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EPA's Methane Proposal for the Oil and Gas Sector – A Strong Foundation to Reduce Methane Emissions and Regulatory Path for More

By Carrie Jenks, Kate Konschnik, Abby Husselbee, Hannah Perls
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In the months leading up to the UN climate conference in Glasgow (COP26), the United States and the European Union made a global methane pledge to reduce their collective methane emissions 30 percent from 2020 by 2030. Methane is a powerful greenhouse gas (GHG) emitted by the oil and natural gas industry,[1] as well as the agricultural and waste management sectors. In November, with the COP26 underway, the United States took a big first step in achieving that commitment with a regulatory package for methane emissions from the oil and gas sector. For the first time, the US Environmental Protection Agency (EPA) will limit methane from existing oil and natural gas infrastructure, including approximately one million producing oil and gas wells, 1,400 compression stations located along natural gas transmission lines, and 650 natural gas processing facilities.[2] Ultimately, each state will be required to design and implement standards for this existing infrastructure, which must be at least as stringent as the federal emissions guidelines.

For new infrastructure, EPA proposes to restore methane rules for upstream oil and gas industry segments, which the Trump administration had rolled back (including for natural gas transmission and storage infrastructure, which had been removed entirely from regulation); strengthen emissions requirements for oil and natural gas production; and extend coverage of these requirements to many more pieces of equipment than were originally included in the rules.

Many of the proposed changes were made possible through recent breakthroughs in methane research and the development of advanced monitoring technologies and methods. Since 2012, when EPA first set emissions standards on new oil and gas equipment,[3] active research in this field has led to changes in our understanding of the nature and magnitude of methane emissions from the oil and gas sector. For example, monitoring surveys from the past decade have underscored the role that intermittent "super-emitting' sources play in overall sector emissions. As a result, EPA's proposal focuses on malfunctioning equipment and operational upsets as a source of pollution and

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[1] Proposed Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, 86 Fed. Reg. 63,110, 63,114. (Nov. 15, 2021); available at: https://www.govinfo.gov/content/pkg/FR-2021-11-15/pdf/2021-24202.pdf. Methane is the primary component of natural gas.

[2] 86 Fed. Reg. at 63,153.

[3] As discussed in this paper, the 2012 requirements related to volatile organic compounds (VOCs), a family of hazardous air pollutants including benzene. Many of the actions EPA required owners and operators to take under that rule had the co-benefit of reducing methane pollution as well; however, EPA did not directly regulate methane emissions from this sector until 2016.

seeks to increase the frequency of on-the-ground leak surveys and enable more aerial surveys to find bigger methane sources more quickly.

Additionally, research has underscored the unpredictable nature of methane emissions, identifying wider variation in potential emissions from similar components and activities. In response, EPA proposes to depart from a blanket exemption from leak detection surveys for low- production oil and gas wells and instead proposes exemptions for well sites that demonstrably emit below 3 tons per year (tpy) of methane.

EPA included many technical questions for comment in the proposal. While the questions may appear focused on small details, the feedback EPA receives will be critical for the broader design and ambition of the final rule. Agency leadership seems willing to seek deeper methane reductions and intends to issue a Supplemental Proposal based on comments. EPA specifically seeks input on the scope of components within the oil and gas sector that should be regulated, the flexibility it gives states to use advanced technologies for their own programs, and ultimately, the opportunity to create incentives to identify and eliminate the largest methane emissions more quickly.

Finally, the proposal introduces a bold new approach to empower communities in the detection of equipment malfunctions and other large sources of unexpected methane emissions. While EPA is seeking input on the final design details, the concept could represent a fundamental shift in the way environmental harms are identified and addressed.

EPA published the proposal in the Federal Register on November 15, 2021. Comments are due January 14, 2022. There are many areas where public comment over the next 60 days could inform EPA's final rulemaking.

In this paper, we focus on those areas that could enable a regulatory framework to use advanced methane monitoring technologies and methods. We highlight key areas on which stakeholders may want to provide EPA comment to support a final rule that achieves significant emission reductions through the deployment of cost-effective technologies and approaches.

Regulatory History and Legal Authority

The US oil and gas sector emits methane during normal production, processing, transmission, and storage operations, which may include intentional venting and flaring of emissions. A great deal of equipment also leak methane, sometimes by design and other times, during operational upsets. Over a 20-year period, methane is 83 times more powerful as a GHG than carbon dioxide.[4] As a result, steps to reduce methane are a critical component of the Biden administration's climate goals.

[4] 86 Fed. Reg. at 63,129.

If finalized, EPA estimates that its 2021 proposal will result in 41 million fewer short tons of methane emitted between 2023 and 2035.[5] A large share of these emission reductions are driven by the proposal's first-time requirements for existing sources.

In 2012 and 2016, EPA issued regulations that established New Source Performance Standards (NSPS) for new and modified sources in the oil and natural gas sector. The 2012 rule established requirements to reduce volatile organic compounds (VOCs);[6] the 2016 rule established additional requirements for VOCs and directly regulated methane emissions.[7] EPA also issued an Information Collect Request (ICR) to operators requesting information about controlling methane emissions from their existing onshore gas facilities.[8]

The Trump EPA rescinded the ICR in March 2017, stalling the process to develop requirements for existing sources.[9] EPA also finalized two replacement regulations for new sources. The first of the two rules, known as the "2020 Policy Rule," eliminated the regulatory requirements related to methane--thereby eliminating the obligation to regulate emissions from existing sources--and removed transmission and storage from the regulated source category.[10] The companion "2020 Technical Rule," eased the process for seeking approval of alternative monitoring technologies and methods, and altered several Obama-era standards, including the monitoring and repair requirements and emissions standards for pneumatic pumps.[11]

Among his Day One Executive Orders, President Biden directed EPA to review the 2020 Technical Rule and to propose a methane regulation covering existing sources.[12] Later, in June 2020, President Biden signed a joint resolution of Congress disapproving the 2020 Policy Rule, under the Congressional Review Act (CRA).[13]

Effect of the Congressional Review Act

As a result of Congress disapproving the 2020 Policy Rule through the CRA, EPA can treat the 2020 rule as though it "had never taken effect."[14] Therefore, Congress eliminated the need for EPA to undertake a rulemaking process to repeal the 2020 rule. EPA may now simply propose additional regulatory requirements to the 2016 NSPS. By eliminating a regulatory step, Congress also removed

[5] EPA, Regulatory Impact Analysis for the Proposed Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, p. 20 (Nov. 2, 2021), https://www.epa.gov/system/files/documents/2021-11/proposal-ria-oil-and-gas-nsps-eg-climate-review_0.pdf.
[6] 40 C.F.R. § 60.5360 (2012).
[7] 40 C.F.R. § 60.5360a (2016).
[8] See 81 Fed. Reg. 66962 (Sep. 29, 2016).
[9] EPA, Background on the Information Collection Request for the Oil and Natural Gas Industry (Mar. 2, 2017), https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/background-information-request-oil-and.
[10] 40 C.F.R. § 60.5360a (2020).
[11] Id.
[12] Exec. Order No. 13,990, 86 Fed. Reg. 7,037 (Jan. 20, 2021).
[13] S.J. Res. 14, 117th Cong. (2021).
[14] 5 U.S.C. § 801(b)(1).

a potential litigation risk given that EPA will not have to defend a deregulatory action in addition to the new rule, in any future court challenge.

