March 27, 2020

Dr. Thomas Armitage
Designated Federal Officer, EPA Science Advisory Board
U.S. Environmental Protection Agency
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Re: Notification of Two Public Teleconferences of the Chartered Science Advisory Board, Comments on Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review

Dear Dr. Armitage:

Environmental Defense Fund ("EDF") strongly recommends that the Chartered Science Advisory Board ("SAB") undertake review of the scientific and technical basis of the Environmental Protection Agency's ("EPA" or "the agency") proposed rule titled Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review, 84 Fed. Reg. 50,244 (Sep. 24, 2019) ("proposed rule" or "proposal"). EPA's proposal ignores the Agency's foremost obligation under the Clean Air Act – "to promote the public health and welfare," 42 U.S.C. § 7401(v)(1) – and runs counter to the scientific and technical evidence before the agency. EDF is attaching comments and technical appendices submitted to EPA on the proposed rule, which provide more detail on the inadequacy of EPA's scientific and technical basis for the proposed action.

In 2012 and 2016, EPA finalized rules to reduce harmful volatile organic compound (VOC) and methane emissions from new and modified sources in the oil and gas sector. 77 Fed. Reg. 49,490 (August 16, 2012); 81 Fed. Reg. 35,824 (June 3, 2016). These rules were based on a robust factual record demonstrating significant endangerment from pollution emitted by the oil and gas sector. EPA now proposes to revoke a significant portion of these standards without addressing the strong scientific and technical bases underlying the 2012 and 2016 rules. Specifically, EPA has proposed to shrink the regulated source category, excluding the significant transmission and

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storage segments from regulation entirely. EPA has also proposed to eliminate methane regulations altogether for all sources within the oil and gas source category, and asserted this would preclude future regulation of existing sources in the category. Each of these would greatly increase the release of harmful pollution from oil and gas sources and are contradicted by the scientific and technical record.

First, the proposal entirely ignores the science demonstrating severe endangerment from the additional methane pollution it would allow, including new studies and reports issued since 2016 that document both the threat from climate change and the scale of oil and gas methane pollution. Indeed, one of the key new climate studies was issued by this Administration, and highlights the grave dangers humans face from climate change and the imperative to reduce greenhouse gases, including climate pollutants like methane.[1]

Next, EPA's scientific and technical justifications for this rule are inadequate and contradictory. EPA's proposal to limit the scope of the oil and gas source category, and its stated justifications for so doing, have no rational scientific or technical basis and ignore the sound technical and scientific basis for the 2012 and 2016 rules. EPA's sole rationale for limiting the scope of the source category to exclude the transmission and storage sources is that minor differences in the composition of the gas across different segments allegedly require EPA to make a separate finding that emissions from transmission and storage sources alone significantly contribute to endangerment. But then, despite the fact that in total, sources in the transmission and storage segments emit well over a million tons of methane each year, the Proposal declines to make any determination on the finding of significant contribution.

Similarly, EPA also undermines its sole justification for eliminating methane regulation – because methane standards are allegedly "redundant" of standards for another regulated pollutant – by claiming that rescinding methane standards would allow EPA to avoid its duty under section 111(d) of the Clean Air Act, 42 U.S.C. § 7411(d), to regulate emissions from *existing* oil and gas operations (which are responsible for the vast majority of the industry's methane emissions). Finally, with virtually no scientific or technical analysis, the proposal claims that the prevention of regulation for these hundreds of thousands of existing sources that are responsible for the vast majority of emissions will have a limited impact because of source turnover, and state and voluntary programs. As explained in detail in the attached comments, these assertions by EPA are not borne out by analytical evidence: even with turnover and state programs, existing sources will contribute millions of tons of methane and VOC pollution over the coming decades that could be mitigated with EPA standards.

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[1] USGCRP, Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States (Nov. 23, 2018); https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf.

EDF strongly encourages the SAB to undertake review of the adequacy of EPA's scientific and technical justifications for its proposal.

Respectfully submitted,

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Attachments:

Comments of Clean Air Council, Clean Air Task Force, Center for Biological Diversity, Chesapeake Bay Foundation, Earthjustice, Earthworks, Environmental Defense Fund, Environmental Law and Policy Center, Natural Resources Defense Council, Sierra Club, National Parks Conservation Association, Columbia Riverkeeper, and Waterkeeper Alliance to EPA on Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review, EPA-HQ-OAR-2017-0757 (Nov. 25, 2019), with appendices

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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	)	
Oil and Natural Gas Sector:	)	**Docket No. EPA-HQ-OAR-2017-0757**
Emission Standards for New,	)	
Reconstructed, and Modified	)	*Via regulations.gov*
Sources Review	)	*November 25, 2019*
	)	

We submit these comments on behalf of Clean Air Council, Clean Air Task Force, Center for Biological Diversity, Chesapeake Bay Foundation, Earthjustice, Earthworks, Environmental Defense Fund, Environmental Integrity Project, Environmental Law and Policy Center, Natural Resources Defense Council, Sierra Club, National Parks Conservation Association, Columbia Riverkeeper, and Waterkeeper Alliance (together, "Joint Environmental Commenters"). Joint Environmental Commenters' comments are informed by the urgent need to reduce emissions of methane and other harmful pollutants from the U.S. oil and natural gas sector. Based on this critical scientific imperative, the Joint Environmental Commenters strongly oppose EPA's illegal and unauthorized proposed revisions to the new source performance standards for the oil and gas sector. Proposed Rule, *Oil & Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review*, 84 Fed. Reg. 50,244 (Sept. 24, 2019) ("Proposal").

Introduction

Through the Proposal, EPA proposes to allow hundreds of thousands of existing oil and gas sources to continue pumping millions of metric tons of the powerful greenhouse gas methane and other pollutants into the atmosphere every year. The Proposal further proposes to allow new sources in the transmission and storage segment of the industry to stop using pollution control measures they have been successfully undertaking for years, which, by the agency's own analysis, will result in an *additional* 370,000 tons of dangerous methane emissions in the near-term. EPA's Proposal ignores the Agency's foremost obligation under the Clean Air Act (the "Act")—"to promote the public health and welfare," 42 U.S.C. § 7401(b)(1)—and instead unlawfully attempts to twist the Act to conform to the current Administration's deregulatory agenda.

Under section 111 of the Act, when EPA finds that a category of sources' emissions cause or contribute significantly to pollution that is anticipated to endanger public health or welfare, it must promulgate regulations to reduce harmful emissions from those sources. That is precisely what EPA did in 2016 when it issued new source performance standards for methane and volatile organic compound ("VOC") emissions from oil and gas sources. *Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources*, 81 Fed. Reg. 35,824 (June 3, 2016) (codified at 40 C.F.R. pt., 60, subpt. OOOOa) ("NSPS" or "2016 Rule"). At that time, EPA recognized the severe endangerment of public health and welfare caused by these pollutants and, in particular, the fact that methane is a potent greenhouse gas and a major contributor to climate change. *Id.* at 35,833–37. Scientific studies published since 2016 have

found that methane emissions from the oil and gas sector are much higher than EPA estimated in 2016. And additional studies and reports—including one by this Administration—have highlighted the grave dangers humans face from climate change and the imperative to reduce greenhouse gases, including climate pollutants like methane which, though short-lived in the atmosphere, is a major driver of both near-term and long-term climate impacts.

The Proposal runs directly contrary to the Agency's obligations under the Clean Air Act and the enormous factual record demonstrating significant endangerment from pollution emitted by the oil and gas sector. In 2016 (and before that, in 2012), EPA recognized its obligations to revise its new source performance standards to address pollution from the oil and gas sector that significantly contribute to endangering human health and welfare. The Agency recognized that sources in the previously unregulated transmission and storage segments of that sector contributed to dangerous pollution and that the very same technologies used in the regulated production and processing segments could reduce that pollution. Accordingly, EPA properly set standards for those segments. The Agency also recognized the severe endangerment posed by methane to human health and welfare, and concluded *both* that it had a rational basis, and that methane emissions from the oil and gas sector significantly contribute to endangerment, before promulgating new standards to control methane. In short, given the Agency's legal duties and the clear and compelling factual record, EPA was required to set standards for the transmission and storage segments and for methane pollution and it properly did so.

The Proposal unlawfully goes directly in the opposite direction. Contrary to the Agency's Clean Air Act obligation, the common denominator of the current EPA's various proposed and alternative revisions is deregulation through made-up procedural hurdles and arbitrary reasoning. The Agency strains to erect barriers to regulation nowhere contained in the Act. And then, after erecting these new barriers, the Agency does not even consider whether its longstanding standards surmount them, instead simply proposing to rescind critical health protections and reconsider them later. EPA does not even claim any particular burden to industry from implementing the 2016 Rule's standards (indeed, many voices in the industry do not support the rescission). At bottom, the Proposal uncritically adopts past critiques by stakeholders like the American Petroleum Institute, but ignores EPA's duty to apply and adhere to the Clean Air Act to reduce dangerous pollution.

The Proposal's effort to rescind regulation of the transmission and storage segments of the industry—segments that have now been regulated for seven years—is the case in point. In its 2012 and 2016 rulemakings, EPA explained that the original listing of the oil and gas source category encompassed the transmission and storage segments of the sector. But even if those segments had not already been included, the Agency continued, it was exercising its authority under the Act to revise the source category to include these segments, which the Agency explained are part of one interrelated process containing the same polluting equipment throughout and subject to the same pollution reduction measures. The scope of the source category as it now stands falls well within the range of other listed source categories, which broadly cover entire industries or polluting equipment across different industries, and in some cases include far more internal heterogeneity than do the various emission points within segments of the oil and gas sector.

No matter; the Proposal now asserts that it was *unlawful* for EPA to expand the source category in this way because (grasping at straws to find any distinction) there are differences in the non-methane composition of the gas found in the different segments—gas composition differences that have nothing to do with whether or how to regulate methane emissions. (Remarkably, despite the alleged importance of these gas composition differences, the Proposal later proclaims that the best system of emissions reduction for sources is the *same* regardless of whether the Agency seeks to reduce methane or VOCs—in other words, regardless of the composition—and based on that assertion contends it is justified in rescinding methane regulations altogether.) The Proposal thus asserts that the Agency was *required* to make a *new* significant contribution finding for the transmission and storage segments on their own, something the Proposal contends was not done. And yet, despite the fact that in total, sources in the transmission and storage segments emit well over a million tons of methane each year, the Proposal declines to make any determination on the finding of significant contribution.

Instead, the Agency plans simply to revoke the current standards for sources in the transmission and storage segments in their entirety. The Proposal identifies no practical or administrative problems in enforcing those standards, and identifies no significant burden to industry in continuing to comply with them. The bottom line is this: EPA erects new barriers in order to remove critical public health protections leading to more dangerous pollution, and the Proposal identifies no other purpose than to deregulate.

EPA's proposed rescission of methane standards for the entire sector is perhaps even more nonsensical. The Agency asserts that this action is appropriate because methane standards are "redundant" of standards for another regulated pollutant, VOC. But in the same breath, the Proposal admits that methane standards are, in fact, not at all redundant, because rescinding them would allow EPA to avoid its duty to regulate methane emissions from *existing* oil and gas operations, which are responsible for the vast majority of the industry's methane emissions. This is the pinnacle of arbitrary and irrational reasoning. The Proposal acknowledges that, assuming "redundant" regulation of *new* sources' methane and VOC emissions was at all a problem, it could also be resolved by rescinding the *VOC* regulations, which (the Proposal recognizes) would preserve EPA's authority and obligation to regulate existing sources. But the Proposal decides to revoke methane standards instead, allegedly because some of the VOC standards were promulgated first. First-issued simply is not a rational basis for choosing which one to keep, particularly when the choice has enormous ramifications for emissions of dangerous pollution. Bottom line once again: more deregulation, more dangerous pollution.

Even if we put the existing source elephant to the side, the Proposal does not identify any way in which removing methane regulations reduces *any* burdens on operators of sources subject to the new source standard, the ostensible purpose of the rulemaking, nor does it admit to any other purpose.

The bulk of the Proposal addresses whether the Agency might be able to erect yet another barrier to regulation in the future, a part of the Proposal that is largely divorced from oil and gas sector regulations and that commenters respond to at length in separate comments. But with regard to methane emissions from the oil and gas sector specifically, while nowhere asserting that those emissions do *not* significantly contribute to climate endangerment (they obviously do)

the Proposal asks whether EPA must make a significant contribution finding for each pollutant from a source category that it regulates. Without actually proposing such a requirement, the Proposal provides a lengthy discourse, in the nature of an Advanced Notice of Proposed Rulemaking, on why such a requirement should be considered and how it should be defined and implemented. It also asks whether methane emissions from currently regulated segments of the oil and gas sector would satisfy such a requirement. These hypothetical inquiries are gratuitous. Even if a significant contribution finding for methane emissions were required, EPA made that finding in 2016. That finding, which the Proposal does not actually propose to reverse, is plainly well founded: the oil and gas sector is the largest industrial emitter of methane, which is responsible for a quarter of the warming we've experienced thus far. By any measure, these emissions significantly contribute to the endangerment of public health and welfare by greenhouse gas air pollution. Indeed, this section of EPA's Proposal only serves to highlight that the Agency has unlawfully and arbitrarily stuck its head in the sand, ignoring the very problem—the human health and welfare effects of greenhouse-gas driven climate change—that the Act is intended to address.

EPA should withdraw this deeply flawed Proposal, which would result in more pollution in communities across the country, and instead continue to implement, enforce, and strengthen the NSPS. The agency must also adopt protective standards for existing sources of methane and VOCs in the oil and gas sector, which are responsible for the vast majority of emissions.

Table of Contents

Contents

Introduction **1**

Background **7**

I. The proposal's revision of the source category to exclude the transmission and storage segments is unlawful. 18

A. EPA's 2012/2016 revision of the source category to include the transmission and storage segments (if they were not already included) was lawful and correct. 18

B. At any rate, the 1979 listing encompassed the oil and gas sector broadly, and the Proposal's assertion that it did not is contrary to EPA's historical treatment of that source category. 27

C. The Proposal's revision of the oil and gas source category to remove the transmission and storage segment is unlawful and unreasonable. 33

D. Even if the Proposal were correct that a new significant contribution finding is necessary (and it is not), it is arbitrary for EPA to rescind an existing regulation without making a defensible finding that the transmission and storage segments do *not* significantly contribute. 42

II. The proposal's primary and alternative proposals to rescind methane regulation are unlawful. 43

A. It is unlawful for EPA to determine that it lacks a rational basis to regulate methane when it has already determined that methane from the oil and gas source category contributes significantly to air pollution that endangers public health and welfare and determined that there is a best system of emissions reduction for methane under section 111. 44

B. EPA's proposed conclusion that the agency lacks a rational basis to regulate methane from the oil and gas sector is arbitrary, capricious, and runs counter to the evidence before the agency. 47

C. The "Redundancy" Rationale is Arbitrary and Pretextual—EPA's True Rationale is to Prevent Regulation of Existing Sources under Section 111(d). 60

III. The Proposal is Unlawful Because It Doesn't Adequately Consider Implications for Existing Source Emissions. 64

A. By rescinding the 2016 Rule's methane requirements, EPA's Proposal attempts to unlawfully skirt the Agency's legal obligation under the Clean Air Act to address methane pollution from existing oil and gas sources. 64

B. EPA cannot decline to regulate methane emissions from this sector because of methane's role in ozone formation. 66

C. EPA arbitrarily fails to assess the Proposal's impacts on existing source emissions in any meaningful way, and a proper analysis shows that those impacts will result in substantial amounts of harmful pollution. 67

D. EPA's claims that the absence of existing source regulations will have limited impacts due to source turnover, market incentives, voluntary programs, and state requirements are contradicted by the evidence. 71

IV. Methane Emissions from the U.S. Oil and Gas Sector Are "Significant" Under Any Metric. 83

A. Oil and gas methane emissions "contribute significantly" to pollution that endangers public health and welfare. 84

B. More recent data confirm—and strengthen—the conclusion that oil and gas methane emissions contribute significantly to pollution that endangers public health and welfare. 87

C. Additional considerations further highlight the fact that oil and gas methane emissions contribute "significantly" to pollution that endangers public health and welfare. 90

D. EPA must evaluate the "significance" of oil and gas methane emissions from the production, processing, transmission, and storage segments together, rather than in isolation; but in any event, each segment contributes "significant" emissions independently of the other. 93

V. The Proposal Is Unlawful Under Section 111 and Arbitrary and Capricious Because EPA Ignores the Scientific Facts About Climate Change and Associated Perils to Human Health and Welfare. 99

A. The scientific record confirms that anthropogenic climate change is a grave and imminent hazard, and the latest studies—which EPA has not even considered—reinforce that climate change is proceeding at an unprecedented pace requiring rapid and decisive action to reduce greenhouse gas emissions now. 99

B. EPA's failure to consider the facts of climate change or to justify its decisions to weaken standards in the face of those facts is both contrary to its statutory mandate and to the record before it, and is thus arbitrary, capricious, and unlawful. 106

Conclusion 108

Background

The Clean Air Act Requires EPA to Regulate Categories of New and Existing Stationary Source that Significantly Contribute to Pollution that Endangers Public Health and Welfare.

Under Clean Air Act section 111(b), EPA "*shall*" list categories of stationary sources that the Administrator finds "cause[], or contribute[] significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare," and "*shall*" promulgate "standards of performance" for emissions of air pollutants from new and modified sources within each such category (new source performance standards or NSPS). 42 U.S.C. § 7411(b)(1) (emphasis added). Pursuant to section 111(b)(1)(B), EPA must, "at least every 8 years, review and, if appropriate, revise such standards" following the procedure required for promulgation of such standards. *Id.* § 7411(b)(1)(B).

When EPA establishes performance standards for new sources in a source category, and when that category emits a pollutant that is not subject to regulation under other provisions (sections 108 or 112), section 111(d) and applicable regulations require EPA to control emissions from existing sources in that source category. EPA's regulations provide a mandatory duty that EPA issue emission guidelines for such pollutant "[c]oncurrently upon or after proposal of [section 111(b)] standards of performance for the control of a designated pollutant from affected facilities." 40 C.F.R. § 60.22a(a). After EPA issues final guidelines for existing sources for a designated pollutant, states must submit plans that establish standards of performance for that pollutant from designated facilities within the state. 40 C.F.R. § 60.23a(a)(1). Thus, the obligation to control emissions of a designated pollutant from existing sources is triggered by EPA's issuance of a new source performance standard for emissions of that pollutant by new sources.

Section 111 originated in the Clean Air Act of 1970. 84 Fed. Reg. at 50,251. By the mid-1970s, Congress was dissatisfied with EPA's pace of action under this section. *Id.* Accordingly, the 1977 Clean Air Act Amendments included a new subsection (f) under section 111, which set a schedule for EPA to list additional source categories and prioritize them for regulation. *Id.* In 1979, as required, EPA published a list of additional source categories for regulation under section 111, including "Crude Oil and Natural Gas Production." *Id.*

Emissions from Oil & Gas Sources Threaten Human Health and Welfare.

The Clean Air Act give EPA a legal mandate to protect against the harms associated with climate change and the threats that climate pollutants like methane pose to public health and welfare. As the U.S. government acknowledged just last year in an assessment in which EPA participated, global climate change is one of the largest challenges our civilization faces. *See* United States Global Change Research Program (USGCRP), *Fourth National Climate Assessment*: Volume II, at 34 (Nov. 2018) ("2018 National Climate Assessment").[1] And as EPA concluded almost a decade ago, the science of climate change, the risks it presents to human

[1] USGCRP, Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States (Nov. 23, 2018); https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf ("NCA4-II").

health and welfare, and the role of anthropogenic greenhouse gas ("GHG") emissions as the prime driver of this phenomenon are irrefutable. *See generally Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule*, 74 Fed. Reg. 66,496 (Dec. 15, 2009). Immediate and deep cuts to global GHG emissions are necessary to mitigate the worst effects of climate change.

Reducing emissions from the U.S. oil and natural gas sector is an indispensable part of addressing the urgent threat of climate change. The best available data shows that total greenhouse gas emissions from all sources must be steeply reduced in the near term to avoid more harmful global average temperature increases, and that overall greenhouse gas emissions cannot exceed a net zero balance by mid-century at the latest if we are to avoid the most devastating effects of climate change.[2] Methane is the main component of natural gas and a common byproduct of oil production. This highly potent greenhouse gas and fast-acting climate forcer traps heat in the atmosphere at a rate 87 times that of carbon dioxide over a 20- year timeframe, and up to 36 times that of carbon dioxide over a 100-year timeframe.[3] Climate scientists now recognize that avoiding catastrophic climate change will require both a long-term strategy to reduce carbon dioxide emissions and near-term action to mitigate methane and similar short-lived climate forcers. Approximately one-quarter of the anthropogenic climate change we are experiencing today is attributable to methane.[4] The need to reduce greenhouse gas emissions, including methane, is highly time-sensitive.

The onshore oil and natural gas sector is the largest domestic industrial source of methane emissions.[5] According to EPA's most recent Inventory of Greenhouse Gas Emissions and Sinks, U.S. oil and gas operations emitted nearly 8.1 million metric tons of methane into the air in 2017, approximately 31 percent of the nation's total methane emissions for that year.[6] And the latest scientific evidence shows that EPA inventories dramatically underestimate the amount of methane emitted by the oil and gas sector. A recent synthesis of site-level emissions studies

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[2] Intergovernmental Panel on Climate Change (IPCC), *2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, at 12 (Oct. 2018, rev. Jan. 2019), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_Low_Res.pdf ("IPCC (2018)").

[3] IPCC, *Climate Change 2013: The Physical Science Basis (Contribution of Working Group 1 to the Fifth Assessment Report), Chapter 8: Anthropogenic and Natural Radiative Forcing* ("IPCC AR5"), at 714, Table 8.7, https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf (Thomas Stocker et al., eds. 2013); Bradbury et al., Dep't of Energy, Office of Energy Policy and Systems Analysis, *Greenhouse Gas Emissions and Fuel Use within the Natural Gas Supply Chain – Sankey Diagram Methodology* (July 2015), at 10, https://www.energy.gov/sites/prod/files/2015/07/f24/QER%20Analysis%20-%20Fuel%20Use%20and%20GHG%20Emissions%20from%20the%20Natural%20Gas%20System%2C%20Sankey%20Diagram%20Methodology_0.pdf (explaining how the effects of oxidation increase the IPCC's global warming potential values for methane to 87 over a 20-year timeframe an 36 over a 100-year timeframe).

[4] IPCC AR5 (calculation based on Chapter 8); *see also* Shindell et al., *Improved Attribution of Climate Forcing to Emissions*, 326 SCIENCE 716, 717 (2009).

[5] According to EPA's most recent *Inventory of Greenhouse Gas Emissions and Sinks* (GHGI), oil and gas emissions together exceeded emissions of all other individual categories listed, at 8.1 million metric tons in 2017. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017 (2019) at ES-7, Table ES-2, https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf.

[6] AR5, at ES-7, Table ES-2; *see* 84 Fed. Reg. at 50,249 ("The oil and natural gas production, natural gas processing and transmission sectors emit 29 percent of U.S. anthropogenic methane.").

found that the U.S. oil and gas sector emits 13 million metric tons per year, equivalent to 2.3 percent of gross U.S. gas production—a value that is approximately 60 percent higher than EPA estimates. Alvarez et al., *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, 361 SCIENCE, 186–188 (2018). As the Proposal acknowledges, "[e]missions can occur in all segments of the natural gas industry." 84 Fed. Reg. at 50,249. The 2016 NSPS represents the federal government's first step toward addressing these massive emissions figures by promulgating measures to reduce oil and gas methane by 300,000 tons in 2020 and 510,000 tons in 2025. 81 Fed. Reg. at 35,885.

After A Long Delay, EPA Promulgated the NSPS To Address These Threats to Public Health and Welfare from Oil and Gas Emissions and Initiated the Process to Develop Guidelines for Existing Sources.

Finally recognizing the urgent need to protect the public against the dire impacts of climate change and other harmful effects from oil and gas pollution, in 2016, EPA finalized performance standards for new and modified sources under section 111(b) of the Clean Air Act to limit methane and VOC emissions for the oil and gas sector. 81 Fed. Reg. at 35,824. These standards built on EPA's earlier efforts to regulate VOC emissions and sulfur dioxide emissions from the sector, and were built upon an extensive technical record that EPA formed after years of formal processes.

Specifically, in 1979, EPA listed the oil and gas sector under section 111(b)(1)(A) in response to a Congressional command to expeditiously list priority categories of stationary sources that emit pollutants endangering human health and welfare. 44 Fed. Reg. 49,222 (Aug. 21, 1979). EPA then promulgated standards of performance for emissions of VOC and SO_2 from sources in the oil and gas sector in 1985. 50 Fed. Reg. 26,122 (June 24, 1985) (VOC); 50 Fed. Reg. 40,158 (Oct. 1, 1985) (SO_2). Although the Clean Air Act requires EPA to review and revise such standards every 8 years, 42 U.S.C. § 7411(b)(1)(A), the Agency failed to do so until August 2011, when EPA proposed revisions to the oil and gas NSPS targeting emissions of VOC from the production, processing, transmission and storage segments of the sector. 76 Fed. Reg. 52,738 (Aug. 23, 2011). EPA acknowledged in the proposal that "processes in the Oil and Natural Gas source category emit significant amounts of methane," and that such emissions are equivalent to more than 328 million metric tons of carbon dioxide each year. *Id.* at 52,756. However, EPA did not propose any standards for methane emissions, despite having previously determined in 2009 that methane and other greenhouse gases endanger public health and welfare. *See* 74 Fed. Reg. at 66,496. In August 2012, EPA issued a final rule revising some aspects of the proposed standards, including regulating new sources in the transmission and storage segments of the industry. 77 Fed. Reg. 49,490 (Aug. 16, 2012) ("2012 Final Rule"). In violation of section 111(b)(1)(B)'s mandatory 8-year review obligation, EPA failed to determine at that time whether it was appropriate to establish methane standards. Instead, EPA stated that it "intend[ed] to continue to evaluate the appropriateness of regulating methane with an eye toward taking additional steps if appropriate." *Id.* at 49,513.[7]

[7] Throughout this time, EPA already had in its possession compelling data demonstrating that many measures to avoid (or reduce) methane leaks from new and existing oil and natural gas operations are available and cost-effective. For instance, the agency had acknowledged years earlier that, through its voluntary Natural Gas Star Program—a public-private partnership with the oil and natural gas industry launched in 1993—"many of [the]

In June 2013, President Obama issued a Climate Action Plan[8] that, among other things, committed to developing a comprehensive, interagency strategy to reduce methane emissions. That strategy, released in March 2014,[9] committed EPA to a number of activities, including assessing significant sources of methane and other emissions from the oil and natural gas sector, soliciting input from independent experts through a series of technical white papers, and determining how best to pursue further methane reductions from these sources. EPA stated that it intended to use the technical documents and public comments received to "solidify its understanding of these potentially significant sources," enabling the agency "to fully evaluate the range of options for cost-effectively cutting VOC [volatile organic compounds] and methane waste and emissions."[10] EPA subsequently released for public comment and peer review five technical white papers[11] regarding sources of and mitigation techniques to control methane and VOC emissions in the oil and natural gas sector and received more than 43,000 comments,.

In September 2015, EPA proposed long-overdue regulations to require new and modified oil and natural gas facilities to meet standards limiting their methane emissions. 80 Fed. Reg. 56,593 (Sept. 18, 2015). EPA originally allowed for a 60-day comment period on the proposal, but extended it to 77 days. 80 Fed. Reg. 70,179 (Nov. 13, 2015). The agency received over 900,000 public comments on the proposed new source standards. *See* EPA's Responses to Public Comments on the EPA's Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources (May 2016), EPA-HQ-OAR-2010-0505-7632. Many of the Joint Environmental Commenters submitted extensive technical and legal comments on the 2015 proposal and further urged EPA to move forward expeditiously with existing source emission guidelines, which EPA must issue under section 111(d) and 40 C.F.R. § 60.22(a) once it finalizes performance standards for new and/or modified sources.

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technologies and management practices" available to control methane emissions from the sector "have been well documented (including information on cost, benefits and reduction potential) and implemented in oil and gas systems throughout the U.S." EPA, Office of Air & Radiation, *Technical Support Document for the Advanced Notice of Proposed Rulemaking for Greenhouse Gases; Stationary Sources* ("TSD 2008"), Sec. VII, at 30 (June 2008), EPA-HQ-OAR-2008-0318-0081.

[8] *Available at* https://obamawhitehouse.archives.gov/sites/default/files/image/president27sclimateactionplan.pdf.

[9] *Available at* https://obamawhitehouse.archives.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.

[10] *Id.* at 8.

[11] EPA, Office of Air Quality Planning and Standards ("OAQPS"), Oil and Natural Gas Sector Leaks (Apr. 2014) ("Sector Leaks White Paper") EPA-HQ-OAR-2010-0505-5110, https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-5110; EPA, OAQPS, Oil and Natural Gas Sector Hydraulically Fractured Oil Well Completions and Associated Gas during Ongoing Production (Apr. 2014) ("Hydraulic Fracturing White Paper") EPA-HQ-OAR-2010-0505-5108, https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-5108; EPA, OAQPS, Oil and Natural Gas Sector Compressors (Apr. 2014) ("Compressors White Paper") EPA-HQ-OAR-2010-0505-5109, https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-5109; EPA, OAQPS, Oil and Natural Gas Sector Pneumatic Devices (Apr. 2014) ("Pneumatic Devices White Paper") EPA-HQ-OAR-2010-0505-5030, https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-5030; EPA, OAQPS, Oil and Natural Gas Sector Liquids Unloading Processes (Apr. 2014) ("Liquids Unloading White Paper") EPA-HQ-OAR-2010-0505-5032, https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-5032 (white paper on liquids unloading).

On June 3, 2016, EPA promulgated final performance standards for methane and VOC emissions from new and modified oil and natural gas source. *Oil and Natural Gas Sector: Emission Standards for New, Reconstructed and Modified Sources*, 81 Fed. Reg. 35,824 (June 3, 2016). Although the agency did not concurrently propose or finalize guidelines for limiting such emissions from existing oil and natural gas sources, it recognized its legal obligation to do so. Accordingly, on the same day that it issued the 2016 Rule, EPA published notice that it would be issuing an information collection request ("ICR") to obtain "more specific information that would be of critical use in addressing existing source emissions pursuant to CAA section 111(d)." 81 Fed. Reg, 35,763, 35,764 (June 3, 2016).

The standards in the NSPS rely on widely-available, well-demonstrated technologies and best practices to deliver real-world emission reductions. Moreover, the NSPS's provisions deliver significant benefits at costs that constitute only a small fraction of industry revenues—and these costs will continue to decline with technological innovations, including advanced approaches to leak detection and repair ("LDAR"). The NSPS also reflects and builds upon approaches taken by leading states like Colorado and California, which have successfully implemented many of these solutions in their own state-level standards to help reduce oil and gas methane emissions and protect the health of their communities, all without negative economic repercussions. These proven state-level standards have shown that effective pollution control of oil and gas operations is plainly "achievable" and "adequately demonstrated" as required by the Clean Air Act, 42 U.S.C. § 7411(a)(1) (defining "standard of performance"). But the lack of standards in other significant producing states has similarly underscored the need for uniform federal protections.

EPA amassed an extensive technical record supporting the NSPS, including information on low-cost technologies that are readily available to reduce these emissions. As noted above, two years before it issued the final rule, EPA conducted a broad-based solicitation for information concerning emissions from oil and gas sector sources and cost-effective technologies to minimize those emissions. The five technical white papers looked at the significant sources of VOC and methane emissions within the oil and natural gas sector, including those sources' emissions and the mitigation techniques available.[12] EPA sought formal input from independent experts, as well as other data and technical information from all stakeholders.[13] In addition, there are innumerable reports that document the cost-effective opportunities to reduce oil and gas sector emissions. For example, a report by ICF International found that a discrete set of key technologies could help to reduce methane emissions by 40 percent for an average of just one penny per thousand cubic feet of natural gas produced.[14] Another report released around that same time concluded, based on emission estimates from EPA's Inventory of Greenhouse Gas Emissions and Sinks, that proven, low-cost technologies could reduce sector-wide methane

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[12] *See* Sector Leaks White Paper; Hydraulic Fracturing White Paper; Compressors White Paper; Pneumatic Devices White Paper; Liquids Unloading White Paper.
[13] *See* Sector Leaks White Paper at 1; Hydraulic Fracturing White Paper at 1; Compressors White Paper at 1; Pneumatic Devices White Paper at 1; Liquids Unloading White Paper at 1.
[14] ICF International, prepared for EDF, *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*, B-6 (March 2014) ("ICF (2014)") https://www.edf.org/sites/default/files/methane_cost_curve_report.pdf.

emissions by 42 to 48 percent, at a cost of just $8 to $18 per metric ton CO_2-e.[15] These same technologies will likewise reduce substantial quantities of VOC and HAP emissions. And because methane is a saleable commodity, reductions in methane emissions often pay for themselves, in whole or in part, making methane mitigation a low-cost (and sometimes *negative* cost) proposition.

In the final 2016 rule, EPA projected that, as finalized, the NSPS would achieve annual methane, VOC, and HAP reductions of 300,000, 150,000, and 1,900 short tons, respectively, in 2020. 81 Fed. Reg. at 35,885. Those reductions increase to 510,000, 210,000, and 3,900 short tons in 2025. *Id*. Of those total reductions, the fugitive emissions requirements included in the NSPS accounted for 170,000 short tons of methane and 46,000 shorts tons of VOCs in 2020, and 350,000 short tons and 94,000 short tons in 2025. 2016 RIA at 3-13, Table 3-4. These fugitive emissions reductions are the climate equivalent of taking 800,000 cars off of the road by 2020, and taking nearly 1.5 million cars off of the road by 2025.[16]

Domestic companies and workers have for years been building and installing the equipment and instituting the practices necessary to reduce waste of natural gas and minimize emissions of methane and other harmful pollutants. Another report found that these technologies are manufactured by numerous companies across the country—many of them small businesses in places like Texas, Oklahoma, the Mountain West, and the industrial Midwest.[17]

Since the new Administration took office, EPA has engaged in serial unsuccessful attempts to weaken the NSPS, and has sought to avoid regulating existing sources.

Within weeks of the new administration taking office, EPA reversed course and began an effort to systematically remove or undermine these crucial oil and gas pollution safeguards. First, then-Administrator Scott Pruitt unilaterally withdrew the ICR that was intended to gather data in support of existing source standards. *Notice Regarding Withdrawal of Obligation to Submit Information; Notice*, 82 Fed. Reg. 12,817 (Mar. 7, 2017). The Administrator's withdrawal came just one day after receiving a letter from the Attorneys Generals and Governors of certain states that had opposed adoption the NSPS.[18] The ICR would have collected information on major equipment and component counts at low-production wells and helped determine the effectiveness of any ongoing leak detection and repair program to which the reporting facility was subject—both areas for which EPA now professes it has uncertainties that cause it to doubt the cost-effectiveness of the NSPS.[19] The Administrator's entire basis for withdrawing the ICR

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[15] Clean Air Task Force et al., *Waste Not: Common Sense Ways to Reduce Methane Pollution from the Oil and Gas Industry* 8-9 (Jan. 2015) ("Waste Not"), http://www.catf.us/resources/publications/files/WasteNot.pdf.
[16] EPA, *Greenhouse Gas Equivalencies Calculator*, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator (Dec. 2018).
[17] Datu Research, prepared for EDF, *The Emerging U.S. Methane Mitigation Industry* (Oct. 2014) https://www.edf.org/sites/default/files/us_methane_mitigation_industry_report.pdf.
[18] See Letter from Ken Paxton, Texas AG et al., to Scott Pruitt, U.S. EPA Administrator (Mar. 1, 2017) https://www.epa.gov/sites/production/files/2017-03/documents/letter_from_attorneys_general_and_governors.pdf
[19] *See* Information Collection Request Supporting Statement at 95, EPA ICR No. 2548.01 (Nov. 9, 2016) https://www.epa.gov/sites/production/files/2016-11/documents/oil-natural-gas-icr-supporting-statement-epa-icr-2548-01.pdf; *see also* EPA, Final Oil and Gas ICR Fact Sheet at 1, https://www.epa.gov/sites/production/files/2016-11/documents/oil-gas-final-icr-factsheet.pdf.

was that "EPA would like to assess the need for the information that the agency was collecting through these requests, and reduce burdens on businesses while the Agency assesses such need." 82 Fed. Reg. at 12,817. To date, there is no evidence that EPA has undertaken this assessment.

A number of states and the Environmental Defense Fund sued EPA for unreasonably delaying its promulgation of existing source standards. *New York v. Wheeler*, No. 18-cv-0773 (D.D.C., filed April 5, 2018). The discovery in that case reveals that EPA's withdrawal of the ICR was not based upon any reasoned analysis by EPA, but was accomplished entirely through politics and industry lobbying. For example, the senior career staff "most familiar with the circumstances surrounding the ICR withdrawal" "did not discuss the ICR withdrawal at any time with Mr. Pruitt," nor "with any outside parties," and did not "bec[o]me aware of the basis for the withdrawal of the 2016 ICR [until] March 2, 2017," the day it was signed. EPA's Amended Responses to Plaintiffs' First Set of Interrogatories at 4-7, *New York v. EPA*, No. 1:18-cv-00773 (D.D.C. May 6, 2019), ECF No. 48-2.

Instead, the ICR withdrawal was spurred by a request from an oil and natural gas industry lobbyist who urged "several key rationales for either eliminating the ICR or at least extending the response date." Appendix A at 8 (email from Kathleen Sgamma, Western Energy Alliance, to David Kreutzer, EPA (Feb. 10, 2017)). That request was shepherded by a member of the new Administration's transition team, who thanked the lobbyist "for bringing it to our attention," explaining that "[t]here was nobody here (political or career) who thought the ICR made sense given the changes in associated policy," and apologized that "with all of the commotion of the transition, the very sensible proposal to cancel the ICR fell through the cracks." Appendix A at 19 (email from David Kreutzer, EPA, to Kathleen Sgamma, Western Energy Alliance (Mar. 3, 2017)). Within a matter of weeks, the ICR was canceled outright and EPA's process to regulate existing sources halted, based on an apparent change in policy that occurred without any public process or record in support. *See id*. According to an email sent by another political appointee to EPA's chief of staff, Administrator Pruitt later "regaled" a conservative policy group "with the speed with which the retraction of the ICR on methane was done," and the agency repeatedly touted it as a "key deregulatory action." Appendix A at 19 (email from David Schnare, EPA, to Ryan Jackson, EPA (June 27, 2017)), 25.

Several weeks later, on March 28, 2017, the President issued Executive Order No. 13,783, 82 Fed. Reg. 16,093 (Mar. 31, 2017), which directed agencies to review existing regulations and "appropriately suspend, revise, or rescind those that unduly burden the development of domestic energy resources *beyond the degree necessary to protect the public interest or otherwise to comply with the law*." *Id.*, Sec. 1(c) (emphasis added). EPA initiated its review of the Oil and Gas NSPS in April 2017 (E.O. Review). 82 Fed. Reg. 16,331 (Apr. 4, 2017).

