land are contributing to the excessive methane emissions that are visible in the basin-level emissions data.

In addition, not all methane emissions from oil and gas production facilities are reported to the GHGRP, due to limitations such as a reporting threshold that exempts smaller operators. As

[1] Drilling Information, Inc. (DI). 2011. *DI Desktop.* 2011 Production Information Database.
[2] Website address: http://www.epa.gov/enviro/facts/ghg/customized.html
[3] Available here: http://www.epa.gov/ghgreporting/documents/xls/ghgp_data_2012_09012013_FINAL.xlsx

noted in our comments, there are also limitations on the accuracy of the GHGRP data (such as the use of average leak emissions per component instead of measured leak emissions). However, we are not aware of any reason why these limitations of the GHGRP data would skew the comparisons of GHGRP data for these basins and the US as a whole that we present in our comments. Our emissions estimates are meant to be illuminating approximations, not precise calculations.

Because some of the category label for emissions sources in the GHGRP data are not terribly clear, we provide them here together with the terms we have used for the emissions sources.

Emissions Source	GHGRP Emissions Category Label
Leaks	OTHER EMISSIONS FROM EQUIPMENT LEAKS
Liquids Unloading	WELL VENTING
Pneumatic Valve Controllers	PNEUMATIC DEVICE VENTING
Pneumatic Pumps	NATURAL GAS DRIVEN PNEUMATIC PUMPS
Reciprocating Compressors	RECIPROCATING COMPRESSORS
Centrifugal Compressors	CENTRIFUGAL COMPRESSORS
Venting of associated natural gas during oil production* ("casinghead gas")	ASSOCIATED GAS VENTING FLARING

*Emissions during well completion are not included in this category.

Methane venting from oil and gas operations in these 4 basins accounts for 27% of total venting in the U.S.

Basin Name	Methane Venting (MMcf)	Percent of US Venting
Green River Basin	6,366	4.8%
Uinta Basin	4,371	3.3%
San Juan Basin	19,375	14.5%
Piceance Basin	6,122	4.6%
Total in Selected Basins	36,235	**27.2%**
Total in US.	133,196	

Here we break out emissions in these 4 basins by emissions source (MMcf):

Emissions Source		Green River Basin	Uinta Basin	San Juan Basin	Piceance Basin
Fugitives / Leaks		839	436	2,693	483
Liquids Unloading		502	412	6,374	2,593
Pneumatics	Pneumatic Controllers	3,447	2,047	8,840	2,438
	Pneumatic Pumps	822	982	196	362
	Pneumatics Total	4,269	3,030	9,036	2,799
Compressors	Reciprocating	-	-	547	-
	Centrifugal	1	0	31	8
	Compressors Total	1	0	579	8
Associated / Casinghead Gas		3	51	29	-
Other		751	442	664	239
Total		6,366	4,371	19,375	6,122
Grand Total		**36,235**			

And here are the combined emissions for the 4 basins by emissions source and compare to national emissions (MMcf):

Emissions Source		Total Venting in Selected Basins (MMcf)	Total Venting in U.S. (MMcf)	Percentage of National Emissions for Source	Percentage of Total National Emissions, All Sources
Fugitives / Leaks		4,451	21,121	21.1%	3.3%
Liquids Unloading		9,882	16,017	61.7%	7.4%
Pneumatics	Pneumatic Controllers	16,773	49,910	33.6%	12.6%
	Pneumatic Pumps	2,362	7,837	30.1%	1.8%
	Pneumatics Total	19,135	57,747	33.1%	14.4%
Compressors	Reciprocating	547	1,284	42.6%	0.4%
	Centrifugal	41	155	26.4%	0.0%
	Compressors Total	588	1,440	40.9%	0.4%
Associated / Casinghead Gas		83	5,189	1.6%	0.1%
Other		2,096	31,682	6.6%	1.6%
Total		**36,235**	**133,196**		**27.2%**