Moreover, under the CRA, an agency cannot issue "substantially the same rule" as one that has been disapproved.[15] In this instance, a strong argument can be made that EPA, even under a future administration, cannot propose a rule that "deregulates methane emissions from the production and processing sectors or deregulates the transmission and storage sector entirely."[16] The Congressional resolution enables EPA to argue that Congress clearly intends EPA to regulate methane emissions from the oil and gas sector.

Endangerment Finding

In the 2016 NSPS, which EPA affirms in this proposed rule, EPA explained that once EPA determines that the category causes or contributes significantly to air pollution that could reasonably endanger public health or welfare, the Clean Air Act authorizes EPA to promulgate performance standards under section 111 for any air pollutant emitted by the source category. EPA asserted that it does not need to issue an additional determination for each specific pollutant provided that EPA has a rational basis for regulating the air pollutant from the source category. The CRA provides EPA an additional justification to return to this prior legal reasoning.[17]

Additionally, EPA explains in the proposal that it reviewed its prior actions and newly available information related to climate change risks and the impact of methane emissions. Based on that review, in combination with the CRA and associated legislative history, EPA reaffirms its statutory interpretation. Citing the Intergovernmental Panel on Climate Change (IPCC) and the source category's contribution to methane emissions, EPA also reaffirms that it has a rational basis to regulate methane emissions from the source category. In the alternative, EPA makes the finding that methane emissions from the oil and natural gas source category "contribute significantly to dangerous air pollution."[18] Similarly, EPA reaffirms that the transmission and storage segment, along with the production and processing segments are part of this source category.

Key Provisions of EPA's Proposal

Section 111 of the Clean Air Act authorizes EPA to implement standards of performance for air pollutants from stationary sources that are listed as a source category under section 111(f). Section 111(a)(1) requires that the standards of performance reflect the "degree of emission limitation achievable through the application of the best system of emission reduction [BSER] which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impacts and energy requirements) the Administrator determines has been adequately

[15] 5 U.S.C. 801(b)(2).
[16] 86 Fed. Reg. at 63,151.
[17] The Trump administration asserted a new interpretation that the Clean Air Act requires EPA to make a separate endangerment finding for each pollutant the agency seeks to regulate from a source category.
[18] 86 Fed. Reg. at 63,152.

demonstrated."[19] To develop BSER, EPA evaluated potential control measures available for sources, the emission reductions available through these measures, and evaluated the reasonableness of control costs for each option.

As noted in the proposal, the Act affords EPA "considerable discretion in choosing a means of cost consideration."[20] For the proposed standards, EPA evaluated the cost effectiveness under a single-pollutant approach and a multipollutant approach in order to "take into account the systems of emission reduction considered in this rule typically achieve reductions in multiple pollutants at one and secure a multiplicity of climate and public health benefits."[21]

Once EPA establishes standards for new sources, EPA is also required, in certain circumstances, to issue emission guidelines (EG) for emission reductions from existing sources. Specifically, the Clean Air Act directs regulation of existing sources of pollution that are not already addressed under sections 110 or 112 of the Act. In this case, because VOCs are regulated as a precursor to ozone under section 110, the Act does not require EPA to issue EG for VOCs. However, methane emissions from the oil and gas sector are not regulated under section 110 or section 112; therefore, EPA must issue EG for existing sources, based on BSER.

EPA's proposal is broader than the 2016 rule's requirements in terms of scope and stringency. It looks to reduce emissions from several potentially emitting components and activities not previously regulated in the oil and natural gas production sector and identifies numerical or work practice standards for each. The rule would also extend coverage to existing sources under section 111(d) of the Clean Air Act, increase monitoring frequency at all well sites and compressor stations, and eliminate venting of associated gas from oil wells. Additionally, the proposal would essentially require elimination of emissions from all pneumatic controllers, bring more storage tanks under regulatory coverage by aggregating emissions from connected tanks, and reach pneumatic pumps in the production and transmission segments. The proposal makes further distinction between requirements based on the date the component was installed or a triggering action was taken, as set out in Table 1 of the preamble[22] and below. Finally, the proposal includes new environmental justice provisions to enhance community engagement in monitoring, enforcement, and consultation in state implementation plans.

Table 1: Applicability Dates for Proposed Subparts Addressed in this Proposed Action

SUBPART	SOURCE TYPE	APPLICABLE DATES
40 CFR part 60, subpart OOOO	New, modified, or reconstructed sources	After August 23, 2011 and on or before September 18, 2015

[19] 42 U.S.C. § 7411(a)(1).
[20] 86 Fed. Reg. at 63,133.
[21] Id.
[22] 86 Fed. Reg. at 63,117.

SUBPART	SOURCE TYPE	APPLICABLE DATES
40 CFR part 60, subpart OOOOa	New, modified, or reconstructed sources	After September 18, 2015 and on or before November 15, 2021
40 CFR part 60, subpart OOOOb	New, modified, or reconstructed sources	After November 15, 2021
40 CFR part 60, subpart OOOOc	Existing sources	On or before November 15, 2021

Overall, the proposal expands coverage and is designed to deepen methane reductions, however, EPA extends some flexibility for sources installed between September 18, 2015 and November 15, 2021, based on VOC standards in the 2020 Technical Rule.[23] For instance, equipment to capture gas during well completions need not be purchased for each well site but may be shared across multiple sites; equipment at the well site owned by third parties does not have to be monitored for leaks; and well sites with no major production and processing equipment do not have to follow required leak detection and repair regimes. EPA is also maintaining the changes to its Alternative Means of Emission Limitation (AMEL) process,[24] enabling vendors to seek approval for use of new methane monitoring technologies and methods and potentially lowering the barriers to approval for these new technologies and methods. Additionally, EPA is offering relief on monitoring frequency for well sites and compressor stations in Alaska, where weather conditions might impede manual inspections.[25]

Below we summarize some of the key components of EPA's proposal, and in the Appendix we list the proposed NSPS compared to the 2016 requirements. In some instances, EPA decided to maintain the previously determined BSER for affected facilities (e.g. storage vessels and pumps) but expanded coverage of the requirements.

Increased Monitoring of Fugitive Emissions at Well and Compressor Sites

Currently, operators conduct leak detection semi-annually and focus on certain components known to leak. Operators must walk around a physical location with a hand-held device (a VOC analyzer or a FLIR camera), pointing it directly at components to determine if they are leaking. In this proposal, EPA states that "data shows that the universe of components with potential for fugitive emissions is broader than the illustrative list included in the 2016 NSPS OOOOa, and that the majority of the largest emissions events occur from a subset of components that may not have been clearly included in the definition."[26] To address this gap, EPA proposes to expand the definition of "fugitive

[23] Section X *Summary of Proposed Action for NSPS OOOOa,* 86 Fed. Reg. at 63,157.
[24] 86 Fed. Reg. at 63,166.
[25] *See, e.g.,* 86 Fed. Reg. at 63,174.
[26] 86 Fed. Reg. at 63,169.

emissions" to add to the list of components an inspection should cover[27] In particular, EPA proposes to add possibly malfunctioning equipment into the leak detection regime; previously, it was assumed certain equipment performed as it should and was not inspected.