That same month, on April 18, 2017, EPA notified operators via letter—without signing or publishing any official notice—that the agency intended to issue a 90-day stay of certain provisions of the NSPS (including the fugitive emission requirements) under section 307(d)(7)(B) of the Clean Air Act, 42 U.S.C. 7607(d)(7)(B), and that sources did not need to comply with those requirements while the stay was in effect.[20] Eventually, on June 5, 2017, EPA

[20] *See* Letter from Scott Pruitt, U.S. EPA Administrator, to Howard Feldman, API et al. (Apr. 18, 2017).

published the notice of reconsideration and retroactive partial stay of, *inter alia*, the fugitive emission requirements—two days *after* the initial June 3, 2017 compliance deadline for those requirements and with a retroactive effective date of June 2, 2017.[21] *Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources; Grant of Reconsideration and Partial Stay*, 82 Fed. Reg. 25,730 (June 5, 2017) ("Administrative Stay Rule"). Many of the Environmental Commenters immediately challenged EPA's Administrative Stay Rule in the D.C. Circuit as unlawful. EPA argued that the stay was consistent with section 307(d)(7)(B) because there were issues of central relevance in the final rule that commenters had not had an opportunity to comment on, and therefore reconsideration was mandatory. The D.C. Circuit quickly and summarily vacated the stay, holding that—on the contrary—because the commenters had had an opportunity to comment on all the relevant issues during the 2016 Rule's process, any reconsideration was not mandatory and EPA could not issue stay under section 307(d)(7)(B). *Clean Air Council v. Pruitt*, 862 F.3d 1, 14 (D.C. Cir. 2017).

Less than two weeks after publishing the Administrative Stay Rule, and before the *Clean Air Council* case was decided, EPA published two more proposals that sought to further stay the 2016 Rule by three months and two years, respectively. *Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed and Modified Sources: Three Month Stay of Certain Requirements*, 82 Fed. Reg. 27,641 (June 16, 2017); *Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed and Modified Sources: Stay of Certain Requirements*, 82 Fed. Reg. 27,645 (June 16, 2017) (collectively the "June 2017 Stay Proposals"). EPA cited no legal authority for the June 2017 Stay Proposals, and in fact directed commenters to *avoid* commenting on the substantive requirements of the 2016 Rule. 82 Fed. Reg. at 27,648. Several months later, in November 2017, EPA published two new "notices of data availability" that did not, in fact, make any data available. *See Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources: Stay of Certain Requirements*, 82 Fed. Reg. 51,788 (Nov. 8, 2017); *Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources: Three Month Stay of Certain Requirements*, 82 Fed. Reg. 51,794 (Nov. 8, 2017) (collectively the "November 2017 NODAs"). Instead, these essentially supplemental proposals presented new legal theories as to how EPA could stay certain provisions, including the fugitive emissions requirements. Both sets of proposals had short comment periods: 45 days for the June 2017 Stay Proposals and only 30 days for the November 2017 NODAs. The minimal amount of public participation permitted with respect to these attempts to suspend or revise the NSPS stand in stark contrast to the thorough and collaborative process that EPA undertook to promulgate the rule.

To date, EPA has not finalized the June 2017 Stay Proposals. However, on October 15, 2018, despite the fact that industry had been complying with the NSPS for two years without any documented problems, EPA proposed to revise those standards in a way that would increase emissions of methane and VOCs from oil and gas sources. *Oil and Natural Gas Emission Standard for New, Reconstructed, and Modified Sources Reconsideration*, 83 Fed. Reg. 52,056 (Oct. 15, 2018). The proposal would fundamentally weaken these critical federal emissions standards, principally by cutting the frequency of leak detection and repair in half (from every six months to annually) and by doubling the intervals allowed for repairing identified leaks (from

[21] EPA claimed that the proposal was effective three days prior to publication without any evidence it had authority to do so. *See* 82 Fed. Reg. 25,731.

30 to 60 days). EPA admitted these changes may "degrade air quality and adversely affect health and welfare." *Id.* at 52,059. Indeed, according to EPA, that proposal would *increase* methane emissions by up to 480,000 short tons and VOC emissions by up to 124,000 short tons in the years 2019-2025.[22] 83 Fed. Reg. at 52,059-60. The principal reason given for increasing dangerous emissions: EPA *might* come upon information in the future that would suggest the current standards are not *as* cost-effective as the best currently available evidence suggests they are, and, in the meantime, industry would prefer weakened regulations. *See, e.g.*, *id.* at 52,065. EPA held a 60-day comment period on that proposal, and it has yet to be finalized.

Finally, on September 24, 2019, EPA issued its latest Proposal, which seeks to deregulate the transmission and storage segments of the natural gas sector, and to remove methane regulations for the entire sector—a transparent attempt to preclude regulation of existing oil and gas sources under section 111(d) and further limit the reach of the new source standards. The positions and arguments reflected in EPA's latest proposal closely track those of the American Petroleum Institute ("API"). Indeed, in an outline of API's top priorities sent to the Trump Administration Transition/Landing teams, the number two "Rule or Policy Concern" was identified as the 2016 NSPS. API prominently explained that the "[f]inal rulemaking directly regulates 'methane' as a pollutant. Under the Clean Air Act, this triggers the development of a regulation to address *existing* sources across the segments. Regulation of existing sources should be avoided." Appendix A at 68 (API Energy Policy Priorities) (emphasis in original). The document further suggests "revisiting of process EPA undertook that failed to demonstrate that the source category represents a 'significant' contribution to endangering public health and welfare." *Id.*[23]

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[22] The estimated forgone emissions reductions were calculated using a different baseline that recognizes small changes EPA made since the 2016 final rule that now allow operators on the Alaska North Slope to perform LDAR inspections annually instead of semi-annually. *See* EPA, *Regulatory Impact Analysis for the Proposed Reconsideration of the Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources* at 1-7 (2018) ("2018 RIA").

[23] Former Assistant Administrator for Air and Radiation William Wehrum was at the agency for all of EPA's prior attempts to slash regulations (and thus increase emissions) from this sector and for most of the "review" process leading to the current Proposal. While in private practice, Wehrum long represented the American Petroleum Institute ("API"), and shortly before becoming Assistant Administrator, Wehrum filed a document in the litigation over EPA's earlier rulemakings raising the same issues (and advancing the same legal theories) that the Proposal now adopts. Nonbinding Statement of Issues of the American Petroleum Institute, *Am. Petroleum Inst. v. EPA*, No. 16-1270 (D.C. Cir. Sept. 6, 2016); *see also* Petitioners' Motion to Govern Further Proceedings, *North Dakota v. EPA*, No. 13-1108 (D.C. Cir. Oct. 21, 2016). Still as a private attorney representing API, Wehrum signed a court document supporting abeyance of that litigation, explaining that the administrative proceeding that he would later direct at EPA could address the legal challenges he was bringing on behalf of his then-client, API. Industry Petitioners' Joint Response In Support of EPA's Mot. to Hold Cases in Abeyance, *Am. Petroleum Inst. v. EPA*, No. 13-1108 (April 17, 2017) ("Industry Petitioners support EPA's effort to evaluate the 2016 NSPS Rule … It is easily conceivable that EPA will decide to make significant changes to the rule that address the challenges that Industry Petitioners are planning to bring in this case."). Approximately 10 days after Attorney Wehrum ceased representing API, on November 27, 2017, API requested a meeting with now-Assistant Administrator Wehrum to "discuss priorities" including "methane, ozone, and RFS," and a meeting was scheduled for soon thereafter. Appendix A at 60-64 (email chain between Hilary Moffett, API, and Shanita Loving, EPA (Nov.-Dec. 2017). The subsequent unified regulatory agenda (Spring 2018) included two new items not contained in the previous (Fall 2017) one: one to address technical issues regarding the 2016 NSPS and one to address policy issues, including direct regulation of methane. *See* https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201804&RIN=2060-AT90; https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201804&RIN=2060-AT54.

While the current administration has been waging a concerted assault on critical public health, environmental, and waste prevention safeguards, knowingly and willfully increasing emissions of dangerous pollutants, several states have moved in the opposite direction, recognizing the scientific imperative to reduce these emissions and the availability of low-cost, common sense programs. In the time since the 2016 Rule was finalized, three states have finalized or strengthened methane standards for oil and gas operations. In July 2017, California finalized statewide methane regulations requiring more frequent fugitive emissions inspections for both well sites and compressor stations compared to EPA's Proposal. Cal. Code. Regs. tit. 17 § 95669 (2017). Then, in June 2018, the Colorado Air Quality Control Commission strengthened the state's 2014 methane regulations to increase the frequency of LDAR inspections for oil and natural gas wells in ozone nonattainment areas and to require LDAR for pneumatic controllers. 5 Colo. Code Regs. 1001-9 § XII.L (2018). That same month, Pennsylvania finalized General Permit requirements that increased the frequency of LDAR inspections. Pennsylvania Department of Environmental Protection, Bureau of Air Quality, General Plan Approval and/or General Operating Permit GP-5 and GP-5A.

These state efforts continue. Pennsylvania is also expected to move forward with existing source regulations.[24] New Mexico is also conducting stakeholder outreach efforts as work continues to develop the state's first methane reduction regulations for the oil and gas sector per Governor Michelle Lujan Grisham's executive order on climate change.[25] Likewise, Colorado is currently conducting a rulemaking to further strengthen the state's oil and gas emissions regulations.[26]

In fact, the current Proposal is broadly opposed not only by environmental and public health organizations, state and local governments, affected communities, and policy advocates, but also by many of the very parties that EPA claims will benefit from it: oil and gas companies themselves. Representing ExxonMobil, XTO Energy Regulatory Manager Matt Kolesar stated:

> Government action through methane policy and regulation also has an important role to play in aligning incentives, leveling the playing field and ultimately helping industry as a whole rise to the challenge…. As we explained in our written comments to the EPA, ExxonMobil strongly encourages the agency to continue regulating methane emissions at new and modified sources, and to expand methane regulation to existing sources.[27]

Shell's U.S. Country Chair Gretchen Watkins said:

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[24] *See* Pennsylvania DEP, *Draft Proposed Rulemaking*, Title 25, Pt. 1, Subpart C, Art. III, Chapter 121, http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/Air%20Quality%20Technical%20Advisory%20Committee/2019/4-11-19/ONG_PRN_Annex_A_AQTAC_4-11-2019.pdf).

[25] Press Release, New Mexico Environment Department, *State agencies begin stakeholder process on methane regulatory strategy* (June 7, 2019), https://www.env.nm.gov/wp-content/uploads/2019/06/060719-NMED-EMNRD-task-force-update-.pdf.

[26] Colorado Dep't of Public Health and Environment, Fall 2019 Rulemaking (last accessed Nov. 14, 2019), https://www.colorado.gov/pacific/cdphe/fall-2019-rulemaking.

[27] Ben Ratner, *EDF and ExxonMobil Discuss Technology and Regulation To Reduce Methane Emissions*, FORBES (Mar. 12, 2019), https://www.forbes.com/sites/edfenergyexchange/2019/03/12/edf-and-exxonmobil-discuss-technology-and-regulation-to-reduce-methane-emissions/#6f5ee7a14d9e.

> At Shell, we generally don't make a habit of trying to tell governments how to do their jobs. I am breaking that rule today to request that the Environmental Protection Agency continue the direct regulation of methane emissions. The agency is thinking about stripping out methane from the 2016 methane rule and regulating a different emission instead. I disagree. I want EPA to keep doing what it's doing. In fact, I would support EPA regulating methane emissions from existing oil and gas assets as well.[28]

Likewise, BP's CEO Bob Dudley stated: "We actually support regulation of methane here in the U.S."[29] And BP America Chief Susan Dio said: "[V]oluntary actions by several energy companies are not enough to solve the problem. The best way to help further reduce and ultimately eliminate methane emissions industrywide is through direct federal regulation of new and existing sources."[30]

Equinor CEO Eldar Sætre stated: Climate change could lead the oil and gas industry to face "a crisis of confidence" that is "a real threat to our license to operate."[31] And the company's Head of Sustainability, Bjørn Otto Sverdrup, stated: "Reducing methane emissions is part of our approach to providing energy for a low carbon future. That is why @Equinor continues to believe that methane should be regulated in the US at the federal level."[32]

These companies and others—including Equitrans, a midstream gas transmission operator,[33] investors representing over $5.5 trillion in assets under management[34] and 12 of the nation's largest utilities[35]—have spoken in favor of retaining and, in some cases, expanding methane standards.

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The Proposal is both unlawful and unwise, and should be abandoned. In the following section, we explain: why the Proposal's source category revision is unlawful (§ I), why the

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[28] Gretchen Watkins, *Shell supports the direct regulation of methane – here's why*, LINKEDIN (Mar. 12, 2019), https://www.linkedin.com/pulse/shell-supports-direct-regulation-methane-heres-why-gretchen-watkins/.

[29] Northey and Lee, *Shell, BP, Exxon Press EPA to Regulate Methane*, E&E NEWS (Mar. 13, 2019), https://www.eenews.net/energywire/stories/1060127133.

[30] Susan Dio, *BP America chief: It's essential that the EPA regulate methane emissions*, HOUSTON CHRONICLE (Mar. 27, 2019), https://www.houstonchronicle.com/opinion/editorials/article/BP-America-chief-It-s-time-for-the-Trump-13721656.php.

[31] Crooks, *The week in energy: The climate crisis for oil and gas*, FINANCIAL TIMES (Mar. 16, 2019), https://www.ft.com/content/4a25bbb4-475c-11e9-a965-23d669740bfb.

[32] @Bsverdrup, TWITTER (Mar. 15, 2019 12:14 PM), https://twitter.com/BSverdrup/status/1106634889347166209.

[33] Press Release, Equitrans Midstream, *Equitrans Midstream Corporation and EQM Midstream Partners Support Indistry Efforts to Continue Reducing Methane Emissions* (Sept. 25, 2019), https://ir.equitransmidstream.com/news/news-archives/news-details/2019/Equitrans-Midstream-Corporation-and-EQM-Midstream-Partners-Support-Industry-Efforts-to-Continue-Reducing-Methane-Emissions/.

[34] Wokaty, Interfaith Ctr. On Corp. Resp., *Citing Climate and Portfolio Risks, Investors Call on Oil and Gas to Oppose Federal Methane Rollbacks* (Aug. 29, 2019), https://www.iccr.org/citing-climate-and-portfolio-risks-investors-call-oil-and-gas-producers-oppose-federal-methane.

[35] Press Release, MJ Bradley & Associates, *Joint Statement on EPA's Proposed Policy Amendments to the New Source Performance Standards for the Oil and Natural Gas Industry* (Sept. 3, 2019), https://www.mjbradley.com/sites/default/files/OGNSPS_Joint-Statement_3Sept2019.pdf.

Proposal's methane rescission is unlawful (§ II), how the Proposal unlawfully fails to take into account the vast emissions from existing sources in the category (§ III), why even if there were such a requirement (there is not) EPA has reasonably concluded that methane emissions from the oil and gas sector significantly contribute to endangerment (§IV), and how the Proposal unlawfully ignores the problem of climate change (§ V).

I. The proposal's revision of the source category to exclude the transmission and storage segments is unlawful.

The oil and gas category lawfully and correctly includes the transmission and storage segments both originally and as revised. EPA's Proposal to revise the source category to exclude transmission and storage is therefore arbitrary, capricious, and unlawful.

A. EPA's 2012/2016 revision of the source category to include the transmission and storage segments (if they were not already included) was lawful and correct.

EPA makes various arguments, addressed below, that the transmission and storage segments were not included in the 1979 listing. We show below that EPA is wrong; they were included in 1979 and subsequent actions. But even if this were not so, in its 2012 and 2016 rulemakings EPA lawfully revised the oil and gas source category to include the transmission and storage segments:

> However, to the extent that there is any ambiguity in the prior listing, the EPA hereby finalizes, as an alternative, its proposed revision of the category listing to broadly include the oil and natural gas industry. As revised, the listed oil and natural gas source category includes oil and natural gas production, processing, transmission, and storage. In support, the EPA has included in this action the requisite finding under section 111(b)(1)(A) that, in the Administrator's judgment, this source category, as defined above, contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. To be clear, the EPA's view is that no revision is required for the standards established in this final rule. But even assuming it is, for the reason stated below, there is ample evidence that this source category as a whole (oil and natural gas production, processing, transmission, and storage) contributes significantly to air pollution that may reasonably be anticipated to endanger public health and welfare. First, through the 1979 Priority List, the EPA determined that the oil and natural gas industry contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. To the extent that the EPA's 1979 determination looked only at certain emissions sources in the industry, clearly the much greater emissions from the broader source category, as defined under a revised listing, would provide even more support for a conclusion that emissions from this category endanger public health or welfare. In addition, the EPA has included immediately below information and analyses regarding public health and welfare impacts from GHGs, VOC, and SO_2 emissions, three of the primary pollutants emitted from the oil and natural gas industry, and the estimated emissions of these pollutants from the oil and natural gas source category. It is evident from this information and

> analyses that the oil and natural gas source category contributes significantly to air pollution which may reasonably be anticipated to endanger public health and welfare. Therefore, to the extent such a finding were necessary, pursuant to section 111(b)(1)(A), the Administrator hereby determines that, in her judgment, this source category, as defined above, contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare.

81 Fed. Reg. at 35,833. This revision was supported by the record and is both lawful and correctly describes how the source category functions in practice. The Proposal's attempt to revise the listing to exclude the transmission and storage segments of the oil and gas sector—which fails to adduce a record basis for reversing any of these findings and instead pretends EPA did not make them—is unreasonable and unlawful.

1. The plain language of the Act authorizes EPA to revise a source category.

EPA had unambiguous authority to undertake this revision of the oil and gas source category. As the Proposal recognizes, the Clean Air Act grants the Administrator authority (and, indeed, a duty to) to list and revise categories. 84 Fed. Reg. at 50,254. That section states: "The Administrator shall, within 90 days after December 31, 1970, publish (*and from time to time thereafter shall revise*) a list of categories of stationary sources." 42 U.S.C. § 7411(b)(1)(A) (emphasis added). The plain language of the statute thus directs that the Administrator not only may revise the list of source categories, but *must* do so. *See Nat'l Ass'n of Home Builders v. Defs. of Wildlife,* 551 U.S. 644, 661, (2007) ("By its terms, the statutory language"—"shall"—is mandatory[.]") The Administrator is further required to "include a category of sources in such list if in his judgment it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7411(b)(1)(A). Accordingly, where a source category, either in the first instance or as revised according to the Administrator's mandatory revision duty, causes or contributes significantly to dangerous air pollution, it must be listed under section 111(b)(1)(a), and EPA's earlier interpretation of its authority to do so was correct. Importantly, the touchstone of section 111 is to reduce emissions of endangering pollutants. *See PDK Labs. Inc. v. DEA*, 362 F.3d 786, 796 (D.C. Cir. 2004) (the "words of the statute should be read in context, the statute's place in the overall statutory scheme should be considered, and the problem Congress sought to solve should be taken into account" to determine whether Congress has foreclosed the agency's interpretation) (internal citation omitted).

Other language in section 111 further demonstrates that Congress contemplated that source categories would be broad and encompass a variety of different types of emission sources. For example, the Act grants the Administrator authority to "distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing ... standards." 42 U.S.C. § 7411(b)(2). Had Congress contemplated that source categories must or should be narrowly defined, authorization to establish different standards for different "classes, types, and sizes" within source categories would be unnecessary. *See Agnew v. Gov't of the D.C.*, 920 F.3d 49, 57 (D.C. Cir. 2019) (explaining "the surplusage canon's directive that a statute not be interpreted in a way that renders any part of it superfluous") (citing *Arlington Cent. Sch. Dist. Bd. of Educ. v.*

Murphy, 548 U.S. 291, 299 n.1 (2006)); c*f. NRDC v. EPA*, 489 F.3d 1364, 1372-73 (D.C. Cir. 2007) (subcategory must have independent meaning from "category").

EPA recognized the intent of the language in section 111(b) to authorize broad source categories long ago. In 1980, the agency explained: "Source categories are intended to be broad enough in scope to include all processes associated with the particular industry." 45 Fed. Reg. at 76,427–28 (explaining why the "Asphalt Roofing Plants" category established in 1979 should be amended to include asphalt processed at oil refineries and asphalt processing plants). And in practice, EPA has long listed broad source categories, covering an entire industry or a source that may be found in numerous industries, and sometimes establishing different subcategories within source categories.

For example, "[i]n 1971, the EPA initially included fossil fuel-fired EGUs (which includes natural gas, petroleum and coal) that use steam-generating boilers in a category that it listed under CAA section 111(b)(1)(A), and promulgated the first set of standards of performance for sources in that category, which it codified in subpart D." 80 Fed. Reg. 64,510, 64,528 (Oct. 23, 2015). As such it was one of the first five source categories the Agency ever listed. *Id.* Then, "[i]n 1979, the EPA divided subpart D into 3 subparts—Da ("Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978"), Db ("Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units") and Dc ("Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units")—in order to codify separate requirements that it established for these subcategories." *Id.* "*None* of these subsequent rulemakings, including the revised codifications, however, constituted a new listing under CAA section 111(b)(1)(A)." *Id.* (emphasis added).

The electric utility steam generating unit category thus includes oil-, natural gas-, and coal-fired electric utility boilers, which fire entirely different fuel types and generate widely different levels of pollutants such as SO_2, and NO_x. Within the universe of coal-fired boilers, units vary significantly in emissions depending on whether they fire bituminous, sub-bituminous, or lignite coal. These kinds of differences may also entail different control technologies and techniques that can be used to control that pollution. The breadth of diversity within this source category exceeds the modest differences in gas composition at different segments of the natural gas industry, which EPA now claims *precludes* a single source category that includes production, processing, transmission, and storage. Yet EPA has never claimed that the "Electric Utility Steam Generating Units" category is unlawfully heterogeneous. On the contrary, the D.C. Circuit specifically upheld EPA's decision *not to sub-categorize* particular classes of units within this source category based on boiler and fuel type. *Lignite Energy Council v. EPA*, 198 F.3d 930, 933 (D.C. Cir. 1999).

Relatedly, the fossil fuel fired-electric generation unit [EGU] category, which EPA established in 2015 for the purpose of establishing standards of performance for carbon dioxide, encompasses two subcategories—electric utility steam generating units and stationary combustion. *See* 80 Fed. Reg. 64,510, 64,531–32, 64,717–18. This category also includes units that fire coal, gas, and oil, and spans an even broader array of technological configurations than the source category discussed above: it encompasses traditional steam units (both pulverized coal

and circulating fluid bed boilers), integrated gasification combined cycle units, and both simple-cycle and combined-cycle stationary combustion turbines. As EPA's own data show,[36] the carbon dioxide emission rates of different kinds of EGUs within this category vary dramatically:

Table 1. Average CO_2 emission rates of different kinds of units in the fossil fuel fired-EGU source category

Type of EGU	Average CO_2 emission rate (lbs/MWh)
Gas-fired combined cycle combustion turbines	904
Gas-fired steam EGUs	1,414
Gas-fired simple cycle combustion turbines	1,419
Oil-fired simple cycle combustion turbines	1,638
EGUs that fire bituminous coal	2,150
All coal-firing steam EGUs	2,213
EGUs that fire sub-bituminous coal	2,248
EGUs that fire lignite coal	2,332
Oil-fired steam EGUs	2,354

The highest-emitting units in this source category —oil-fired steam EGUs—emit approximately 160 percent more CO_2 per megawatt-hour than the lowest-emitting units—gas-fired combined cycle combustion turbines. Between the two kinds of EGUs that emit the most CO_2 in the aggregate—gas-fired combined combustion turbines and coal-fired steam EGUs—the difference is 145 percent. This is orders of magnitude greater than the relatively tiny differences in gas composition that occur in different segments of the oil and gas supply chain: EPA found that in 2018, the average nationwide proportion of methane in gas in the transmission segment was only *five percent more* than in the production segment. This is even smaller than the differences in CO_2 emitted by coal plants alone: as these data show, EGUs that burn lignite emit over eight percent more CO_2 per megawatt-hour than those that burn bituminous coal.

Likewise, when the Agency gave "examples" of sources covered in its stationary reciprocating internal combustion engine (RICE) source category, it included such engines used at "electric power generation, transmission, or distribution; medical and surgical hospitals; motor and generator manufacturing; pump and compressor manufacturing; welding and smoldering equipment manufacturing; natural gas transmission; crude petroleum and natural gas production; natural gas liquids producers; and national security. The regulated engine types include: either a gasoline-fueled engine or any other type of engine, with a spark plug…" 73 Fed. Reg. at 3,569. Accordingly, this source category covers a wide range of industries.

Other examples abound. In its 1979 listing decision, EPA explained that it aggregated non-metallic mineral processing subcategories into one category because the Agency planned to study "the entire non-metallic mineral processing industry at one time, since many of the processes and control techniques are similar." 44 Fed. Reg. at 49,223; *see id.* at 49,225 (explaining that EPA aggregated several "source categories under a generic industry heading,"

[36] These data derive from EPA, Clean Power Plan Data File: Goal Computation Appendix 1-5 (Aug. 2015), https://archive.epa.gov/epa/cleanpowerplan/clean-power-plan-final-rule-technical-documents.html.

which "does not necessarily imply that a single standard would apply to all sources within the listed category"); *see also id.* at 49,224 (explaining that "two source categories, gray iron and steel foundries, were combined into one source category"); *id.* at 49,224 (in listing decision, recognizing that synthetic organic chemical manufacturing industry (SOCMI) may include "over 600 different processes," and noting that EPA would work on generic standards that "could regulate nearly all emissions by covering four broad areas: process facilities, storage facilities, leakage, and transport and handling losses," and "[t]herefore, SOCMI is listed as a single source category").

2. EPA lawfully exercised its authority to revise in 2012 and 2016.

EPA's in-the-alternative decision in 2012 and 2016 to revise the oil and gas source category to include additional emission sources flows directly from EPA's authority under section 111. *See, e.g.*, 76 Fed. Reg. at 52,745 ("To the extent there are oil and gas operations not covered by the currently listed Oil and Natural Gas source category, pursuant to CAA section 111(b), we hereby modify the category list to include all operations in the oil and natural gas sector."); 81 Fed. Reg. at 35,828.

As EPA explained in 2015:

> There are also good reasons for treating various segments of the natural gas industry as one source category. Operations at production, processing, transmission and storage facilities are a sequence of functions that are interrelated and necessary for getting the recovered gas ready for distribution. Because they are interrelated, segments that follow others are faced with increases in throughput caused by growth in throughput of the segments preceding (*i.e.,* feeding) them. For example, the relatively recent substantial increases in natural gas production brought about by hydraulic fracturing and horizontal drilling result in increases in the amount of natural gas needing to be processed and moved to market or stored. These increases in production and throughput can cause increases in emissions across the entire natural gas industry. We also note that some equipment (*e.g.,* storage vessels, compressors) are used across the oil and natural gas industry, which further supports considering the industry as one source category.

80 Fed. Reg. at 56,600; *see also* 81 Fed. Reg. at 35,828 (similar). EPA further distinguished the process of producing natural gas for distribution and the process for producing oil for distribution. The Agency stated: "The process of producing natural gas for distribution involves operations in the various segments of the natural gas industry described above. In contrast, oil production involves drilling/ extracting oil, which is immediately followed by distribution offsite to be made into different products." 81 Fed. Reg. at 35,832 n. 26.

3. The functional approach EPA took in 2012 and 2016 is correct and consistent with the Agency's past decisions about the scope of source categories.

As EPA earlier concluded, the similarities between the production and processing segments of the oil and gas sector (on the one hand) and the transmission and storage segments (on the other) are substantial. As such, EPA's alternative decision to revise the source category to include all segments is at the very least eminently lawful and reasonable. Indeed, these facts support a conclusion that, to the extent these segments were not already part of the oil and gas source category, the Act *required* EPA to revise the source category to include these segments and to establish standards to reduce emissions from them.

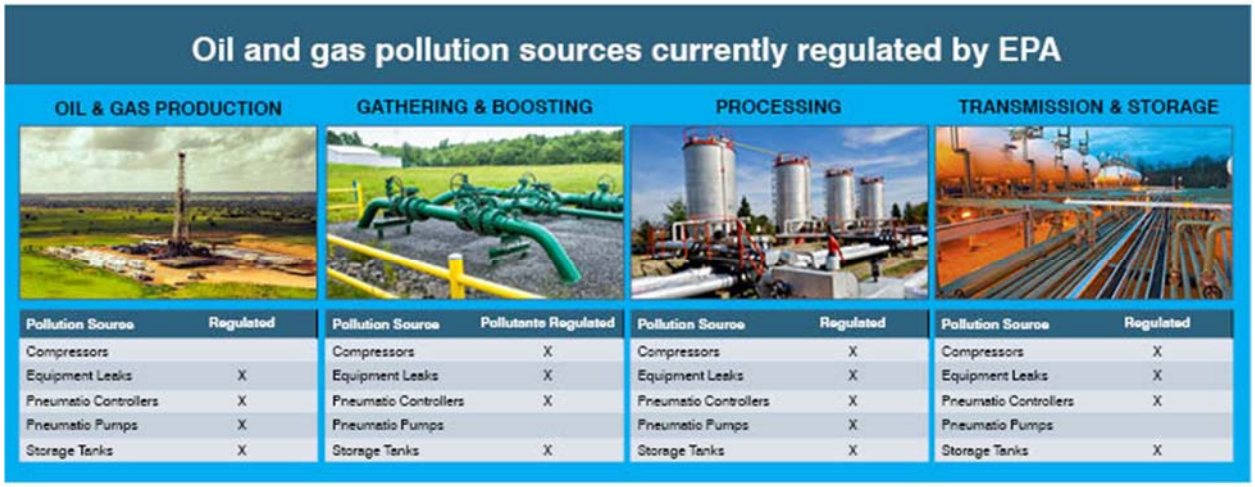
First, as EPA earlier concluded, the transmission and storage segments are part of the same process of producing natural gas for distribution to consumers. Without processing and transmission, natural gas could not be used and without production, there would be nothing to process or transport. The more gas that is produced, the more processing and transport is needed, and the greater emissions from all sectors will be. As the Agency's 2016 Regulatory Impact Analysis explained:

> After processing, natural gas enters a network of compressor stations, high-pressure transmission pipelines, and often-underground storage sites. Compressor stations are any facility which supplies energy to increase pressure to improve the movement of natural gas through transmission pipelines or into underground storage. Typically, compressor stations are located at intervals along a transmission pipeline to maintain desired pressure for natural gas transport. These stations will use either large internal combustion engines or gas turbines as prime movers to provide the necessary horsepower to maintain system pressure. Underground storage facilities are subsurface facilities utilized for storing natural gas which has been transferred from its original location for the primary purpose of load balancing, which is the process of equalizing the receipt and delivery of natural gas. Processes and operations that may be located at underground storage facilities include compression and dehydration.

2016 RIA at 2-8.

Second, as EPA also earlier concluded, the types of equipment used and the technologies to reduce emissions are the same in the transmission and storage segments and in the production and processing segments of the sector. In fact, every regulated emission source in the transmission and storage segment is also regulated in the production and processing segments, and in every case, EPA standards apply the same technologies and best practices to reduce emissions across all of these industry segments. *See* 2016 Response to Comments at 1-16 ("[W]e have not seen a difference in the available options for reducing emissions from segment to segment.") Figure 1, below, underscores this complete overlap.

Figure 1[37]:



Pollution Source	Regulated
Compressors	
Equipment Leaks	X
Pneumatic Controllers	X
Pneumatic Pumps	X
Storage Tanks	X

Pollution Source	Pollutants Regulated
Compressors	X
Equipment Leaks	X
Pneumatic Controllers	X
Pneumatic Pumps	
Storage Tanks	X

Pollution Source	Regulated
Compressors	X
Equipment Leaks	X
Pneumatic Controllers	X
Pneumatic Pumps	X
Storage Tanks	X

Pollution Source	Regulated
Compressors	X
Equipment Leaks	X
Pneumatic Controllers	X
Pneumatic Pumps	
Storage Tanks	X

For example, in its 2014 White Paper on compressors, EPA concluded that "[c]ompressors have been identified as an emission source that has potential to produce emissions to the atmosphere during oil and gas production (gathering and boosting), processing, transmission and storage." Oil and Natural Gas Sector Compressors: Report for Oil and Natural Gas Sector Compressors Review Panel, at 2-3, Dkt. No. EPA-HQ-OAR-2010-0505-5109 (Apr. 2014) ("Compressors White Paper"); *id.* at 5 (noting that centrifugal compressors "are primarily used for continuous, stationary transport of natural gas and are widely used in the processing and transmission industry segments"); *id.* at 11-12 Table 3-2 & 3-3. The same control technologies can be used to reduce emissions from compressors in all four segments of the industry. *Id.* at 29-42 (describing available compressor mitigation techniques). The same is true for pneumatic devices and equipment leaks, emissions sources that exist throughout the oil and gas sector and can be mitigated with the same technologies in each segment. *See* Oil and Natural Gas Sector Pneumatic Devices: Report for Oil and Natural Gas Sector Pneumatic Devices Review Panel, at 8, Dkt. No. EPA-HQ-OAR-2010-0505-5030 (Apr. 2014) ("This report's main objective was to quantify annual methane emissions from pneumatic controllers from the natural gas production, processing, transmission, and distribution sectors."); Oil and Natural Gas Sector Leaks: Report for Oil and Natural Gas Sector Leaks Review Panel, at 3, Dkt. No. EPA-HQ-OAR-2010-0505-5110 (Apr. 2014) ("For the purposes of this paper, leaks are defined as VOC and methane emissions that occur at onshore facilities upstream of the natural gas distribution system…. This includes leak emissions from natural gas well pads, oil wells that co-produce natural gas, gathering and boosting stations, gas processing plants, and transmission and storage infrastructure."). And across these segments, the standards EPA adopted to reduce pollution from these sources are either identical or nearly so. *See* 40 C.F.R. § 60.5390a(c) (identical standards for pneumatic controllers in the production and transmission and storage segments); 40 C.F.R. § 60.5397a (very similar requirements for leak detection and repair at well sites and compressor stations).

[37] *See* EPA's 2016 Fact Sheet, https://www.epa.gov/sites/production/files/2016-09/documents/sources_covered_2012nsps.pdf. Note that "gathering and boosting" is considered part of the "production" segment for the purposes of these rules.

In sum, EPA's 2015 proposal explained that:

> [W]ith respect to equipment used category-wide of which only a subset of those equipment are covered under the NSPS VOC standards (i.e., pneumatic controllers, and compressors located other than at well sites), EPA's analysis shows that the BSER for reducing VOC from the remaining unregulated equipment [i.e., the equipment in the storage and transmission segments] to be the same as the BSER for those currently regulated. The EPA is therefore proposing to extend the current VOC standards for these equipment to the remaining unregulated equipment.

80 Fed. Reg. at 56,595.

Third, as the current Administration does not (and cannot) dispute, pollutant emissions from the transmission and storage segments cause or contribute to the same endangerment as pollutant emissions from the production and processing segments. *See* 84 Fed. Reg. at 50,249 ("Emissions can occur in all segments of the natural gas industry."). As explained in more detail *infra* § IV, all segments of the oil and gas sector emit methane, VOCs, SO_2, and HAPs in significant quantities. *See* 2016 RTC at 1-2 ("VOC and methane are emitted from all segments of the natural gas industry. While the amounts may differ from segment to segment, where one emission decreases, the other increases. As a result, the overall emissions from each segment, including transmission and storage, are significant.").[38]

These common-sense factors and considerations are the same that EPA has long relied on in determining the scope of source categories under section 111, with respect to both initial listings and revisions. For example, "Metallic Mineral Processing" was listed as a source category in 1979. 44 Fed. Reg. at 49,225. As with the "Crude Oil and Natural Gas Production" category, EPA did not in 1979 explicitly delimit the scope or bounds of the source category. *Id.* But when the Agency promulgated pollution reduction standards in 1982, it explained how it determined what sources of emissions to include: "The process operations included in the proposed standards were selected because they are significant individual sources of particulate matter emissions . . . and because they are all amenable to the same types of air pollution control techniques." 47 Fed. Reg. at 36,861. Thus, sources of emissions were included because they emitted significant[39] quantities of dangerous pollutants and those emissions could be reduced using the same air pollution control techniques.

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[38] Note, however, that for the purpose of the "significance" finding required under section 111(b)(1)(A), EPA need only find that the source category as a whole contributes significantly to pollution that endangers public health and welfare, not individual segments within that category do. See 81 Fed. Reg. at 35,876 (section 111(b)(1)(A) "is clear that the listing and endangerment findings requirements are to be made for source categories, not specific emission sources within the source category. The provision also does not require that the EPA identify all emission points within a source category when listing that category."). In the case of the oil and gas industry, it is true that each of the individual segments *do* emit significant quantities of pollution that endangers public health and welfare, but the legality and integrity of the source category listing as defined in the 2012 and 2016 rule is not contingent on that fact.

[39] *See* TSD 2008.

Likewise, in revising the asphalt roofing plants category, originally listed in 1979 without elaboration, 44 Fed. Reg. at 49,226, EPA explained that the "emissions, processes, and applicable controls are the same." 45 Fed. Reg. at 76,428. Specifically, EPA stated: "The emissions, processes and applicable controls for blowing stills and asphalt storage tanks at oil refineries and asphalt processing plants are the same as those at asphalt roofing plants. It is therefore reasonable to treat the asphalt processing and roofing manufacture industry as a single category of sources for the purposes of establishing standards of performance." *Id.*

EPA undertook a similar analysis in proposing to expand the synthetic organic chemical manufacturing industry ("SOCMI") source category to include "storage vessels emitting VOC's located at plants other than SOCMI plants, such as liquid bulk storage terminals." 49 Fed. Reg. 29,698, 29,700 (July 23, 1984). EPA explained that the source category should be expanded because those facilities "store the same or similar liquids as those at SOCMI plants and … can be controlled with the same effectiveness, the same costs … and the same control technology as storage vessels located at SOCMI plants." *Id.* The Agency concluded: "Therefore, due to the similarities between VOC emitting storage vessels and handling equipment located at SOCMI plants and VOC emitting storage vessels and handling equipment not located at SOCMI plants, and due to the additional emissions reduction that can be achieved, the Administrator is proposing to expand the SOCMI source category to include VOC emitting storage vessels and handling equipment not located at SOCMI plants." *Id.*

So, too, when the Agency "expand[ed] the source category of industrial fossil fuel-fired steam generators to cover all steam generators, including both fossil and nonfossil fuel-fired steam generators, as well as steam generators used in industrial, commercial, and institutional applications." 51 Fed. Reg. 42,794 (November 25, 1986). The Agency stated that "[a]s amended, this source category includes any device or system which combusts fuel which results in the production of steam (or hot water), including incinerators with heat recovery, combined cycle steam generators, cogeneration systems and small electric utility steam generating units." *Id.* And it explained that "[a]ll of these types of steam generators exhibit emission characteristics which are similar quantity and type. Furthermore, the emission control devices which have been found to be effective on steam generating units are also effective in reducing emissions from other types of steam generators." *Id.* at 42,794–95; *see id.* at 42,795 ("The Administrator has determined that fossil and nonfossil fuel-fired industrial, commercial, and institutional steam generating units should be classified together as one source category for the purpose of the priority listing. These steam generating units emit similar pollutants, fire the same fuels, and may employ the same emission control techniques. Their impacts on human health are similar and the Administrator has determined, pursuant to the provisions of section 111(b)(1)(A), that the inclusion of industrial, commercial, and institutional steam generating units in one source category is warranted.").