Additionally, the proposal would increase the frequency of monitoring for fugitive emissions. EPA proposes restoring the quarterly monitoring for compressor stations from the 2016 rule. EPA then proposes monitoring frequencies for well sites depending on each site's annual methane emissions. New and existing well sites emitting at least 3 tpy of methane would be required to conduct quarterly monitoring of their equipment using either optical gas imaging or Method 21 monitoring.[28] (EPA solicits comment on whether to direct owners and operators to consider the potential for malfunctioning equipment when determining whether they exceed this threshold.) EPA also offers a "co-proposal" that would require quarterly monitoring at well sites emitting at least 8 tpy, while enabling wells that emit between 3 and 8 tpy to be tested semi-annually.[29] EPA proposes exempting well sites that emit 3 tons of methane or fewer per year provided the site demonstrates its actual emissions fall below this threshold.[30]

Consistent with current requirements, the proposed rule would require well sites to use optical gas imaging (OGI) as the primary monitoring technology, with Method 21 as an alternative option. However, these inspections are labor-intensive and expensive relative to many advanced monitoring technologies and methods.[31] Moreover, EPA's current leak detection and repair (LDAR) regime likely only addresses about 2 percent of the sector's methane emissions.[32] Therefore, EPA proposes an alternative approach to use bimonthly advanced measurement technology in combination with at

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[27] EPA proposes that a fugitive emission component is "any component that has the potential to emit fugitive emissions of methane and VOC at a well site or compressor station, including valves, connectors, PRDs, open-ended lines, flanges, all covers and closed vent systems, all thief hatches or other openings on a controlled storage vessel, compressors, instruments, meters, natural gas-driven pneumatic controllers or natural gas-driven pumps. However, natural gas discharged from natural gas-driven pneumatic controllers or natural gas-driven pumps are not considered fugitive emissions if the device is operating properly and in accordance with manufacturers specifications. Control devices, including flares, with emissions resulting from the device operating in a manner that is not in full compliance with any Federal rule, State rule, or permit, are also considered fugitive emissions components." 86 Fed. Reg. at 86,169-70. The 2016 rule defined "fugitive emissions component" as "any component with the potential to emit methane and VOCs", including valves, connectors, and openings on storage vessels that were not otherwise regulated.

[28] *See, e.g.,* 86 Fed. Reg. at 63,170, 63,174-75. Well sites and compressor stations on the Alaska North Slope are only required to submit to annual monitoring. Method 21 is a long-standing EPA methodology for detecting VOC leaks in oil and natural gas equipment.

[29] *See, e.g.,* 86 Fed. Reg. at 63,172.

[30] 86 Fed. Reg. at 63,171.

[31] K. Rashid, A. Speck, T.P. Osedach, D.V. Perroni, A.E. Pomerantz, Optimized Inspection of Upstream Oil and Gas Methane Emissions Using Airborne LiDAR Surveillance, Applied Energy 275 (2020) 115327.

[32] Compare EPA, Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources, Background Technical Support Document for the Final New Source Performance Standards 40 CFR Part 60, subpart OOOOa, U.S. Environmental Protection Agency, May 2016, Tables 9.3 & 9.4, to "Actual vented, fugitive, and flared methane emissions from petroleum and natural gas systems," *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2019*. U.S. Environmental Protection Agency, 2021, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks. *See also*, https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0295-0035.

least annual OGI.[33] EPA proposes allowing sources to use such advanced measurement technology provided it can detect at least 10 kilograms of methane per hour.[34] The potential technologies EPA discusses in the proposal include fixed-base and open-path sensor networks, unmanned aircraft systems (UAS) equipped with methane detection equipment, the use of ground or air based high-end instruments for mobile measurements, and satellite observations.

Once a source identifies a leak, EPA proposes that the source must repair the leak within a set period of time, but seeks comment on the development of a tiered repair approach that would require repairing the largest leaks first.[35]

Pneumatic Controller Emissions

EPA proposes to require pneumatic controllers to have a VOC and methane emissions rate of zero.[36] Additionally, the proposal would extend this requirement to intermittent vent pneumatic controllers, which were previously not regulated under the NSPS.[37] Natural gas-driven intermittent devices comprise the majority of pneumatic controllers and are responsible for a majority of emissions from this category.[38] EPA also proposes to eliminate nearly all of the current time and safety exceptions.[39]

Elimination of Gas Venting of Associated Gas from Oil Wells

During oil production, pressurized natural gas builds in oil wells, requiring owners and operators to periodically relieve pressure by venting or flaring the gas. EPA estimates that a significant amount of gas—over 500 billion cubic feet in 2019— is emitted through such venting and flaring.[40] Prior NSPS have not regulated emissions related to venting or flaring, though many states already prohibit venting and Colorado, New Mexico, and Alaska also prohibit routine flaring.[41]

EPA's proposal would require oil wells to route the gas to a sales line, or, if a sales line is not available, to use the gas onsite as a fuel source or flare the gas in a way that achieves a 95 percent emissions reduction.[42] EPA requests comment on many aspects of the use and sale of captured gas, including how to define "access to a sales line," productive uses for captured gas, and how to incentivize the sale and use of gas.[43] EPA also notes that under the proposal, every oil well that produces associated gas would be subject to the rule. For wells that already route gas to a sales line,

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[33] 86 Fed. Reg. at 63,197.
[34] Id.
[35] 86 Fed. Reg. at 63,172.
[36] 86 Fed. Reg. at 63,179. For sources in Alaska, EPA proposes that pneumatic controllers can emit up to 6 standard cubic feet per hour.
[37] Id.
[38] 86 Fed. Reg. at 63,178.
[39] 86 Fed. Reg. at 63,179
[40] 86 Fed. Reg. at 63,236.
[41] For example, North Dakota, one of the country's major gas producers, bans venting and requires flaring. N.D. Admin. Code 43-02-03-45 (2000). For states prohibiting routine flaring, *see, e.g.,* 2 Colo. Code Regs. § 404-1:903 (2021); Alaska Stat. § 31.05.150 (2007), N.M. Code R. § 19.15.29.6 (2021).
[42] *See, e.g.,*86 Fed. Reg. at 63,183, 63,237.
[43] Id.

the only requirement would be to certify that this is occurring. Wells that route associated gas to a flare would be subject to monitoring, recordkeeping, and reporting requirements. Alternatively, EPA seeks comment on whether to define affected facilities as oil wells that produce associated gas and do not route gas to a sales line. EPA explains that such a definition would significantly reduce the number of affected facilities.

Liquids Unloading

The 2014 GHG Inventory data estimated that liquids unloading emissions in 2012 were 14 percent of overall methane emissions from the natural gas production segment. Independent research corroborates this estimate.[44] However, EPA did not address this source of emissions in previous NSPS for the oil and natural gas production sector. Since the first NSPS targeting VOC emissions from the sector in 2012, several states have regulated this well maintenance activity.[45] EPA now proposes to do the same, directing owners and operators to perform liquids unloading with zero emissions. Similar to the proposed approach for associated gas from oil wells, EPA proposes two options: all liquid unloading events would be required to eliminate their methane emissions or, liquid unloading events that emit methane would be identified as "affected sources".[46]

Regulation of Existing Sources

Existing oil and gas sources "comprise the vast majority of polluting sources"[47] By regulating methane emissions from new sources, the Clean Air Act obligates EPA to regulate existing infrastructure including approximately one million onshore oil and gas wells. EPA estimates that 35 million of the projected 41 million short tons of methane avoided by 2035 will result from the regulation of existing sources.[48]

Once EPA establishes NSPS for a particular source category, EPA must issue EG for existing sources and "prescribe regulations to establish procedures under which States submit plans to establish, implement, and enforce standards of performance."[49] States must then submit plans to EPA to establish binding standards of performance for those existing sources.[50]

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[44] See, e.g., D.T. Allen et al., Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Liquid Unloadings, *Environ. Sci. Technol.* 2015, 49, 1, 641-648.
[45] 86 Fed. Reg. at 63,137 (referencing California, Colorado, Pennsylvania and Wyoming's rules, and New Mexico's proposed rules).
[46] 86 Fed. Reg. at 63,179-80.
[47] 86 Fed. Reg. at 63,152. Of note, EPA proposes that liquids unloading would be a modification of a well. As a result, the requirement would not be needed for existing wells.
[48] EPA, Regulatory Impact Analysis for the Proposed Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, p. 20 (Nov. 2, 2021), https://www.epa.gov/system/files/documents/2021-11/proposal-ria-oil-and-gas-nsps-eg-climate-review_0.pdf.RIA 20.
[49] 86 Fed. Reg. at 63,134.
[50] In response to some arguments that section 111(d) prohibits EPA from regulating emissions from a source category already reduced under section 112, EPA makes clear in the proposal that it agrees with it "longstanding legal interpretation spanning multiple Administrations that the 111(d) exclusion does not preclude the agency from regulating a non-HAP pollutant from a source category under section 111(d) even if that source category is regulated under section 112." Thus, this proposal includes EG for existing sources in the oil and gas source category for methane as methane is not regulated under section 112.

EPA states in the proposal that "there is a fundamental obligation under CAA section 111(d) that [state] standards of performance reflect the degree of emission limitation achievable through the application of the BSER, as determined by the Administrator."[51] However, the Act also authorizes states to consider the source's remaining useful life and other facts, which might justify some deviation from the EG established by EPA. EPA's EG, which EPA intends to release as part of the Supplemental Proposal, will provide requirements for states for the development of the plans and criteria for EPA to assess plans' adequacy. If a state fails to submit an approvable plan, EPA will directly regulate sources in that state through a federal plan.

This proposal includes "presumptive standards" that will provide the basis for the Emissions Guidelines in the Supplemental Proposal and assist states in developing state plans. In most cases, the presumptive standards mirror the NSPS created by EPA for new and modified sources. EPA explains these presumptive standards "serve a function similar to that of a model rule" to streamline the state plan development process.[52]

Where states do not adopt the presumptive standards, they must demonstrate how their plans will accomplish the same or greater emissions reductions than the presumptive standards. EPA notes that the proposed presumptive standards have "deliberately included certain flexibilities (e.g., in cases of technical infeasibility)," and therefore, "should be achievable and cost-effective for a wide variety of facilities across the source category."[53] Thus, "EPA believes that it would likely be difficult for States to demonstrate that the presumptive standards are not reasonable for the vast majority of designated facilities."[54] That said, section 116 of the Act authorizes EPA to approve state plans that include more stringent standards than the final EG.[55]

Recognizing that states may want their own existing methane programs to serve as the basis for their section 111(d) state plans,[56] EPA requests comment on how an equivalency demonstration should be made to ensure the state regime is rigorous and consistent with federal requirements.[57]

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[51] 86 Fed. Reg. at 63,134.
[52] 86 Fed. Reg. at 63,118.
[53] Id.
[54] Id.
[55] Id. *citing Union Electric Co. v. EPA*, 427 U.S. 246 (1976); 40 CFR 60.24a(f) (2020). EPA clarifies that while the Affordable Clean Energy Rule argued that *Union Electric* was not applicable to section 111(d), EPA no longer takes that position and "believes that because of the structural similarities between CAA sections 110 and 111(d), CAA section 116 as interpreted by *Union Electric* requires the EPA to approve CAA section 111(d) State plans that are more stringent than required by the EG if the plan is otherwise in compliance with all applicable requirements." However, EPA states that it would not have the authority to approve and render Federally enforceable measures on entities other than covered sources referred to as "designated facilities," but is requesting comments on how states could rely on state programs that apply to sources broader than covered sources to meet the requirements of section 111(d).
[56] Currently, three states—California, Colorado, and New Mexico—and two Canadian provinces have rules or proposed rules that are very similar if not identical to EPA's proposed zero methane and VOC emission requirement.
[57] 86 Fed. Reg. at 63,252.

State plans must also include compliance deadlines that ensure sources comply as soon as practicable but no later than two years after the state plan submittal deadline.[58] The proposal discusses the need for states to perform outreach and meaningful engagement with stakeholders, including overburdened and underserved communities, as discussed below.

Environmental Justice

As part of the CRA resolution, Congress noted that regulation of the Crude Oil and Natural Gas source category is necessary in part to "promote environmental justice." EPA's proposal seeks to fulfill that intent by addressing several procedural and substantive justice concerns. Prior to issuing the proposal, EPA conducted outreach to environmental justice communities and organizations, including opening a public docket for pre-proposal input, holding roundtables with state officials, and providing virtual public trainings and listening sessions. Concerns raised by stakeholders during these consultations are reflected in the proposed rule, including enhanced consultation requirements for states and measures to improve emissions detection, enforcement, and data transparency for fenceline communities. The preamble also includes a substantial discussion of the rule's environmental and public health effects and an extensive assessment of the disproportionate impacts of climate change on discrete, vulnerable communities.

EPA proposes to allow communities to trigger additional monitoring and enforcement actions when they detect a large emission event. This mechanism would help to address the concern that EPA's estimates do not include all methane emissions from "abnormal events."[59] If finalized, this provision could represent a first-of-its-kind validation of community oversight and science as an independent investigation or enforcement mechanism. The proposal does not elaborate on what this "pathway" would look like; instead, EPA requests additional information on how different technologies could be used to identify such events, as well as additional data on fenceline exposures to facilitate finer risk analyses. To promote feedback on these requests, EPA plans to host two half-day trainings in mid-November to review the proposed rule targeted at communities with environmental justice concerns, Tribes, and small business stakeholders.[60]

For the existing source state plans, the proposal includes requirements for states to demonstrate they have engaged in "robust and meaningful outreach and engagement" with stakeholders, including affected low-income communities, communities of color, and indigenous populations, prior to adopting and submitting the state plan to EPA.[61] While the proposal does not include criteria the agency will use to evaluate whether a state has complied with this requirement,[62] EPA will publish

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[58] 86 Fed. Reg. at 63,255-56 *citing* Am. Lung Assoc. v. EPA, 985 F.3d 914, 991 (D.C. Cir. 2021). EPA explains that while the D.C. Circuit vacated the timing provisions for when states must submit their state plans after final rules are published, it will soon address those aspects.

[59] 86 Fed. Reg. at 63,130.

[60] EPA, EPA to Host Trainings November 16-18, 2021, on EPA's Proposed Rule to Reduce Methane and other Harmful Pollutants from the Oil and Natural Gas Industry (last visited Nov. 6, 2021), https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/epa-host-trainings-november-16-18-2021-epas.

[61] 86 Fed. Reg. at 63,254.

[62] Currently states must hold at least one public hearing before adopting a plan to regulate existing sources, which is then subject to EPA review.

each decision to approve or disapprove a state plan and solicit comment. This state oversight is crucial to ensure EPA's commitment to enhanced engagement with affected communities is adequately implemented at the state level, particularly if states are granted additional flexibility to achieve federal emission standards.