Similarly, in setting standards for pollution emissions from Grain Elevators, EPA explained that "[g]rain handling operations are grouped as one affected facility since they have similar operating capacities, and air pollution control devices frequently serve several pieces of handling equipment." 42 Fed. Reg. at 2843; *see also* 49 Fed. Reg. 26,885, 26,887 (June 29, 1984) (for "Flexible Vinyl and Urethane Coating and Printing" source category, explaining that an NSPS was established for the flexible vinyl coating and printing process and that "[i]f the

investigation shows that the [best demonstrated technology] for the flexibly vinyl industry is also applicable to this segment of the flexible packaging industry, then this standard will be revised to include this segment of the packaging industry.”).

EPA followed this well-worn path with respect to the oil and gas sector in 2012 and 2016: while the original 1979 listing did not delimit the scope of the “Crude Oil and Natural Gas Production” source category, EPA regulated sources of pollution in the oil and gas sector that were significant sources of the same pollutants (methane and VOC), used the same equipment, and were amenable to the same types of air pollution control technologies. And, as discussed above, the different segments of the industry that EPA included in the source category are interrelated and interdependent, constituting a unified supply chain that is most rationally addressed and regulated as a single industrial unit.

B. At any rate, the 1979 listing encompassed the oil and gas sector broadly, and the Proposal’s assertion that it did not is contrary to EPA’s historical treatment of that source category.

As just explained, even if the transmission and storage segments of the oil and gas sector were not included in the original listing, EPA lawfully revised that listing in the 2012 and 2016 rulemakings. But at any rate, the best reading of the 1979 listing is that it did encompass sources in these segments. As the Proposal begins: “Since the inception of the CAA, with its aim to promote the ‘public health and welfare and the productive capacity’ of the nation’s population, the EPA has focused on air emissions from the oil and natural gas industry.” 84 Fed. Reg. at 50,245–46 (citing 42 U.S.C. 7401(b)(1)). In 1979, EPA listed “Crude Oil and Natural Gas Production” as a category of stationary sources that significantly contributes to endangerment of public health and welfare, thus triggering its obligation to create standards of performance for pollution sources in that category. 44 Fed. Reg. at 49,226. One year later, the Agency explained that “[s]ource categories are intended to be broad enough in scope to include all processes associated with the particular industry.” 45 Fed. Reg. at 76,427–28.

Now for the first time, EPA proposes to conclude that the original source category listing did not include emissions sources in the transmission and storage segments of the sector under this source category, 84 Fed. Reg. at 50,254–55, even as it admits that “[e]missions can occur in all segments of the natural gas industry,” *id.* at 50,249. For support, the Proposal relies principally on a single sentence—not in the original listing, but in a 1984 proposal for standards of performance for the natural gas processing segment. This sentence, which the Proposal repeats three times, cannot support the weight the Proposal places on it. The Proposal ignores the history of EPA’s source category approach, both in general and specific to oil and gas sector, that shows that transmission and storage have always been part of the source category or, at a bare minimum, that EPA’s interpretations in 2012 and 2016 are reasonable.

1. *The 1979 Priority Listing and supporting documents demonstrate that the transmission and storage segments are part of the "Crude Oil and Natural Gas Production" source category.*

The EPA's treatment of the "Crude Oil and Natural Gas Production" source category prior to the current proposal, as well as the context and history of the source category listing, demonstrate that the transmission and storage segments are part of the "Crude Oil and Natural Gas Production" source category as originally listed in 1979. After it had lagged in implementing Congress's command in 1970 to establish and regulate categories of stationary sources under section 111, EPA began the process of reviewing source categories in 1976. *Priorities and Procedures for Development of Standards of Performance for New Stationary Sources of Atmospheric Emissions*, EPA-450/3-76-020 (May 1976) ("1976 Priority List"). During that initial review—which occurred before the 1977 Amendments to the Clean Air Act—EPA did not evaluate "Crude Oil and Natural Gas Production" as a stand-alone category, but instead grouped it with the "Sulfur Recovery Plants" category, which also included petroleum refineries. *Id.* at 162, Table 4-18.

In 1977, Congress revised the Clean Air Act in part out of frustration with EPA's slow pace of regulation. In doing so, Congress specifically directed EPA to take swift action and set priorities for listing and regulating sources under section 111, and EPA issued a proposed priority list in response. *Priorities for New Source Performance Standards Under the Clean Air Act Amendments of 1977*, EPA-450/3-78-019 (April 1978) ("1978 Priority List"). The function of the priority list was to "screen[] . . . source categories to select those of most concern in developing NSPS" using statutorily-mandated criteria that were established in the 1977 Amendments. *Id.* at 2. In describing the sources it considered, EPA noted:

> Since the requirements of the [1977 Clean Air Act] Amendments focus on developing a *list of sources not yet listed or regulated under NSPS provisions*, those source categories for which an NSPS has already been proposed or promulgated have been excluded from consideration here. This reduces the number of sources to be considered somewhat but still leaves the number in excess of 200 categories.

Id. at 3 (emphasis added). Having been compelled by the statute to list "major" sources, EPA divided those over 200 sources into major and minor source categories. "Out of a total of 203 source categories evaluated, 47 sources were classified as minor source categories. The 156 major source categories were evaluated independently of the minor source categories." *Id.* at 9. Thus, EPA accounted for *all* source categories in the priority listing, classifying each one as either major, minor, or not evaluated. *Id.* at A-2, Table A-1 (listing "Source Categories Not Evaluated"); A-3 to A-6, Table A-2 (list of "Minor Sources"). *See also* 44 Fed. Reg. at 49,223 (noting that "two groups of sources in addition to minor sources are not included on the promulgated list" and that the first group of those sources "are identified in the [1978 Priority List]," while the second are those source categories listed prior to the 1977 Amendments). The transmission and storage segments of the natural gas sector were not separately listed as either a major or minor source, nor identified as a not-evaluated source, despite the significant emissions from these sources. *See* 84 Fed. Reg. at 50,256. ("[T]he record does not specifically address the transmission and storage segment."). The most natural implication is that EPA viewed them as

part of a listed source category, specifically "Crude Oil and Natural Gas Production," and EPA recognized this broad coverage both during and before the rulemakings associated with the 2016 Rule. In the proposal for OOOO, in 2011, EPA reiterated that since at least 1984 the Agency's "intent [was] to address all sources under an industry heading . . . ." 76 Fed. Reg. at 52,745 (citing 44 Fed. Reg. at 49,222, 49,224–25); *see* also 77 Fed. Reg. at 49,514 ("[W]hen the EPA initially listed this source category, it did so in a document where it described its listings as broad. . . . EPA has viewed this source category listing very broadly"); 80 Fed. Reg. at 56,600 (EPA stated that "the intent of the 1979 listing was to broadly cover the natural gas industry").

The Proposal cites the existence of an analysis of a "stationary pipeline compressor engine" source category as proof that the transmission and storage segments are excluded from the "Crude Oil and Natural Gas Production" source category. But the fact that EPA initially singled out stationary pipeline compressor engines for exclusion from the broad "Crude Oil and Natural Gas Production" source category without mentioning or addressing the transmission and storage segment is strong evidence that it did *not* intend to exclude the transmission and storage segments *generally* from the "Crude Oil and Natural Gas Production" source category definition. Furthermore, the origin of the "stationary pipeline compressor engine" source category was simply "internal combustion engines," indicating that the agency was not motivated by a desire to diminish the scope of the "Crude Oil and Natural Gas Production" source category, but rather because it believed these particular engines were already covered under a different category. *See, e.g.*, 1976 Priority List at 120, Table 4-12. In fact, while EPA did have "stationary pipeline compressor engines" as a separate source category on the Proposed List, 43 Fed. Reg. 38,872, 38,872 (Aug. 31, 1978), and on the First Revised List, the final priority list did not include this category. *See* 44 Fed. Reg. 49,225–26. The absence of the "stationary pipeline compressor engine" source category in the final list coupled with the rise in priority rank of "stationary internal combustion engines" suggests that the two source categories were mostly likely combined.[40] Moreover, stationary internal compression engines are located in a wide variety of industrial processes, including in all segments of the oil and gas industry. *See* 40 C.F.R. § 60.4230 (spark ignition), 60.4200 (compression ignition). It is clear that EPA did not view "stationary internal combustion engines" as encompassing (or uniquely related to) the transmission and storage segments of the oil and natural gas industry, but a separate source category related to internal combustion engines.

2. The 1984 New Source Performance Standards do not narrow the broad scope of the "Crude Oil and Natural Gas Production" source category.

The Proposal further claims that "to the extent there was ambiguity" in the original listing, "the issue was resolved in 1984" when EPA first proposed standards of performance for the source category. 84 Fed. Reg. at 50,255. The Proposal contends that the actual standards that EPA set in 1984 and the language it used to do so "clarify" any confusion about the source category's scope.

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[40] *See Revised Prioritized List of Source Categories for NSPS Promulgation*, EPA-450/3-19-023, at 16-19, Table 3-5 ("stationary internal combustion engines" rose from priority rank 11 from the Revised EPA List to a rank of 9 for the second Revision, while "stationary pipeline compressor engines" had priority rank 15 on the Revised EPA List and were absent from the second Revision).

This is incorrect. As an initial matter, the 1984 NSPS serves to demonstrate that EPA did not view its listing as constrained to its literal terms—"Crude Oil and Natural Gas Production"—because the 1984 NSPS regulated the *processing*, not the production, segment of the natural gas industry. *See* 49 Fed. Reg. at 2637 (explaining that "natural gas production" was "not to be confused with natural gas processing"). Taken to a literal extreme, the Proposal's argument would mean that the 1984 NSPS exceeded the scope of the source category and was thus unlawful. EPA declines to follow its own Proposal's argument to its logical conclusion, reflecting the incoherence of its legal theory.

Furthermore, the Proposal appears to concede that the Agency has never been limited to regulating only those specific sources within the listed category that it regulated in the first NSPS. Prior to 2012, EPA had only ever issued standards for emissions at gas processing plants as part of the "Crude Oil and Natural Gas Production." That year, after gathering more information in fulfillment of its (long-delayed) obligation under section 111(B)(1)(B) to review and revise the NSPS, EPA regulated VOC from previously unregulated upstream sources, including well completions, centrifugal compressors, reciprocating compressors, pneumatic controllers and storage vessels. *See generally* 77 Fed. Reg. 49,490 (Final Rule promulgating Subpart OOOO). These sources were not part of EPA's analysis in 1979 or 1984 NSPS yet the Proposal does not suggest that they were improperly regulated in the 2012 OOOO rulemaking. *See* 77 Fed. Reg. at 49,490 ("In addition to the operations covered by the existing standards, the newly established standards will regulate volatile organic compounds from gas wells, centrifugal compressors, reciprocating compressors, pneumatic controllers and storage vessels.").

Moreover, EPA's cherry-picked citation to the 1984 NSPS ignores other statements made during other rulemakings for the source category, including the very same 1984 rulemaking, that suggest the source category was intended to broadly cover the oil and gas sector, or at least was not limited to only production and processing. *Contra* 84 Fed. Reg. at 50,256. For example, in the 1984 rulemaking, while discussing its "rationale" for the "selection of sources and pollutants," EPA explained that "[t]here are several VOC emission points within this industry" that "can be divided into three main categories: process, storage, and equipment leaks."[41] 49 Fed. Reg. at 2,637. Furthermore, in that NSPS, EPA felt the need to specifically exclude certain sources found in the transmission and storage segments from the standards it set, something that would not have been necessary if the agency had intended to exclude these segments themselves from the definition of the source category. *See id.* at 2,650 ("The provisions of this subpart do not apply to compressor stations, dehydration units, sweetening units, underground storage facilities, field gas gathering systems … unless the facility is located at an onshore natural gas processing plant.").

[41] For example, leaks occur throughout the sector. *See* 40 C.F.R. §§ 60.5397a(g)(1) (regulating leaks from well pads), 60.5400a (regulating leaks from processing plants), 60.5397a(g)(2) (compressor stations). As EPA notes, compressor stations can either be for gathering and boosting or transmission. 40 C.F.R. § 5420a (defining "compressor station"). *See also* Sector Leaks White Paper, at 3 (noting that leaks can occur "from natural gas well pads, oil wells that co-produce natural gas, gathering and boosting stations, gas processing plants, and transmission and storage infrastructure"). Moreover, storage occurs upstream in the production segment in the form of centralized tank batteries, a series of connected storage tanks. *See* 81 Fed. Reg. 35,861 (noting that centralized tank batteries are part of the well site definition). *See also* 40 C.F.R. § 5420a (defining "well site").

Indeed, apart from the current rulemaking, EPA's consistent position is that the "Crude Oil and Natural Gas Production" source category describes "the major emission points of this source to include process, storage, and equipment leaks . . . [that] can be found through the various segments of the natural gas industry." 80 Fed. Reg. 56,6000 (citing 49 Fed. Reg. 2,637). Given that storage and equipment leaks occur in the transmission and storage segment just as they occur in the production segment, it is far from clear that the transmission and storage segments are now or have ever been excluded from the source category definition.

As noted above, the Proposal relies almost exclusively on a statement in the 1984 rulemaking to support its new, and exceedingly narrow, interpretation:

> The crude oil and natural gas production industry encompasses the operations of exploring for crude oil and natural gas products, drilling for these products, removing them from beneath the earth's surface, and processing these products from oil and gas fields for *distribution* to petroleum refineries and gas pipelines.

84 Fed. Reg. 50,256 (citing 49 Fed. Reg. at 2,636) (emphasis added). EPA uses this statement to draw parallels between petroleum refineries and transmission and storage. 84 Fed. Reg. at 50,256–57. While petroleum refineries are a separately listed source category, EPA's comparison fails. First, the purpose of petroleum refineries is to remove impurities and isolate the valuable components of crude oil in preparation for its various final industrial and commercial uses. The proper analogy is not between refineries and natural gas transmission and storage, but between refineries and natural gas *processing plants*, which similarly remove impurities from the raw product and transform it into pipeline-quality gas. Of course, the Proposal concedes that gas processing plants are properly included in the "Crude Oil and Natural Gas Production" source category; indeed, the Agency's argument would entirely fall apart if it were not. Thus, petroleum refineries cannot serve as a useful analogy to support the Proposal's theory of the correct scope of the "Crude Oil and Natural Gas Production" source category definition.

Additionally, the petroleum refineries category was addressed at all stages of the priority listing. *See* 1976 Priority List, 1978 Priority List, 1979 Priority List. As discussed earlier, EPA never addressed or even alluded to the existence of a "natural gas transmission and storage" category during those proceedings. If transmission and storage was, in fact, a separate source category, EPA would surely have treated it the same as petroleum refineries, or at a bare minimum addressed it during the priority list process. The fact that EPA said nothing at all about a transmission and storage segment once again supports its inclusion the Crude Oil and Natural Gas Production source category and belies EPA's reference to petroleum refineries as an appropriate analogy.

At best, the cited statement in the 1984 rulemaking draws a distinction between the "Crude Oil and Natural Gas Production" source category and the distribution segment, which comes *after* transmission and storage and encompasses the networks of local distribution mains that deliver gas to its final users.[42] Indeed, that was EPA's interpretation of the 1979 listing

[42] To the extent that EPA did distinguish between distribution and the rest of the oil and gas sector, there is no evidence that EPA specifically intended to exclude it from the Crude Oil and Natural Gas Production source category.

(though not its revision authority) in the OOOOa rulemaking. *See* 80 Fed. Reg. 56,600 n.9 ("The process of producing natural gas *for distribution* involves [production, processing, transmission and storage]. In contrast, oil production involves drilling/extracting oil, which is immediately followed by distribution offsite to be made into different products") (emphasis added). This is further supported by the fact that throughout the transmission and storage segments, dehydrators are used to process the gas to make it suitable for distribution to the end user by removing hydration that accumulates. This is akin to what happens for crude oil before it reaches distribution to refineries.

3. The interrelatedness of the segments of the oil and gas industry supports a conclusion that the transmission and storage segments were included in the "Crude Oil and Natural Gas Production" source category.

As the Agency explained one year after promulgating the 1979 list including the "Crude Oil and Natural Gas Production" source category, "[s]ource categories are intended to be broad enough in scope to include all processes associated with the particular industry." 45 Fed. Reg. at 76,427–28. And as EPA has also correctly explained, the production, processing, transmission and storage segments constitute a sequence of functions that produce gas for distribution to the end user. EPA's treatment of other source categories soon after the priority listing process consistently recognized that the interrelatedness of facilities *or* of emissions controls for those facilities helps determine what sources are within each source category. *See* 49 Fed. Reg. at 26,887 (in setting NSPS for flexible vinyl and urethane coating and printing, EPA found that if the same controls for the flexible vinyl industry were applicable for flexible packaging industry, it would refine the NSPS to include the latter segment); 47 Fed. Reg. 36,859, 36,861 (Aug. 24, 1982) (noting that the sources subject to the proposed metallic mineral processing plant standards were included, in part, because "they are all amenable to the same types of air pollution control techniques"); 45 Fed. Reg. at 76,405 (recognizing the asphalt roofing industry includes sources at asphalt roofing plants and particular kinds of equipment at oil refineries "because the emissions, processes, and applicable controls are the same").[43]

Prior to the current proposal, EPA's treatments of the "Crude Oil and Natural Gas Production" rulemakings have followed this approach. From the outset of regulating the industry, EPA stated that "[t]here are several VOC emission points within this industry. These emission points can be divided into three main categories: processing, storage, and equipment leaks . . . ." 49 Fed. Reg. at 2,637. Many of the same emission points at gathering and boosting compressor stations are virtually the same as those at compressor stations within the transmission and storage segment, as are the methods for controlling those emissions. As shown above, it is not irregular for EPA to address new emission sources within a source category once it learns more about similarities to other sources of pollution within that category, nor is it unusual for emission sources within a category to span large distances and different locations if "the emission, processes, and applicable controls are the same." As such, the interrelatedness of both the

[43] Although petroleum refineries are a separate source category under section 111, EPA explained in this rulemaking that the source category for asphalt roofing industry "encompasses not only asphalt roofing plants but certain production units at oil refineries and asphalt processing plants which were not included on the Priority List promulgated on August 21, 1979." 45 Fed. Reg. at 76,405.

sources and the emission controls across all segments of the oil and natural gas industry supports a conclusion that the 1979 listing included the entire supply chain—production, processing transmission, and storage segments of the industry—within the source category's definition.

C. The Proposal's revision of the oil and gas source category to remove the transmission and storage segment is unlawful and unreasonable.

The Proposal asserts that EPA has no discretion and *must* revise the oil and gas source category to remove the transmission and storage segments. *See, e.g.*, 84 Fed. Reg. at 50,257 ("EPA proposes to determine that its determination in the 2016 NSPS OOOOa that equipment and operations at production, processing, and transmission and storage facilities are a sequence of functions that are interrelated and necessary for getting the recovered gas ready for distribution, *was unreasonable*"). As explained comprehensively *supra*, the Proposal is simply wrong in this regard, and if it is finalized as proposed, it would be subject to vacatur for legal error. *See U.S. v. Ross*, 848 F.3d 1129, 1134 (D.C. Cir. 2017) ("Where a statute grants an agency discretion but the agency erroneously believes it is bound to a specific decision, we can't uphold the result as an exercise of the discretion that the agency disavows"). To the extent EPA seeks to revise the source category as a *discretionary* rather than *mandatory* matter, however, then it bears the burden to explain based on record facts *why* it is choosing to exercise its discretion in that fashion, something it has not done. *See FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515–16 (2009).

The Proposal appears to recognize the Administrator's authority to revise a source category—indeed, it proposes to revise the oil and gas source category itself. 84 Fed. Reg. at 50,254. But in a strained attempt to argue that the 2012/2016 revision was unlawful, EPA makes up a brand-new "sufficiently unrelated" test for source category definitions under section 111 and then argues that the transmission and storage segments of the natural gas industry are sufficiently unrelated to the production and processing segments of that industry so as to preclude their aggregation into a single source category. *Id.* at 50,256. The Proposal then posits that if the sources that EPA desires to add to a source category are "sufficiently unrelated," then the Agency *must* make a new significant contribution finding with respect to those additional sources by themselves. *Id*. But the Proposal points to no authority or precedent for its new "sufficiently unrelated" test. And even if it were a valid test, EPA has failed to show, based on factual evidence, that the transmission and storage segments of the oil and gas industry are sufficiently unrelated to the production and processing segments to excluded from the source category. Indeed, the record evidence shows precisely the opposite. In any event, because the Proposal's sole rationale for excluding these segments now is that the 2012 and 2016 rulemakings unlawfully included them, to prevail on this theory, the Agency must demonstrate not only that the original listing did not include the transmission and storage segments, but that it *could not have* included those segments and EPA would have had to initiate a separate listing for them. That is a high hurdle that EPA does not come close to meeting.

1. The Proposal points to no authority for its new "sufficiently unrelated" test.

As an initial matter, the Proposal points to no authority or precedent for the "sufficiently unrelated" test that the Agency now claims the statute requires. Indeed, it admits that EPA has previously revised source categories without applying any such test. 84 Fed. Reg. at 50,257 & n. 52 (describing past revisions of source categories that did *not* apply this test). As the examples *supra* demonstrate, EPA has often either initially listed or subsequently revised source categories to include a host of emission sources that sometimes span different industries altogether, so long as those sources emit similar pollution from similar equipment and/or can be controlled through similar technologies. The touchstone has always been pollution reduction, *not* arbitrary barriers to regulation.

In the 2016 rule, the Agency rejected similar arguments:

> But, more importantly, the EPA rejects this comment because it is contrary to the law. CAA section 111(b)(1)(A) requires that the EPA list a category of sources ''if in [the Administrator's] judgment it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health and welfare.'' The provision is clear that the listing and endangerment findings requirements are to be made for source categories, not specific emission sources within the source category. The provision also does not require that the EPA identify all emission points within a source category when listing that category. The commenter's claim that the EPA must separately list and make findings for particular emission source types within individual segments of the natural gas industry clearly contradicts with the plain language of section 111(b)(1)(A) which, as discussed above, is stated in terms of source category, not emission source types. Regardless, the EPA has satisfied the two criteria the commenter has identified as required by section 111(b)(1)(A): (1) Define a discrete category of stationary sources; and (2) determine that emissions from the source category cause or significantly contribute to endangerment to health or the environment.

81 Fed. Reg. at 35,876.

The Proposal argues that unless it adopts the "sufficiently unrelated" test, the Agency's attempt to "expand[] [a] source category by including new sources could be used to circumvent [the] requirement" that EPA make a significant contribution finding for each listed category. But Congress did not impose such a limit on EPA's authority to define the scope of source categories. Moreover, the Proposal points to no instances of the Agency abusing this authority despite the fact that, as explained *supra*, EPA has for decades listed expansive source categories based on the use of similar equipment, similar emissions, and/or similar control technologies among different emission sources within the defined category. At a minimum, the Proposal's "sufficiently unrelated" test would render Congress's explicit grant of authority to subcategorize a nullity when applied to the oil and gas industry. If, as the Proposal suggests, sources within a source category must be as related as the Agency now believes—i.e., contain a product that has precisely the same composition and conduct precisely the same operation—it is difficult to see

any use for subcategories within a source category. *See Agnew*, 920 F.3d at 57 (explaining "the surplusage canon's directive that a statute not be interpreted in a way that renders any part of it superfluous") (citing *Arlington*, 548 U.S. at 299 n.1); *see also* 42 U.S.C. § 7411(b)(2) (EPA may "distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing ... standards").

Put another way, EPA has, in the context of the oil and gas sector and elsewhere, concluded that it can develop different standards or subcategories within a source category based on differences across emission sources that merit different emission limits or control technologies for those sources. *See supra* Section IA1,3. Here, EPA asserts that the differences between production/processing and transmission/storage require treating those as entirely separate *categories*, even though the agency has not identified *any* differences in the controls or emission limits that would be necessary for these different segments. The only distinction EPA points to between these segments is the slightly different ratios of methane, VOC, and HAPs in the composition of the gas streams before and after processing, but the agency fails to identify a single way in which this affects the practical application of the standards. Whatever latitude the agency has to define differences between categories, it is manifestly unreasonable for the agency to conclude that those differences can be less significant than the differences that EPA has otherwise recognized in establishing *subcategories* within a single source category.

Notably, the Proposal's argument that the transmission and storage segment is "sufficiently unrelated" due to differences in gas composition runs headlong into the Agency's rationale for removing methane regulation—that methane regulation is allegedly "redundant" of VOC regulation across *all* segments. If the regulation for these two gases is the same (to the point where it is irrational to regulate both), it is difficult to see how differences in the relative percentages of those two gases in the different segments renders those segments unrelated at all, much less "sufficiently unrelated" that they must be separately listed.

Indeed, it is the Proposal itself that unlawfully circumvents the Clean Air Act's requirements. Under the Proposal's new test, the Agency could conclude, based on immaterial differences, that sources were "sufficiently unrelated" to each other to the point where the source categories were so small as to not significantly contribute to dangerous pollution. That would thoroughly undermine the Act's (and section 111's) goal of reducing harmful emissions from both new and existing sources. EPA itself previously rejected a similar argument based on this very consideration. In its 2008 rulemaking to establish NSPS for from spark-ignition internal combustion engines and stationary reciprocating internal combustion engines, certain commenters requested that EPA exempt smaller engines at upstream sites from the scope of regulation. Response to Comments on Proposed Standards of Performance for Stationary Spark Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, EPA-HQ-OAR-2005-0030, at 278. In response, EPA explained:

> Stationary engines have been found to contribute significantly to air pollution under section 111 of the CAA and nothing indicates that smaller engines are not part of that problem – in fact, the data indicate the opposite. Further, it is not appropriate to look only at small engines at upstream facilities in reviewing pollution concerns.

> All categories of sources can be subcategorized into small enough subcategories that each subcategory of sources may want EPA to review their contribution in isolation, but the combined pollution of these subcategories clearly contributes to air pollution.

Id. In other areas of the law, courts have rejected agencies' attempts to slice and dice large environmental problems into multiple smaller concerns, such that they need not be addressed under the governing statute. *E.g.*, *Kleppe v. Sierra Club*, 427 U.S. 390, 398, 401 (1976) (requiring agency to consider together proposals that would have cumulative or synergistic environmental impact); *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1313 (D.C. Cir. 2014) ("An agency impermissibly 'segments' NEPA review when it divides connected, cumulative, or similar federal actions into separate projects and thereby fails to address the true scope and impact of the activities that should be under consideration."); *Nat'l Wildlife Fed'n v. Appalachian Reg'l Comm'n*, 677 F.2d 883, 890 (D.C. Cir. 1981). ("The existence of a comprehensive program with cumulative environmental effects cannot be escaped by disingenuously describing it as only an amalgamation of unrelated smaller projects."); *cf. New York v. EPA*, 443 F.3d 880 (D.C. Cir. 2006) (rejecting EPA's attempt to exempt from the New Source Review program physical changes that did not exceed twenty percent of the replacement value of the process unit).

That unlawful circumvention is present in the current Proposal in at least two respects. First, the Proposal attempts to artificially divide what is, for all practical purposes, one industry of interrelated functions in a transparent ploy to render one or both of the divided parts not a significant contributor to endangerment. Indeed, there is evidence that this was precisely the point. At an industry gathering sponsored by the U.S. Energy Association on May 23, 2019, Administrator Wheeler stated that the agency might split the oil and gas sector into separate categories. "With the sources split," he stated, "it's not clear whether the level of greenhouse gas emissions will be high enough to trigger the significant attribution criteria, which are required to set emission standards under the Clean Air Act."[44] But it matters not into how many slices you cut the pizza, it still has the same number of calories. Second, by first deregulating the transmission and storage segments and then investigating the alleged redundancy of methane regulation, the Proposal takes out the segments where methane emissions predominate. It is these deceits that actually threaten to circumvent the language and purpose of the Clean Air Act.

2. *The segments of the oil and gas industry are plainly sufficiently related.*

Even if the "sufficiently unrelated" test reflected a reasonable construction of the statute—and it clearly does not—the segments of the oil and gas industry are plainly not sufficiently unrelated. Indeed, in 2016, the Agency concluded that it had authority to expand the sources regulated within a source category where they "reasonably belong in a listed source category." 81 Fed. Reg. at 35,876 ("Thus, the statute leaves the EPA with the discretion to determine how to carry out such task, and that gives the EPA the flexibility to list and revise the list, including redefining the scope of a previously listed category, as long as the EPA meets the

[44] Mandel and Farah, *EPA chief floats change to methane oversight*, E&E NEWS (May 24, 2019), https://www.eenews.net/energywire/2019/24/stories/1060387889.

above criteria with the requisite endangerment findings for the source category as a whole. It allows the EPA to revise a category listing to include sources that, though not included in the initial listing (*e.g.,* the EPA might no[t] have known about it at the time), reasonably belong in a listed source category.")

The oil and gas transmission and storage segments are sufficiently related to—or reasonably belong to be listed under—the oil and gas source category; together with the other segments, they constitute a source category that is well within the bounds of previous source category listings and expansions. As explained at length, *supra*, they are part of the same industry, same supply chain, they use the same polluting equipment, and the same control technologies and practices can be used to control their pollution emissions. *See* 80 Fed. Reg. at 56,600 (explaining these similarities); *see also* 81 Fed. Reg. at 35,828 (similar).

Indeed, as also described *supra* § IA1, EPA has in the past grouped within a single source category sources that are in the same industry or part of a single supply chain despite differences in location. *E.g.*, 45 Fed. Reg. at 76,427-28 (asphalt industry). In this regard, the fact that the scope of the original 1979 listing is ambiguous *supports*, rather undermines, a conclusion that the segments are sufficiently related or reasonably belong in the same source category. Likewise, as also described *supra*, EPA has placed in the same source category sources that use the same polluting equipment and whose emissions can be reduced through the same pollution control technologies. *E.g.*, 47 Fed. Reg. at 36,861 (metallic mineral processing). The particular equipment that the NSPS regulates—such as compressors, pneumatic controllers, and equipment leaks—are found throughout the four segments of the oil and gas sector. Indeed, the fact that the Proposal must *add* affirmative language to specifically carve out pollution sources in the transmission and storage segment makes clear that those segments are sufficiently related to or reasonably belong in the oil and gas source category. *Compare, e.g.*, 40 C.F.R. § 60.5365a(b) (current standards apply to "[e]ach centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals.") *with* 84 Fed. Reg. at 50,283 (proposed standards apply to "[e]ach centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals *that is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment*.") (emphasis added).

By contrast, the purported differences on which the Proposal relies to posit that the segments are sufficiently unrelated are not only minor from a numerical standpoint, but are entirely unrelated to the agency's reasons for regulating or to the NSPS itself. The Proposal states:

> Specifically, the EPA proposes to determine that its determination in the 2016 NSPS OOOOa rule that equipment and operations at production, processing, and transmission and storage facilities are a sequence of functions that are interrelated and necessary for getting the recovered gas ready for distribution, was unreasonable. We now propose that the transmission and storage operations are distinct from production and processing operations *because the natural gas that enters the transmission and storage segment has different composition and characteristics than the natural gas that enters the production and processing segments.*

84 Fed. Reg. at 50,257 (emphasis added). The Proposal then goes on to explain that the composition of gas in the production and processing segment is more impure (i.e., contains relatively more VOC and hazardous air pollutants) compared to gas in the transmission and storage segments (which contains relatively fewer VOC and hazardous air pollutants), and that production and processing segments purify raw gas before it moves into transmission and storage. *Id.* The Proposal states that while gas in the production segment consists of approximately 83-88 percent methane, four percent VOC, and less than one percent HAP, gas in the transmission segment consists of approximately 93 percent methane, 1 percent VOC, and less than 0.01 percent HAP. This assertion is both misleading factual and irrelevant legally (It is worth noting once more that the electric generating unit source also encompasses a product with even more divergent compositions—coal and gas, and even differences among coal—that likewise result in different pollutant emissions.).

As an initial matter, EPA considered and rejected these very arguments when it adopted the 2016 Rule. Indeed, commenters claimed that EPA was required to perform a separate rulemaking to assess whether the transmissions and storage segment itself merited regulation, citing differences in gas composition and operations. In response, EPA stated:

> We disagree with the comment that a separate rulemaking for natural gas transmission and storage is warranted. While there may be differences in operations and gas composition/pressure among the different segments of the natural gas industry, we have not seen a difference in the available options for reducing emissions from segment to segment. For each emission source subject to this final rule, we analyzed the available emission reduction measures, including their costs in each segment, and identified the BSER, based on which we set the performance standards. Our approach is no different from that taken in promulgating the 2012 NSPS, in which we promulgated storage vessel standards across the oil and natural gas industry.

2016 RTC at 1-16. The Proposal entirely fails to recognize this past finding, let alone to explain why differences that it previously found insufficient to merit separate treatment across segments can now lawfully form the sole basis for making the distinctions in the Proposal.

Moreover, as the Proposal appears to recognize "variations can occur from basin-to-basin within each segment." 84 Fed. Reg. 50,258; *id.* at 50,248 (recognizing that [t]he composition of field gas varies across basins," and noting that "the Appalachian region is predominantly dry gas and northern mid-continent (North Dakota) is primarily wet gas.") Indeed, these basin-to-basin variations can swamp the purported variations on which EPA relies. As support, the Proposal cites to a 2018 memorandum from an EPA contractor, the Eastern Research Group. Memorandum to U.S. EPA from Eastern Research Group, *Natural Gas Composition*, Dkt. No. EPA-HQ-OAR-2017-0757 (November 13, 2018). That memorandum included a table showing the percentage of methane in gas extracted at different basins, which we have reproduced below.

Table 2. Production Segment Updated Methane and VOC Content

Region	Year 2014 Gas Prod. (BCF)	Min. Methane (Vol %)	Avg. Methane (Vol %) [a]	Max. Methane (Vol %)	Min. VOC (Vol %)	Avg. VOC (Vol %) [a]	Max. VOC (Vol %)
Appalachian	5,890	74.0	95.6	98.4	0.01	0.8	10.5
Gulf Coast	8,411	40.2	89.8	97.9	0	3.3	25.7
Mid Continent	3,533	59.6	85.2	97.9	0	5.8	21.5
North Dakota (Associated Gas)	458	17.5	47.1	63.7	8.30	23.9	40.9
Rocky Mountain	4,352	58.9	84.8	92.9	0	4.9	26.5
Texas (Associated Gas)	2,096	55.0	80.1	97.8	0.10	8.1	28.0
Gas Wells Only	**22,186**	**40.2**	**89.6**	**98.4**	**0**	**3.3**	**26.5**
Oil Wells Only (Associated Gas)	**2,554**	**17.5**	**74.2**	**97.8**	**0.1**	**10.9**	**40.9**
All Wells	**24,740**	**17.5**	**88.0**	**98.4**	**0**	**4.1**	**40.9**

[a] Average values weighted by production from EPA's Nonpoint Oil and Gas Emission Estimation Tool (year 2014).

This table shows that wells (i.e., sources located entirely within the production segment) in the Appalachian region on average have a higher percent methane than the transmission and storage segment has on average. The average methane percentage by volume for these basins ranges between 80 percent and 95.6 percent, a percentage difference that is far larger than the minor difference in composition between the average well (88 percent) and the average in the transmission and storage segment (93 percent). As a factual matter, the distinction simply does not hold. And, as discussed above, these compositional differences are far smaller than the varying levels of pollution that are emitted from different sources in other listed categories, such as electric utility steam generating units.

While the Proposal also describes how the operations in these segments differ, it concedes that the processes used to remove impurities in the production and processing segments are also used in the transmission and storage segments. 84 Fed. Reg. at 50,258 (explaining that dehydration "can also occur at compressor stations … when the natural gas has collected water during transmission," as well as when "natural gas is extracted from underground storage"); *id.* at 50,248 (acknowledging that "processing occurs in the in the transmission and storage segment," and querying how to "differentiate a facility in which this type of processing occurs from a 'natural gas processing plant," noting that under the current definitions, processing that occurs in the transmission and storage segment would qualify as a "natural gas processing plant"). This latter query baldly reveals how backwards and perverse EPA's reasoning is: rather than propose to revise the source category based on actual functional differences between the individual segments, the agency asks commenters how it might justify differentiating between segments that it has already determined to split into separate categories but cannot yet properly distinguish from a functional standpoint.

Nor does EPA dispute that the same polluting sources are found throughout the segments and can be controlled by the same technologies. Moreover, independent analysis by MJ Bradley & Associates ("MJB&A") (Appendix B) shows that many of the same companies operate in multiple segments of the industry. Specifically, MJB&A identified 50 of the largest companies operating upstream (by number of wells owned/operated) and determined that at least 20 of these companies (40%) also operate in the midstream.

Perhaps most importantly, the Proposal nowhere explains why these differences in composition or operation are in any way relevant to reducing pollution—the entire goal of section 111. Nor does the agency claim, let alone demonstrate, that a unified oil and gas source category would pose any practical problems for the agency in administering the program or for sources in complying with it. The Proposal baldly states that "[t]hese distinct differences in the operations, the physical transformation of the field gas to sales gas, and the physical movement of sales gas through pipelines establish that two separate categories are necessary." 84 Fed. Reg. 50,258.[45] But this merely begs the question: the agency assumes as a premise that these differences are relevant to the source category definition without ever providing any evidence or reasons supporting that conclusion. For instance, nowhere does the Proposal explain why it matters that there may be some relatively minor differences in gas composition and operations between segments if the same equipment emits pollutants that EPA has concluded are dangerous and the same technologies reduce this pollution. In fact, the Proposal apparently concedes as much. 84 Fed. Reg. at 50,258 (admitting that it is "true" that "similar equipment (*e.g.*, storage vessels, pneumatic pumps, compressors) is used across the industry"); *see also* 2016 RTC at 1-16 (considering these differences and concluding that they do not matter for purposes of regulation).