Key Considerations for Final Rule

Several broad themes emerge in the preamble text, suggesting key considerations for the final rule that transcend individual components and activities. EPA will need to rely on additional comments to consider approaches that will enhance the overall effectiveness and durability of the rule to achieve reductions in methane from this sector consistent with the United States' global methane pledge.

In this section, we explore several priority areas for EPA to consider for the final rule, including:

- Can new standards—expressed as numerical limits or work practices—address additional known sources of methane emissions?
- How can new methane monitoring and measurement technologies and methods be used to enhance mitigation, community empowerment, and enforcement?
- How can states use new methane monitoring and measurement technologies and methods in their implementation plans, perhaps even in a broader performance-based approach to methane mitigation?

New and Enhanced Emission Standards for Known Sources

For many components and activities in the oil and gas production sector, EPA, states, and stakeholders know the emission risk and how to address it through specific standards or work practices. The 2012 and 2016 rules applied standards to a number of these sources, including high-bleed controllers, well completions at oil wells, and storage tanks emitting more than 6 tpy of methane. Since 2016, EPA has gathered information identifying additional sources of emissions, justifying new performance standards (e.g. liquids unloading[63] and associated gas releases at oil production wells).[64]

The proposal highlights where EPA believes standards for previously regulated sources can be expanded to cover more of those types of sources across the oil and natural gas production sector. For example, the proposal expands the definition of "storage vessel" to include "centralized production facilities" so that emissions from adjacent storage vessels that receive fluid from the same source would have to be considered in aggregate (and would more likely exceed 6 tpy, thereby triggering the requirement to reduce emissions by 95 percent).[65]

In addition, previously, EPA only required controllers located in natural gas processing facilities to eliminate methane emissions; other controllers could emit up to 6 standard cubic feet of methane

[63] 86 Fed Reg. at 63,179-80.
[64] 86 Fed. Reg. at 63,183.
[65] 86 Fed. Reg. at 63,173, 63,178.

per hour. In response, companies often replaced high-bleed valves with intermittent-bleed valves, which now comprise the largest source of emissions from controllers. EPA now proposes to set a zero-emissions standard for all pneumatic controllers, no matter where they are located.[66]

Similarly, EPA is proposing to require all pneumatic and natural gas-driven piston pumps to reduce emissions by 95 percent (except where the existing on-site control device achieves less than a 95-percent reduction, or where it is technically infeasible to route pump emissions to that existing device).[67] Prior requirements excluded pumps in the storage and transmission segments of the industry as well as natural gas-driven piston pumps.

The proposal identifies even more sources that could be regulated but for which more field data, modeling, or other analysis is needed to firmly establish the need and the stringency. EPA notes that if sufficient data are offered through the public comment process, EPA may propose standards for these sources in a Supplemental Proposal.[68] These sources include:

- abandoned and unplugged wells;
- pipeline pigging and related blowdown activities; and
- tank truck loading operations.

EPA also requests comment on possible monitoring, recordkeeping, and reporting requirements to ensure the proper design and operation of combustion control devices, where they are required to meet a standard.[69]

As methane detection and measurement capabilities continue to improve, industry, regulators, and communities can refine their understanding of the largest sources of methane emissions and identify reduction strategies. In the end, a regulatory approach that creates an incentive to achieve greater emission reductions cost-effectively would be preferable to component-by-component standards. While EPA will need comments to support its expansion of NSPS to new sources, EPA also seeks input on how to enable advanced monitoring technologies and methods for a broader methane reduction approach. As we discuss below, advanced technologies for detecting and reducing methane emissions may vary as to whether, when, and how they can be included in a final regulatory framework. Some may be appropriate for the EPA to add to their final rule, while others may have advanced sufficiently for the states when they put together implementation plans to regulate existing sources of methane from this sector.

Monitoring and Measurement Technologies and Approaches for Unknown, Intermittent, or Unforeseen Sources

While some sources of methane in the oil and gas sector are readily known, others are unknown, intermittent, or unforeseen. These sources comprise one of the three categories of “super-emitters”

[66] 86 Fed. Reg. at 63,178-79.
[67] 86 Fed. Reg. at 63,181.
[68] 86 Fed. Reg. at 63,240-45.
[69] 86 Fed. Reg. at 63,245-47.

identified by the National Academies of Sciences, Engineering, and Medicine:[70] the malfunctioning sources, either intermittent or prolonged in nature, that result from malfunctions and poor work practices. EPA proposes a departure from past practice by including these types of emissions in leak detection regimes. Stuck valves, tank lids left ajar, and weathered or poorly maintained equipment can result in unanticipated, and significant, methane emissions. Once methane is detected, the abatement solution is often straightforward—turning a valve, closing a tank hatch, patching a gathering line, or lighting a flare. The challenge is finding these sources in the first place.

As noted in the proposal, stakeholders have urged EPA to "modernize the rule by employing next-generation tools for methane identification and quantification, particularly for large emission or 'super-emissions' events."[71] EPA recognizes the promise that new technologies and methods hold for detecting large, unexpected sources of methane more quickly than today.

> While most of these advanced measurement technologies and methods are not sensitive enough to pin-point the exact same emission sources as the current fugitive emission detection programs, many can more quickly detect the largest emissions sources (*e.g.,* malfunctions and undersized or non-performing major equipment); they can also find emissions that may be missed by fugitive emission surveys (*e.g.,* component- level leaks on valves, connectors, and meters)… Integrating advanced emission detection technologies into this rule … could be a valuable way to reduce fugitive emissions more cost-effectively and rapidly detect and remedy 'super-emitting' events that make an outsize contribution to overall emissions from this source category.[72]

EPA also notes that advanced technologies "may be less susceptible to operator error or judgment than traditional methods of leak detection" and enable surveys over "broader areas than can be effectively surveyed with field personnel, drastically reducing the driving time from site to site, which could have potential cost and safety benefits and allow for more frequent monitoring."[73] These advantages could allow operators to find and fix large leaks more quickly.

The proposal suggests several possible applications for these new technologies and methods. In the following section, we focus on five such applications: detecting leaks/malfunctions, empowering communities, improving the GHG Inventory, compliance assurance, and a regulatory path toward performance-based requirements. Comments may need to distinguish between possible applications when identifying one or more advanced technologies or methods to deploy to best achieve the goal. For instance, an operator might use different methods for periodic compliance checks than for ongoing company leak detection practices.

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[70] 86 Fed. Reg. at 63,129-30; n. 77. The other categories are chronic high-emitting sources, which include known sources with existing or proposed standards, and episodic high-emitting sources from intentional releases.
[71] 86 Fed. Reg. at 63,145.
[72] 86 Fed. Reg. at 63,197.
[73] Id.

1. Monitoring for Leaks and Malfunctions

As noted above, EPA proposes two ways to enhance existing leak detection regimes: expanding the definition of "fugitive emissions component" to capture episodic and malfunction events in LDAR inspections,[74] and doubling the frequency of leak detection inspections at well sites and compressor stations to four times a year,[75] in line with regulatory requirements of California, Colorado, and Ohio.[76] When the source of an emissions leak is a malfunction or operational upset, EPA proposes requiring the operator to conduct a root cause analysis and to report the upset as a possible violation of the Clean Air Act, in addition to repairing the problem.