Indeed, the fact that the Proposal asserts that the BSER for the transmission and storage segments is the *same* regardless of whether EPA is regulating both methane and VOC or VOC alone, 84 Fed. Reg. 50,260-61, belies EPA's conclusion that these segments requires their own distinct source category. In this regard, the two major revisions that EPA includes in the Proposal—amending the source category definition and removing standards of performance for methane—are fundamentally at cross-purposes. To justify the latter revision, EPA asserts that regulation of methane and VOC is entirely redundant across the entire source category. But if regulation is entirely redundant—that is, if the source of pollution and standards to control that pollution are identical regardless of the relative composition of methane and VOC in the gas—then differences in gas composition cannot be the basis for determining that two distinct source categories are necessary. In trying to have it both ways, EPA reveals the logical fissures that beset the entire Proposal, underscoring that the true purpose of the agency's action is simply deregulation.

Finally, the Proposal's stated justification for the "sufficiently unrelated" test and its explanation as to why the oil and gas transmission and storage segments allegedly fail that test are themselves unrelated. Nowhere does the Proposal contend that by grouping the various

[45] The only alleged support that EPA proffers for this statement of "necess[ity]" is that there are past examples of EPA establishing separate source categories to handle the production and processing of a material and subsequent transport of the product. 84 Fed. Reg. at 50,258 (describing the petroleum industry). But that *at most* establishes that EPA could have established two separate source categories. It does not bear on the question of whether EPA *was required to* establish two separate source categories, as the Proposal asserts. Nor does EPA explain whether in the case of the petroleum industry the sources of pollution and technologies used to control that pollution are the same, as they are in the oil and gas sector. Moreover, the agency has in the past grouped elements of storage and transfer with production and processing. *E.g.*, 40 C.F.R. Part 60, Subpart Y (coal preparation and processing plants source category includes thermal dryers, pneumatic coal-cleaning equipment, coal processing and conveying equipment (including breakers and crushers), coal storage systems, transfer and loading systems; 40 C.F.R. Part 60, Subpart OOO (affected facilities include each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station in fixed or portable nonmetallic mineral processing plants).

segments of the oil and gas industry together, the 2012-2016 revision circumvented the Clean Air Act's requirements or purposes. EPA cannot just identify arbitrary differences between sources and assert those differences render the sources sufficiently unrelated to permit their inclusion in a single source category. *See id.* at 50,258 (asserting, without support, that "the differences in the operations of, and the emission profiles of, the different segments are more significant"). The Agency must explain why these differences matter for the purposes of regulation under section 111. Commenters have valiantly searched the Proposal for any such explanation that would support a finding that the different segments not only may, but *must* be listed separately, and have come up empty handed. It would be an abuse of discretion to cleave the source category based on such a slim and irrelevant rationale.

3. The Proposal fails to demonstrate that the Agency either must or may now revise the source category, and must therefore be withdrawn.

The Proposal asserts that EPA has no discretion and *must* revise the oil and gas source category to remove the transmission and storage segments. *See, e.g.*, 84 Fed. Reg. at 50,257 ("EPA proposes to determine that its determination in the 2016 NSPS OOOOa that equipment and operations at production, processing, and transmission and storage facilities are a sequence of functions that are interrelated and necessary for getting the recovered gas ready for distribution, *was unreasonable*") (emphasis added); *id.* at 50,258 ("These distinct differences in the operations, the physical transformation of the field gas to sales gas, and the physical movement of sales gas through pipelines establish that two separate categories are *necessary*.") (emphasis added); *id.* at 50,259 ("Accordingly, the promulgation of the NSPS for transmission and storage sources was *contrary to law*.") (emphasis added). As explained comprehensively *supra* § IC, the Proposal is simply wrong in this regard, and if it is finalized as proposed, it would be subject to vacatur for legal error. *See U.S. v. Ross*, 848 F.3d at 1134 ("Where a statute grants an agency discretion but the agency erroneously believes it is bound to a specific decision, we can't uphold the result as an exercise of the discretion that the agency disavows"); *Prill v. NLRB*, 755 F.2d 941, 947-48 (D.C. Cir. 1985) ("An agency decision cannot be sustained, however, where it is based not on the agency's own judgment but on an erroneous view of the law. For it is a fundamental principle of law that 'an administrative order cannot be upheld unless the grounds upon which the agency acted in exercising its powers were those upon which its action can be sustained.'") (citing *SEC v. Chenery Corp.*, 318 U.S. 80, 95 (1943)).

To the extent EPA seeks to revise the source category as a *discretionary* rather than *mandatory* matter, then it must explain *why* it is choosing to exercise its discretion in that fashion. This would entail a candid assessment of the emissions consequences of deregulation and an explanation of why foregoing those emissions reductions is a sensible policy that is consistent with the Clean Air Act. *See Fox Television*, 556 U.S. at 515–16. In doing so, the Agency would have to acknowledge its earlier factual record and explain any departures from that factual record. In the Proposal, the Agency does none of this.

Emissions standards for the transmission and storage segments have now been in place for over seven years[46] and nowhere does the Proposal assert that they are not achievable, are

[46] It is notable that while some industry actors challenged EPA's 2012 interpretation or alternative revision of the scope of the source category, all were willing to hold their challenges in abeyance for seven years and counting

unreasonably or exorbitantly costly, or are not reducing significant quantities of dangerous emissions. Nor does the Proposal offer any practical reason to remove these segments from the source category or suggest that they would be better regulated as a separate source category beyond EPA's contrived "sufficiently unrelated" test. The Proposal does not even claim that performance standards for the transmission and storage segments unduly burdens industry, despite the fact that the Executive Order that ultimately led to this Proposal targeted regulations that "unduly burden the development of domestic energy resources." 84 Fed. Reg. at 50,246. Importantly, any such explanation could not be included in the final rule for the first time: the Proposal itself must provide the central rationales for source category revision. *See Ne. Md. Waste Disposal Auth. v. EPA*, 358 F.3d 936, 949 (D.C. Cir. 2004) ("Without a readily accessible statement of the agency's rationale, interested parties cannot comment meaningfully during the rulemaking process. Nor can they, or the courts, determine whether the agency has acted capriciously or whether its statutory interpretation is reasonable under *Chevron*'s second step.").

D. Even if the Proposal were correct that a new significant contribution finding is necessary (and it is not), it is arbitrary for EPA to rescind an existing regulation without making a defensible finding that the transmission and storage segments do *not* significantly contribute.

As noted *supra*, the transmission and storage segments of the oil and gas industry have now been regulated for over seven years, yielding significant reductions in dangerous pollution. In addition, industry actors have relied on these standards and made investments to meet them, including in capital equipment like low-bleed pneumatic controllers. *See* 2016 TSD at 69. The Proposal would arbitrarily place these industry parties, who have complied with the regulation for years, in a different position than companies who build new sources if and when the Proposal is finalized. Nowhere does the agency confront this fact. *See Fox Television*, 556 U.S. at 515 (holding that an agency must "provide a more detailed justification than what would suffice for a new policy created on a blank slate . . . when its prior policy has engendered serious reliance interests that must be taken into account.").

The foregoing renders it arbitrary and capricious for EPA to now conclude that it was obliged to make a significant contribution finding for the transmission and storage segments, did not do so, and so must now rescind all regulation for sources in those sectors. Beyond asserting that it *might* do so in the future, 84 Fed. Reg. at 50,259, the Proposal fails to explain why it does not take the logical next step and assess whether the transmission and storage segments contribute significantly to dangerous pollution. Indeed, the current record, as well as EPA's past findings, demonstrate that the transmission and storage segments by themselves *do* contribute significantly to dangerous air pollution. As explained in detail in Section IV, this is true even under the overly conservative emission assumptions and global warming potential that EPA adopts in the Proposal; it is still more true in light of the most recent research on oil and gas sector emissions and more representative GWP figures for methane.

(even before the current Administration took office), all the while complying with the regulations. This does not suggest a significant degree of confidence in those lawsuits or a significant injury to industry in complying with the regulations in the meantime.

In fact, the conclusion is so readily apparent from the existing data that there is no reason for EPA to delay making this finding, yet the Agency gives no reason for declining to do so. Furthermore, these segments have been successfully regulated for over seven years, and EPA does not point to any reason for deregulating them other than the supposed need to take an additional administrative step for which it has extensive data and the outcome of which is obvious. The Proposal's failure to take this step is arbitrary and capricious. *See Yakima Valley Cablevision, Inc. v. F.C.C.,* 794 F.2d 737, 746 n. 36 (D.C. Cir. 1986) ("The failure of an agency to consider obvious alternatives has led uniformly to reversal.") (citing cases)*; Farmers Union Cent. Exch., Inc. v. F.E.R.C.,* 734 F.2d 1486, 1511 (D.C. Cir. 1984) ("It is well established that an agency has a duty to consider responsible alternatives to its chosen policy and to give a reasoned explanation for its rejection of such alternatives."); *Pub. Citizen v. Steed*, 733 F.2d 93, 103 (D.C. Cir. 1984) (holding that the National Highway Traffic Safety Administration's suspension of tire-grading regulation was arbitrary and capricious because agency failed to pursue available alternatives); *California v. United States Dep't of the Interior*, 381 F. Supp. 3d 1153, 1168 (N.D. Cal. 2019) ("When considering revoking a rule, an agency must consider alternatives in lieu of a complete repeal, such as by addressing the deficiencies individually.").

II. The proposal's primary and alternative proposals to rescind methane regulation are unlawful.

EPA's proposed rescission of methane requirements from the NSPS is unlawful, arbitrary, and capricious. *See State Farm*, 463 U.S. at 43 (agency action is arbitrary when the agency has "relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it [cannot] be ascribed to a difference in view or the product of agency expertise"); *Fox Television* 556 U.S. at 515–16 (to revise a policy, agency must show "that the new policy is permissible under the statute, [and] that there are good reasons for it" justified by the administrative record).

In the Proposal, the Agency proposes to rescind methane requirements[47] based on assertions that "EPA lacked a rational basis to establish standards of performance for methane emissions from the production and processing segments because those requirements are entirely redundant with the existing NSPS for VOC, establish no additional health protections, and are, thus, unnecessary," and that it "is rational for the EPA to determine that requirements that are redundant to other requirements are not necessary because they do not result in emission reductions beyond what would otherwise occur." 84 Fed. Reg. at 50,259. This "redundancy" justification is unlawful and arbitrary for at least three reasons.

First, EPA cannot determine that it lacks a rational basis to regulate methane when the Agency has made statutory findings supporting listing the oil and gas source category under section 111 on the basis of methane alone—in other words, it has concluded that greenhouse

[47] According to EPA, rescission of methane requirements is the "second of the two steps of its primary proposal," 84 Fed. Reg. at 50,259, and the sole component of EPA's "alternative proposal," *id.* at 50,261. This section of the Joint Environmental Comments responds to the rescission of methane requirements under both EPA's primary and alternative proposals, as the Agency states that under the "alternative proposal, the EPA's basis for proposing to rescind the applicability to methane of the NSPS for all sources in the source category is essentially the same as the EPA's basis for proposing the same action for sources in the production and processing segments." *Id.*

gases, specifically methane, from the oil and gas industry significantly contribute to air pollution that endangers public health and welfare.[48] EPA has not proposed to overturn those findings or the facts underlying them in the Proposal—the Agency nowhere claims that methane emissions do not endanger human health and welfare nor that the oil and gas sector does not significantly contribute to that endangerment. In light of those undisturbed findings, EPA cannot now determine that it lacks a rational basis to regulate—in other words, the agency cannot apply a test that would result in a *higher* burden for regulating a pollutant from a previously-listed source category than would otherwise apply if the Agency were listing the source category and regulating that same pollutant in the first instance.

Second, even setting aside EPA's prior findings regarding methane's contribution to endangerment, the Agency's current proposal that it lacks a rational basis to regulate methane is unlawful, arbitrary, and runs counter to the evidence before it. EPA's claim that methane requirements are redundant is fundamentally inconsistent with both its own proposed legal findings and with the factual record. Indeed, the Proposal asserts that they are not redundant at all, and would preclude regulating the vast majority of existing sources of endangering methane in the oil and gas sector. And even if the Agency were correct to claim that methane regulations are redundant (it is not), it arbitrarily fails to identify any way in which the alleged redundancy is problematic. Moreover, EPA's "redundancy" rationale unlawfully ignores its own prior findings, based in extensive record evidence, that it had a rational basis to directly and independently regulate methane from the oil and gas sector.

Third, EPA's "redundancy" rationale is entirely arbitrary, and appears to be unlawfully pretextual. It does not align with EPA's stated rationale for the rulemaking. Based on statements by Agency decisionmakers, as well as the contents of the Proposal, the true rationale for rescinding the methane requirements appears to be preventing any future regulation of existing oil and gas sources under Section 111(d) of the Clean Air Act—an impermissible rationale for the Proposal that directly contravenes the entire purpose of this critical provision of law.

A. It is unlawful for EPA to determine that it lacks a rational basis to regulate methane when it has already determined that methane from the oil and gas source category contributes significantly to air pollution that endangers public health and welfare and determined that there is a best system of emissions reduction for methane under section 111.

EPA cannot now lawfully determine that it "lacked a rational basis to establish standards of performance for methane emissions" from the oil and gas sector, 84 Fed. Reg. at 50,259, because it concluded in 2016 that methane from this source category contributes significantly to air pollution that endangers human health and welfare. 81 Fed. Reg. at 35,842–43. Where EPA has made this statutory determination, it cannot decline to regulate a pollutant based on a non-statutory factor such as alleged redundancy the Agency invokes here.

[48] Although EPA was not required to make this finding in order to regulate methane, it did so nevertheless, and the Agency cannot now ignore that finding and the factual evidence underlying it. EPA's solicitation of comments regarding significant contribution findings are addressed in Section IV of these comments, and in a separate comment submitted to this docket by the undersigned organizations that focuses specifically on the significant contribution finding.

Under section 111, EPA must list any source category that "causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.SC. § 7411(b)(1)(A). No less than one year after listing a category, the Agency "*shall* publish proposed regulations[] establishing Federal standards of performance for new sources within such category," and "*shall*" finalize such standards within one year thereafter. *Id.* § 7411(b)(1)(A) & (B) (emphasis added). This is not an optional exercise: as the word "shall" indicates, the Agency *must* issue final standards of performance for one or more pollutants after listing a source category. Nowhere does this provision allow EPA to take *additional* considerations into account that would enable it to then decline to regulate these pollutants. The statue simply leaves no room for EPA to opt out of regulating those emissions on the basis of other, non-statutory factors that it may believe are relevant (such as "redundancy").

The Agency has long held that, as a general matter, it need only have a rational basis to determine which additional pollutants to regulate from a listed source category under section 111(b)(1)(B), and that it need not make a pollutant-specific significant contribution finding ("SCF") for any given pollutant in order to issue standards for that pollutant from a listed category. As discussed in the comments submitted to this docket that focus specifically on the SCF, this position is correct: section 111(b)(1)(A)'s endangerment finding and SCF requirement apply to the source category as a whole, not to each newly-regulated pollutant emitted from a previously-listed source category (for which the agency need only have a rational basis to adopt standards of performance). However, where EPA *has* affirmatively found that a source category's emissions of a specific pollutant do, in fact, cause or contribute significantly to endangerment—even while the statute does not *require* such a finding—it can have no rational basis to avoid issuing standards for that pollutant. In other words, section 111(b)(1)(A)'s statutory factors for listing a source category—the endangerment finding and SCF requirement—provide a floor according to which EPA *must* regulate a particular pollutant from that category, regardless of whether the pollutant is addressed in the initial listing decision or is subsequently determined to satisfy those statutory factors. Indeed, it would be irrational for EPA to fail to regulate an additional pollutant from a category simply because it had already listed the source category based on other emissions, if the same evidence regarding the new pollutant would have *required* the agency to list the source category under section 111(b)(1)(A) (and thus to issue standards of performance under subsection (b)(1)(B)) had the category not been previously listed.

In the 2016 NSPS, EPA formally made the findings that "even if CAA section 111 required the EPA to make an endangerment finding as a prerequisite for this rulemaking, then, the information and conclusions described [regarding impacts of greenhouse gas emissions and emissions of methane from the oil and gas sector] should be considered to constitute the requisite finding (which includes a finding of endangerment as well as a cause-or-contribute significantly finding)." 81 Fed. Reg. at 35,843. As the undersigned organizations had argued in the rulemakings leading up to that finding, EPA was *required* to regulate methane from the oil and gas source category under section 111 pursuant to its mandatory duty to review and revise standards of performance every eight years, and the facts demonstrating the oil and gas sector's substantial contribution to endangerment from methane. *See* Comments of Sierra Club, et al, Docket No. EPA-HQ-OAR-2010-0505 (Nov. 30, 2011), at 74-80. EPA does not propose to withdraw this finding in this rulemaking, and as we discuss in Section IV of these comments, the most recent data not only reaffirms but strengthens this conclusion. Where the Agency has made

such a statutory finding for a listed category's emissions of a specific pollutant, it cannot subsequently ignore it and alter or remove standards of performance based on a non-statutory factors such as alleged redundancy with other standards.

Furthermore, EPA's assertion of "redundancy" as a basis for removing the methane standards would nullify another statutorily-based determination from the 2016 Rule: the agency's BSER finding. As defined in section 111(a)(1), standards of performance must reflect the "best system of emission reduction," a determination that encompasses a host of mandatory considerations, including achievability, adequate demonstration, costs, energy requirements, nonair environmental and health considerations, the amount of air pollution reduced, and whether the system is the "best." 42 U.S.C. § 7411(a)(1); *see also* 84 Fed. Reg. at 50,251; 84 Fed. Reg. 32,520, 32,534 n.151 (July 8, 2019) (citing *Sierra Club v. Costle*, 657 F.2d 298, 326 (D.C. Cir. 1981)). In the 2016 Rule, EPA selected a BSER for methane emissions from the oil and gas source category that specified widely available, cost-effective, and well demonstrated technologies and practices that would achieve significant emission reductions. *See generally* 81 Fed. Reg. at 35,843–48. In elevating the non-statutory concept of "redundancy," EPA would not only undo the finding that oil and gas methane emissions significantly contribute to dangerous pollution, but would erase its separate BSER finding as well.

In this regard, the Proposal bears all the hallmarks of arbitrary agency decisionmaking. As the D.C. Circuit has explained:

> As the Supreme Court stated in *State Farm*, an agency's rule normally is arbitrary and capricious if it "entirely failed to consider an important aspect of the problem" before it. 436 U.S. at 43. A statutorily mandated factor, by definition, is an important aspect of any issue before an administrative agency, as it is for Congress in the first instance to define the appropriate scope of an agency's mission. When Congress says a factor is mandatory, that expresses its judgment that such a factor is important. In accordance with this principle, we have held that "the complete absence of any discussion" of a statutorily mandated factor "leaves us with no alternative but to conclude that [the agency] failed to take account of this statutory limit on [its] authority," making the agency's reasoning arbitrary and capricious.

Pub. Citizen v. Fed. Motor Carrier Safety Admin., 374 F.3d 1209, 1216 (D.C. Cir. 2004) (quoting *United Mine Workers v. Dole*, 870 F.2d 662, 673 (D.C. Cir. 1989)).

EPA decisively fails this test. First, in the Proposal, the Agency seeks to withdraw standards of performance for methane emissions from the oil and gas sector without even discussing the fact that it had previously determined those emissions cause or contribute significantly to pollution that endangers public health and welfare, much less offering evidence to the contrary (let alone actually rebutting its earlier conclusion). Moreover, the Agency relies on a *non*-statutory consideration—alleged redundancy with VOC regulations—to justify its proposal to rescind methane standards for oil and gas equipment. This factor is entirely outside of the scope of EPA's authority to consider: the Agency simply may not decline to issue standards of performance for methane emissions from this source category in light of the fact that, in 2016, it found those emissions would, by themselves, satisfy the SCF and endangerment finding factors of section 111(b)(1)(A). If the oil and gas source category had not been

previously listed, the agency's 2016 finding would *require* it to list that category based on its methane emissions, and would mandate that it issue standards of performance for methane pursuant to section 111(b)(1)(B). Nor may EPA negate a statutorily-rooted BSER determination on the basis of redundancy. For EPA to now propose to withdraw its methane standards on grounds not contemplated by the statute is fundamentally arbitrary, capricious, and unlawful.

B. EPA's proposed conclusion that the agency lacks a rational basis to regulate methane from the oil and gas sector is arbitrary, capricious, and runs counter to the evidence before the agency.

Not only is the Proposal's "redundancy" rationale for rescinding methane requirements not contemplated under section 111(b), it does not even pass the straight-face test. Indeed, the Proposal recognizes that rescinding methane regulation will mean that the vast majority of emissions from the oil and gas sector (coming from hundreds of thousands of existing sources) will go uncontrolled. There is good reason to believe that is the entire point of the redundancy exercise, which otherwise makes no sense, as the Proposal points to no burden to the industry from the alleged redundancy. As we discuss below, "redundancy" is not and cannot be a lawful basis for withdrawing the 2016 Rule's methane standards, and the Proposal is arbitrary, capricious, and unlawful as a result.

1. EPA's claim that methane requirements are "redundant" with VOC requirements is contradicted by the agency's own proposed findings and the record.

As the Proposal itself demonstrates, methane regulation is simply *not* redundant of VOC regulation. The Proposal readily admits that, according to EPA's own proposed legal interpretation, a key "legal consequence" of removing methane requirements is that the Agency will not have authority under section 111(d) to control *any* emissions from existing sources, which represent that vast majority of emissions from the sector. 84 Fed. Reg. at 50,272. While recognizing this enormous consequence, EPA quite amazingly ignores these emissions while discussing the alleged "redundancy" of methane regulation and its rationale for rescinding those standards. Indeed, the Proposal goes so far as to state that "EPA recognizes that in proposing to rescind one set of standards in part for its redundancy with another set, the EPA is choosing to rescind the applicability of those standards to methane emissions and not VOC emissions, rather than vice-versa." 84 Fed. Reg. at 50,260. The alleged reason for choosing to rescind methane regulations, according to the Proposal, is "because the requirements for VOC … are longer established than those for methane." *Id.* Accordingly, in its explanation of *why* EPA is choosing to remove methane standards as opposed to VOC standards, the Agency attempts to ignore its own conclusions concerning the consequences that decision will have on its authority to adopt existing source standards. And even if the Agency *could* ignore these consequences for existing source (which it cannot) EPA's claimed redundancy also fails based on the unique effects of regulating methane and VOCs at new sources alone.

a. Methane regulation is not "redundant" with respect to EPA's duty to issue emissions guidelines for existing sources under 111(d) based on EPA's own proposed legal interpretation.

EPA's assertion that methane requirements are "redundant" and therefore "not necessary because they do not result in emission reductions beyond what would otherwise occur," 84 Fed. Reg. at 50,259, is contradicted by EPA's own argument that removal of methane regulation from the NSPS precludes *any* future regulation of existing sources in the oil and gas source category. By ignoring impacts from pollution from existing sources, EPA's "redundancy" rationale runs counter to the evidence before it; thus, EPA has "entirely failed to consider an important aspect of the problem." *State Farm*, 463 U.S. at 43.

It is an axiomatic principle of administrative law that agency decisionmaking must be reasoned. *State Farm*, 463 U.S. at 43; *Ctr. for Biological Diversity v. Zinke*, 900 F.3d 1053, 1071 (9th Cir. 2018). An agency acts arbitrarily when it takes action that is not supported by substantial evidence. *See, e.g.*, *Cablevision Systems Corp. v. FCC*, 597 F.3d 1306, 1310 (D.C. Cir. 2010); *Fl. Gas Trans. Co. v. FERC*, 604 F.3d 636, 639 (D.C. Cir. 2010); *Ass'n of Data Processing Serv. Orgs. v. Bd. of Governors*, 745 F.2d 677, 683-84 (D.C. Cir. 1984). Reasoned decisionmaking requires that the agencies "weigh[] competing views, select[] a [solution] with adequate support in the record, and intelligibly explain[] the reasons for making that choice." *FERC v. Elec. Power Supply Ass'n*, 136 S. Ct. 760, 784 (2016).

To that end, EPA must examine all relevant data and articulate a satisfactory explanation for its action, including a "rational connection between the facts found and the choice made." *State Farm*, 463 U.S. at 43; *see also Genuine Parts Co. v. Envtl. Prot. Agency*, 890 F.3d 304, 313 (D.C. Cir. 2018) (holding that EPA failed to consider an important aspect of the problem by ignoring relevant evidence in the rulemaking record). This explanation requires EPA to provide "sufficient clarity or specificity" that goes beyond a mere "conclusory statement," to weigh competing views, to examine the relevant information, and to show that the data relied upon is accurate and defensible. *Am. Min. Cong. v. Envtl. Prot. Agency*, 907 F.2d 1179, 1190–91 (D.C. Cir. 1990); *Int'l Fabricare Inst. v. Envtl. Prot. Agency*, 972 F.2d 384, 392 (D.C. Cir. 1992); *Elec. Power Supply Ass'n,* 136 S. Ct. at 784; *Dist. Hosp. Partners v. Burwell*, 786 F.3d 46, 57 (D.C. Cir. 2015). Agencies must use "the best information available" in reaching their conclusions. *Flyers Rights Education Fund v. FAA*, 864 F.3d 738, 745 (D.C. Cir. 2017); *cf. Catawba County v. EPA*, 571 F.3d 20, 45 (D.C. Cir. 2009). EPA's failure to consider *any* impacts from existing source pollution while removing methane requirements, despite acknowledging those impacts, is quintessentially arbitrary and capricious agency action.

In the Proposal, EPA claims that "rescinding the applicability of the NSPS requirements to methane emissions will have *no impact* on the amount of methane emissions." 84 Fed. Reg. at 50,259 (emphasis added). Later, however, the Agency states that it "recognizes that rescinding the applicability of the NSPS to methane emissions for the sources in the Crude Oil and Natural Gas Production source category that are currently covered by the NSPS will mean that existing sources of the same type in the source category will not be subject to regulation under CAA section 111(d)." 84 Fed. Reg. 50,272. These two claims are quite obviously contradictory—a fact that, by itself, would render the Proposal arbitrary and capricious. *See Gen. Chem. Corp. v. United States*, 817 F.2d 844, 846 (D.C. Cir. 1987) (agency decision that was "internally

inconsistent and inadequately explained . . . was arbitrary and capricious and not supported by substantial evidence on the record considered as a whole.”).

As discussed in more detail in Section III of these comments, EPA fails to conduct any meaningful analysis of the pollution that will be emitted by existing sources in the absence of regulation under section 111(d). Analyses undertaken by commenters EDF and CATF demonstrate that the pollution allowed by foregoing Section 111(d) regulation will be substantial.[49] As an illustration, there are currently over 850,000 wells that would qualify as existing sources under 111(d), and the Proposal would attempt to preclude federal regulation of those sources under any emission guidelines issued under that provision. In 2020, existing sources will emit over 10 million metric tons of methane, over 2.3 million tons of VOCs, and nearly 90,000 tons of hazardous air pollutants like benzene. EDF estimates that over a third of this pollution—3.7 million tons of methane, nearly 900,000 tons of VOCs, and over 33,000 tons of HAPs—would be prevented by a 111(d) rule that simply mirrored current requirements in the NSPS. The Proposal’s claim that it will have “no impact on the amount of methane emissions” is both facially absurd and demonstrably false: it will have an *enormous* impact on the amount of methane emissions for many years.

With no quantitative analysis, EPA attempts to characterize its removal of the legal predicate to regulate existing sources as having “limited environment[al] impact.” 84 Fed. Reg. 50,273. This assertion is plainly false—millions of tons of climate and air pollution is hardly “limited,” as discussed in more detail in Section III below. Even so, EPA’s recognition of these “limited . . . impact[s],” however flawed, further belies the agency’s claim that “there are *no* expected emission impacts from rescinding the methane requirement,” 84 Fed. Reg. 50,278. (emphasis added). EPA arbitrarily fails to explain (let alone resolve) the deep tensions underlying these disparate conclusions in the Proposal.

These emissions impacts are entirely the result of the Proposal’s proposed preclusion of existing source regulations under Section 111(d)—what EPA calls a “legal consequence” of removing methane requirements from the NSPS. 84 Fed. Reg. at 50,272. These foregone future emissions reductions contradict EPA’s claim that it “is rational for the EPA to determine that [methane] requirements that are redundant to other requirements are not necessary because they do not result in emission reductions beyond what would otherwise occur.” 84 Fed. Reg. at 50,259. Under EPA’s own legal theory in the Proposal, methane requirements in the NSPS trigger EPA’s obligation to reduce pollution emissions from existing sources. But these “emissions reductions” *will not occur* in the absence of methane regulations for new sources—according to EPA, VOC standards themselves cannot similarly trigger the agency’s obligation to control existing sources under section 111(d). Therefore, methane standards simply cannot be considered “redundant” with VOC standards, which will not ultimately result in anywhere near the same quantity of reductions. EPA’s explanation for removing methane requirements is thus internally inconsistent, runs counter to the evidence before the agency, and entirely fails to

[49] Appendix D, Renee McVay, Hillary Hull, Kate Roberts, EDF, Assessment of Harm to the Public from Foregoing Methane Guidelines for Existing Sources; Appendix E, Clean Air Task Force, Modeled impacts from EPA methane rollbacks.

consider these important impacts. *See State Farm* 463 U.S. at 43. It is standard-issue arbitrary decisionmaking.

Furthermore, it would not be rational or legal for EPA to put blinders on in order to ignore the enormous consequences of rescinding methane regulation for existing sources. Section 111 of the Clean Air Act is concerned with reducing dangerous pollution from stationary sources—new, modified, *and existing*. *See, e.g.*, 42 U.S.C. § 7411(b)(1)(B) (discussing "new sources *within* such category") (emphasis added); *id.* § 7411(d)(2)(B) (discussing existing sources as "sources in the category of sources"). The Clean Air Act directs EPA to make a significant contribution finding for the *source category*, which necessarily encompasses existing as well as new or future sources. Indeed, it would be patently absurd for EPA to ignore the emissions of sources actually in existence and actively causing pollution in determining whether a particular source category significantly contributes to pollution that endangers public health and welfare. *See* 42 U.S.C. § 7411(b)(1)(A) (using present tense, Act requires Administrator to "include a category of sources in such a list if in his judgment it causes or contributes significantly to, air pollution"). Accordingly, the plain text suggests that Congress was concerned with dangerous pollution from both new and existing sources. This issue is discussed more fully in the SCF-specific comments submitted to this docket. Nothing in the Act sanctions the Proposal's willful ignorance of the massive amounts of dangerous pollution emitted by existing sources.

b. Methane regulation is not "redundant," even when confined to new sources.

Even when narrowly and impermissibly confined to new sources, EPA's claim that methane standards are redundant is arbitrary, capricious, and unlawful. Indeed, this claimed redundancy relies on the fact that the 2016 Rule's determination of the best system of emission reduction for both methane and VOC emissions was largely the same. *See, e.g.*, 84 Fed. Reg. 50,246; *see also* 81 Fed. Reg. at 35,841. As an initial matter, EPA's redundancy rationale impermissibly collapses the agency's threshold determination about whether it has a rational basis to regulate a new pollutant with its ultimate conclusion about the appropriate standards for that pollutant. As a general matter, whatever latitude inheres in EPA's rational basis determination, it is unreasonable to interpret that discretion to authorize (or require) EPA to conduct a statutorily separate and subsequent BSER analysis, compare the standards EPA would adopt based on that analysis to standards EPA has (or might) adopt for other pollutants, and conclude that those standards are sufficiently dissimilar to allow regulation in the first instance.

Regardless, EPA's claimed redundancy for new sources is wrong. It inaccurately reflects only a snapshot in time and so fundamentally misunderstands the history of EPA's standards for VOC, the Agency's approach to and rationale for adopting standards for both methane and VOC in 2016, and how EPA's continued regulation of methane affects its ongoing obligations to assess and revise new source standards.

In 2012, EPA adopted VOC standards for certain pieces of equipment in the oil and gas sector but declined to extend those standards to equipment across all segments of the source category based on its determination that the pollution from some of these sources was relatively lower in VOC content. *See* 77 Fed. Reg. at 49,522 (recognizing pneumatic controllers in the transmission and storage segment as important pollution sources but declining to regulate based

on the "low level of VOC emitted from these sources); *id* at 49,523 (same regarding compressors in the transmission and storage segment); 81 Fed. Reg. at 35,841 (reiterating 2012 Rule conclusions).

In 2016, EPA took action to adopt both methane and VOC standards for previously unregulated sources, including those sources in the 2012 rulemaking that it had declined to regulate based solely on EPA's evaluation of VOC emissions. 81 Fed. Reg. at 35,841 (adopting standards for pneumatic controllers and compressors in the transmission and storage segment). Importantly, the agency's analysis of the emissions, available controls, and costs to secure reductions from these sources had not meaningfully changed between 2012 and 2016. *Compare, e.g.*, 2011 TSD at 5-17 (identifying VOC cost-effectiveness of $286/ton reduced for pneumatic controllers in the transmission and storage segment) *with* 2016 TSD at 69 (identifying slightly *higher* VOC cost-effectiveness of $323/ton reduced for pneumatic controllers in the transmission and storage segment).

Notwithstanding the same underlying technical foundation, in the 2016 Rule, EPA recognized that "there are cost-effective controls that can simultaneously reduce both methane and VOC emissions from these equipment across the industry," 81 Fed. Reg. at 35,841, and "in many instances, [these controls] are cost effective even if all the costs are attributed to methane reduction." *Id*. And in response to a comment noting that "[d]irect regulation of methane, rather than as a co-benefit to VOC reduction, enables EPA to regulate additional equipment, such as compressors and pneumatic devices, that are sources of significant amounts of methane emissions, but relatively low levels of VOCs," 2016 RTC at 2-61, EPA agreed, affirming that "[t]he EPA has reviewed the comment, and agrees *that direct regulation of GHGs enables the reduction of additional methane emissions beyond what could be achieved by prior VOC-focused rules*." *Id.* (emphasis added); *see also* 81 Fed. Reg. at 35,885 (2016 rule will deliver 300,000 tons of methane reductions in 2020). So, while EPA did align methane and VOC standards in the 2016 rule, the underlying analysis makes clear that agency's holistic evaluation of emissions and reduction opportunities from the source category—including both methane and VOCs—was necessary to facilitate this expansion.

EPA's claimed redundancy also ignores that methane regulation will have unique impacts on the agency's ongoing and forthcoming review of the new source standards,[50] including how the Agency considers cost and benefits, relevant factors in the likely stringency of the standards EPA ultimately adopts. While the BSER is largely the same for methane and VOC in the current NSPS, there is no guarantee that the BSER will not diverge for the two pollutants in the future, especially given the fact that EPA's standards for methane formally address the six well-mixed GHGs of which methane is one constituent element. *See* 40 C.F.R. § 60.5360a(a) ("This subpart establishes emission standards and compliance schedules for the control of the pollutant greenhouse gases"). At least one other GHG—carbon dioxide—is emitted in significant quantities from this industry, and EPA may determine in the future that it has a rational basis to regulate those emissions under section 111(b). In that case, the BSER for GHGs may differ significantly from the BSER for VOCs, since the former would encompass controls for methane and carbon dioxide.

[50] Under section 111(b)(1)(B), EPA is required to periodically (at least every eight years) review the NSPS and revise the standards, as appropriate. 42 U.S.C. § 7411(b)(1)(B).

Furthermore, in its 2016 BSER determinations, EPA evaluated the cost of controls in a number of different ways, including by examining "multipollutant" cost effectiveness. *See* 81 Fed. Reg. at 35,829. This approach recognizes that controls can reduce both methane and VOCs and so ascribes a portion of the cost of a particular control to each of these regulated pollutants. *Id.* (contrasting a single pollutant approach, which attributes all of the cost of control to each pollutant individual); *see, e.g.*, 2016 TSD at 69 (showing substantially better cost-effectiveness when controls are considered on a multipollutant basis).[51] Should EPA remove methane as a regulated pollutant, the agency may try to justify ignoring the methane emissions reductions achieved by a control when weighing cost-effectiveness and considering only VOC reductions—an approach that would overstate costs and likely result in under-control of pollution. This is especially true where the relative concentrations of pollutants can vary across sources. *See supra* (noting relatively lower concentration of VOCs in equipment like pneumatic controllers in certain segments). In that scenario, EPA might seek to ignore the benefits of methane emissions reductions achieved by a standard of performance for a certain source when weighing its cost-effectiveness, and then determine that VOC controls alone are not cost-effective at that source.

Similarly, on the benefits side, this administration has indicated its view that that reductions of co-emitted (but formally unregulated) pollutants should not factor into a benefits analysis in the same manner as those pollutants that are directly regulated. *See, e.g.*, 84 Fed. Reg. 2,670, 2,676 (Feb. 7, 2019) (proposing to find that EPA improperly gave weight to co-benefits of reducing emissions of co-pollutants in Mercury and Air Toxics Standards for power plants).[52] Under this view, removing methane regulation could result in the agency disregarding the benefits of methane reductions, which are the only pollution reduction benefits from the oil and gas sector that EPA has claimed it can monetize. *See, e.g.*, 81 Fed. Reg. at 35,827 (recognizing VOC and HAP reductions as important but declining to monetize them).

Accordingly, removing methane standards would almost certainly lead to the adoption of less protective requirements, whether lawfully or not. *See* 2016 RTC at 2-61 (affirming "that direct regulation of GHGs enables the reduction of additional methane emissions beyond what could be achieved by prior VOC-focused rules"). This is far from an academic concern, as EPA is now in the middle of a separate rulemaking that seeks to weaken key standards for new sources, 83 Fed. Reg. 52,056 (Oct. 16, 2018), although the agency has not put forward any record support for those actions.[53] And apart from these pending rulemakings, EPA has previously recognized the importance of addressing currently unregulated sources within the oil and gas sector like liquids unloading events, 2016 RTC at 9-2 ("The EPA continues to consider ways to address emissions associated with liquids unloading and is including this emissions

[51] EPA has stated it is not reopening its determination that the standards in the 2016 NSPS are cost effective on a VOC-only basis, 84 Fed. Reg. at 50,260 n. 65.
[52] Many of the Joint Environmental Commenters here have filed extensive comments opposing EPA's proposed approach to addressing co-benefits. *See, e.g.,* Comments of Air Alliance Houston, et al, Docket No. EPA-HQ-OAR-2018-0794 (Apr. 17, 2019), https://www.regulations.gov/document?D=EPA-HQ-OAR-2018-0794-1191.
[53] *See* Comments of Environmental Defense Fund, et al, Docket No. EPA-HQ-OAR-2017-0483 (Dec. 15, 2018).

source in the upcoming information gathering effort"), as well as the potential benefits associated with emerging leak detection technologies.[54]

In sum, even when confined to new sources, EPA's claim that methane regulation is redundant is flawed. Indeed, though the Agency aligned its BSER determinations for methane and VOCs in the 2016 rule, EPA indicated that regulating methane enabled more protective standards than the previous VOC-only approach, a conclusion that is borne out by the substantial, additional pollution reductions the 2016 rule delivers. And going forward, continuing to regulate methane, consistent with EPA's statutory obligation, will likely affect the BSER analysis the agency performs and therefore the standards it adopts.

2. EPA has failed to provide any credible reason for removing methane requirements based on "redundancy."

Even if EPA were correct in its assertion that methane regulations are redundant with VOC requirements (it cannot and is not, for the reasons discussed above), and even if redundancy could, in theory, provide a valid legal basis for removing such regulations (again, it cannot), EPA arbitrarily fails to identify any way in which the alleged redundancy is problematic. While agencies may reconsider and revise their policies, before doing so they must demonstrate "that the new policy is permissible under the statute, [and] that there are good reasons for it," *Fox Television*, 556 U.S. at 515–16, and that it is "justified by the rulemaking record," *Am. Petroleum Inst.*, 862 F.3d at 66 (quoting *State Farm*, 463 U.S. at 42). EPA has failed to provide any "good reasons" for why the alleged redundancy between methane and VOC requirements justifies the removal of methane requirements; on the contrary, the Agency's own analysis shows that there are no benefits associated with its proposed action. Furthermore, in addition to not solving any current problem, the removal of methane regulation now will likely create difficulties for regulation of the oil and gas sector in the future.

Fundamentally, EPA's claims that methane requirements are "wholly redundant" with VOC regulations, 84 Fed. Reg. at 50,261, and that there "is no need to add NSPS requirements applicable to methane," *id.* at 50,260, are mere "conclusory statement[s]" that do not explain any *need* for the rescission. *See Am. Min. Cong. v. EPA*, 907 F.2d 1179, 1190–91 (D.C. Cir. 1990). According to EPA's own analysis, there are no benefits—for either the public or the regulated industry—from removing the allegedly "redundant" methane requirements. EPA itself states in the Proposal that there are "no expected cost… effects from removing the methane requirements…" 84 Fed. Reg. 50,247. In fact, EPA characterizes removal of methane requirements as "*less* disruptive" than removal of VOC requirements, 84 Fed. Reg. 50,260 (emphasis added), but does not explain why it is taking any "disruptive" action at all, especially since the 2016 NSPS has been in full effect and successfully implemented for over three years.

At various points through the Proposal, EPA appears to link its decision to rescind methane requirements with Executive Order 13,783, "Promoting Energy Independence and Economic Growth," which directed EPA to determine "whether the rules 'unduly burden the

[54] Furthermore, as EPA recognizes, new technologies for detecting fugitive emissions that specifically detect methane are emerging. 84 Fed. Reg. at 50,260. EPA avoids discussing how these types of new technologies could be incorporated under a VOC-only NSPS.

development of domestic energy resources beyond the degree necessary to protect the public interest.'" *See* 84 Fed. Reg. at 50,246. Yet E.O. 13,783 does not provide any lawful basis to remove methane standards for oil and gas sources under section 111. EPA has utterly failed to explain how methane requirements "unduly burden the development of domestic energy resources" under E.O. 13,783, or how the removal furthers the goals of that Executive Order—especially in light of the agency's prior findings, discussed below, *infra* § IIB3, that aligning methane standards would promote clarity and *ease* compliance burdens. Instead, the agency itself says that the removal of methane requirements "would lead to no changes in compliance activities and, as a result, would not produce any energy impacts." 84 Fed. Reg. 50,278. The Agency further estimates that there will be $0 in cost savings for industry. *Id.* (forecasting "no expected changes in the cost . . . from rescinding the methane requirements.") *see id.* at 50,282 (certifying that "this action will not have a significant economic impact on a substantial number of small entities"). Indeed, it is difficult to discern how a review process that began with the goal of reducing regulatory burdens ended with a Proposal that concedes it does not reduce any regulatory burdens—unless, of course, the purpose is to preclude existing source regulation.[55]

Ultimately, EPA's rescission of the methane requirements in the NSPS does not alleviate any burdens or problems—instead, it creates new difficulties for the agency and uncertainty for both the regulated industry and harm to the public.

3. EPA's claim that methane requirements are redundant with VOC regulation unlawfully ignores EPA's prior conclusion, based in extensive record evidence, that the agency had a rational basis to directly regulate methane from the oil and gas sector.

Even setting aside EPA's lack of authority to rescind methane regulations without reversing its earlier statutory findings, as well as the fact that the "redundancy" rationale is contrary to the evidence and ignores an important aspect of the problem, the Proposal is flatly incorrect to assert that EPA has a "rational basis" to remove methane controls from the oil and gas NSPS, and is unlawful on yet another ground. In the 2016 NSPS, EPA correctly determined that it had a rational basis to directly regulate methane in addition to VOCs from this source category. 81 Fed. Reg. at 35,843. EPA's current proposed finding that it in fact "*lacked a rational basis* to establish standards of performance for methane emissions," 84 Fed. Reg. at 50,259 (emphasis added), is arbitrary: EPA fails to explain how its change in position is justified in light of the extensive legal and factual findings made in the 2016 Rule.[56]

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[55] In any event, the E.O. states—as it must—that it "shall be implemented consistent with applicable law." E.O. 13,783 § 8(b). *See also Marks v. Cent. Intelligence Agency*, 590 F.2d 997, 1003 (D.C. Cir. 1978) ("Of course, an executive order cannot supersede a statute."). For the many reasons explained in these comments, the Proposal is inconsistent with the requirements of the Clean Air Act, and would thus be invalid even if it otherwise successfully implemented E.O. 13,783, which it does not.

[56] EPA developed an extensive factual record to support the current NSPS. *See supra* § Background. In addition to the mandatory notice and comment procedure, EPA issued five white papers for extensive peer review and public input to facilitate a more complete understanding of data on emissions and controls for oil and gas facilities. Through this enhanced process, which included more than 900,000 public comments and three public hearings, EPA "improved [its] understanding of the methane and VOC emissions from these sources and the mitigation techniques available to control them," including an abundance of available, adequately demonstrated, and cost-effective technology to limit methane and VOC emissions. 80 Fed. Reg. at 56,595.

While agencies may reconsider and revise their policies, before doing so they must demonstrate "that the new policy is permissible under the statute, [and] that there are good reasons for it," *Fox Television*, 556 U.S. at 515–16, and is "justified by the rulemaking record," *Am. Petroleum Inst.*, 862 F.3d at 66 (quoting *State Farm*, 463 U.S. at 42). Reasoned decisionmaking in the context of a change in policy or legal interpretation also requires that an agency demonstrate awareness of, and fully explain any departure from, the "facts and circumstances that underlay or were engendered by a prior policy." *Fox Television*, 556 U.S. at 516.[57] "An agency cannot simply disregard contrary or inconvenient factual determinations that it made in the past." *Id.* at 537 (Kennedy, J., concurring). Where an agency is operating against a factual record that contradicts its new policy, reasoned decisionmaking also requires that the agency "provide a more detailed justification than what would suffice for a new policy created on a blank slate." *Id.* at 516.[58]

As discussed above, EPA has no authority to decline to issue methane standards for the oil and gas sector based on the SCF included in the 2016 rule. However, as discussed in the SCF-specific comments submitted to this docket, the statute itself does not require EPA to make such a finding before regulating an additional pollutant under section 111(b)(1)(B) from a listed source category; rather, it need only have a rational basis to do so. *See, e.g.*, 81 Fed. Reg. at 35,842 (EPA has the "authority to establish a standard for performance for any pollutant emitted by … [an existing source category] … as long as the EPA has a rational basis for setting a standard for the pollutant."). In the 2016 Rule, EPA asserted that, "[i]n making such determination, we have generally considered a number of factors to help inform our decision . . . includ[ing] the amount of the pollutant that is being emitted from the source category, the availability of technically feasible control options, and the costs of those control options." *Id.*[59]

EPA properly concluded in 2016 that, independent of whether or not oil and gas methane emissions were "significant," it had a rational basis to regulate them based on an extensive record, including detailed findings on the harms associated with methane (and the large quantities emitted by the oil and gas sector) in that rulemaking, 81 Fed. Reg. at 35,842, in the 2015 proposal, 80 Fed. Reg. at 56,601, and in the 2009 endangerment finding for greenhouse gases, *see generally* 74 Fed. Reg. 66,496. In the 2016 NSPS (and in other past rulemakings). In explaining its basis for this conclusion, EPA relied "primarily on the analysis and conclusions in the EPA's 2009 Endangerment Finding, coupled with subsequent assessments from the IPCC, USGCRP, and NRC that describe scientific developments since those EPA actions and other facts" pertaining to human health and welfare. 81 Fed. Reg. at 35,843. Second, EPA determined

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[57] *See also Pub. Citizen*, 733 F.2d at 98 (agency must "cogently explain" basis for suspending rule) (quoting *State Farm*, 463 U.S. at 48); *Organized Village of Kake v. USDA*, 795 F.3d 956, 968-969 (9th Cir. 2015); *AMB Onsite Services-West v. NLRB*, 849 F.3d 1137, 1146 (D.C. Cir. 2017).

[58] *See Perez v. Mortg. Bankers Ass'n*, 135 S. Ct. 1199, 1209 (2015); *Air All. Houston*, 906 F.3d at 1067; *Am. Petroleum Inst.*, 862 F.3d at 69; *see also Humane Society of the United States v. Locke*, 626 F.3d 1040, 1051 (9th Cir. 2010) (finding an agency action arbitrary and capricious because it did not confront "inconsistencies" between the previous factual record and new facts considered in repealing a rule).

[59] Commenters do not agree EPA that could decline to issue standards of performance for a particular pollutant on the basis of compliance costs or a lack of technically feasible control options for reducing emissions below the level associated with the least-polluting industrial processes and technologies currently in use. However, in the 2016 Rule, EPA determined that technically proven, cost-effective methane controls *were* widely available for this sector, and that there *was* a rational basis to issue standards, so the particular question of whether EPA could, in theory, decline to issue standards on this basis of those factors is not presented in this rulemaking.

that "the facts also demonstrate that the current methane emissions from oil and natural gas production sources and natural gas processing and transmission sources contribute substantially to nationwide GHG emissions." *Id.* Third, "EPA identified technically feasible and cost-effective controls that can be applied nationally to reduce methane emissions and, thus, GHG emissions, from the oil and natural gas source category." *Id.* Here, EPA "considered whether the costs (e.g., capital costs, operating costs) are reasonable considering the emission reductions achieved through application of the controls required." *Id.*

Based on these findings, EPA concluded in the 2016 NSPS that that methane emission reductions from the oil and gas sector should not be achieved indirectly through VOC controls, but "should be directly addressed through GHG standards in the form of limits on methane emissions under CAA section 111(b) based on direct evaluation of the extent and impact of GHG emissions from this source category and the emission reductions that can be achieved through the best system for their reduction." *Id.* at 35,841. EPA further found that the "standards detailed in this final action will achieve meaningful GHG reductions and will be an important step towards mitigating the impact of GHG emissions on climate change." *Id*.

EPA has failed to provide "good reasons" for disregarding these prior findings, much less the "more detailed justification" required when making a policy change that contradicts earlier factual findings. *Fox Television*, 556 U.S. at 516. Instead, EPA barely acknowledges its 2016 conclusions regarding the importance of directly regulating methane. For example, EPA acknowledges in the Proposal its 2016 finding that methane should be addressed directly, but the agency's only response to this finding is "[a]fter further consideration, the EPA proposes to come to a different conclusion about the need for methane requirements, for the reasons discussed in this section and below." 84 Fed. Reg. 50,260 n. 64. But those "reasons" are nonexistent: the Agency fails to explain either the basis for its "different conclusion" or why it is ignoring the key factors that underpinned its rational basis finding in the 2016 Rule.[60]

EPA's only reason for changing its policy is its new factually incorrect assertion that "because [methane] requirements are entirely redundant with the existing NSPS for VOC, [they] establish no additional health protections, and are, thus, unnecessary." 84 Fed. Reg. at 50,259. Above, we detailed the various reasons why this claim is entirely untrue. But even if were true, it is an insufficient justification for the agency's reversal in position for several reasons. First, in the 2016 Rule, EPA addressed this alleged "redundancy" and found it an improper basis for declining to issue methane regulations, a fact that EPA ignores in this Proposal. Second, the Proposal ignores key impacts across the entire source category from rescinding methane requirements. And third, the authorities and past practices that EPA references in the Proposal do not support the Agency's change in position.

First, EPA explicitly addressed the alleged redundancy between methane and VOC requirements in the 2016 NSPS, and found that the requirements were not redundant—and even

[60] Indeed, EPA notes the 2016 standards represent the BSER and are cost-effective even on a VOC-only basis for production and processing sources, 84 Fed. Reg. at 50,260 n. 65, and further notes that EPA is not proposing to change the finding that the 2016 standards likewise represent the BSER for transmission and storage sources, *id.* at 50,261 n. 66.

if there were no additional emissions reductions achieved through the dual standards, aligning the control requirements for different pollutants could *ease* compliance burdens on sources:

> While this final rule will result in additional reductions, as specified in sections II and IX of this preamble, the EPA *often revises standards even where the revision will not lead to any additional reductions of a pollutant because another standard regulates a different pollutant using the same control equipment*. For example, in 2014, the EPA revised the Kraft Pulp Mill NSPS in 40 CFR part 60 subpart BB published at 70 FR 18952 (April 4, 2014) to align the NSPS standards with the National Emission Standards for Hazardous Air Pollutants (NESHAP) standards for those sources in 40 CFR part 63, subpart S. Although no previously unregulated sources were added to the Kraft Pulp Mill NSPS, several emission limits were adjusted downward. The revised NSPS did not achieve additional reductions beyond those achieved by the NESHAP, but aligning the NSPS with the NEHSAP eased the compliance burden for the sources.

81 Fed. Reg. 35,841 n. 60 (emphasis added); *see also* 81 Fed. Reg. 35,841 ("Moreover, in addition to the reductions to be achieved, establishing both GHG and VOC standards for equipment across the industry will also promote consistency by providing the same regulatory regime for this equipment throughout the oil and natural gas source category for both VOC and GHG, thereby facilitating implementation and enforcement."). In the current Proposal, EPA ignores this finding, and fails to explain why it is abandoning its prior conclusion that aligning methane and VOC requirements *eases* the regulatory burden on sources.

Other D.C. Circuit case law confirms that EPA must regulate a source's emissions of a particular pollutant under section 111 even where the source already controls those emissions because of other legal obligations. For instance, in *New York v. Reilly*, 969 F.2d 1147, 1153 (D.C. Cir. 1992), the court rejected EPA's argument that it need not ban the burning of lead-acid vehicle batteries under the NSPS for municipal waste combustors because "the Resource Conservation and Recovery Act includes strict provisions against the burning of lead-acid batteries." The court responded that "the mere existence of other statutory authority which might undergird EPA's final stance is insufficient to justify the omission of the battery ban." *Id.* Similarly, in *Portland Cement Ass'n v. EPA*, 665 F.3d 177, 191 (D.C. Cir. 2011), the court rejected legal challenges to an NSPS limit for PM that tracked a concurrently-issued PM standard adopted under section 112. The court explained that, "[a]lthough both the NSPS and NESHAP rulemaking resulted in a PM emissions limit of 0.01 pounds per ton, EPA arrived at that limit using two different mechanisms," while acknowledging that "the final rule . . . noted that kilns would have to install fabric filter technology to comply with NESHAP, concluding that the parallel NSPS rule would therefore have no additional cost." *Id.* Similarly, while EPA set the same BSER for methane and VOC in the 2016 Rule, the considerations underlying the BSER analysis differs significantly for these pollutants, which cause distinct harms.

Second, EPA's "redundancy" argument cannot justify EPA's change in position because the Proposal ignores key impacts from rescinding the methane requirements, as discussed in more detail *supra* § II —including the implications for emissions from existing sources in the source category. EPA claims that "[i]n the case of the Oil and Natural Gas source category, *there are no methane emissions from the sources subject to the NSPS* beyond those emissions already

subject to control by the provisions to control VOC in the NSPS." 84 Fed. Reg. 50,260. But EPA does not explain why it is only considering emissions from sources subject to the current NSPS, rather than emissions from *the source category as a whole* (including existing sources), which it *must* consider when determining whether to regulate a given pollutant under section 111.[61]

EPA properly evaluated impacts across the entire oil and gas source category when it included methane standards in the 2016 NSPS. *See, e.g.*, 81 Fed. Reg. at 35,841 (methane "is something that should be directly addressed through GHG standards in the form of limits on methane emissions under CAA section 111(b) based on direct evaluation of the extent and impact of GHG emissions from this source category"); 81 Fed. Reg. at 35,837-40 (discussing methane emissions from across the oil and gas source category and explaining "the collective GHG emissions from the oil and natural gas source category are significant"). EPA fails to even recognize that it is changing its long-held practice of considering emissions across the relevant source category when regulating (or, in this case, de-regulating) under section 111. This alone is arbitrary. *Fox Television*, 556 U.S. at 515 ("The requirement that an agency provide reasoned explanation for its action would ordinarily demand that it display awareness that it *is* changing position. An agency may not, for example, depart from a prior policy *sub silentio* or simply disregard rules that are still on the books.") (emphasis in original). Much less does the Proposal explain how section 111 permits it to ignore emissions from existing sources as part of its inquiry, or offer a reasoned justification for having done so here. This is yet further evidence of arbitrary decisionmaking. *Id.* (an agency must show "that the new policy is permissible under the statute" and "that there are good reasons for it").

Finally, the past practice cited by EPA does not provide reasoned support for removing methane standards from the oil and gas NSPS on the basis of "redundancy." In *National Lime Association v. EPA*, 627 F.2d 416 (D.C. Cir. 1980), EPA had promulgated a performance standard for PM emissions from lime manufacturing plants but declined to propose standards for NO_X, CO, and SO_2 emissions. *See id.* 627 F.2d at 426 n.27 (citing 42 Fed. Reg. 22,506, 22,507 (May 3, 1977)). According to the Agency, part of the reason EPA did not propose standards for SO_2 emissions was because it had determined that the same technology that reduces PM emissions (baghouses or electrostatic precipitators) resulted in "significant reduction in SO_2 emissions." 42 Fed. Reg. at 22,507. In the Proposal, EPA attempts to analogize to *National Lime* by arguing that methane requirements for oil and gas sources similarly provide no additional emission reductions beyond those achieved by VOC requirements.

However, the agency misreads the rulemaking at issue in *National Lime*. There, although EPA noted that PM controls would also reduce significant amounts of SO_2, this was *not* a motivating factor in the agency's decision not to issue standards for SO_2. Rather, the agency cited the potentially negative "environmental, economic and energy impacts" that could result from the use of SO_2-specific control technology as the basis for its decision not to issue standards for SO_2. 42 Fed. Reg. at 22,507. No such negative consequences would result or have resulted

[61] A full discussion of this issue appears in the SCF-specific comments submitted concurrently to this docket by the undersigned organizations. *See also* Joint Comments of Environmental and Public Health Organizations on EPA's Proposed "Review of Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units" Pertaining to EPA's Basis for Regulating Carbon Pollution from Electric Generating Units Under Section 111 of the Clean Air Act, Docket No. EPA-HQ-OAR-2013-0495, at 13–17 (Mar. 18, 2019).

from the application of methane standards to oil and gas equipment, and the Proposal does not claim that they would. On the contrary, based on a voluminous administrative record, the 2016 rulemaking concluded that methane controls "are cost-effective even if all the costs are attributed to methane reduction," 81 Fed. Reg. at 35,841, and EPA does not propose to reverse that finding now.[62]

EPA further explained in the 2016 Rule that:

> [W]hile the controls used to meet the VOC standards in the 2012 NSPS also reduce methane emissions incidentally, *in light of the current and projected future GHG emissions* from the oil and natural gas industry, reducing GHG emissions from this source category should not be treated simply as an incidental benefit to VOC reduction; rather it is something that should be directly addressed through GHG standards in the form of limits on methane emissions under CAA section 111(b).

Id. at 35,841 (emphasis added). Here, EPA relies in part on projections about future emissions, a practice courts have specifically endorsed in the past in the context of section 111. *Nat'l Asphalt Pavement Assoc. v. Train*, 539 F.2d 775, 784-85 (D.C. Cir. 1976) (upholding EPA's determination that asphalt concrete plants contribute "significantly" to air pollution where Agency had relied in part on both "the number of existing plants and "the expected rate of growth in the number of plants" to make such a determination). By contrast, in *Lime*, SO_2 emission reductions were treated as an "incidental benefit," as opposed to a pollutant that needed to be regulated due to "current and projected future" emissions. And the Proposal does not even address these projected future emissions.

Furthermore, nothing in *National Lime* supports the removal of regulations that have been in place for years based on alleged redundancy. While EPA claims in the Proposal that in some instances, it "historically declined to *propose* standards for a pollutant that is emitted in low amounts," 84 Fed. Reg. at 50,260 (internal quotations and alterations omitted) (emphasis added), it points to no past practice of *removing* standards for a pollutant based on allegedly low emissions.

Lastly, in *National Lime*, the two relevant pollutants—PM and SO_2—were (and are) both regulated as criteria pollutants under section 110, so neither would be subject to existing source emission guidelines under section 111(d). *See* 42 U.S.C. § 7411(d)(1)(A)(i). As such, the Agency's decision to issue PM standards but not SO_2 standards would have no impact on existing source emissions. By contrast, as discussed above, EPA posits that removing methane standards from the oil and gas NSPS would preclude existing source regulations for that source category that would otherwise be required under the statute. This is yet another reason why *National Lime* is inapposite.

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[62] It is worth reiterating here that we do not concede that EPA relied on legally permissible factors in declining to issue SO_2 standards for these sources, s*ee supra*, and the D.C. Circuit was not presented with that question. See *Nat'l Lime Assoc.*, 627 F.2d at 426 n.27 (D.C. Cir. 1980). Nevertheless, it is clear that "redundancy" was not the basis for EPA's decision not to propose SO_2 standards for lime plants, so that rulemaking cannot serve as a valid administrative precedent for EPA's current Proposal under any legal position.

In summary, EPA has failed to provide a reasoned justification for disregarding EPA's prior conclusion, based in extensive record evidence, that the agency had a rational basis to directly regulate methane from the oil and gas sector.

C. The "Redundancy" Rationale is Arbitrary and Pretextual—EPA's True Rationale is to Prevent Regulation of Existing Sources under Section 111(d).

A fundamental precept of administrative law is that agencies must announce their *actual* reasons for their policy decisions. "[T]he orderly functioning of the process of review requires that the grounds upon which the administrative agency acted be clearly disclosed and adequately sustained . . . in light of the existing administrative record." *SEC v. Chenery Corp.*, 318 U.S. at 94; *see also Dep't of Commerce v. New York*, 139 S .Ct. 2551, 2575 (2019) (prohibiting a citizenship question on the 2020 census when action was "incongruent with what the record reveals about the agency's priorities and decisionmaking process."). An agency's decision may be arbitrary or pretextual when there is "a significant mismatch between the decision . . . made and the rationale [the agency] provided." *See Dep't of Commerce*, 139 S. Ct. at 2575 (finding both a "disconnect between the decision made and the explanation given" because the only reason given—to assist DOJ in protection of voting rights—did not match the evidence presented and that the agency "went to great lengths to elicit the request from DOJ (or any other willing agency)"). If the "evidence tells a story that does not match the explanation," then courts "cannot ignore the disconnect" or "exhibit a naiveté from which ordinary citizens are free." *Id.*; *see also Cowpasture River Pres. Ass'n v. Forest Serv.*, 911 F.3d 150, 179 (4th Cir. 2018) (rejecting agency action that reflected "a preordained decision" that the agency had "reverse engineered . . . to justify this outcome") (internal quotations omitted); *Woods Petroleum Corp. v. U.S. Dep't of Interior*, 18 F.3d 854, 859 (10th Cir. 1994) (rejecting agency decision where the "sole reason . . . was to provide a pretext for the [agency's] ulterior motive"); *Saget v. Trump*, 375 F. Supp. 3d 280, 361 (E.D.N.Y. 2019) ("[A] court cannot sustain agency action founded on a pretextual or sham justification that conceals the true basis for the decision.") (internal quotations omitted).

Substantial evidence suggests that the Proposal violates this bedrock principle of law. At the very least, EPA's failure to discuss a "relevant factor[]" in its decision to rescind methane requirements—the goal of removing the legal predicate for regulation of existing sources under section 111(d), what appears to be a key motivation for the Proposal—is arbitrary and capricious. *See State Farm*, 463 U.S. at 43. As described *supra*, the Proposal claims that it seeks to "remov[e] regulatory duplication" by rescinding methane controls from the 2016 NSPS because those standards "impose redundant requirements." 84 Fed. Reg. at 50,246. According to the Agency, methane controls "establish no additional health protections," *id.*, and their removal "would lead to no changes in compliance activities." 84 Fed. Reg. at 50,278. But while the Proposal explains that a "legal consequence" of removing methane standards is that the Agency would no longer have the authority or obligation to regulate existing sources under section 111(d), nowhere does it claim that this is the Agency's *reason* for removing methane standards. Indeed, when discussing whether to eliminate this allegedly problematic redundancy by removing either methane or VOC standards, the Proposal does not even mention the implications for existing sources. Rather, it says: "EPA recognizes that in proposing to rescind one set of standards in part for its redundancy with another set, the EPA is choosing to rescind the applicability of those standards to methane emissions and not VOC emissions, rather than vice-versa." 84 Fed. Reg. at 50,260. The Agency's proffered reason for rescinding methane rather

than VOC standards is that "the requirements for VOC … are longer established than those for methane." *Id.* "Additionally," the Proposal points out that "redundancy is not uniform across facilities in the sector," noting that storage tanks are only subject to VOC standards. *Id.* "*For these reasons*," the Proposal explains, "in choosing between the two requirements, the EPA considers it appropriate and less disruptive to rescind the methane standards." *Id.* (emphasis added).

It is, on its face, startling that EPA entirely ignores the implications for existing sources in its discussion of whether to remove methane or VOC standards to alleviate the allegedly duplicative requirements for affected sources. Under the Agency's own legal theory, removing VOC controls, but not methane controls, would *not* affect its authority to regulate existing sources, whereas withdrawing methane controls, but not VOC controls, would eliminate that authority. It goes without saying that this is a major consideration in deciding this question, yet EPA simply passes over it. Indeed, this is far too big of an oversight to ascribe to mere negligence on the agency's part. As we discuss below, there is substantial evidence that removing EPA's authority to control existing source emissions would not merely be a *consequence* of the Proposal, but is, in fact, its underlying *motivation*.

In this regard, the Proposal's claim that it is removing methane standards because of the alleged "redundancy" is incoherent and arbitrary and appears to be an unlawful pretextual reason that shields the Proposal's true rationale: to remove the Agency's mandate to regulate existing sources. As we discuss below, the Proposal presents no good reason for removing the alleged redundancy, and the Agency's prior actions and communications suggest that the *aim* of the methane review was to remove the mandate to regulate existing sources with the result of proposing methane rescission on "redundancy" grounds rather than the other way around.

1. *The lack of a sensible rationale for rescinding methane regulations and the Proposal's discussion of implications for existing sources suggests the aim of the Proposal is to prevent existing source regulation.*

The Proposal claims that it stems from EPA's review process following an Executive Order directing agencies to consider whether the rules "unduly burden the development of domestic energy resources beyond the degree necessary to protect the public interest." 84 Fed. Reg. at 50,246. Yet, as discussed above, EPA does not identify *any* burden to the development of domestic energy resources stemming from the alleged overlap of methane regulations with VOC regulations. On the contrary, the Proposal claims that removing methane controls "would lead to no changes in compliance activities." *Id.* at 50,278. Moreover, the RIA for the Proposal forecasts that rescinding methane standards will result in $0 in cost reductions for industry. *Id.* (forecasting "no expected changes in the cost . . . from rescinding the methane requirements."). EPA cannot rationally justify an action on the grounds of eliminating regulatory burdens while at the same time concluding that the Proposal will not result in changes in compliance activities or costs. The fact that the Proposal admits that the proposed solution to the identified "problem" will do nothing to actually rectify it is arbitrary and suggests that other reasons are likely motivating the Proposal.

Further evidence of this arbitrariness comes from the Proposal's foray into the question of whether VOC regulations alone would trigger existing source requirements. EPA proposes to adopt for the first time a legal interpretation that establishing VOC standards for new sources (unlike methane standards) does not trigger the Agency's obligation under section 111(d) to issue emission guidelines for existing sources. 84 Fed. Reg. at 50,272–73. But EPA then abruptly stops short of analyzing any of the pollution impacts of its proposed interpretation. That EPA reaches this legal conclusion about existing source regulation in the Proposal—without analyzing any of the impacts of that conclusion—further suggests that EPA's true purpose for the Proposal is solely to preclude methane regulations for existing sources.

2. *The history of this Administration's actions and communications provides further evidence of an effort to find a means to reach the goal of not regulating existing sources.*

Soon after the Trump administration took office, some oil and gas industry representative began to press their priorities. Chief among them was avoiding regulation of existing sources. The API's number two "rule or policy concern" was the 2016 NSPS. API prominently explained in a document that it sent to the new administration that the "[f]inal [2016] rulemaking directly regulates 'methane' as a pollutant. Under the Clean Air Act, this triggers the development of a regulation to address *existing* sources across the segments. Regulation of existing sources should be avoided." Appendix A at 68 (API Energy Policy Priorities) (emphasis in original). Similarly, regulating methane from new and existing sources (through issuance of the ICR) was identified as one of six examples of "Clean Air Act Overreach by the Obama Administration" in a memo from an industry lawyer to the EPA landing team. Appendix A at 57-58.

Likewise, the Western Energy Alliance ("WEA") contacted members of the landing team to urge EPA to "eliminat[e]" the information collection request (ICR) that the Agency had issued after two rounds of notice-and-comment in support of developing existing source regulation. WEA's lobbyist presented "several key rationales for either eliminating the ICR or at least extending the response date," including that "it seems unlikely that the new EPA will approach this 'existing' source regulation in the same way" and "should [the NSPS] be… pulled back by EPA, it would have no statutory authority to even promulgate an existing source regulation under 111(d)." Appendix A at 8 (email from Kathleen Sgamma, Western Energy Alliance, to David Kreutzer, EPA (Feb. 10, 2017)). WEA's request was shepherded by a politically-appointed member of the new administration's transition team, who thanked the lobbyist "for bringing it to our attention," explaining that "[t]here was nobody here (political or career) who thought the ICR made sense given the changes in associated policy," and apologized that "with all of the commotion of the transition, the very sensible proposal to cancel the ICR fell through the cracks." Appendix A at 19 (email from David Kreutzer, EPA, to Kathleen Sgamma, Western Energy Alliance (Mar. 3, 2017)); *see also* Appendix A at 19 (email from David Schnare, EPA, to Ryan Jackson, EPA (June 27, 2017)) (political appointee claiming that it "looks like [the ICR withdrawal] will be easier than we thought").

As explained *supra*, the Agency hurried to withdraw the ICR immediately thereafter without any public process or apparently any substantive engagement with career staff. As one political appointee explained, "Administrator [Pruitt] wants this turned into a Notice for Federal

Register publication and he wants it over there today for publication tomorrow. OGC drafts. It can be literally three sentences long." Appendix A at 17 (email from David Schnare, EPA (Mar. 2, 2017)). The resulting rationale published in the Federal Register was indeed precisely three sentences:

> The withdrawal is occurring because EPA would like to assess the need for the information that the agency was collecting through these requests, and reduce burdens on businesses while the Agency assesses such need. This also comes after the Agency received a letter on March 1, 2017 from nine state Attorneys General and the Governors of Mississippi and Kentucky, expressing concern with the burdens on businesses imposed by the pending requests. EPA takes these concerns seriously and is committed to strengthening its partnership with the states.

82 Fed. Reg. 12,817 (Mar. 7, 2017). This rationale itself appears to be pretextual: if the Agency truly wanted to "assess the need for the information," it would have suspended, not withdrawn, the ICR, given that it requires two rounds of notice and comment to promulgate an ICR. By completely rescinding the request, the Agency made the snap and unreasoned determination that it believed the information was *not* needed; and to the extent it might determine otherwise after the fact, it committed itself to two additional notice-and-comment periods to revive the ICR. Moreover, the referenced letter from the Attorneys General to EPA was dated *after* the Agency had already decided to withdraw the ICR, and therefore could not provide a reason for it. *Compare* Letter from Ken Paxton, Texas AG et al., to Scott Pruitt, U.S. EPA Administrator (Mar. 1, 2017) *with* Appendix A at 17 (email from David Schnare, EPA (Feb. 28, 2017)) (directing EPA press shop to develop press release for ICR withdrawal [111(d) disc 2028002]) *and* Appendix A at 9 (email from David Kreutzer, EPA to David Schnare, EPA (Feb. 10, 2017) (noting "Looks like [the ICR withdrawal] will be easier than we thought"). The bottom line is that by early March 2017, just weeks after Administrator Pruitt took office, the Agency had already halted its efforts to regulate existing sources.

This prompted a lawsuit by several states and the Environmental Defense Fund challenging EPA's unreasonable delay in promulgating existing source standards. *See New York v. EPA*, No. 1:18-cv-00773 (D.D.C. Apr. 5, 2018). That lawsuit could result in an order and timeline mandating that EPA promulgate existing source regulations. And one of EPA's first actions after issuing the Proposal was to seek a stay of that litigation on the grounds that the Proposal, if finalized, would eliminate the Agency's obligation to regulate existing sources, obliterating EPA's rationale that methane standards are in any way "redundant" and highlighting the Agency's eagerness to avoid existing source regulation. EPA Motion to Stay Pending Conclusion of Rulemaking, *New York v. EPA*, Case No. 1:18-cv-00773(D.D.C. Sept. 27, 2019), ECF No. 59; *see also* EPA's Reply in Support of their Motion to Stay Pending Conclusion of Rulemaking, *New York v. EPA*, Case No. 1:18-cv-00773(D.D.C. Oct. 25, 2019), ECF No. 63.

This course of conduct suggests that the EPA's true motivation in the Proposal was to eliminate the legal trigger for existing source regulations and that the Agency used "redundancy" as a sham justification for its predetermined decision. Withdrawing the ICR was merely a means of halting the process of developing existing source emission guidelines until the EPA was able to issue this rule, absolving itself of any legal obligation to do so.

In sum, the Proposal's flimsy "redundancy" rationale is a stand-in for EPA's true rationale—eliminating the Agency's authority and obligation to issue existing source standards, thus rendering the Proposal arbitrary and pretextual. If the rulemaking process "is to be more than an empty ritual," the agency must provide its true reasoning rather than hide behind a façade.

III. The Proposal is Unlawful Because It Doesn't Adequately Consider Implications for Existing Source Emissions.

In the Proposal, "EPA recognizes that by rescinding the applicability of the NSPS, issued under CAA section 111(b), to methane emissions for the sources in the Crude Oil and Natural Gas Production source category that are currently covered by the NSPS, existing sources of the same type in the source category will not be subject to regulation under CAA section 111(d)." 84 Fed. Reg. at 50,271. Despite this "recognition" of impacts for existing sources, EPA fails to explain how its Proposal addresses EPA's obligations under the CAA to prevent pollution from these sources. EPA has concluded that the oil and gas source category, including existing sources, significantly contributes to endangerment of human health and welfare. Without reversing those findings, it cannot simply ignore them. Likewise, EPA fails to meaningfully assess the extent of those emissions impacts themselves—a failure that is arbitrary in its own right, and that also renders the Agency's conclusions on redundancy unlawful. A proper analysis would illustrate that there will be substantial harmful pollution from these sources absent federal emissions guidelines. Finally, EPA's claims there will be "limited impact" from not regulating existing sources due to source turnover, market incentives, voluntary programs, and state requirements are manifestly untrue, factually unsupported, and run counter to the evidence before the agency. EPA must grapple with the true consequences of its Proposal—and give the public a fair opportunity to do so as well by seriously analyzing and presenting those impacts—which it thus far has not done.

A. By rescinding the 2016 Rule's methane requirements, EPA's Proposal attempts to unlawfully skirt the Agency's legal obligation under the Clean Air Act to address methane pollution from existing oil and gas sources.

EPA's foremost obligation under the Clean Air Act is "to promote the public health and welfare." 42 U.S.C. § 7401(b)(1). Under section 111 of the CAA, when EPA finds that a category of sources emit pollution that endangers human health and welfare, it must promulgate regulations to reduce emissions of pollutants from the source category. As discussed *supra* § IA1, in section 111, Congress directed the Administrator to list categories of sources based on a category's air pollution, without distinguishing new versus existing sources. 42 U.S.C. § 7411(b)(1)(A). Congress then required EPA to address both new and existing sources of air pollution in each listed category. *Id.* §7411(b)(1)(B), (d).

Section 111(d) provides that:

> The Administrator *shall* prescribe regulations… under which each State shall submit to the Administrator a plan which (A) establishes standards of performance for any existing source for any air pollutant [not subject to requirements under the NAAQs program or section 112] to which a standard of performance under this

> section would apply if such existing source were a new source, and (B) provides for the implementation and enforcement of such standards of performance.

Id. § 7411(d)(1) (emphasis added). EPA's regulations implementing section 111(d) require the agency to propose emission guidelines for existing sources "[c]oncurrently upon or after proposal of standards of performance" under section 111(b). 40 C.F.R. § 60.22(a).

In the Proposal, "EPA recognizes that by rescinding the applicability of the NSPS, issued under CAA section 111(b), to methane emissions for the sources in the Crude Oil and Natural Gas Production source category that are currently covered by the NSPS, existing sources of the same type in the source category will not be subject to regulation under CAA section 111(d)." 84 Fed. Reg. at 50,271. EPA fails to explain how rescinding methane requirements in the NSPS and avoiding the promulgation of section 111(d) guidelines furthers EPA's duty to protect the public health and welfare. Instead, the Proposal seeks to shirk EPA's long-overdue obligation to promulgate section 111(d) guidelines for existing sources based on the unsupported and legally irrelevant criteria of "redundancy." And rather than reckoning with the true public consequences of its action, EPA dismisses the harm its Proposal will do by asserting, against all evidence, that "the lack of regulation of existing sources under CAA section 111(d) will not mean a substantial amount of lost emission reductions" because factors outside of the CAA will allegedly mitigate the environmental impact of EPA's Proposal. *Id.*

As explained in detail below, EPA's claim that the Proposal' will have a "limited impact" on existing source emissions is demonstrably wrong. Moreover, none of the considerations that EPA cites in an attempt to support this claim—source modification, market incentives, voluntary programs, or state requirements—are factors the agency can consider when determining whether to establish standards under section 111(d) anyway. Indeed, these factors are precisely the ones that Congress *rejected* when it chose to require *uniform national* standards. The CAA is clear: EPA "shall prescribe regulations" for existing sources in listed source categories that are subject to new source requirements for air pollutants not regulated under the NAAQS or section 112. 42 U.S.C. § 7411(d)(1). The statute does not give EPA discretion to decline to issue section 111(d) regulations based on other factors, including those that EPA lists here.