The proposed definition of "fugitive emissions component" brings a larger population of potentially emitting components into a regular monitoring regime. The broader definition also encompasses sources that advanced monitoring technologies or approaches may be better suited to address. For example, Method 21 may miss larger leaks from malfunctions, while advanced technologies—often deployed from the air and able to detect bigger plumes of emissions and sources above ground level—might capture these sources and thereby achieve greater emission reduction opportunities compared to currently-used LDAR methods. If demonstrated, those reductions could support a determination that alternative monitoring technologies are "equivalent" to Method 21 and OGI.

The proposal indicates EPA's openness to new technologies and methods for detecting methane leaks. For example, as noted above, the proposal includes an alternative work practice standard for detecting fugitive emissions that would either:

- allow the use of any technology with a minimum detection threshold of 10 kg/hr for a bimonthly leak survey,[77] or
- enable a broader range of detection thresholds and require more frequent survey for less sensitive instruments (in a so-called "matrix approach").[78]

EPA also seeks information on the role continuous monitoring could play,[79] as well as "simple AVO [audio-visual-odor] checks that could be performed . . . to identify potential large emission events."[80]

Finally, EPA requests input on regulatory alternatives for surveying well sites "that accomplish the stated objectives of the EPA and which minimize any significant economic impact of the proposed rule on small entities."[81] This opens the door to comments on the relative capabilities and cost

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[74] 86 Fed. Reg. at 63,169.
[75] 86 Fed. Reg. at 63,192-94; 63,196 (EPA is proposing quarterly LDAR at well sites emitting greater than 3 tpy is BSER and quarterly LDAR for compressors remains BSER.
[76] 86 Fed. Reg. at 63,195.
[77] Further, EPA proposes allowing companies to use these alternative work practice standards across "a county, sub-basin, or other appropriate geographic area" in recognition that many of the advanced technologies and methods can cover more ground in shorter time than a manual inspection. *See, e.g.,* 86 Fed. Reg. at 63,175.
[78] *See, e.g.,* 86 Fed. Reg. 63,176.
[79] 86 Fed. Reg. at 63,176-77.
[80] 86 Fed. Reg. at 63,197.
[81] 86 Fed. Reg. at 63,173.

effectiveness of alternative monitoring regimes to semi-annual or quarterly LDAR inspections using Method 21 or OGI. Given that cost is a factor for BSER, stakeholders may also consider providing information regarding how a single survey could cover multiple wells sites across owners, which could defray monitoring costs.

For comments related to new technologies and approaches and how to evaluate their use as "alternative monitoring approaches", it will be important for EPA to assess whether these advanced technologies and methods can be deployed to achieve equivalent and consistent outcomes compared to an LDAR regime using Method 21 or OGI.

2. Community Empowerment

Community groups expressed strong interest in requiring greater community access to monitoring data "so people will know the air they are breathing."[82] More generally, communities were interested in the use of advanced monitoring technologies and methods to refine what is known about emissions from oil and gas infrastructure.

EPA requests comments on "how to evaluate, design, and implement a program whereby communities and others could identify large emission events and, where there is credible information of such a large emission event, provide that information to owners and operators for subsequent investigation and remediation of the event."[83] The proposal is clear that EPA would need to provide more detail in a Supplemental Proposal before finalizing a community alert system. However, the request for information about such a program creates an opportunity for technology companies, methane researchers, and communities to submit information on the best ways to harness advanced technologies and methods to address larger emissions plumes more quickly, while empowering communities to play an active role in this abatement strategy.

3. Improvement of EPA's Greenhouse Gas Inventory

During EPA's outreach to stakeholders in advance of the proposed rule, stakeholders had criticized EPA's GHG Inventory (Inventory) for its overreliance on emissions calculations rather than on measurement and monitoring.[84] These calculations often rely on:

- emissions factors—estimates of the amount of emissions a particular activity or piece of equipment is likely to emit; and
- activity factors—estimates of the length of pipeline or number of components likely present at a site.

Sometimes, calculations are too low; other times, too high, but all are based on an expectation that similar components will have a similar emissions profile, which measurements studies have

[82] 86 Fed. Reg. at 63,144.
[83] 86 Fed. Reg. at 63,177.
[84] 86 Fed. Reg. at 63,146.

repeatedly debunked.[85] Moreover, the Inventory only applies to sources with emissions above a certain threshold. For instance, "[g]iven the variability of practices and technologies across oil and gas systems and the occurrence of episodic events, it is possible that EPA's estimates do not include all methane emissions from abnormal events."[86]

EPA indicates that it will continue to refine emissions estimates for the Inventory.[87] EPA also proposes to reference Inventory emissions factors in parts of the rule without listing the current underlying calculations, recognizing that factors will likely change as information improves.

As stakeholders respond to questions in the proposal related to the Inventory, it may also be important to identify ways EPA could leverage the data collected by any advanced monitoring technologies deployed under this rule, to inform and improve the Inventory.[88] Current monitoring technologies and methods (e.g. Method 21 using a VOC analyzer; OGI using a FLIR camera) that detect plumes but do not measure them. Reporting requirements associated with leaks direct operators to identify *if* there has been a leak, but do not estimate the quantity of the methane emissions. By contrast, some of the advanced monitoring technologies and methods can directly measure or estimate the amount emitted. Pairing the use of such technologies with recordkeeping and reporting requirements that provide EPA with access to emissions magnitudes could create a valuable new source of data for informing the Inventory's emissions factors and calculations. In addition, reporting the number of potentially emitting components at a well site or other piece of oil and gas production infrastructure could improve activity factors for the Inventory.

The proposal also requests comment on how to alleviate reporting burdens on states for their existing source implementation plans. "Specifically, EPA believes that in this context it could be difficult for the State plans to include 'an inventory of all designated facilities, including emission data for the designated pollutants and information related to emissions'." Therefore, EPA proposes that states rely on the Inventory for estimates.[89] While identifying every controller, pump, and other regulated component could be challenging, to the extent there are practical and cost-effective ways for states to inform and improve the Inventory, such information could be shared with EPA in comments.

4. EPA Enforcement of Performance Standards

As discussed above, the proposal includes requirements for several sources including storage vessels, centrifugal compressors, and pneumatic pumps to ensure a 95 percent reduction in

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[85] *See, e.g.,* A.P. Ravikuman and A.R. Brandt, Designing Better Methane Mitigation Policies: The Challenge of Distributed Small Sources in the Natural Gas Sector, Envt'l Research Letters 12, 044023 (2017); J.C. Lin, R. Bares, B. Fasoli, M. Garcia, E. Crosman, S. Lyman, Declining Methane Emissions and Steady, High Leakage Rates Observed Over Multiple Years in a Western U.S. Oil/Gas Production Basin, Scientific Reports 11, 22291 (2021)

[86] 86 Fed. Reg. at 63,130.

[87] Id.

[88] EPA requests comment on what elements are appropriate for more frequent reporting on monitoring; *see, e.g.,* 86 Fed. Reg. at 63,185.

[89] 86 Fed. Reg. at 63,253.

emissions. EPA also proposes a new standard for associated gas emissions from oil wells by 95 percent. In each case, an owner or operator must route methane emissions from these sources to a sales line, to an onsite use (to displace diesel generated power, for instance), or to a flare or combustor, to destroy the methane and release carbon dioxide. EPA is taking comment on whether flares can in fact achieve 98 percent destruction of methane.[90]

It is challenging for regulators to determine whether 95 percent of emissions from one of these components has actually been routed to a productive use or a combustion device. Moreover, there is little verification that existing onsite flares and other combustion devices are meeting the 95 percent – or a possible 98 percent – efficiency rate. Indeed, a July 2021 report by the EPA's Office of Inspector General, found that "State permitting authorities had difficulty verifying continuous compliance with combustion efficiency requirements for flares and enclosed combustors."[91] As advanced monitoring technologies and methods improve, they are becoming increasingly able to attribute methane plumes to particular sites and in some cases, to particular components. It will be important for EPA to understand from commenters how advanced monitoring technologies and methods could be deployed for this purpose. In addition, EPA solicits comment on what additional measures should be put in place "to ensure proper performance of flares" and demonstrate continuous compliance when a standard requires the use of a combustion control device.[92]

5. Regulatory Path for Performance-based Regulation

EPA's understanding of methane emissions is changing rapidly. From research conducted in the past decade, we know better "that there is significant variation in the well characteristics, type of oil and gas products and production levels, gas composition, operations, and types and quantity of equipment at wells sites across the U.S."[93]

Based on this better understanding, as noted above, EPA is now proposing to eliminate the low production exemption from LDAR, which assumed all low production wells would automatically emit low amounts of methane, and replace it with an exemption for well sites that emit fewer than 3 tpy of methane. Although EPA proposes that owners and operators would use default emissions factors and component counts from the Inventory to calculate whether their well site remains under the threshold, EPA requests feedback given its recognition of the shortcomings with this approach. For example, EPA notes that emissions factors do not reflect the possibility of malfunctions or operational upsets at a site, and components outside of the wellbore might not be included in the well site calculation. In the alternative, EPA requests comment on the utility and feasibility of a different kind of baseline survey, which might include direct measurement.[94]

Stakeholders may also want to consider whether there are cost-effective opportunities to collect direct measurements and component counts at wells sites, which would also help refine the

[90] 86 Fed. Reg. at 63,199.
[91] 86 Fed. Reg. at 63,246; n. 325.
[92] Id.
[93] 86 Fed. Reg. at 63,187.
[94] 86 Fed. Reg. at 63,171.

Inventory (as we note above). Recognizing that the purpose of the 3 tpy threshold is to relieve the regulatory burden on low-emitting well sites, additional measurements of well sites could better map their emissions distribution and begin to predict total emissions as well as target the biggest sources of methane.

An additional benefit of accurate data is that as EPA, states, industry, and communities better understand emissions distributions and spot patterns in the data, the information can be used to create incentives for better engineering systems. With such advancements, a future regulatory path may emerge that shifts from a detection-after-the-fact regime to a preventative approach. In the nearer term, enhanced data can also lay the foundation for regulations that require operators to identify and fix the biggest sources of methane first, for overall deeper reductions in methane pollution. EPA specifically requests comment on how to structure a requirement that would tier repair deadlines based on the "severity of the fugitive emissions."[95]

Leveraging State Plans to Develop Regulatory Approaches Based on New Technology and Approaches

As we discuss above, the EPA proposal begins the process of regulating existing oil and gas sources for the first time. EPA sets EG and then, each state crafts an implementation plan. As EPA develops the EG, it will be important to consider if there are opportunities to support states using new technologies for enforcement and compliance purposes that enable greater methane reductions.

EPA appears open to working with states that have existing methane regulations to reduce duplicative regulatory requirements for industry in their state, and enabling states to impose more stringent methane standards than the federal NSPS.[96] EPA also wants to work with states interested in proposing an alternative fugitive monitoring program,[97] which could incorporate advanced monitoring technologies and methods.

EPA also seeks comment on the timing for state implementation plans. EPA's general implementing regulations had granted states nine months after publication of the final rule to submit a 111(d) implementation plan; the Trump EPA had extended that to two years. EPA may also set different timelines for specific industrial categories. The D.C. Circuit has vacated these timing provisions, requiring EPA to revisit the issue.[98] Here, while fast action on methane abatement is critical, new technologies and access to methane monitoring data may become available in the next two to three years. To the extent near term advancements would enable states to achieve greater emission reductions, it will be important for EPA to understand from stakeholders the timing details for these advancements. Commenters may also want to consider explaining how states might take advantage of developments by developing more flexible standards that can ensure greater methane reductions.

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[95] 86 Fed. Reg. at 63,172.
[96] 86 Fed. Reg. at 63,137.
[97] Id.
[98] 86 Fed. Reg. at 63,134, n. 95.

Next Steps for EPA and Other Federal Agencies

EPA makes clear that the proposed rule is only a first step in establishing a durable regulatory framework that achieves significant methane emission reductions from oil and gas sources. EPA also recognizes that "a broad ensemble of mutually leveraging efforts across all States and all Federal agencies is essential to meaningfully address climate change effectively."[99]

On November 2, the White House Office of Domestic Policy released its Methane Emissions Reduction Action Plan,[100] laying out a whole-of-government approach to addressing methane emissions through a combination of nonregulatory programs and additional regulation. For example, the Pipeline and Hazardous Materials Safety Administration (PHMSA) is working to finalize four rules by the end of 2022 to expand and improve monitoring requirements and address pipeline integrity concerns and ruptures, particularly in high population areas.[101] The White House estimates these rulemakings together will reduce methane emissions up to 20 million metric tons (MMT) of CO2-equivalent per year.[102] Additionally, the Bureau of Land Management (BLM) plans to propose requiring operators to pay royalties for vented or flared natural gas on public lands.[103] The Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM) could strengthen financial assurance requirements for oil and gas operators to prevent long-term methane leaks from unplugged wells.[104] And, the Department of Agriculture (USDA) intends to use financial and other incentives to encourage the adoption of alternative manure management systems and other methane-reducing practices, expand on-farm generation and use of renewable energy, and increase investments in agricultural methane quantification and related innovations, among other programs. Finally, anticipated FERC decisions,[105] have the potential to further reduce existing and future methane emissions.

For this proposal, however, EPA will continue to refine the regulatory framework based on comments received from stakeholders. The key considerations discussed have the potential to enable the final rule to achieve greater and more cost-effective emission reductions. EPA plans to use information

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[99] 86 Fed. Reg. at 63,137; 63,115.

[100] *US Methane Emissions Reduction Action Plan*, White House (Nov. 2021), https://www.whitehouse.gov/wp-content/uploads/2021/11/US-Methane-Emissions-Reduction-Action-Plan-1.pdf.

[101] These rules include a final rule published on Nov. 2, 2021 extending PHMSA's regulatory oversight to gathering lines for the first time. *Pipeline Safety: Safety of Gas Gathering Pipelines: Extension of Reporting Requirements, Regulation of Large, High-Pressure Lines, and Other Related Amendments*, 86 Fed. Reg. 63,266 (Nov. 15, 2021). PHMSA also plans to finalize the *Valve Installation and Minimum Rupture Detection Standards* rule and the *Safety of Gas Transmission Pipelines, Repair Criteria, Integrity Management Improvements, Cathodic Protection, Management of Change, and Other Related Amendments* rule by the end of 2021. In early 2022, PHMSA plans to propose a rule strengthening standards for LNG facilities.

[102] *US Methane Emissions Reduction Action Plan*, White House 7 (Nov. 2021), https://www.whitehouse.gov/wp-content/uploads/2021/11/US-Methane-Emissions-Reduction-Action-Plan-1.pdf.