The Agency may argue that these factors do not pertain to its underlying reason for the Proposal, but are merely explanations as to why the Proposal's impacts on those sources will allegedly be "limited." Rather—the argument might go—EPA's basis for the Proposal is the alleged "redundancy" of the 2016 Rule's methane controls and its VOC controls. Yet as we discussed extensively above, that rationale is unlawful and arbitrary, as well as pretextual. Removing EPA's legal obligation to control existing source emissions from the oil and gas sector is no mere effect of the Proposal, but is its fundamental drive and purpose. In that regard, EPA's reliance on source modification, market incentives, voluntary programs, and state requirements to justify the Proposal exceeds the agency's authority under the CAA. *See Massachusetts v. EPA*, 549 U.S. 497, 533-535 (2007) (EPA cannot rely on a "laundry list of reasons not to regulate" when there is a "clear statutory command" under the CAA). Ultimately, the Proposal ignores EPA's obligations under the CAA to regulate new and existing sources from the oil and gas sector. It is thus unlawful and must not be finalized.

B. EPA cannot decline to regulate methane emissions from this sector because of methane's role in ozone formation.

In the Proposal, EPA asks whether it can decline to regulate methane emissions from existing sources because methane contributes to background levels of ozone, which is, in turn, a pollutant regulated under section 108 of the Act (and therefore not susceptible to regulation under section 111(d)). 84 Fed. Reg. at 50,269. In support of this position, EPA cites section 302(g) of the statute, which defines the term "air pollutant" to "include[] any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term 'air pollutant' is used." 42 U.S.C. § 7602(g). As an initial matter, the Proposal does not dispute (and it is undisputable) that "air quality criterial have not been issued" for methane, that methane "is not included on a list published" under section 108(a), and that methane is also not regulated under section 112. 42 U.S.C. § 7411(d). Moreover, methane is a potent greenhouse gas, *infra* § IIIC, and, as EPA has recognized, the purpose of methane regulation under section 111 is plainly to help mitigate impacts associated with climate change. *See, e.g.*, 81 Fed. Reg. at 35,825 ("The EPA includes requirements for methane emissions in this action because methane is one of the six well-mixed gases in the definition of GHGs and the oil and natural gas source category is one of the country's largest industrial emitters of methane.").

It is equally plain that the purpose of methane regulation under section 111 is not ozone mitigation. For EPA to claim otherwise would be foreclosed by the Agency's longstanding treatment of methane as a negligibly reactive VOC—in other words, a substance that EPA expressly *does not* regulate for the purpose of controlling ozone.[63] Indeed, EPA defines VOC at 40 C.F.R. § 51.100(s) to mean:

> [A]ny compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions.
>
> (1) This includes any such organic compound other than the following, which have been determined to have negligible photochemical reactivity: Methane . . .

40 C.F.R. § 51.100(s)(1). The same regulations make clear that these negligibly reactive substances may be excluded when determining compliance with VOC emission limits. *Id.* § 51.100(s)(2). Methane was one of the first four compounds that EPA listed as negligibly reactive under these regulations. In doing so, the Agency underscored its view that "[i]n determining reductions required to meet oxidant NAAQS, these VOC [including Methane] should not be included in the base line nor should reductions in their emission be credited toward achievement of the NAAQS." 42 Fed. Reg. 35,314 (July 8, 1977). In a 2005 Federal Register notice affirming this policy, EPA further noted:

> Under virtually all existing programs, EPA and States exclude certain negligibly reactive compounds from the regulatory definition of VOC and thus exempt them

[63] The proposal recognizes this treatment, 84 Fed. Reg. at 50,269 n. 86, though offers no basis for disregarding it.

> from regulation as ozone precursors. This exemption policy serves two important purposes:
>
> (1) Because EPA does not give VOC reduction credit for programs that reduce emissions of negligibly reactive compounds, control efforts are focused on emissions that contribute significantly to the formation and accumulation of ozone. The Agency continues to believe that it is not appropriate, and would be misleading, to give VOC reduction credit to States or industries for reducing emissions of compounds that have little or no effect on ozone concentrations . . . .

70 Fed. Reg. 54,046, 54,049–54,050 (Sept. 13, 2005).

Since its initial action in 1977, EPA has identified more than 60 compounds that it has determined to be negligibly reactive, most recently in a rule finalized in November of 2018. 83 Fed. Reg. 61,127 (Nov. 28, 2018).[64] Across that 40-year stretch, EPA never disturbed its initial finding that methane is negligibly reactive for purposes of its contribution to ozone formation. In light of the Agency's own extensive and unbroken history of treating methane in this fashion, it would be manifestly arbitrary and unlawful for it to adopt precisely the opposite conclusion in this rulemaking. Moreover, for purposes of 111(d) regulation, EPA proposes to determine VOCs are precursors to ozone that cannot be regulated under section 111, relying partially on the treatment of those substances under section 108[65] – the very thing that EPA would be arbitrarily (and inconsistently) disregarding should it seek to similarly classify methane.

The Agency's questions about whether it can treat methane as an ozone precursor not subject to existing source emission guidelines under section 111(d) is still more evidence that the Agency's stated rationales are pretextual, and that its true motivation is to avoid existing source regulation despite the deep legal and factual flaws with that approach.

C. EPA arbitrarily fails to assess the Proposal's impacts on existing source emissions in any meaningful way, and a proper analysis shows that those impacts will result in substantial amounts of harmful pollution.

In the Proposal, EPA claims that "the lack of regulation of existing sources under CAA section 111(d) will have limited environmental impact," but utterly fails to back up this faulty assertion with any a meaningful analysis, particularly a detailed quantitative analysis that is critical to properly evaluate those emissions impacts. 84 Fed. Reg. at 50,273. A robust quantitative analysis shows that there will be substantial emissions from existing sources that will go uncontrolled if EPA finalizes the Proposal and avoids issuing existing source emission

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[64] A full list of exempt substances is available at https://www.epa.gov/ground-level-ozone-pollution/complete-list-voc-exemption-rules.

[65] EPA's focus on the treatment of VOC under section 108 also disregards the fact that one of the important purposes the agency (wrongly) ascribes to VOC regulation *in this proposal* is to reduce methane emissions. 84 Fed. Reg. at 50,261 n.66 ("[EPA's] current view is that what is important is that the VOC requirements will assure that the methane emissions reductions occur").

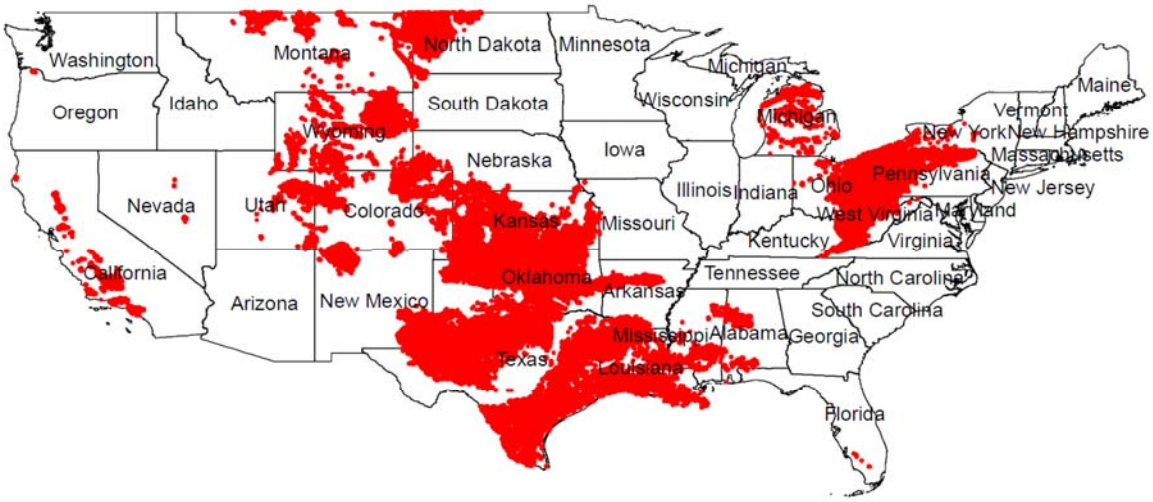
guidelines under section 111(d). Those emissions will exacerbate climate change and threaten public health, and the agency's attempts to reverse-engineer a way to avoid its obligation to reduce them violates the Clean Air Act.

EPA must examine all relevant data and articulate a satisfactory explanation for its action, including a "rational connection between the facts found and the choice made." *State Farm*, 463 U.S. at 43; *see also Genuine Parts Co. v. Envtl. Prot. Agency*, 890 F.3d 304, 313 (D.C. Cir. 2018) (holding that EPA failed to consider an important aspect of the problem by ignoring relevant evidence in the rulemaking record). This requires EPA to provide "sufficient clarity or specificity" that goes beyond a mere "conclusory statement," to weigh competing views, to examine the relevant information, and to show that the data relied upon is accurate and defensible. *Am. Min. Cong.*, 907 F.2d at 1190–91; *Int'l Fabricare Inst. v. Envtl. Prot. Agency*, 972 F.2d 384, 392 (D.C. Cir. 1992); *FERC v. Elec. Power Supply Ass'n,* 136 S. Ct. 760, 784 (2016); *Dist. Hosp. Partners v. Burwell*, 786 F.3d 46, 57 (D.C. Cir. 2015). Agencies must use "the best information available" in reaching their conclusions. *Flyers Rights Education Fund v. FAA*, 864 F. 3d 738, 745 (D.C. Cir. 2017); *cf. Catawba County v. EPA*, 571 F.3d 20, 45 (D.C. Cir. 2009). EPA fails to meaningfully assess the Proposal's impacts on existing source pollution, even as it acknowledges those impacts, and despite having ample analytical tools and emissions data at its disposal. This failure reflects quintessentially arbitrary and capricious agency action.

In the absence of any such quantitative analysis by EPA, commenters Environmental Defense Fund ("EDF") and Clean Air Task Force ("CATF") separately modeled the impacts on emissions from existing oil and gas sources that would result from EPA's Proposal. A full description of the methodology and analysis is included in Appendix D and Appendix E to these comments. Briefly, these analyses first characterize the existing sources that would be covered under section 111(d) emission guidelines. They then quantify both the emissions associated with these sources and the emissions reductions that would be achieved by section 111(d) guidelines that mirror requirements under the current NSPS.

The EDF analysis first identified existing oil and gas wells around the country, finding over 850,000 producing wells that would be covered by section 111(d) guidelines. Figure 2 displays a map of these existing wells.

Figure 2: Map of Existing Wells



The analyses then calculated the projected emissions from these wells and from all other existing equipment that would be covered under a section 111(d) guidelines that corresponded to the 2016 NSPS. EDF and CATF both found that these existing sources will emit substantial amounts of methane, VOC, and hazardous air pollutants (HAPs) in the coming years, and that the Proposal would eliminate major emission reductions from existing sources that would otherwise occur under a section 111(d) rule.

For example, in 2021, 9.8 million metric tons of methane will be emitted by potentially affected existing sources. This is equivalent to the 20-year climate impact of over 170 million passenger vehicles driving for one year or nearly 900 billion pounds of coal burned.[66] The EDF analysis further estimates that 3.6 million metric tons of those methane emissions, or 37 percent, could be avoided if EPA issued section 111(d) guidelines that simply mirrored the same requirements as the current NSPS.[67] This is equivalent to the climate impact of over 60 million passenger vehicles driving for one year or over 330 billion pounds of coal burned. Similarly, the CATF analysis estimates that in 2025, 3.2 million metric tons of methane pollution could be prevented by section 111(d) guidelines, equivalent to the carbon dioxide emissions from 70 coal plants.[68] Table 2 summarizes EDF's analysis of the annual emissions that will continue to occur at potentially affected existing sources if EPA continues to delay the promulgation of existing source regulations. While total emissions from existing sources decline each year as a larger fraction of the overall number of sources become new or modified, even by 2030, emissions from existing sources will be very substantial, and the cumulative impact is staggering. Table 2 also shows that significant emissions reductions are possible at these existing facilities.

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[66] Calculation uses the IPCC AR5 WGI 20-year GWP of 84, which does not account for feedback effects or oxidation.

[67] Several states that regulate new and existing sources apply the same technologies and best practices to both new and existing facilities. *See, e.g.*, 5 Colo. Code Regs. 1001-9 (2018).

[68] EPA GHG Equivalencies calculator, using CH4 GWP of 87. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

Table 2: EDF Analysis of Estimated Emissions at Affected Existing Sources and Potential Reductions Under Section 111(d) Guidelines

Time Period	Total Emissions from Affected Existing Sources [metric tons]			Emissions that Could be Prevented by Section 111(d) Guidelines [metric tons]		
	Methane	VOC	HAPs	Methane	VOC	HAPs
2017	11,689,715	2,741,847	103,115	4,253,249	1,022,588	38,484
2018	11,099,151	2,597,590	97,684	4,067,664	977,969	36,805
2019	10,622,933	2,472,822	92,978	3,915,227	938,202	35,305
2020	10,184,924	2,360,138	88,729	3,740,813	893,495	33,620
2021	9,785,180	2,256,193	84,809	3,583,294	852,460	32,072
2022	9,413,009	2,158,703	81,132	3,438,607	814,377	30,635
2023	9,025,023	2,059,736	77,402	3,287,058	775,799	29,181
2024	8,647,856	1,964,209	73,802	3,136,680	737,802	27,749
2025	8,294,707	1,874,858	70,434	2,997,488	702,609	26,423
2026	7,967,127	1,791,676	67,299	2,867,333	669,482	25,175
2027	7,657,181	1,712,896	64,330	2,744,475	638,148	23,994
2028	7,366,050	1,639,260	61,555	2,629,755	609,015	22,896
2029	7,099,500	1,571,426	58,998	2,524,569	582,076	21,880
2030	6,854,814	1,508,791	56,637	2,428,541	557,245	20,944
Total 2017-2030	**125,707,170**	**28,710,145**	**1,078,904**	**45,614,753**	**10,771,267**	**405,163**

In addition to substantial amounts of climate-forcing methane, existing sources are projected to emit very large quantities of VOC and HAPs, which negatively affect public health. *See* Appendix G, Ananya Roy and Tammy Thompson, Health Impacts of Oil and Natural Gas Operations. Among other harms, VOCs emitted from the oil and gas sector form ozone, which can cause a number of harmful effects on the respiratory system, is linked to increased rates of strokes, heart problems, and neurological effects, and can lead to premature death. Oil and gas sources also emit HAPs such as benzene and formaldehyde, known human carcinogens. These emissions are of particular concern to populations that live in close proximity to oil and gas infrastructure, and certain sub-populations, such as children, the elderly, and low-income communities, who are at a greater risk still.

By identifying existing well sites, the EDF analysis was also able to identify the local communities that would be disproportionately affected by the air pollution allowed by EPA's Proposal. The analysis finds that approximately 9,300,000 people live within half a mile of an existing well in the U.S., including approximately 600,000 children under the age of five years and 1,400,000 elderly people over the age of 65 years, who are especially sensitive to the health risks posed by ozone and other local air pollution. Additionally, approximately 1,400,000 people living below the poverty line live within half a mile of an existing well; these communities are also at a heightened risk due to such factors as lack of access to medical care. EPA arbitrarily ignores these effects and makes no use of the available tools to quantify and monetize the benefits of VOC reductions from the oil and gas sector.[69]

Indeed, EPA's failure to analyze the Proposal's impacts on existing source emissions is particularly remarkable given that, in the very same month, the Agency also released a report analyzing global non-CO_2 greenhouse gas mitigation opportunities. [70] For major oil- and gas-producing countries, including the United States, the report discussed emissions projections, available controls, the cost and effectiveness of such controls, and overall mitigation opportunities.[71] The report's estimates of business-as-usual emissions do not account for the effects of policy future measures, although they do incorporate existing policies for which data are available. In the report, EPA found that the U.S. had the second highest technical abatement potential of methane emissions from the oil and gas sector across all countries, concluding that, by 2030, the U.S. could reduce 5.4 million metric tons of methane from this industry. The main contributors to these reductions are directed inspection and maintenance programs, like the 2016 rule's leak detection and repair requirements, along with measures to reduce emissions from pneumatic controllers. Yet the Proposal would bar EPA from imposing these requirements on existing sources (while also removing their application to *new* sources in the transmission and storage segments). Accordingly, even EPA's own contemporaneously released report further underscores the arbitrary nature of the Proposal's conclusion that existing source standards would not make a meaningful difference in emissions from the oil and gas sector.

D. EPA's claims that the absence of existing source regulations will have limited impacts due to source turnover, market incentives, voluntary programs, and state requirements are contradicted by the evidence.

As discussed above, EPA's mandatory duty to regulate pollution from existing sources under section 111(d) is not excused by the presence of other factors that the Agency claims would help to mitigate some of that pollution. In particular, the Proposal's excuses that these other factors (like state regulations and voluntary programs) will mitigate pollution, in addition to being wrong, run straight into the purpose of the Act to produce *uniform* standards. In enacting the Clean Air Act, Congress was specifically concerned with establishing *uniform* standards

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[69] *E.g.* Fann et al., *Assessing Human Health PM2.5 and Ozone Impacts from U.S. Oil and Natural Gas Sector Emissions in 2025*, 52 *ENVT'L SCI. & TECH.* 2018, 8095 ("Fann et al.").

[70] U.S. EPA, *Global Non-CO_2 Greenhouse Gas Emission Projections & Mitigation Potential: 2015-2050* (Sep. 2019), https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-non-co2-greenhouse-gas-emission-projections.

[71] *See* U.S. EPA, *Global Non-CO_2 Greenhouse Gas Emission Projections & Marginal Abatement Cost Analysis: Methodology Documentation* 5-14 (Sep. 2019), https://www.epa.gov/sites/production/files/2019-09/documents/nonco2_methodology_report.pdf.

throughout the United States, rather than leaving air pollution regulation solely to the states and industry (as the Proposal would do). The House Report accompanying the 1970 Act explained the benefits of uniform national standards for new sources as distinguished from leaving this issue to the states, explaining:

> The Secretary is authorized and directed to establish Federal emission standards for new stationary sources where emissions from such sources are extremely hazardous or where such emissions contribute substantially to the endangerment of the public health or welfare. The purpose of this new authority is to prevent the occurrence anywhere in the United States of significant new air pollution problems arising from such sources either because they generate extra hazardous pollutants or because they are large-scale polluters.
>
> At present emission standards for stationary sources are established exclusively by the States.
>
> The promulgation of Federal emission standards for new sources in the aforementioned categories will *preclude efforts on the part of States to compete with each other in trying to attract new plants and facilities without assuring adequate control of extra-hazardous or large-scale emissions therefrom*. Such emission standards may be enforced either by a State as part of that State's plan or by the Secretary if a State fails to include such standards within its plan.

H.R. Rep. No. 91-1146, at 3 (1970) (emphasis added). The Report also states that, "the basic strategies in the Nation's war against air pollution *must be developed in a unified and consistent way by the Federal Government . . . .*" *Id.* at 15 (emphasis added).[72] The Proposal itself seems to recognize this elsewhere. 84 Fed. Reg. at 50,264 (discussing legislative history as promoting a "uniform standard of proof"). Statutory language in other sections of the Act further supports this. While Congress allowed States to set *higher* standards than those set by EPA, it specifically precluded standards that are "less stringent than the [federally established] standard or limitation." 42 U.S.C. § 7416.

Furthermore, EPA's approach here of using a Proposal to solicit data that would provide a post-hoc justification for its preferred outcome is unlawful under section 307 of the CAA, as commenters have discussed in detail with respect to other rulemakings.[73] In any event, the

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[72] Similarly, in discussing the Clean Air Act Amendments of 1977, Senator Muskie—one of the chief architects of the Act—explained:

> Under the Clean Air Act Amendments of 1970, section 111 requires that EPA promulgate performance standards reflecting the best system of emission limitation for new sources. Congress had several reasons for including this requirement. First, *standards with a degree of uniformity are needed to avoid situations where some States may attract industries by relaxing standards relative to other States*.

Senate Consideration of the Report of the Conference Comm., at 353 (1977) (emphasis added).

[73] Under section 307, EPA must include in its proposed rule any data supporting the proposal so the public can meaningfully comment. 42 U.S.C. § 7607(d)(3)(A). Here, EPA puts the cart before the horse: instead of providing comprehensive and defensible data to support its proposed revisions to the NSPS, EPA attempts to use the Proposal

limited data and analysis that EPA *does* provide in the Proposal in no way supports the Agency's conclusion that the absence of existing source regulations will have limited impacts, for the specific reasons discussed below.

1. Source turnover will not address vast quantities of emissions from existing sources.

With limited analysis, EPA asserts in the Proposal that many currently existing sources will become "modified" sources in the future, thus becoming subject to the 2016 Rule's requirements, while other existing sources will be replaced by new facilities or shut down. 84 Fed. Reg. at 50,273. According to EPA, this will purportedly result in an "expected reduction of methane emissions from existing sources" absent section 111(d) emission guidelines. *Id.* But the data that EPA includes in the Proposal and record do not support its sweeping conclusion that turnover and obsolescence will "mitigate the environmental impacts of lack of direct existing source regulation under CAA section 111(d)." *Id.* Moreover, even if the *agency* had presented such evidence, it would not (and could not) address the scientific imperative of reducing methane emissions *now* given the potent, fast-acting nature of this pollution and its outsized contribution to near-term warming. *See supra* § Introduction.

EPA indicates in the Proposal that it reached this conclusion based on data from the U.S. Greenhouse Gas Inventory (GHGI) (for pneumatic controllers, compressors, tank throughput, and well completions); Drillinginfo.com (for well completions); and OOOOa compliance reports (for assessing turnover rates). These data do not support EPA's turnover conclusions, and in any event, exhibit significant limitations for assessing turnover and obsolescence rates. For example, the GHGI provides absolute source *counts* for each year, but does not include information on *specific sources*—meaning it is not possible to assess the number of sources that are new, those number that have ceased operation, or the number that have remained in use over a time period.[74] In other words, the GHGI data does not bear at all on the questions EPA raises with respect to turnover rates. Furthermore, the analysis simply ignores huge sources of emissions, such as reciprocating compressors and all leaks downstream of wellpads.

We address the data EPA has provided by source below.

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to *collect* supportive information and thereby shield it from public review and critical examination. *See* Joint Environmental Comments on NSPS Reconsideration, at 55–65, Dkt. No. EPA-HQ-OAR-2017-0483-0223 (Nov. 1, 2018).

[74] It is appropriate to analyze the impact of turnover on emissions by assessing impacts on the *number* of affected sources, rather than by considering how turnover will affect percentages of production subject to standards, as some in industry have urged, because the *number* of existing sources is directly relevant to emissions from those sources. EPA recognizes the relationship between affected source counts and aggregate emissions in the Agency's approach for calculating baseline emissions and projected emissions reductions, where EPA first develops model plants, then develops emissions estimates for each model facility, and finally estimates total emissions across affected sources based on activity data. *See, e.g.* 2016 TSD at 131. And as commenters have discussed extensively in past rulemakings, at the site-level, absolute emissions at low-production sites are similar to emissions at sites with higher production. *See* Joint Environmental Comments on EPA's Reconsideration Proposal at 101-102.

a. Pneumatic Controllers

The Proposal compares data on the counts of high-bleed, low-bleed, and intermittent-bleed pneumatic controllers from the GHGI from 2011–2017. 84 Fed. Reg. at 50,273. Counts of high-bleed and low-bleed pneumatic controllers decreased by 74 percent and 41 percent, respectively, between 2011 and 2017, while counts of intermittent-bleed controllers increased by 52 percent. *Id.* According to EPA, this suggests a high rate of turnover for pneumatic controllers and relatively few remaining high-bleed pneumatic controllers. *Id.* But there are numerous problems with relying on these numbers to claim a high turnover rate of existing controllers. For example, as we describe above, the GHGI data isn't disaggregated in a way that allows for separation of new and existing sources.

It is also critical to note that the decreasing trend in the counts of high-bleed pneumatic controllers discussed above is far from uniform nationwide, as can be seen by examining EPA's GHGRP data. The counts of these highly polluting devices have dropped dramatically in basins where regulations require operators to remove them, such as Colorado's Denver and Piceance basins and Wyoming's Green River Basin, and basins with declining well counts such as the San Juan basin.[75] At the same time, there are basins with large numbers of high-bleed pneumatic controllers where the counts have been flat or even rising from 2011-2018. Table 3 shows three examples of basins where the counts of high-bleed controllers fluctuate, but there is no clear downward trend. In fact, in both the Anadarko and Uinta Basins, counts were higher in 2018 than in 2011 (despite the substantial air quality problems in the Uinta Basin).

Table 3. Counts of High-Bleed Pneumatic Controllers.

	Counts of High-Bleed Pneumatic Controllers							
BASIN	2011	2012	2013	2014	2015	2016	2017	2018
260 - East Texas Basin	1,627	2,682	2,906	2,706	1,615	1,434	1,471	1,391
360 - ANADARKO BASIN	7,766	7,896	7,255	6,364	6,390	7,252	9,838	8,470
575 - Uinta Basin	1,233	1,311	386	347	1,434	1,541	1,296	1,752

Given the persistence of these polluting devices in a number of large basins, there is no reason to believe that the number of high-bleed controllers will continue to decrease at an appreciable rate nationwide, now that state existing source regulations have had their effect in Colorado and Wyoming. EPA cannot rely on this pattern persisting into the future.

Finally, the fluctuations in counts from year-to-year shown in the table makes clear that there is large uncertainty in the counts of these devices, as has been noted in previous studies.[76]

b. Compressors

According to the Proposal's analysis of the GHGI data, counts of wet-seal compressors remained the same from 2011 through 2017, counts of dry-seal compressors increased by 21

[75] Part of the San Juan basin stretches into Colorado, so a portion of the decrease in the count of high-bleed pneumatic controllers is likely due to the regulations requiring replacement of these devices in Colorado.
[76] *See* Allen et al, *Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers*, 49 ENVTL. SCI. TECH. 633, 639 (Dec. 9, 2014), https://pubs.acs.org/doi/pdf/10.1021/es5040156.

percent (an increase of 58 compressors), and the number of processing plants increased by 61. 84 Fed. Reg. at 50,273. This data suggests extremely low turnover rates for wet-seal centrifugal compressors—possibly none *at all* over six years. In short, the GHGI data does not provide *any* support for the proposition that turnover will mitigate the need to control emissions from existing compressors.

EPA has pointed to no information that supports its assertion that compressors will turnover quickly. A review of two of the largest of the manufacturers of these compressors illustrates the long operating lives of compressors.[77] There are tens of thousands of reciprocating compressors in the natural gas industry, vastly outnumbering centrifugal compressors. Indeed, analysis of the EPA GHG Reporting Program reveals that reciprocating compressors were responsible for 40% more methane emissions than centrifugal compressors in 2017. To our knowledge, there is no evidence that there is any significant turnover in the existing fleet of reciprocating compressors. EPA's failure to even mention reciprocating compressors as they present analysis of the turnover of compressors is indicative of the inadequacy of this analysis.

c. Storage Vessels

The Proposal considers changes in throughput at large, uncontrolled storage vessels, stating that "*if* many existing storage vessels were being replaced, becoming subject to 2016 NSPS OOOOa and then installing controls, we *may* expect production throughput at large uncontrolled storage tanks to decline, with corresponding increases at controlled tanks." 84 Fed. Reg. at 50,273 (emphasis added). However, this hypothesis is not borne out by the GHGI data that EPA cites, which shows an 18 percent *increase* in oil production throughput at large uncontrolled tanks. *Id.* While this growth in throughput is less than at controlled tanks, the increase shows that substantial emissions are continuing to occur at unregulated tanks.

d. Well Completions

The Proposal includes data from the GHGI on well completions, presumably as a proxy for wellsite turnover. This data shows a decrease in the completion rate at natural gas wells from 2.4 percent to 1.1 percent between 2011 and 2017, and a steady completion rate of 3 percent at oil wells over that time period. 84 Fed. Reg. at 50,273-74. EPA recognizes that these ratios indicate "that a relatively small number of wells are completed each year." *Id.* at 50,274. Similarly, Drillinginfo data indicates that only roughly a third of wells have been completed in the last 10 years, while roughly two-thirds of wells have not undergone a completion in the past decade. *Id.* These data, which shows completions are limited relative to the total population of wells, completely undermines the assertion that modifications and new development will rapidly subject a large proportion of wells to NSPS requirements. Instead, the data suggest that existing

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[77] *See* Dresser Rand, Prospectus, at 2 (Aug. 4, 2005) (noting that compressors manufactured by Dresser Rand, then the "market leader in North America in new unit sales of turbo and reciprocating compressors" with "approximately 38% of all the units in our classes of products that are currently in operation and is the largest installed base of such equipment in the industry," have a "typical operating life of 30 years or more"), https://www.sec.gov/Archives/edgar/data/1316656/000095012305009520/y08819b4e424b4.htm; COMPRESSORtech^2, *Legacy Equipment Gets OEM Support*, at 2 (January-February 2014) (noting that equipment turnover "is a long-term process since the life of a [reciprocating compressor] is about 50 years") https://www.neuman-esser.de/en/company/media/nea-in-the-press/legacy-equipment-gets-oem-support/.

wells will continue to be a significant portion of total wells, representing a major emissions problem.

Perhaps recognizing that this data does not support its theory that existing wells will rapidly become subject to the NSPS (thus mitigating the need for existing source standards), EPA solicits additional data on well completions and requests comment on how to characterize wells sharing well sites (i.e., on whether EPA should assume that wells that have not undergone recent completion share a site with a well that has been recently completed, and are thus subject to the NSPS). *Id.* Absent significant additional information (which must be made available for public review and comment to the extent it exists), EPA lacks sufficient evidence to assume any significant number of existing wells have been recently completed (or share a site with a recently completed well) and are subject to the NSPS; nor is it proper for EPA to assume that significant turnover will occur at existing well sites in the near future.

e. Compliance Reports

In the Proposal, EPA also includes data from NSPS OOOOa compliance reports on the number of facilities subject to the NSPS. 84 Fed. Reg. at 50,274.[78] EPA indicates that:

> A high rate of turnover (*e.g.,* a high rate of facilities performing modification(s) which caused them to become subject to the 2016 NSPS OOOOa) would imply that a *large number of facilities should be submitting compliance reports*. Thus, *the general proportions of the number of facilities in the compliance reports versus the total population indicates how quickly facilities became subject to the NSPS during this period*.

Id. (emphasis added). Despite recognizing this relationship (and without accounting for the fact that the numbers of facilities submitting compliance reports reflects new facilities as well as modified facilities), EPA fails to compare the number of facilities in the compliance reports to the known total population of those facilities. We compare the number of facilities reporting subject to the NSPS to the total counts of those facilities from the GHGI below in Table 4. This comparison underscores that the vast majority of facilities in the oil and gas sector are not currently complying with the NSPS—and the extremely small fraction of facilities (ranging from 0.52 percent of pneumatic pumps at well sites to 5.70 percent of processing plants) that *are* reporting compliance indicates that there is limited turnover in sources, and that emissions from unregulated, existing sources remain a major problem (for context, EDF's emissions impacts analysis assumes a 5% turnover rate, which is at the high end of this range, and though overly conservative, shows persistent and substantial emissions impacts from existing sources). Furthermore, the numbers of facilities reporting compliance reflect both new and modified facilities, so turnover from existing sources is even more limited than might be implied by the percentages in Table 4.

[78] EPA does not include the relevant compliance report data in the regulatory docket for this proposal, and has long delayed releasing reports to the public. *See* 2018 Joint Environmental Comments on NSPS Reconsideration, at 61–63.

Table 4: Comparison of Source Counts in OOOOa Compliance Reports and GHGI*

Source	OOOOa Compliance Reports (as reported in 2019 NSPS)	GHGI	% of Sources Submitting OOOOa Reports	Notes
Wells	2,991 well sites	978,176 wells	0.61%**	** Comparison assumes 2 wells per well site based on EPA assumptions
Storage Vessels	697	No data on number of storage vessels, only throughput	--	
Pneumatic Pumps at well sites	663	126,932	0.52%	**Assuming all chemical injection pumps are pneumatic pumps
Compressor stations	130	7,284	1.78%	
Reciprocating Compressors at compressor stations	148	5,331	2.78%	**GHGI value is number of reciprocating compressors at transmission and storage compressor stations only; no data available for compressor stations in the production segment
Processing Plants	38	667	5.70%	
Reciprocating Compressors at processing plants	32	4,179	0.77%	

* Pneumatic controllers are not included in this comparison, as there are limited circumstances in which pneumatic controllers must report compliance as affected facilities under OOOOa. OOOOa compliance report data for compressors and processing plants does not appear to include reports for facilities subject to OOOO but not OOOOa.

We also evaluated the responses to EPA's 2016 Information Collection Request for the Oil and Natural Gas Industry that the agency received before withdrawing that request, which also indicate that only a small fraction of oil and gas facilities are regulated under the NSPS and the vast majority of facilities are existing sources. Under part of Part 1 of the surveys, facilities were required to report whether they were subject to OOOOa. Only 3 percent of wells (4,880 of 160,929 reported wells) and 14 percent of central production sites (2,893 of 20,263 central production facilities) were reported as subject to OOOOa. *See* Appendix C, Dana Lowell, MJ Bradley & Associates, Rate of Equipment and Site Turnover to NSPS OOOOa Regulation. Once again, EPA's claim that rapid turnover will obviate the need for existing source regulations is soundly rebutted by on-the-ground evidence.

2. Market incentives will not address vast quantities of emissions from existing sources.

The Proposal next asserts that "operators have market incentives to reduce emissions and the loss of valuable product to the atmosphere… [d]epending on the future trajectories of natural gas prices and the costs of natural gas capture… market incentives speak to the question of whether, even in the absence of specific regulatory requirements applicable to methane emissions from existing sources, meaningful emission decreases can nevertheless be projected to occur." 84 Fed. Reg. at 50,274. Thus, the Agency reasons, existing source regulations are simply not needed: companies can be trusted to curb their emissions on their own, without a regulatory driver in place, out of pure financial self-interest.

There are a number of severe flaws with EPA's theory that market incentives will significantly address methane emissions existing oil and gas sources. First, after noting these theoretical "market incentives," including the fact that they largely depend on natural gas price trajectories, EPA fails to conduct any analysis of how operators might be anticipated to reduce their emissions in light of expected natural gas prices. In reality, examples abound of operators choosing to flare or vent gas, rather than capture it, under current market prices. Second, EPA ignores a fundamental economic principle in its discussion of market incentives: when there is a negative externality associated with an activity (here, the emission of both climate-disrupting and conventional pollution) that is not reflected in an individual operator's costs, market incentives are typically insufficient to reduce the activity to socially optimal levels. Third, the emissions trends noted by EPA do not support the proposition that market incentives are adequate to reduce methane emissions from existing sources in lieu of federal regulation. Quite the opposite, the data cited by EPA shows that emissions from the oil and gas industry have remained persistently high despite those incentives.

First, EPA neglects to actually analyze the extent to which operators have an incentive to reduce loss of gas (and correspondingly methane emissions) under current and projected gas prices. Recent evidence suggests that at current gas prices, companies are venting or flaring gas rather than capturing it for sale. For example, a recent study shows that gas venting and flaring in the Permian Basin, which spans Texas and New Mexico and is one of the world's leading oil-

and gas-producing regions, has *tripled* in the past two years.[79] Similarly, CATF analysis of data from North Dakota[80] shows that this past summer, flaring in North Dakota surged to unprecedented levels. In June and July 2019, producers in the stated wasted almost 21 bcf of gas per month – almost a quarter of the gas produced in the state. This is a staggering amount: in each month, producers flared off roughly twice the gas consumed by North Dakotans for home heating *in a year*. The carbon dioxide pollution from this flaring is also enormous – as much as at least four coal-fired power plants operating for a month.

Furthermore, EPA data shows that industry often fails to replace equipment even when industry analyses show that replacing that equipment would be *profitable over the short run.* For example, the GHGI data discussed above shows that the counts of equipment such as high-bleed pneumatic controllers have diminished in recent years, tens of thousands of these wasteful devices remain in place across the country. These devices keep polluting unnecessarily, despite industry analyses that show that replacing them with lower emitting devices pays for itself in a few years.[81]

Second, EPA ignores that current market incentives are insufficient to secure needed reductions in methane emissions from the oil and gas sector. This is described in detail by Catherine Hausman of the University of Michigan and Daniel Raimi of Resources for the Future in a comment and report submitted to this rulemaking docket, who explain:

> [EPA's claim that there are sufficient market incentives to reduce methane emissions] is erroneous in that it ignores a basic principle of economics: if there is an externality associated with methane emissions, then private actors will reduce emissions at a rate that is less than optimal for society as a whole. This is precisely why the Environmental Protection Agency develops and enforces regulations that protect human health and the environment.

Comments of Catherine Hausman and Daniel Raimi (Oct. 16, 2019), Dkt. No. EPA-HQ-OAR-2017-0757-0083.

Third, the data on natural gas production and emissions trends cited by EPA do not support the proposition that market incentives are sufficient to significantly reduce methane emissions. Instead, the data show that methane emissions have remained persistently high over the past decades even though the same incentives have long applied to the industry. Nor do the trends that EPA cites account for the latest studies, which show that methane emissions for the oil and gas sector are dramatically higher than the Agency estimates.

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[79] Press release, Rystad Energy, *Permian Natural Gas Flaring and Venting Reaching All-Time High* (June 4, 2019), https://www.rystadenergy.com/newsevents/news/press-releases/Permian-natural-gas-flaring-and-venting-reaching-all-time-high/.

[80] North Dakota Department of Mineral Resources Oil and Gas Division, *Chart of monthly MCF gas produced with price per MCF sold*. Available at https://www.dmr.nd.gov/oilgas/stats/Gas1990ToPresent.xls.

[81] For example, for a 2014 rulemaking in Colorado requiring the replacement of high-bleed pneumatic controllers statewide, Industry stakeholders submitted an expert report that estimated a payback period of 2.8 years for replacing high-bleeds. *See* McDonald and Bender (2014), *Final Economic Impact Analysis For Industry's Proposed Revisions to Colorado Air Quality Control Commission Regulation Number 3, 6, and 7 (5 CCR 1001-9)*, at 32.

EPA highlights the decline in the *percentage* of natural gas vented or flared over time based on EIA data, while also noting that total methane emissions from oil and gas have remained at the same levels as gas production has increased (as reflected in the GHGI). 84 Fed. Reg. at 50,274–76. While EPA admits that the EIA data they are using to support this argument is "voluntarily and inconsistently reported," 84 Fed. Reg. at 50,275, it is critical to note that it is fundamentally flawed data. For example, the EIA data reports precisely zero flaring in Michigan every year since 2012, and precisely zero flaring in Oklahoma every year since 2002. Further, recent studies indicate that the GHGI significantly underestimates the true extent of methane emissions from the oil and gas sector. As discussed in several places throughout these comments, a recent synthesis of site-level emissions studies published by Alvarez et al. found that the U.S. oil and gas sector emits 13 million metric tons per year, equivalent to 2.3 percent of gross U.S. gas production—a value that is approximately 60 percent higher than EPA estimates in the GHGI.[82] Moreover, EPA's focus on "methane emissions intensity" arbitrarily ignores that *absolute* methane emissions from the oil and gas industry—regardless of what percentage of output those emissions constitute—must be significantly decreased to avoid the most catastrophic climate impacts. *See infra* § VI.