[103] https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=1004-AE79.

[104] BLM, Risk Management, Financial Assurance and Loss Prevention, Notice of Proposed Rulemaking, 85 Fed. Reg. 65904 (Oct. 16, 2020).

[105] In February 2021, under the newly installed Democratic Chair, FERC released a Notice of Inquiry about its pipeline review policy, which included questions about how it should evaluate GHG impacts of new pipeline construction and natural gas transportation. Notice of Inquiry, Certification of New Interstate Natural Gas Facilities, 174 FERC 61,125 (2021).

submitted by commenters to enhance its proposal to ensure the final requirements drive significant emission reductions. A final rule that is based on a legally and technically sound regulatory record can enable industry and states to develop and deploy advanced technologies and methods that can increase the scope and pace of emission reductions throughout the oil and natural gas infrastructure.

Appendix: Comparison of 2016 Requirements and 2021 Proposed NSPS

Source	2016 Rule[106]	2021 Proposal
Well sites emitting fewer than 3 tpy of methane	Monitor semiannually using OGI or Method 21 monitoring. Repairs within 30 days, resurvey within 30 days of the repair.	For new and existing sites, monitor by conducting a survey showing calculation of baseline. For new and existing sites, first attempt at repair within 30 days, final repair within 30 days of first attempt.
Well sites emitting at least 3 tpy of methane	Monitor semiannually using OGI or Method 21 monitoring. Repairs within 30 days, resurvey within 30 days of the repair.	For new and existing sites, monitor quarterly using OGI or Method 21 monitoring. Potential to use alternative monitoring bimonthly. For new and existing sites, a co-proposal would require those emitting between 3 and 8 tpy to submit to only semi-annual monitoring. Potential to use alternative monitoring bimonthly. For new and existing sites, first attempt at repair within 30 days, final repair within 30 days of first attempt.
Compressor stations	Monitor quarterly using OGI or Method 21 monitoring. Repairs within 30 days, resurvey within 30 days of the repair.	For new and existing stations, monitor quarterly using OGI or Method 21 monitoring. Potential to use alternative monitoring bimonthly. New and existing compressor stations, attempt repair within 30 days, final repair within 30 days of first attempt.
Exception for well sites and compressor stations in Alaska North Slope	Monitor quarterly using OGI or Method 21 monitoring. Repairs within 30 days, resurvey within 30 days of the repair.	For new and existing well sites and compressor stations, annual monitoring using OGI or Method 21 monitoring. Potential to use alternative monitoring bimonthly. New and existing well sites and compressor stations, attempt repair within 30 days, final repair within 30 days of first attempt.
Storage Vessels	95% VOC emissions reduction from storage vessels for a tank with the potential to emit at least 6 tpy VOCs.	For new storage vessels, 95% VOC and methane emissions reduction from a single storage tank or tank battery with the potential to emit at least 6 tpy VOCs. For existing storage vessels, 95% reduction from a tank battery with potential to emit 20 tpy methane.

[106] Only applied to new and modified sources.

Source	2016 Rule[106]	2021 Proposal
Pneumatic controllers	For pneumatic controllers at onshore natural gas processing plants, zero bleed required. Does not include intermittent vent pneumatic controllers. Pneumatic controllers anywhere else, bleed no more than 6 standard cubic feet per hour (scfh). Does not include intermittent vent pneumatic controllers.	For new and existing sources, no bleed devices required at all sources. Includes intermittent vent pneumatic controllers.
Exception for pneumatic controllers in Alaska	Pneumatic controllers at onshore natural gas processing plants, zero bleed required. Does not include intermittent vent pneumatic controllers. Pneumatic controllers anywhere else, bleed no more than 6 scfh. Does not include intermittent vent pneumatic controllers.	Where power is not available, low bleed (< 6scfh) or, if functional needs require, high bleed devices (> 6scfh) may be used. Must inspect intermittent vents controllers to ensure they are not venting when idle.
Well Liquids Unloading	No NSPS regulating this source.	Unload with zero or minimal methane and VOC emissions. In both co-proposals, affected facilities must use best management practices to minimize venting, keep records of when venting occurs, and record incidents where best management practices are not followed.
Wet seal centrifugal compressors	95% reduction in VOCs and GHG emissions. Excludes all wet seal centrifugal compressors that are located at well sites.	For new and existing compressors, reduce emissions by 95%. Includes wet seal centrifugal compressors that are located at well sites at centralized production facilities.
Reciprocating compressors	Reduce emissions by replacing rod packing within 26,000 hours or 36 months of operation or collect emissions from the rod packing and route the rod packing emissions through a closed vent system under negative pressure.	For new and existing compressors, replace the rod packing when leak rate is greater than 2 standard cubic feet per minute or collect and route emissions from the rod packing through a closed vent system under negative pressure.
Pneumatic Pumps	Zero emissions required for diaphragm pumps at natural gas processing plants. 95% control of diaphragm pumps at well sites if there is an existing control or process onsite, but not required if the existing control achieves less than 95% reduction or if control is technically infeasible.	Zero emissions required for diaphragm and piston pumps at natural gas processing plants. 95% control of diaphragm and piston pumps in production segment if there is an existing control process onsite; 95% control of diaphragm pumps in transmission and storage segments if there is an existing control process onsite. 95% control not required if the existing control achieves less than 95% reduction or if control is technically infeasible. For existing sources, the same standards apply; excludes piston pumps in locations other than those at natural gas processing plants.

Source	2016 Rule[106]	2021 Proposal
Well Completions[107]	Subcategory 1 (non-wildcat and non-delineation wells): REC and a completion combustion device, except that venting may be used where combustion would be unsafe. Subcategory 2 (exploratory and delineation wells and low-pressure wells): Either use a completion combustion device or route flow back to completion vessels and use a separator. Combustion is not required where it would be unsafe.	Subcategory 1 (non-wildcat and non-delineation wells): REC and a completion combustion device, except that venting may be used where combustion would be unsafe. Subcategory 2 (exploratory and delineation wells and low-pressure wells): Either use a completion combustion device or route flow back to completion vessels and use a separator. Combustion is not required where it would be unsafe. Because of the nature of well completions, all completions are considered new or modified sources; no EGs needed for existing sources.
Equipment Leaks at Natural Gas Processing Plants	Method 21 LDAR or OGI as an alternative monitoring method with frequency of monitoring based on annual leakage.	For new and existing natural gas processing plants, OGI LDAR program or Method 21 LDAR program with frequency of monitoring delineated in Appendix K based on baseline methane emissions.
Oil Wells with Associated Gas	No NSPS regulating this source.	For new and existing wells, route gas to a sales line. Where a sales line is not available, use gas onsite or flare in a way that achieves a 95% emissions reduction. Venting is not allowed.
Sweetening Units[108]	Units with sulfur production rate of at least 5 long tons a day must reduce SO_2 by 99.9%. Units below this threshold must maintain records.	Units with sulfur production rate of at least 5 long tons a day must reduce SO_2 by 99.9%. Units below this threshold must maintain records. No standards proposed for existing sources.

[107] EPA made amendments in the 2020 Technical Rule on some detailed requiremets, including changes for the use of a separator and to recordkeeping requirements. These amendments are included in this proposal. Otherwise, the 2016 Rule remains. 86 Fed. Reg. 63,234.
[108] No changes from 2016 NSPS. 86 Fed. Reg. 63,181.