Indeed, analysis of trends from EPA's GHGRP shows that emissions decreases from sources that are regulated are responsible for much of the abatement in the leak rate from the oil and gas industry that EPA highlights. Table 5 shows that among sources of methane pollution from onshore oil and gas production, the largest decrease in methane emissions between 2011 and 2018 is attributable to a regulated source: well completions and workovers, which were regulated for gas wells in late 2012 by NSPS Subpart OOOO, and for oil wells in 2016 by NSPS Subpart OOOOa.[83] Other large sources generally show smaller trends, growth, or simply fluctuate. Two unregulated sources which did decrease for a number of years, flaring and liquids unloading, started increasing again in 2018 as drilling picked up. In summary, the largest and most robust emissions reductions arose from regulation of well completions, a source which only emits from new/modified sources, so that EPA's NSPS has dramatically reduced emissions.

[82] Alvarez et al., *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, 361 SCIENCE 186 (2018).

[83] Operators were required to include emissions from oil well completions beginning in 2016, while they only reported gas well completion emissions prior to that year. Meanwhile, oil well completions were not regulated until the latter half of 2016. These factors, together with drilling growth in 2017, explain the rise in reported completion emissions from 2015-2017, which then began decreasing in 2018.

Table 5: Summary of GHG Emissions 2011-2017

Methane Emissions	2011	2012	2013	2014	2015	2016	2017	2018	Change 2011-2018
Onshore Production									
Pneumatic Controllers	855,599	892,554	1,007,775	1,013,518	1,037,358	1,004,885	1,018,600	1,004,751	149,152
Leaks	395,342	386,615	374,721	339,835	344,620	330,301	309,523	292,146	(103,195)
Liquids unloading	292,854	206,872	182,663	141,362	111,826	87,870	83,660	122,444	(170,410)
Pneumatic Pumps	116,585	134,366	121,309	119,503	127,595	108,947	99,886	103,663	(12,922)
Tanks	102,063	120,404	86,909	91,535	77,311	94,412	74,786	74,306	(27,757)
Associated Gas Venting/ Flaring	174,873	166,037	83,512	65,828	58,377	35,953	43,066	58,441	(116,433)
Completions/ Workovers	265,443	136,548	100,580	44,816	29,987	31,457	60,851	51,683	(213,760)
Compressors	44,012	38,180	28,789	18,544	29,333	30,683	20,402	44,705	693
Dehydrators	30,672	31,952	24,133	34,646	23,017	19,984	20,143	22,695	(7,977)
Other Flare	7,128	14,576	25,090	16,514	15,449	9,527	12,640	17,784	10,656
Combustion	19,173	12,175	12,841	16,332	16,782	14,637	14,309	14,056	(5,116)
Well testing	26,858	14,853	10,756	27,509	4,985	1,593	492	171	(26,687)
Onshore Production Subtotal	2,330,603	2,155,132	2,059,076	1,929,942	1,876,641	1,770,248	1,758,358	1,806,847	(523,756)

Even if companies were, on average, engaging in cleaner practices when developing oil and gas—and it is far from clear that that is true—there would still be a critical need for existing source standards to reduce the enormous quantities of pollution that existing sources emit. Market incentives are not sufficient to address this problem.

3. Voluntary programs will not address vast quantities of emissions from existing sources.

Next, EPA claims that voluntary programs, including the EPA's Natural Gas STAR and Methane Challenge programs, API's Environmental Partnership, and the CCAC Oil and Gas Methane Partnership, render unnecessary existing source standards. Fundamentally, voluntary programs are not a substitute for regulations. None of the programs referenced by EPA involve binding commitments to reduce emissions—and the results of each program are reported with varying degrees of transparency. Furthermore, only a small fraction of oil and gas operators have adopted voluntary commitments to meet methane reduction targets. EDF estimates that approximately 67 upstream oil and gas companies have either committed to quantitative methane reduction targets (individually or through voluntary initiatives including the Oil and Gas Climate Initiative and ONE Future) or participate in the API Environmental Partnership.[84] However, the Independent Petroleum Association of America ("IPAA") estimates that there are around 9,000 independent oil and natural gas producers in the United States,[85] while data from the Rystad Energy UCube Database estimates over 6,300 independent U.S. producers. Based on these estimates, EDF estimates that only 0.7 to 1 percent of U.S. oil and gas producers have set a methane target or participate in the Environmental Partnership. And as EPA notes, "the GHGI already accounts for these voluntary reductions, the adoption of control technologies and emission reduction practices of participating companies reporting to the EPA's programs." 84 Fed. Reg. at 50,276. The GHGI data indicates O&G methane emissions—which it likely undercounts by a large margin—remain a pervasive problem despite these voluntary programs.

Indeed, even industry members that have participated in these voluntary programs have noted that they are not a substitute for strong, uniform regulatory requirements. For instance, in a Houston Chronical op-ed, BP America Chief Susan Dio underscored "[v]oluntary actions by several energy companies are not enough to solve the problem. The best way to help further reduce and ultimately eliminate methane emissions industrywide is through direct federal regulation of new and existing sources."[86]

4. State requirements will not address vast quantities of emissions from existing sources.

Finally, EPA points to the fact that "[s]everal major oil and natural gas producing states have established regulations on oil and natural gas sector emissions," including California, Colorado, Montana, New Mexico, North Dakota, Ohio, Pennsylvania, Texas, Utah, and

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[84] *See* Appendix I, List of Companies.
[85] Independent Petroleum Association of America, https://www.ipaa.org/independent-producers/.
[86] Susan Dio, *BP America chief: It's essential that the EPA regulate methane emissions*, HOUSTON CHRONICLE (Mar. 27, 2019).

Wyoming. 84 Fed. Reg. at 50,277. EPA solicits comment on "whether there are enough consistent state requirements in place that will meaningfully reduce emissions should the primary proposal be finalized." *Id.*[87] No matter how "consistent" the requirements are (and, in fact, they vary widely), this patchwork has gaps and different requirements, and is directly contradictory to the "uniform" standards that Congress intended the NSPS program for. *Supra* § 3A.

Furthermore, EPA fails to analyze whether or not the state rules in question even apply to *existing* sources, despite citing those rules to argue that avoiding existing source regulation under section 111(d) will have limited impacts. 84 Fed. Reg. at 50,277, n. 102. EDF assessed the applicability of state standards to existing sources in California, Colorado, Montana, New Mexico, North Dakota, Ohio, Pennsylvania, Texas, Utah, and Wyoming—the states that EPA includes in the Proposal's "Comparison of State Oil and Natural Gas Regulations" table. *Id.* at 50,277. These states take widely divergent approaches that vary significantly in stringency, and most states have *no* standards applicable to existing sources. A detailed assessment of state standards is included in Appendix D. In 2020, state standards applicable to existing sources (certain standards in California, Colorado, Utah, Wyoming in the Upper Green River Basin ozone non-attainment area, and Texas) will reduce only 180,000 metric tons of methane, roughly 5% of what section 111(d) guidelines modeled on the current NSPS could achieve. Accordingly, the few state standards that *do* regulate existing sources come nowhere close to addressing the problem.

EPA arbitrarily fails to meaningfully assess the state standards that it asserts may "meaningfully reduce emissions" in the absence of section 111(d) guidelines, 84 Fed. Reg. 50,277, and a careful analysis shows that state standards reduce only a small fraction of the emissions reductions that section 111(d) guidelines could achieve. Thus, all of EPA's claims regarding the "limited impacts" that its proposal will have on existing source emissions run directly counter to the evidence.

* * *

For these reasons, EPA's Proposal to preclude regulation of existing oil and gas sources under section 111(d) by rescinding methane requirements in the NSPS is unlawful, arbitrary and capricious.

IV. Methane Emissions from the U.S. Oil and Gas Sector Are "Significant" Under Any Metric.

Much of the Proposal is curiously trained on a topic that EPA does not even propose to apply to oil and gas regulation, but maybe will apply to some future rulemaking—whether, contrary to the plain language of the Act, the Agency must make a significant contribution finding ("SCF") for each specific *pollutants* emitted by a source category in addition to the necessary finding for the source category as a whole. Commenters hereby incorporate by reference a separate set of comments they are submitting to this docket that directly and comprehensively addresses this issue. As those comments explain in detail, section 111 does *not*

[87] As discussed above, the presence of state requirements does not absolve EPA of its legal duty to set guidelines under section 111(d).

require EPA to make a pollutant-specific SCF before regulating a particular pollutant from a listed source category. But to the extent EPA is considering switching to this rationale for rescinding methane standards for the oil and gas sector, it cannot for an additional reason: under *any* metric, methane emissions from this source category "contribute significantly" to pollution that endangers public health and welfare.

A. Oil and gas methane emissions "contribute significantly" to pollution that endangers public health and welfare.

EPA solicits comment on "whether, assuming it is required to make a SCF for methane emissions from the Oil and Natural Gas source category as a prerequisite to promulgating an NSPS for methane, the SCF it made in the 2016 NSPS OOOOa rule was an appropriate methane-specific finding." 84 Fed. Reg. at 50,267. Even if such a finding *were* required under the statute, which it is not, EPA fully satisfied this obligation in the 2016 Rule with respect to methane emissions from the oil and gas sector.

1. Though it was not required to, EPA already made the significance determination.

As we discuss in great detail in Section V, it is beyond dispute that emissions of anthropogenic GHGs—including methane—are the primary drivers of climate change that is already harming our planet and society and that poses a catastrophic threat if not sufficiently mitigated.

In addition, EPA correctly determined that the oil and gas industry emits methane in "significant" quantities by any reasonable understanding of that term. As noted in the 2016 rulemaking, EPA's annual Inventory of Greenhouse Gas Emissions and Sinks for that year calculated that oil and natural gas production sources and natural gas processing, transmission, and storage sources accounted for 31.8 percent of domestic methane emissions in 2014, more than any other source category in the country. 81 Fed. Reg. at 35,838–40 (citing Inventory of United States Greenhouse Gas Emissions and Sinks: 1990–2014 ("2014 GHGI") (Apr. 15, 2016)). EPA further calculated that at 232.4 MMT CO_2-e, these emissions constituted 3.4 percent of total U.S. GHG emissions and 0.5 percent of total global GHG emissions—"more than the total national emissions of over 150 countries, and combined emissions of over 50 countries." 81 Fed. Reg.at 35,840. The Agency also noted that this source category contributes an additional 43 MMT of carbon dioxide mainly from acid gas removal during natural gas processing (24 MMT) and flaring in oil and natural gas production (18 MMT), which increases the sector's total GHG emission to 4.0 percent of domestic emissions and 0.6 percent of global emissions.[88] *Id.* at 35,839. Based on these data, EPA concluded that the U.S. oil and gas industry "is a very important contributor in terms of both absolute emissions, and in comparison to other source categories globally or within the United States.," *Id.* at 35,840. Accordingly, "[m]ethane

[88] Although the 2016 Rule does not address carbon dioxide emissions from oil and gas equipment, the regulated pollutant is the following six well-mixed greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Thus, the source category's emissions of all six of these pollutants are relevant to any SCF analysis.

is emitted in significant quantities from the oil and natural gas production sources and natural gas processing and transmission sources that are being addressed within this rule." *Id.* at 35,839.

2. *Calculations using more accurate global warming potentials for methane strengthen EPA's conclusion in the 2016 Rule that oil and gas methane emissions are "significant."*

Furthermore, even EPA's calculations in the 2016 Rule significantly undervalue methane's potency as a climate disrupter relative to other GHGs. To convert methane emissions to carbon dioxide-equivalent values, the Agency relied on EPA's Greenhouse Gas Inventory, which used (and continues to use) an outdated multiplier of 25 to reflect methane's 100-year global warming potential. 81 Fed. Reg. 35,838. Yet EPA acknowledged in the 2016 Rule that methane's 100-year global warming potential (GWP) is actually "28 to 36 times greater than that of CO_2." 81 Fed. Reg. at 35,842. Indeed, the IPCC Fifth Assessment Report concludes that the most accurate 100-year GWP for methane is 34 when accounting for feedback effects,[89] and this value increases to 36 when accounting for oxidation effects as well.[90] Adjusting EPA's calculations based on this more accurate 100-year GWP indicates that this sector's methane emissions account for approximately 4.7 percent of domestic GHGs and 0.7 percent of global GHGs. Accounting for sector-wide CO_2 emissions, this figure amounts to approximately 5.3 percent of domestic GHGs and 0.7 percent of global GHGs.

Taking into account methane's physical characteristics once emitted, the oil and gas sector's actual contribution to GHG emissions is even larger. Over a 20-year-period, a molecule of methane is 87 times more effective at warming the planet compared to a molecule of carbon dioxide;[91] recent research suggests that methane could actually be as much as 96 times more potent than carbon dioxide in taking into account methane's ability to absorb both shortwave and longwave radiation.[92] Yet in the 2016 Rule (and since), EPA declined to quantify the impacts of oil and gas methane with reference to its well-established 20-year GWP of 87, instead considering *only* its impacts under a 100-year GWP. This is irrational for at least two reasons. First, a 20-year snapshot of methane's radiative forcing impact corresponds much more closely to the average atmospheric lifespan of a CH_4 molecule—12.4 years—than does a 100-year view.[93] More importantly, the critical window for reducing GHG emissions in order to avert catastrophic climate change is not 100 years into the future: it is *now*. According to the IPCC,

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[89] IPCC AR5, at 714.

[90] Bradbury et al., U.S. Dep't of Energy, Office of Energy Policy and Systems Analysis, *Greenhouse Gas Emissions and Fuel Use within the Natural Gas Supply Chain – Sankey Diagram Methodology* ("Bradbury et al.") (July 2015), at 10 https://www.energy.gov/sites/prod/files/2015/07/f24/QER%20Analysis%20-%20Fuel%20Use%20and%20GHG%20Emissions%20from%20the%20Natural%20Gas%20System%2C%20Sankey%20Diagram%20Methodology_0.pdf.

[91] IPCC AR5, *supra* § IVA2 (methane's baseline 20-year GWP is 84, and this figure increases to 86 when accounting for feedback effects; Bradbury et al., (this figure increases to 87 when accounting for the impacts of oxidation).

[92] Etminan et al., *Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing* ("Etminan et al.") 43(24) GEOPHYS. RESEARCH LETTERS 12,614 (2016).

[93] IPCC AR5 at 166, Table 2.

under most scenarios, global GHG emissions must decline by approximately 50 percent[94] in 2030 relative to 2010 values and 55 percent relative to 2017 values[95] to keep warming below 1.5 degrees Celsius—the necessary threshold for avoiding the worst impacts of climate change—with little or no overshoot. By 2050, the degree of reduction must be well over 80 percent[96] of global GHG emissions relative to 2010 emissions and nearly 90 percent[97] relative to 2017 values. Because the relevant pollution problem entails near-term thresholds for GHG concentrations above which climate change is expected to reach catastrophic proportions, then evaluating the "significance" of oil and gas methane emissions in contributing to that problem requires an understanding of the warming impacts of those emissions over the next few decades. This necessitates calculations that use methane's 20-year GWP.

Adjusting the above calculations to incorporate methane's 20-year GWP of 87, methane from the domestic oil and gas sector accounts for 9.3 percent of total U.S. GHG emissions and 1.2 percent of global GHG emissions.[98] Accounting for sector-wide CO_2 emissions, these figures reach 9.8 percent of domestic GHG emissions and 1.2 percent of global emissions. That is a staggering contribution to a global problem from just one industry in one country.

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[94] IPCC Summary for Policymakers, at 15, https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf (under policy scenarios 1 and 2, GHG emission reductions must be 50 percent and 49 percent, respectively, by 2030).

[95] UN Environment, *Emissions Gap Report 2018*, at xv (Nov. 2018), http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf.

[96] IPCC AR5 (under policy scenarios 1 and 2, GHG emission reductions must be 82 percent and 89 percent, respectively, by 2050).

[97] According to the IPCC's AR4, global emissions were approximately 49 GT CO_2-e in 2010. Under the IPCC's policy scenarios 1 and 2, this translates into emission totals of 8.82 GT CO_2-e and 5.39 GT CO_2-e by 2080. As a percentage of UN Environment's reported global emissions in 2017 of 53.5 GT CO_2-e, this reflects emission reductions of 83.5 percent and 89.9 percent, respectively.

[98] For global GHG and CH_4 figures, we relied on the WRI/CAIT data set, as EPA did in the 2016 rule. *See* World Resources Institute, *Climate Watch: Data Explorer*, https://www.climatewatchdata.org/data-explorer/historical-emissions (last visited Nov. 16, 2019) ("WRI/CAIT"). Unlike EPA, however, we used 2014 data (the most recent year currently available for WRI/CAIT data) rather than 2012 data (which was the most recent year available to EPA in 2016 that data). Note that the domestic GHG/CH_4 figures EPA used in its calculations rely on 2014 data (derived from the 2016 GHG Inventory), so adjusting those calculations to reflect 2014 rather than 2012 WRI/CAIT properly aligns the domestic and global estimates to the same data year. Furthermore, whereas the original WRI/CAIT data appears to have used a GWP of 21 (based on the IPCC's Second Assessment Report) for converting methane emissions to CO_2-e figures, we adjusted those data (as well as the total GHG emissions data included in the set) to reflect GWPs of 25, 36, and 87, as depicted in Table 6. The total GHG emissions data excludes impacts based on land-use, land-use change, and forestry.

Table 6. U.S. Oil and Gas Emission Ratios Based on 2016 GHG Inventory Data

Scenario	US O&G CH_4 emissions	US O&G CH_4 as % of total US CH_4	US O&G CH_4 as % of total US GHGs	US O&G CH_4 as % of global CH_4	US O&G CH_4 as % of global GHGs	US O&G CH_4 + CO_2 emissions	US O&G CH_4 + CO_2 as % of total US GHGs	US O&G CH_4 + CO_2 as % of global GHGs
Using 100-year CH_4 GWP of 25 (OOOOa assumption)	232.4 MMT CO^2-e/year	31.8%	3.4%	2.7%	0.5%	255.4 MMT CO^2-e/year	4.0%	0.6%
Using 100-year CH_4 GWP of 36	334.7 MMT CO^2-e/year	31.8%	4.7%	2.7%	0.7%	377.7 MMT CO^2-e/year	5.3%	0.7%
Using 20-year CH_4 GWP of 87	808.8 MMT CO^2-e/year	31.8%	9.3%	2.7%	1.2%	851.8 MMT CO^2-e/year	9.8%	1.2%

B. More recent data confirm—and strengthen—the conclusion that oil and gas methane emissions contribute significantly to pollution that endangers public health and welfare.

Starting in the 2017 GHG Inventory, EPA adopted certain methodological changes that resulted in somewhat lower estimated emissions from the oil and gas sector. Recent studies cast doubt on whether these new reduced estimates are correct; as we discuss below, actual emissions from this sector are likely far higher than EPA's inventories suggest. Nevertheless, data from the 2017 inventory still show that oil and gas methane emissions are undoubtedly "significant." This is evident in Table 7, which presents the same scenarios and outcomes as Table 6 but uses 2019 Inventory data rather than 2016 Inventory data. While the ratios depicted in Table 7 are somewhat lower than those in Table 6, they are within a similar general range and easily qualify as "significant."[99]

[99] In both Tables 2 and 3, for global GHG and CH_4 figures for 2017, we relied on data reported in the UN's *Emissions Gap Report 2018*. According to this report, global GHG emissions in 2017 reached 49.2 $GtCO_2$-e excluding land-use, land-use change, and forestry, *id.* at 5, with CH_4 accounting for 16 percent of these emissions. *Id.* at 6. This report also appears to use a multiplier of 21 to convert methane emissions to CO_2-e values, again relying on the 100-year GWP value described in the IPCC's Second Assessment Report. *Id.* at 6, n.13. Accordingly, we adjusted the reported CH4 and GHG values to reflect GWPs of 25, 36, and 87 as depicted in Table 7.

Table 7. U.S. Oil and Gas Emission Ratios Based on 2017 GHG Inventory Data

Scenario	US O&G CH_4 emissions	US O&G CH_4 as % of total US CH_4	US O&G CH_4 as % of total US GHGs	US O&G CH_4 as % of global CH_4	US O&G CH_4 as % of global GHGs	US O&G CH_4 + CO_2 emissions[100]	US O&G CH_4 + CO_2 as % of total US GHGs	US O&G CH_4 + CO_2 as % of global GHGs
Using 100-year CH_4 GWP of 25 (OOOOa assumption)	190.5 MMT CO^2-e/year	29.0%	2.9%	2.0%	0.4%	235.7 MMT CO^2-e/year	3.6%	0.5%
Using 100-year CH_4 GWP of 36	274.3 MMT CO^2-e/year	29.0%	4.1%	2.0%	0.5%	319.5 MMT CO^2-e/year	4.7%	0.6%
Using 20-year CH_4 GWP of 87	662.9 MMT CO^2-e/year	29.0%	8.2%	2.0%	0.9%	708.1 MMT CO^2-e/year	8.8%	1.0%

More importantly, recent data show that EPA's GHG inventories—including the 2019 Inventory—significantly underestimate the true extent of methane emissions from the oil and gas sector by a dramatic margin. In 2018, a team of twenty-four researchers from sixteen institutions, published in Science a comprehensive study of methane emissions from the oil and gas supply chain, from production through local distribution.[101] This study estimated national emissions by synthesizing several previously published datasets, including top-down, aircraft-based emission estimates from 9 basins and over 400 ground-based, facility-scale measurements of oil and gas wells from areas accounting for approximately 30% of U.S. gas production. Alvarez et al. concluded that methane emissions from this sector were on the order of 13 MMT in 2015 (+2.1/−1.6, 95% confidence interval), approximately 63 percent greater than reflected in EPA's Inventory for that year. In Table 8 below, we present the same data as depicted in Table 7, but reflecting Alvarez et al.'s quantitative assessment of U.S. oil and gas emissions.

[100] EPA's 2017 GHG Inventory reports CO_2 emissions of 45.2 MMT for oil exploration/production and natural gas exploration/production, processing, and transmission and storage.

[101] Alvarez et al., *Assessment of methane emissions from the U.S. oil and gas supply chain*, 361 SCIENCE, 186 (July 13, 2018). The study "[did] not update emissions from local distribution and end use of natural gas, owing to insufficient information addressing this portion of the supply chain." *Id.* at 186.

Table 8. Current U.S. Oil and Gas Emission Ratios Based Alvarez et al.'s Emission Factors

Scenario	US O&G CH_4 emissions	US O&G CH_4 as % of total US CH_4	US O&G CH_4 as % of total US GHGs	US O&G CH_4 as % of global CH_4	US O&G CH_4 as % of global GHGs	US O&G CH_4 + CO_2 emissions	US O&G CH_4 + CO_2 as % of total US GHGs	US O&G CH_4 + CO_2 as % of global GHGs
Using 100-year CH_4 GWP of 25 (OOOOa assumption)	325 MMT CO^2-e/year	41.8%	4.9%	3.5%	0.6%	370.2 MMT CO^2-e/year	5.6%	0.7%
Using 100-year CH_4 GWP of 36	468 MMT CO^2-e/year	41.8%	6.8%	3.5%	0.9%	513.2 MMT CO^2-e/year	7.4%	0.9%
Using 20-year CH_4 GWP of 87	1131 MMT CO^2-e/year	41.8%	13.3%	3.5%	1.5%	1176.2 MMT CO^2-e/year	13.8%	1.6%

Tables 6 through 8 make clear that, under any realistic assumption, methane emissions from the U.S. oil and gas sector is significant from both a domestic and global perspective. This is true whether one relies on EPA's 2016 Inventory data (as in Table 6), the more modest 2019 Inventory data (as in Table 7), or the most comprehensive and up-to-date emission estimates from Alvarez et al. (as in Table 8). It is also true whether one relies on an outdated 100-year GWP for methane of 25 (as which the values in the first row of each table depict), an updated 100-year GWP of 36 (as depicted in the second row), or, most appropriately, a 20-year value of 87 (as depicted in the third row). As these tables show, the U.S. oil and gas sector contributes between approximately 30 and 40 percent of domestic methane emissions and between approximately 9 and 14 percent of total domestic GHG emissions. The sector also contributes between 2 and 3.5 percent of global methane emissions and as much as 1.6 percent of global GHGs. As point of comparison, only ten countries on Earth—China, the United States, India, Russia, Brazil, Indonesia, Japan, and Mexico—contribute 1.6 percent or more of the world's total GHG emissions.[102] Even at 0.6 percent of global GHG emissions—the most modest estimate provided above—the U.S. oil and gas sector would still meet or exceed the total emissions of over 160 countries.[103]

[102] *See* WRI/CAIT. The unadjusted WRI/CAIT data, which assumes a GWP of 21 for methane, shows 10 countries as contribute mover 1.6% of the world's GHG emissions: China, the United States, India, Russia, Japan, Brazil, Germany, Indonesia, Canada, and Iran.

[103] *Id.* This calculation is based on the WRTI/CAIT data adjusted to reflect a GWP of 25, although the same conclusion holds true assuming a GWP of 21, as reflected in the unadjusted WRI/CAIT data.

The data simply leave no doubt: methane emissions (and total GHG emissions) from the oil and gas sector are "significant" under any reasonable understanding of that term. Under each of the many assumptions examined above, methane and GHG emissions from domestic oil and gas sources constitute a major portion of total domestic and global GHG pollution. Notably, these scenarios reflect *actual emissions*, rather than the source category's *potential to emit* (i.e., its emissions in the absence of pollution controls). A category's maximum potential to emit is a relevant (and, in some cases, decisive) consideration for determining significance under section 111(b)(1)(A), as reflected in EPA's 1978 priority list of sources. *See* 1978 Priority List, at 4 (noting that developing NSPS priorities for major sources "is done on the basis of an individual facility having the *potential to emit* 100 tons/year . . . . It must be pointed out that this is measured on the basis of uncontrolled emissions. . . .") (emphasis added). The oil and gas sector's emission *as currently controlled* easily qualify a "significant;" the category's potential to emit if uncontrolled would be even more so.

Without major cuts to oil and gas methane emissions *now* and in the immediate future, it will be impossible to stay within the margin of safety that is necessary to avoid the worst impacts of climate change—and therefore to address the Clean Air Act's goal of reducing endangerment from pollution. For EPA to reach any other conclusion than that these emissions contribute "significantly" to pollution that endangers public health and welfare is flatly inconsistent with section 111, would ignore the best available science and would be arbitrary and capricious.

C. Additional considerations further highlight the fact that oil and gas methane emissions contribute "significantly" to pollution that endangers public health and welfare.

In addition to the data presented above, a number of other considerations—both quantitative and qualitative—provide important context emphasizing the significance of the contribution to methane emissions from the oil and gas industry in relation to dangerous climate change. First, to better understand what the above-presented numbers mean in terms of real-world consequences, it is helpful to use the Interagency Working Group's (IWG) social cost of CH_4, which provides an estimate of the damage (translated into dollars) that will be caused by an additional ton of methane emissions.[104] The IWG developed this tool based on three integrated modeling platforms that incorporate rigorous, peer-reviewed science and economics. The IWG's social cost values do not incorporate many areas of climate impacts and cannot reflect the importance of avoiding lower-risk, massively catastrophic climate impacts, and therefore significantly underestimate the true impact that greenhouse gas emissions could and will have on society. As such, they must be viewed as conservative lower-bound estimates of those impacts, but they are nevertheless the most up-to-date, comprehensive, and technically supported figures for the social cost of greenhouse gases that the federal government has thus far produced.[105]

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[104] IWG, *Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide* (Aug. 2016).

[105] In monetizing the harm caused by increased methane emissions due to this Proposal, the Agency relies on the so-called "interim domestic social cost of methane." *See* EPA, *Regulatory Impact Analysis for the Proposed Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review*, 1-4, 3-7–3-14 (Aug. 2019). The current Administration has been using metric for the last two-and-a-half years without even proposing it through a rulemaking and soliciting public comment on it, let alone finalizing or updating it. As

Assuming, based on Alvarez et al., that the U.S. oil and gas sector currently emits 13 MMT per year, calculations using the IWG's social cost of methane tool show the sector's methane emissions in 2019 imposes social costs ranging from $6.8 billion/year (using the maximum 5 percent discount rate) to $40.3 billion/year (using a discount rate of 3 percent at the 95th percentile). These calculations place the intermediate value for such costs (using a 3 percent discount rate) at $15.6 billion/year. No sensible understanding of "significant" can exclude a quantity of pollution that imposes tens of billions of costs on society per year. And these costs will continue on into the foreseeable future. Even if oil and gas methane pollution were reduced by an extraordinary amount over the next decade, such that emissions in 2030 were 70 percent lower than Alvarez et al.'s estimate of 13 MMT/year, those emissions would still impose a social cost of between $3.0 billion/year and $16.4 billion/year in 2030, with an intermediate value of $6.2 billion. It is important to note here that nothing in section 111(b)(1)(A) requires EPA to monetize the costs imposed by a source category's emissions to determine whether it reaches a threshold of significant. Instead, the monetized costs are merely another metric demonstrating oil and gas methane emissions are "significant." More importantly, the Agency *may not* consider compliance costs associated with reducing those emissions when making an SCF. Compliance costs are relevant only to determining a "best system of emission reduction" taking into account factors in section 111(b)(1)(B); it has no bearing on whether a source category (or, even under EPA's flawed reading, a pollutant) causes or contributes significantly to air pollution that endangers health or welfare.

It is also helpful compare oil and gas methane emissions of other large sources. For instance, according to EPA's Air Markets Program Database, the aggregate carbon dioxide emissions from all the coal-fired electric generating units in the country in 2018 was 1.27 billion short tons, or with a median annual emissions of 2.09 million short tons at the 606 units for which data was available.[106] Using Alvarez et al.'s assumption of 13 million metric tons of methane (or 14.3 million short tons) for the oil and gas sector and a GWP of 87, we find that the oil and gas sector emits 1.25 billion short tons of CO_2-equivalents, nearly the same as all the carbon dioxide emissions the nation's fleet of coal-fired power plants and equivalent to the annual emissions of approximately 595 average coal-fired units.[107] Even using a 100-year GWP of 36, the Alvarez et al. research indicates that the nation's oil and gas sector as much methane as close to 250 average coal-fired units on a carbon dioxide-equivalent basis.

A comparison to the nation's vehicle fleet is also revealing. According to EPA, the average U.S. passenger car emits about 4.6 metric tons of carbon dioxide per year.[108] Once again assuming 13 million metric tons of methane from the oil and gas sector and a GWP of 87, this is equivalent to the annual carbon dioxide emissions of approximately 246 million passenger cars. This constitutes approximately 90 percent of the vehicle fleet: the Federal Highway

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discussed in great detail in comments submitted to this docket by the Institute for Policy Integrity and a host of other organizations, including a number of Environmental Commenters, the "interim domestic social cost of methane" is technically unsound and reflects irrational economic and scientific assumptions. EPA's reliance on it, rather than the IWG's globally-oriented social cost of methane, is thus arbitrary, capricious, and unlawful.

[106] EPA, *Air Markets Program Data*, https://ampd.epa.gov/ampd/ (Sept. 18, 2019).

[107] Calculation based on Alvarez, et al., GWP of 87, and EPA Air Markets Program Data for coal-fired EGUs.

[108] EPA, *Green Vehicle Guide: Greenhouse Gas Emissions from a Typical Passenger Vehicle*, https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle (May 10, 2018).

Administration estimates that there are currently about 272 million registered vehicles (cars, trucks, buses, and motorcycles) in the United States.[109] Even using a 100-year GWP of 36, the oil and gas sector's emissions are equivalent to those of over 100 million annual automobiles' carbon dioxide emissions.

Finally, when evaluating the "significance" of oil and gas methane pollution, it is also useful to consider a number of other factors that emphasize the potency of this particular greenhouse gas. As noted above, methane is a considerable driver of near-term climate change: it is responsible for at least one quarter of the overall planetary warming we are experiencing today.[110] This year's emissions of methane from human activities will contribute 30 percent more to warming over the next 10 years than this year's emissions of carbon dioxide from fossil fuels.[111] Globally, a quarter of human-emitted methane comes from the oil and gas sector, and current trends suggest that methane from global oil and gas will soon overtake livestock as the dominant source from human activities.[112] There is simply no way to address the climate problem without addressing methane emissions from the oil and gas sector. In addition, through the creation of tropospheric ozone, methane contributes to background levels of ground-level ozone, which is harmful to humans and is linked to short- and long-term negative health effects, including shortness of breath, decreased lung function, and chronic obstructive pulmonary disease (though as we note above, *supra* § IIIB, EPA does not regulate methane for this purpose). Ozone also aggravates existing cardiovascular and respiratory conditions, such as asthma, emphysema, and bronchitis, with long-term exposure increasing the risk of death from these conditions. And nearly one in three Americans are exposed to harmful levels of ozone.[113,114]

All of these considerations leave no doubt: not only is methane severely detrimental to the global climate and to other measures of air quality relevant to human health and welfare, but methane emissions from the U.S. oil and gas sector contributes significantly to this pollution problem under any reasonable understanding of that term.

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[109] Fed. Highway Admin., Office of Highway Policy Info., *State Motor-Vehicle Registrations – 2017*, https://www.fhwa.dot.gov/policyinformation/statistics/2017/mv1.cfm (Apr. 16, 2019).
[110] *See* Shindell et al., *Improved attribution of climate forcing to emissions*, 326(5953) SCIENCE 716 (2009).
[111] Calculation based on current emissions of methane and carbon dioxide Environmental Protection Agency, Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030 (2012); International Energy Agency World Energy Outlook (2018), atmospheric lifetimes from IPCC AR5,
and radiative properties for CO2 and methane indirect from IPCC AR5 2013 (WGI Chapter 8 – Myhre et al. 2013) and methane direct from Etminan et al..
[112] EPA, 430-S-12-002, *Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030*, https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-non-co2-ghg-emissions-1990-2030 (Dec. 2012).
[113] NCA4-II.
[114] *Id.* at 512.

D. EPA must evaluate the "significance" of oil and gas methane emissions from the production, processing, transmission, and storage segments together, rather than in isolation; but in any event, each segment contributes "significant" emissions independently of the other.

In the Proposal, EPA asks "whether the SCF in the 2016 NSPS OOOOa rule can be considered appropriate in light of the fact that it was based on a greater amount of emissions than are in the source category as proposed in this rulemaking." 84 Fed. Reg. at 50,267. That is, EPA queries whether the 2016 significance finding is still valid in light of the fact that it accounted for emissions from all of the segments of the oil and gas sector (production, processing, transmission, and storage), whereas the Agency now proposes to eliminate the latter segments from the definition of the source category. We answer this question emphatically in the affirmative. In § IC of these comments, we explain in detail why EPA's decision to cleave the oil and gas source category into two is unlawful. Thus, EPA was entirely correct to consider emissions from the sector as a whole when it determined in 2016 that oil and gas methane emission are "significant."

But even if EPA could somehow legally justify revising the source category to cover production and processing equipment only (and it cannot), the Agency would still be obligated to consider emissions from the industry as a whole when making a determination of significance. (And to reiterate, this analysis is already several layers deep in contingencies: EPA's original listing of the oil and gas source category in 1979 already included all segments of the industry, the Agency lawfully revised the source category in the alternative to include all such segments, and section 111(b)(1)(A) does not require pollutant-specific SCFs.) By its plain terms, section 111(b)(1)(A) asks whether a source category "causes, or *contributes* significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.SC. § 7411(b)(1)(A) (emphasis added). Congress was concerned not only with the danger attributable to each source category individually, but the danger created by each category's emissions *together with those of other polluting sources categories*. Hence Congress's use of the word "contribute[]," which is defined by Merriam-Webster as "to give or supply *in common with others*."[115]

A contributory view of the section 111(b)(1)(A)'s SCF requirement is particularly relevant where the source category is inherently connected to one or more other source categories that emit similar pollution such that it makes sense to view their emissions collectively. It is also especially relevant where the source category contributes to a pollution problem that is widespread and that results from many different emission points, such that solutions to that problem require collective, coordinated action. Oil and gas methane emissions bear both of these characteristics. First, the gas production, processing, transmission, and storage segments are physically interconnected and functionally interdependent. Indeed, most gas that is produced must be processed in some way and sent through the transmission and storage segment in order to reach the end user. Likewise, all gas that travels through the transmission and storage segment was in all cases previously subject to production and in most cases subject to processing. Simply put, each segment would disappear in the absence of the other, and even if

[115] Merriam-Webster, Definition of *contribute*, https://www.merriam-webster.com/dictionary/contribute (Nov. 16, 2019).

EPA found some legal way to regulate them separately, it would be irrational to treat their methane emissions as hermetically sealed from one another for the purposes of determining significance. This is especially true given the fact that same regulated equipment appears in both segments, the same kinds of pollutants are emitted in both, and the same practices and controls are used in both segments to curb emissions.

Second, GHG-driven climate change is, by its very nature, a collective action problem. All GHGs emitted around the world mix evenly in the atmosphere to inflict harm on the entire planet. This requires a coordinated response not only at the intergovernmental level, but across state and local governments, communities, industries, and individual firms. Because both the problem itself occurs due to the combined effects of many individual actors and that the solution to the problem also must occur collectively, EPA must determine the significance of methane emission from segments of the oil and gas sector not in isolation, but as part of this global commons tragedy.

Suppose EPA could lawfully take a siloed view of each source category when determining the "significance" of their emissions with respect to particular collective pollution problem. As discussed in section I, the Agency could latch onto any number of allegedly distinguishing factors to split what is effectively a single source category into a multitude of smaller categories, each of which appears on its own to make a relatively small contribution to the larger problem. This would inevitably—and irrationally—distort the true extent to which that source category actually contributed to the pollution problem in an attempt to avoid regulation.

EPA has, in the past, expressly disavowed this approach when identifying sub-categories within primary source categories. *See* Response to Comments on Proposed Standards of Performance for Stationary Spark Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, EPA-HQ-OAR-2005-0030, at 278 (noting that "[a]ll categories of sources can be subcategorized into small enough subcategories that each subcategory of sources may want EPA to review their contribution in isolation, but the combined pollution of these subcategories clearly contributes to air pollution".) The exact same principle applies to defining the primary source categories themselves. A "divide-and-not-conquer"[116] approach is not compatible with goals of the Clean Air Act and particular section 111, yet this is precisely what EPA proposes to do with the oil and gas sector. Even if the Agency could lawfully split production and processing segments from the transmission and storage ones into separate categories—and it cannot—it cannot deny the reality that these categories are entirely interdependent and are major contributors to the greatest collective action problem of our time: global climate change.

EPA was therefore entirely correct in 2016 when it considered emissions from the entire oil and gas sector in making its SCF determination for the source category, and would be

[116] Commenters assert that, given the collective nature of climate change and the catastrophic threat it poses, *any* source category whose emissions must be reduced as part of the collective solution to that problem must qualify as "significant." Thus, even under this hypothetical, EPA would still be required to regulate GHG emissions from each of these sub-divided categories *regardless* of the quantity of GHGs emitted by larger, non-divided category. But the agency must not be permitted to take this irrational approach an under conceivable outcome, as it is both technically unjustified and directly at odds with the driving function of section 111.

required to do so even it succeeded in removing transmission and storage equipment from the definition of the source category for the purposes of issuing standards of performance. In any event, *even in isolation*, the production, processing, transmission, and storage segments contribute significantly to methane emissions that are driving global climate change. EPA According to the most recent GHG Inventory, methane emissions from oil production and natural gas production and processing were in 6.32 MMT in 2017 and emissions from transmission and storage were 1.30 MMT.[117] If oil production and gas production and processing were listed as an individual methane source in the Inventory, it would still be larger than every other source currently listed in that report apart from enteric fermentation, while natural gas transmission and storage would be larger than all but five other categories.

A global viewpoint paints a similar picture. The Proposal reports that production and processing methane emissions—which it lists as 162 MMT CO_2-e in 2017 based on a GWP of 25—account for 1.8 percent of global methane and 0.3 percent of total global GHGs. This quantity is equal to or greater than the total methane emissions from all but eight countries around the world, and is equal to or greater than the total GHG emissions from approximately 150 countries.[118] The Proposal also reports that transmission and storage methane emissions, which it lists as totaling 32 MMT CO_2-e in 2017, account for 0.4 percent of global methane and 0.1 percent of global GHGs. This is equal to or greater than the methane emissions of approximately 145 countries and is greater than the total GHG emissions from approximately 90 countries. These totals—which reflect EPA's own assumptions—are significant by any measure.

Similar calculations that rely on the Alvarez et al.'s findings rather than 2019 Inventory data fortify this conclusion. Accounting for the results of Alvarez et al., production and processing emit approximately 10.9 million metric tons of methane per year, making larger than any other source category listed in the Inventory, and transmission and storage emit 1.8 million metric tons of methane per year, making it the 6th largest category. Using these figures and a GWP of 87 for methane—the most representative number for reasons discussed above—production and processing account for 2.9 percent of global methane and 1.3 percent of total global GHGs. This is equal to or greater than the total methane emissions from all but five countries and the total GHG emissions from all but approximately 12 countries. Under these same assumptions, transmission and storage methane emissions account for 0.5 percent of global methane and 0.3 percent of global GHGs. This is equal to or greater than the total methane emissions of nearly 150 countries and the total GHG emissions from nearly 140 countries. These and other data are depicted in Table 9 below.

[117] EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017 (2019), at Tables 3-37, 3-64 (deriving the methane-specific total from the published CO_2-e totals by dividing by the latter 25, the GWP for methane used in the Inventory) ("2017 GHG Inventory").

[118] The global numerators for the calculations in this sub-section rely on WRI/CAIT data for emissions year 2014, adjusted to reflect a GWP of 25, the same figure used in the 2017 GHG Inventory.

Table 9. Emission Ratios for the Production and Processing and the Transmission and Storage Segments Based on Alvarez et al.'s Emission Factors and a 20-Year GWP of 87

Source category	US O&G CH_4 emissions	US O&G CH_4 as % of total US CH_4	US O&G CH_4 as % of total US GHGs	US O&G CH_4 as % of global CH_4	US O&G CH_4 as % of global GHGs	US O&G CH_4 + CO_2 emissions [119]	US O&G CH_4 + CO_2 as % of total US GHGs	US O&G CH_4 + CO_2 as % of global GHGs
Oil production and natural gas production/processing	950 MMT CO_2-e/year	34.4 %	11.1 %	2.9%	1.3%	995.2 MMT CO_2-e/year	11.7 %	1.3%
Natural gas transmission and storage	156.6 MMT CO_2-e/year	5.2%	1.8%	0.5%	0.2%	201.8 MMT CO_2-e/year	2.4%	0.3%

Applying the most accurate quantitative assumptions (i.e., Alvarez et al. and a GWP of 87), the production and processing segment by itself would contribute a substantially higher percentage of both domestic and global methane and GHGs than did the entire oil and gas industry under EPA's assumptions in the 2016 Rule, in which the Agency determined that the whole sector was a "significant" contributor to dangerous methane pollution. And while transmission and storage emissions are still somewhat lower than that amount, they are nonetheless undeniably substantial and (as noted above) exceed the entire emissions profiles of most of the world's countries.

Thus, even when considered in isolation, these segments contribute "significantly" to methane pollution that is a major source of climate disruption. Under any legal theory of section 111(b)(1)(A)'s SCF—including the plainly wrong interpretation that would require pollutant-specific SCFs—EPA cannot lawfully avoid issuing methane standards for sources in the production, processing, transmission, and storage segments due to some perceived lack of "significance" (or for any other reason, for that matter).

Finally, attempting to erect one last barrier to reducing dangerous pollution, EPA asks in the proposal "whether the SCF in the 2016 NSPS OOOOa rule can be considered appropriate given that nowhere in the course of developing and promulgating that rule did the EPA set forth the standard by which the 'significance' of the contribution of the methane emissions from the source category (as revised) was to be assessed." 84 Fed. Reg. at 50,267. More generally, the

[119] EPA's 2017 Inventory reports CO_2 emissions of 45.2 MMT for oil exploration/production and natural gas exploration/production, processing, and transmission and storage.

Agency asks whether "as a matter of law, under CAA section 111, the EPA is obligated to identify the standard by which it determines whether a source category's emissions 'contribute significantly,' and whether, if not so obligated, the EPA nevertheless fails to engaged in reasoned decision-making by not identifying that standard." *Id.* Relatedly, EPA asks whether it should identify some particular quantity "above which, the emissions of the pollutant from the source category would be determined to significantly contribute, and below which, they would not." *Id.* at 50,269. These more general questions are addressed in a separate comment to this docket, submitted by many of the below-signed groups.

Here, we briefly observe the fact that EPA's questions regarding a standard or threshold for "significance" ignore the Agency's own administrative history and the basic science of air pollution. Since listing the very first source categories in 1971, EPA has *never* identified a specific standard or threshold that a source category's emissions must satisfy in order to be considered "significant" under section 111(b)(1)(B). If the Clean Air Act included such a requirement, it would seem likely to have been recognized by either EPA or the courts would at some point before in the last 48 years. Nor did Congress ever take steps to clarify that the statute required this in the several large-scale amendments of the Clean Air Act. Dozens of source category listings and forty-eight years of silence by the courts and acquiescence by Congress is further evidence that the statute does not, in fact, require a standard or threshold for determining "significance."

More to the point, it would be decidedly irrational for EPA to adopt such a standard or threshold. That is because it is a scientific fact—one that EPA cannot ignore—that different air pollutants have profoundly different effects on human health and/or welfare at the same quantity of emissions; they can also have very different geographic trajectories. One ton of mercury has very different impacts from one ton of fluorides, which has a different impact than one ton of nitrogen oxides, which in turn has distinct effects from one ton of carbon dioxide, and so on. This is true even within a specific class of pollutants: as discussed above, methane is 36 to 87 times more potent than carbon dioxide at warming the planet depending on the time-frame considered. The divergence between carbon dioxide and other GHGs is greater still: the 20- and 100-year GWPs of nitrous oxide are 268 and 298, respectively; for CFC-11, they are 7020 and 5350; and for sulfur hexafluoride they are 17,500 and 23,500.[120] And EPA cannot simply convert these pollutants to CO2-eqvuialent values. Not only do they have quite different GWPs at different time frames, making a single conversion impossible for the purposes of making a threshold finding, but they have distinct impacts to human health and welfare apart from radiative forcing. For instance, while carbon dioxide contributes to ocean acidification and methane does not, methane contributes to tropospheric ozone creation and carbon dioxide does not. While the above-reference social cost of methane may consider this, a static "significance" threshold that would be used for all pollutants would to take into account the different dangers for the broad range of pollutants that are subject to section 111 regulation.

This leads to the broader point that pollutants have very different qualitative characteristics in addition to quantitative differences. Some pollutants, such as particulate matter and ozone, cause health problems primarily related to the cardiovascular system, such as bronchitis, COPD, asthma attacks, and heart attacks. Particulate matter by itself causes different

[120] IPCC AR5, at 714, 731.

ailments depending on the size of the particulate. Fluoride emissions have harmful impacts on vegetation and livestock. Hydrogen sulfide can cause a range of impacts, from eye irritation to nausea and vomiting to a coma or even death. Other pollutants, such as many air toxins, cause a very different class of illnesses, such as cancer, birth defects or neurological defects. Some pollutants travel far from their emission point and cause problems in another geographic location, or—in the case of greenhouse gases—for the entire world. Other pollutants do not travel far and mainly affect the people and environment in the immediate vicinity. Furthermore, some source categories may contribute a relatively low percentage of the nationwide emissions of a particular pollutant, but those emissions may have a devastating impact on the people in the community who *are* affected by it. But importantly, many of these pollutants, including particulate matter, fluoride, and hydrogen sulfide, are regulated under section 111.

It is thus simply impossible to create a single benchmark for determining significance for the purposes of section 111(b)(1)(A), whether expressed in percentages, absolute quantities of emissions, or any other form. This is likely the very reason why EPA has never endeavored to do so in the past. Absolute quantities or percentages of domestic or global emissions may certainly be relevant in determining significance in a given context; indeed, we have cited in these comments both metrics with respect to oil and gas methane emissions. But they cannot provide a one-size-fits-all standard or threshold that applies rigidly across source categories. Indeed, courts have rejected the claim that EPA is required to define a bright line-test to "contribution" under the NAAQS when assessing the impacts of a single pollutant on a particularly air pollution problem. *Mississippi Commission on Envtl. Quality v. EPA*, 790 F.3d 138, 150 (D.C. Cir. 2015) (finding "EPA does not violate the Act even if it fails to adopt 'a bright-line, objective' test' for determining contribution" and that "[a]n agency is free to adopt a totality-of-the circumstances test to implement a statute that confers broad discretionary authority, even if that test lacks a definite 'threshold' or 'clear line of demarcation to define an open-ended term"). Surely the same is true here, many times over. For the Agency here to either attempt to create a one size fits all test or to reject the 2016 rule's significance finding for lack of one would be wholly irrational, arbitrary, and capricious.

Lastly, as discussed in Section I, if EPA decides that section 111 requires some new finding for a source category that the agency never undertook in the past, the remedy is *not* simply to deregulate the affected source category, whether in whole or in part. Rather, if a standard or threshold for significance *were* required under the law, EPA's proper course of action would be to establish and apply that standard to the source category—or any new source category that EPA has split off from the primary listing, however improperly. EPA suggests that its 2016 finding of "significance" may be improper because the agency never established a clear threshold for defining "significance." Once again, such a uniform threshold is not only not required, but would be arbitrary in light of the enormous variation among different pollutants and pollution problems. But to the extent the statute did require a threshold, the agency cannot simply discard its current regulations or leave that finding for some unspecific future date. To do so would plainly be arbitrary, capricious, and unlawful.

V. The Proposal Is Unlawful Under Section 111 and Arbitrary and Capricious Because EPA Ignores the Scientific Facts About Climate Change and Associated Perils to Human Health and Welfare.

The oil and gas sector is the largest industrial emitter of methane in the United States, and the evidence is now overwhelming that climate change caused by methane and other GHGs gravely and imminently imperils human health, the economy, and the natural resources on which human survival depends. Nonetheless, the topic of climate change is almost entirely absent from the Proposal and supporting documents. More troublesome still, it is *completely* absent from EPA's rationale for removing methane regulations. Nowhere does the Proposal acknowledge, much less discuss, the endangerment posed by methane emission from the oil and gas sector, nor does it explain why eliminating methane regulation (which the Proposal asserts will remove EPA's authority to regulate the vast majority of methane emissions from the sector) makes sense in light of that endangerment. This failure renders the Proposal both contrary to the Clean Air Act—the major purpose of which is to reduce dangerous air pollution— and arbitrary and capricious.

By ignoring the threat of climate change, the Proposal is contrary to EPA's statutory duties and flouts basic requirements of reasoned decisionmaking. It fails to address the human suffering and death, environmental destruction and economic harms already caused by climate change and exacerbated by increased GHG emissions, including the emissions increases that would occur as a result of the Proposal. Crucially, it provides no explanation as to why removing methane standards for the United States' economy's largest industrial emitting sector of this pollution could possibly be described as a reasonable response given the established scientific facts about climate change. This is particularly alarming in light of the fact that this administration—with EPA's direct participation—recently published a major report documenting the enormous adverse human health, welfare, and economic effects of climate change. The Proposal contains no rationale for how removing methane regulation, which has already been delivering benefits for over three years, can be reconciled with the overwhelming record evidence that rapid and substantial emission reductions must occur within the next decade if we are to avoid truly disastrous consequences. These stark analytical voids on central issues violate fundamental requirements of reasoned decisionmaking applicable to all federal agencies. They are an egregious violation of EPA's obligations as the agency Congress designated to protect the public from air pollution that endangers health and welfare.

A. The scientific record confirms that anthropogenic climate change is a grave and imminent hazard, and the latest studies—which EPA has not even considered—reinforce that climate change is proceeding at an unprecedented pace requiring rapid and decisive action to reduce greenhouse gas emissions now.

Climate change caused principally by anthropogenic emissions of methane, carbon dioxide, and other GHGs poses severe hazards to human civilization and is already causing extensive damage throughout the nation and the world.[121] In 2009, EPA found—based on an

[121] *See, e.g.*, NCA4-II; Intergovernmental Panel on Climate Change, *IPCC Special Report: Global Warming of 1.5°C*, at 1-7 (Oct. 6, 2018) ("IPCC (2018)"), http://www.ipcc.ch/report/sr15/; IPCC, *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food*

"ocean of evidence"[122]—that anthropogenic GHGs are driving climate change that endangers public health and welfare;[123] the D.C. Circuit upheld that finding in its entirety against industry challenges,[124] and the Supreme Court refused to review the holding.[125] In the 2016 Rule, EPA specifically discussed at length the endangerment finding, the science demonstrating a link between GHG emissions and climate change, the role of methane in contributing to near-term climate change, and the contribution of the oil and gas sector to methane emissions. *See* 81 Fed. Reg. at 35,830, 35,833–837. Since the 2009 endangerment finding and the promulgation of the NSPS, the peer-reviewed scientific literature on climate change and evidence of both future and *current* climate impacts has become even more clear, specific and undeniable, further buttressing the rigor of the endangerment finding and the urgency of the Clean Air Act's legal mandate that EPA address methane emissions from the oil and gas sector.[126] In the U.S. alone, climate change-related damages now cost hundreds of billions of dollars every year, with 2017 setting an annual record of $306 billion.[127]

As EPA put it not long ago, climate change is "the United States' most important and urgent environmental challenge."[128] Recent assessments of the best available science—an already vast and definitive body of knowledge—from the United States government, scientific and professional bodies, and the international scientific community, have confirmed both that these climate change hazards are even more severe than previously believed and that they gravely damage us now.

As explained in the 2016 Rule:

> Climate change caused by manmade emissions of GHGs threatens the health of Americans in multiple ways. By raising average temperatures, climate change increases the likelihood of heat waves, which are associated with increased deaths and illnesses. While climate change also increases the likelihood of reductions in cold-related mortality, evidence indicates that the increases in heat mortality will

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Security, and Greenhouse gas fluxes in Terrestrial Ecosystems, at 1-14 to -15, 2-12 to -29 (Aug. 7, 2019), https://www.ipcc.ch/site/assets/uploads/2019/08/Fullreport-1.pdf. *See also* Appendix F, Ocko, *Methane Emissions Contribute to Both Near- and Longer-Term Climate Damages*; Appendix H, *Annotated Bibliography of Methane Studies, 2016-2019*.

[122] *Coal. for Responsible Regulation, Inc. v. EPA*, 684 F.3d 102, 123 (D.C. Cir. 2012), *rev'd in part on other grounds sub nom. Util. Air Regulatory Grp. v. EPA*, 134 S. Ct. 2427 (2014).

[123] Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

[124] *Coal. for Responsible Regulation*, 684 F.3d at 116-26.

[125] The Supreme Court denied the petitions for certiorari that sought to challenge the D.C. Circuit's ruling upholding the Endangerment Finding. *Virginia v. EPA*, 571 U.S. 951 (2013), and *Pac. Legal Found. v. EPA*, 571 U.S. 951 (2013).

[126] *See* Joint Summary Comments of Environmental, Advocacy, and Science Organizations Regarding the Proposed Greenhouse Gas Emissions and Fuel Efficiency Standards for Light-Duty Vehicles, Model Year 2021-2026 - Comments Specific to Climate Change (Oct. 26, 2018) EPA-HQ-OAR-2018-0283-5075.

[127] NOAA National Centers for Environmental Information [NCEI], Billion-Dollar Weather and Climate Disasters (2018), https://www.ncdc.noaa.gov/billions/.

[128] EPA, Basis for Denial of Petitions to Reconsider and Petitions to Stay the CAA section 111(d) Emission Guidelines for Greenhouse Gas Emissions and Compliance Times for Electric Utility Generating Units, at 1 (Jan. 11, 2017) ("EPA CPP Denial of Reconsideration") https://archive.epa.gov/epa/sites/production/files/2017-01/documents/basis_for_denial_of_petitions_to_reconsider_and_petitions_to_stay_the_final_cpp.pdf.

> be larger than the decreases in cold mortality in the United States. Compared to a future without climate change, climate change is expected to increase ozone pollution over broad areas of the United States, especially on the highest ozone days and in the largest metropolitan areas with the worst ozone problems, and thereby increase the risk of morbidity and mortality. Climate change is also expected to cause more intense hurricanes and more frequent and intense storms and heavy precipitation, with impacts on other areas of public health, such as the potential for increased deaths, injuries, infectious and waterborne diseases, and stress- related disorders. Children, the elderly, and the poor are among the most vulnerable to these climate-related health effects.
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> Climate change impacts touch nearly every aspect of public welfare. Among the multiple threats caused by manmade emissions of GHGs, climate changes are expected to place large areas of the country at serious risk of reduced water supplies, increased water pollution, and increased occurrence of extreme events such as floods and droughts. Coastal areas are expected to face a multitude of increased risks, particularly from rising sea level and increases in the severity of storms. These communities face storm and flooding damage to property, or even loss of land due to inundation, erosion, wetland submergence, and habitat loss.
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> Impacts of climate change on public welfare also include threats to social and ecosystem services. Climate change is expected to result in an increase in peak electricity demand. Extreme weather from climate change threatens energy, transportation, and water resource infrastructure. Climate change may also exacerbate ongoing environmental pressures in certain settlements, particularly in Alaskan indigenous communities, and is very likely to fundamentally rearrange United States ecosystems over the 21st century. Though some benefits may help balance adverse effects on agriculture and forestry in the next few decades, the body of evidence points towards increasing risks of net adverse impacts on United States food production, agriculture, and forest productivity as temperatures continue to rise. These impacts are global and may exacerbate problems outside the United States that raise humanitarian, trade, and national security issues for the United States.

81 Fed. Reg. at 35,833–84. Climate change is a significant threat to human health, and its impacts are increasing both nationwide and worldwide. Rising greenhouse gas concentrations result in temperature increases, changes in precipitation, increases in the frequency and intensity of some extreme weather events, and rising sea levels. These effects endanger our health by affecting our food and water sources, the air we breathe, the weather we experience, and our interactions with the built and natural environments. As the climate continues to change, the risks to human health continue to grow.[129]

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[129] Crimmins et al., USGCRP, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Apr. 2016) https://s3.amazonaws.com/climatehealth2016/low/ClimateHealth2016_FullReport_small.pdf.

For example, National Parks are already being impacted by climate change as well, with 90 percent of our natural resource parks currently experiencing extreme weather[130] and 92 percent of our coastal parks already experiencing sea-level rise,[131] both of which scientists link to climate-changing air pollution. Damage associated with sea-level rise is expected to total more than $40 billion in just 40 of our coastal parks alone.[132] As the climate continues to change, Glacier National Park's namesake glaciers could disappear from the park within the century, and Joshua trees could disappear from Joshua Tree National Park, fundamentally altering the very icons these parks were designated to protect. Similarly, climate change impacts caused by emissions of greenhouse gases such as methane and combustion byproducts such as CO and NOx will contribute to acidification, warming, and sea level rise in the Chesapeake Bay.

The most recent data before the agency leave no doubt that climate change is an urgent and worsening global environmental crisis, and it will require every country to take steps to dramatically reduce greenhouse gas emissions. Climate change is already having a harmful impact on public health and the environment, affecting the health, economic well-being, and quality of life of Americans and populations throughout the world, especially those in the most vulnerable communities.[133]

Other recent studies have reinforced and expanded upon these conclusions. Most notably, one year ago, in November of 2018, this administration—through the United States Global Climate Research Program ("USGCRP"), a federal program for which EPA is a constituent agency along with NASA, NOAA, the National Science Foundation, and others—issued Volume II of the Fourth National Climate Assessment ("NCA4-II"), a dire report about the likely effects of climate change on the health and welfare of Americans and the United States economy.[134] The NCA4-II is a comprehensive, interdisciplinary assessment that represents the federal government's best understanding of the consequences of climate change for the United States. It provides voluminous detailed evidence of the current and future harms and costs climate change imposes on the United States. The NCA4-II emphasizes that the degree of future harm society will experience from climate change depends upon the extent to which action is taken to mitigate emissions of climate-destabilizing greenhouse gases.

The NCA4-II describes the multiple and diverse harms that the United States is already suffering from climate change and explains that those risks will become more severe absent effective and timely action to reduce greenhouse gas emissions. The NCA4-II "draws a direct connection between the warming atmosphere and the resulting changes that affect Americans'

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[130] Monahan and Fisichelli, *Climate Exposure of US National Parks in a New Era of Change*, 9(7): PLoS ONE e101302 (July 2, 2014) http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0101302.
[131] Caffrey and Beavers, *Planning for the Impact of Sea-Level Rise on U.S. National Parks*, 30:1 PARK SCIENCE 6 (2013) http://www.bostonchemicaldata.com/wpi/ParkSciencesummer2013.pdf.
[132] McDowell Peek et. al., *Adapting to Climate Change in Coastal Parks*, NATURAL RESOURCE REPORT NPS/NRSS/GRD/NRR—2015/961 (May 2015).
[133] EPA CPP Denial of Reconsideration, at 5. *See also*, IPCC, *Special Report on the Ocean and Cryosphere in a Changing Climate*, at 1-3 (Sept. 25, 2019) ("People in these regions," of the global population, 28 percent live in coastal areas, 11 percent live on land less than 10 meters above sea level, and 10 percent live in the Arctic or high mountain regions, "face the greatest exposure to ocean and cryosphere change, and poor and marginalized people here are particularly vulnerable to climate-related hazards and risks (*very high confidence*).").
[134] NCA4-II.

lives, communities, and livelihoods, now and in the future." NCA4-II at 36. The report "documents vulnerabilities, risks, and impacts associated with natural climate variability and human-caused climate change across the United States," and "concludes that *the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising*." *Id.* (emphasis in original).

As the report details, some of the harms driven by anthropogenic climate change include "[h]igher temperatures, increasing air quality risks, more frequent and intense extreme weather and climate-related events, increases in coastal flooding, disruption of ecosystem services, and other changes increasingly threaten the health and well-being of the American people, particularly populations that are already vulnerable." *Id.* at 55. The NCA4-II details how climate change is already contributing to massive harms throughout the United States—for example, it is "altering the characteristics of many extreme weather and climate-related events. Some extreme events have already become more frequent, intense, widespread, or of longer duration, and many are expected to continue to increase or worsen, presenting substantial challenges for built, agricultural, and natural systems." *Id.* at 66.

These impacts impose significant economic costs. The NCA4-II notes that NOAA "estimates that the United States has experienced 44 billion-dollar weather and climate disasters since 2015 (through April 6, 2018), incurring costs of nearly $400 billion." *Id.* at 66. Additionally, "[i]n 2015, drought conditions caused about $5 billion in damages across the Southwest and Northwest, as well as parts of the Northern Great Plains. . . . Two years later, in 2017, extreme drought caused $2.5 billion in agricultural damages across the Northern Great Plains." *Id.* at 67. Furthermore, in 2015 "over 10.1 million acres—an area larger than the entire state of Maryland—burned across the United States, surpassing 2006 for the highest annual total of U.S. acreage burned since record keeping began in 1960," and in 2017 "a historic firestorm damaged or destroyed more than 15,000 homes, businesses, and other structures across California," and these fires "caused a total of 44 deaths and their combined destruction represents the costliest wildfire event on record. *Id.* at 67-68.

The NCA4-II concludes that climate change "impacts are projected to intensify—but how much they intensify will depend on actions taken to reduce global greenhouse gas emissions and to adapt to the risks from climate change now and in the coming decades." *Id.* at 36. The report explains that "[m]any climate change impacts and associated economic damages in the United States can be substantially reduced over the course of the 21st century through global-scale reductions in greenhouse gas emissions, though the magnitude and timing of avoided risks vary by sector and region. The effect of near-term emissions mitigation on reducing risks is expected to become apparent by mid-century and grow substantially thereafter." *Id.* at 1,359. The NCA4-II's chapter on "Reducing Risks Through Emissions Mitigation" notes that inaction could have devastating consequences:

> In the absence of more significant global mitigation efforts, climate change is projected to impose substantial damages on the U.S. economy, human health, and the environment. Under scenarios with high emissions and limited or no adaptation, annual losses in some sectors are estimated to grow to hundreds of billions of

> dollars by the end of the century. It is very likely that some physical and ecological impacts will be irreversible for thousands of years, while others will be permanent.

Id. at 1357.

Two years ago, the USGCRP issued Volume I of the Fourth National Climate Assessment, the Climate Science Special Report, which reached essentially identical conclusions as NCA4-II.[135] The 2017 Report explained that "there is no convincing alternative explanation" for the observed warming of the climate over the last century other than human activities, that "[c]hoices made today will determine the magnitude of climate change risks beyond the next few decades," and that "[t]here is significant potential for humanity's effect on the planet to result in unanticipated surprises and a broad consensus that the further and faster the Earth system is pushed towards warming, the greater the risk of such surprises."[136]

In 2018, the Intergovernmental Panel on Climate Change ("IPCC") also issued a new report, synthesizing the latest peer-reviewed climate scientific research and concluding starkly that the time to act on the increasingly exigent circumstances is now. Based on more than 6,000 scientific references and including contributions from thousands of expert and government reviewers worldwide,[137] the IPCC report considers the effects of global warming of 1.5°C above pre-industrial levels in comparison to the previously-considered 2°C; these values represent critical thresholds above which the damage that will result from global climate change is expected to be irreversible and catastrophic.[138] The report concludes that pathways to limit warming to 1.5°C with little or no overshoot require "a rapid phase out of CO_2 emissions and deep emissions reductions in other GHGs and climate forcers."[139] In pathways consistent with a 1.5°C temperature increase, global net anthropogenic CO_2 emissions must decline *by about 45 percent from 2010 levels by 2030*, reaching net zero around 2050 (*high confidence*).[140]

The IPCC report further explains that the approximately 1°C temperature rise that has already occurred has "resulted in profound alterations to human and natural systems, including increases in droughts, floods, and some other types of extreme weather; sea level rise; and biodiversity loss—these changes are causing unprecedented risks to vulnerable persons and populations."[141] The report elaborates on the specific nature of the threat at a 1.5°C temperature increase in comparison to a 2°C increase, indicating that the consequences of warming above 1.5°C are more devastating than previously understood and highlighting the urgency of limiting

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[135] USGCRP, *Fourth National Climate Assessment, Volume I: Climate Science Special Report* (2017) http://science2017.globalchange.gov.
[136] *Id.* at 10, 31, 32.
[137] IPCC Press Release, *Summary for Policymakers of IPCC Special Report on Global Warming of 1.5 C approved by governments* (Oct. 8, 2018), https://www.ipcc.ch/news_and_events/pr_181008_P48_spm.shtml. The IPCC report was produced by 91 authors from 44 citizenships and 40 countries of residence (14 Coordinating Lead Authors, 60 Lead Authors, and 17 Review Editors) and 133 Contributing Authors, includes over 6,000 cited references, and considered a total of 42,001 expert and government review comments.
[138] IPCC (2018) at 181. The IPCC Special Report on Global Warming found that many of the most disastrous outcomes of climate change would occur between 1.5°C and 2°C, rather than between 2°C and 2.6°C as considered in the IPCC's Fifth Assessment Report. *See, e.g.*, IPCC (2018) at 187-88.
[139] *Id.* at 112.
[140] *Id.* at 18.
[141] *Id.* at 53.

warming below this threshold. The IPCC demonstrates that a half degree Celsius of additional warming makes a vast difference in avoiding immense damage in food and water security, loss of coastal properties, extreme heat waves, droughts and flooding, migration, poverty, devastating health outcomes, and lives lost. And it leaves no doubt that emission reductions *within the next decade* will make that difference.

As EPA previously recognized, 81 Fed. Reg. at 35,837, a central feature of the climate crisis is that, once emitted, greenhouse gas emissions remain in the atmosphere for decades or centuries. This means that each year of unabated emissions contributes to a growing, destabilizing stock of climate-altering gases, and that only a limited opportunity to abate emissions remains before the Earth faces long-lasting and effectively irremediable consequences. The IPCC report bolsters this conclusion, essaying the overwhelming scientific evidence for the necessity of deep and immediate greenhouse gas reductions across all sectors of the economy to avoid devastating climate change-driven damages and underscoring the high costs of inaction or delays, *particularly* in the next decade. The report emphasizes the speed with which climate change is occurring and the urgency of taking decisive steps to curtail the emissions that will lock in further warming causing ever more severe harms: "If the current warming rate continues, the world would reach human–induced global warming of 1.5°C around 2040," and "[l]imiting warming to 1.5°C depends on GHG emissions *over the next decades*."[142] Existing national emission-reduction pledges are insufficient to limit global warming to 1.5°C, the report explains, "even if they are supplemented with very challenging increases in the scale and ambition of mitigation after 2030."[143] Thus, critical emission reductions must occur *before* 2030. Limiting global temperature increases to 1.5°C will require action at "a rapid escalation in the current scale and pace of change,"[144] including "very ambitious, internationally cooperative policy environments that transform both supply and demand."[145] "[E]very year's delay before initiating emission reductions decreases by approximately two years the remaining time available to reduce emissions to reach zero emissions."[146]

Amazingly, despite these dire conclusions from the top scientists (including EPA scientists) in the U.S. government and the world's foremost scientific body on climate change, EPA's has put forth a Proposal that (it asserts) would *prevent* the Agency from controlling methane emissions from existing oil and gas sources, which represent the vast majority of emissions from the sector. (This, on top of EPA's now year-old proposal to *increase* the emissions from new and modified sources; see 83 Fed. Reg. 52,056 (Oct. 15, 2018)). According to data from the Greenhouse Gas Reporting Program, oil and natural gas operations are the second largest stationary source of overall GHG emissions in the United States, second only to fossil fuel-fired electricity generation. 81 Fed. Reg. at 35,830. The IPCC reports that, to avoid the worst consequences of climate change, there must be "major reductions in greenhouse gas emissions in all sectors," *id.* at 161, and that such reductions "will require substantial societal and technological transformations." *Id.* at 56. For the United States, any strategy to curtail domestic

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[142] *Id.* at at 33; 95 (emphasis added).
[143] *Id.* at 95; *see also id.* at 392.
[144] *Id.* at 392
[145] *Id.* at 95.
[146] *Id.* at 61*; see also id.* 126 ("The later emissions peak and decline, the more CO2 will have accumulated in the atmosphere").

emissions must encompass steep cuts to oil and gas methane pollution, including from existing sources. EPA's proposal moves in precisely the opposite direction.

In sum, the scientific record is now overwhelming that climate change poses grave harm to public health and welfare; that its hazards have become even more severe and urgent than previously understood; and that avoiding devastating harm requires substantial reductions in greenhouse gas emissions, including from both new and existing sources in the critically important oil and gas sector, within the next decade.

B. EPA's failure to consider the facts of climate change or to justify its decisions to weaken standards in the face of those facts is both contrary to its statutory mandate and to the record before it, and is thus arbitrary, capricious, and unlawful.

Despite the overwhelming record evidence of the hazards of climate change, EPA's Proposal utterly fails to examine (let alone seriously analyze) the health and environmental risks posed by the additional greenhouse gas emissions it will cause. The Proposal makes no effort to address any of the known facts about climate change and its effects, even while EPA proposes regulatory changes that would allow vast emissions to remain unchecked that would otherwise be subject to regulation under section 111(d). Relatedly, it makes no effort whatsoever to reconcile its decision to remove methane regulation with the scientific consensus that major emission reductions *now* are vital to avoid extreme climate harms from warming over 1.5°C.

This is not just bad policy; it is unlawful. EPA is bound by the Clean Air Act to protect the public health and welfare, and section 111 requires EPA to prescribe standards to limit emissions for both new and existing sources in listed categories that cause or significantly contribute to air pollution endangering public health and welfare. 42 U.S.C. §§ 7411(b)(1)(A)–(B), 7411(d). That mandate fulfills Congress's general direction in the Act to "protect and enhance" air quality, *id.* § 7401(a), and as well as the statute's purpose of mitigating the "mounting dangers to the public health or welfare" caused by air pollution. *Id.* § 7401(a)(2). In its Proposal, EPA cannot satisfy these requirements without grappling with (and somehow reconciling) the facts about the health and environmental crises at issue, and without making a rational choice that gives effect to the Clean Air Act's protective mandates in light of the record facts. In the face of the severe and imminent threat of a destabilized climate, stripping away existing protections—with absolutely no explanation or discussion of the result of doing so or alternative protective measures—is a violation of the statute.

Similarly, under basic requirements of administrative law, agencies must consider all "relevant factors," and "examine the relevant data and articulate a satisfactory explanation for its action." *State Farm*, 463 U.S. at 42–43. Contrariwise, agency action is arbitrary, capricious, and unlawful where "the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Id.* at 43. Moreover, reasoned decisionmaking requires that, in developing a proposal, an agency must "weigh[] competing views, select[] a [solution] with adequate support in the record, and intelligibly explain[] the reasons for making that choice." *Elec. Power Supply Ass'n*, 136 S. Ct. at 784. It

must demonstrate a "rational connection" between the record facts and its policy choice. *State Farm*, 463 U.S. at 43.

EPA's Proposal falls short of these requirements. Methane-driven climate change is not an ancillary concern here; it is necessarily a central topic of this rulemaking. The reasonableness of a given policy response—in this case, regulating or not regulating methane—necessarily depends upon the severity, imminence, and remediability of the hazard. EPA cannot simply ignore either the fact of climate change itself or the indisputable conclusion that the Proposal doubles down on the very harms that climate change causes. Instead, it must confront the scientific record, which it acknowledged as recently as 2016, and its own previous conclusion that climate change is not just some vague problem, but "the United States' most important and urgent environmental challenge"[147] for which delayed action comes at a huge cost. If, by eliminating standards already on the books, EPA means to reverse its conclusions about climate change, it has unlawfully failed to notice of such a reversal, 42 U.S.C. 7607(d)(3); 5 U.S.C. 553(b), (c); *see also Fox Television*, 556 U.S. at 515 ("[T]he requirement that an agency provide reasoned explanation for its action would ordinarily demand that it display awareness that it is changing position. An agency may not, for example, depart from a prior policy *sub silentio* or simply disregard rules that are still on the books."). Nor has EPA provided the remotest basis for questioning the scientific record of climate change or departing from its prior findings. If the Agency now believes that scientific findings on climate change in the administrative record and in recent reports by the USGCRP and IPCC, it must set forth its reasoning for that conclusion. Having failed to do so, the Proposal is thus arbitrary and capricious and an abuse of discretion.

EPA may attempt to argue that any emissions increase due to the Proposal would be negligible and that methane from existing sources in the oil and gas sector constitutes just a small fraction of global GHG emissions. This is an entirely specious line of reasoning; the oil and gas sector is the second largest stationary source of overall GHG emissions in the United States, which is second only to China as the world's largest emitter climate pollutants. As discussed in Section IV, on a carbon dioxide-equivalent basis, the U.S. oil and gas sector's methane emissions exceed the total GHG emissions of all but a handful of countries on Earth. Thus, in both absolute and relative terms, oil and gas methane emissions are, in fact, enormous.[148]

More importantly, this argument would stifle *any* serious action to reduce climate pollution. Addressing the threat of climate change will necessitate reductions from individual source categories that, standing alone, represent what might appear to be a small fraction of the overall problem. Indeed, EPA itself so concluded in its 2009 endangerment finding:

> [N]o single greenhouse gas source category dominates on the global scale, and many (if not all) individual greenhouse gas source categories could appear small in comparison to the total, when, in fact, they could be very important contributors in

[147] EPA CPP Denial of Reconsideration, at 1.

[148] *See Massachusetts v. EPA*, 549 U.S. at 524 ("Reducing domestic automobile emissions is hardly a tentative step. Even leaving aside the other greenhouse gases, the United States transportation sector emits an enormous quantity of carbon dioxide into the atmosphere."); *Coal. for Responsible Regulation*, 684 F.3d at 128 (approving EPA's finding that MY2012-2016 light duty vehicle GHG standards "result in meaningful mitigation of greenhouse gas emissions").

> terms of both absolute emissions or in comparison to other source categories, globally or within the United States. If the United States and the rest of the world are to combat the risks associated with global climate change, contributors must do their part even if their contributions to the global problem, measured in terms of percentage, are smaller than typically encountered when tackling solely regional or local environmental issues. The commenters' approach, if used globally, would effectively lead to a tragedy of the commons, whereby no country or source category would be accountable for contributing to the global problem of climate change, and nobody would take action as the problem persists and worsens.

74 Fed. Reg. 66,543 (Dec. 15, 2009). EPA has not offered—and could not offer—any reasoned explanation for abandoning these findings or this approach.

Furthermore, applied generally, such fatalistic reasoning could undermine or even preclude all regulation of emissions of greenhouse gases—indeed, it could foreclose efforts to control emissions of *any* pollutant emitted from many different sources. This is antithetical to section 111's directive to reduce pollution that endangers public health and welfare. *See, e.g.*, *Massachusetts*, 549 U.S. at 524. Because all of the individual steps needed to address the problem of this nature might appear to have relatively small effects when viewed in isolation, such reasoning amounts an assertion that it is not worth doing *anything* to address the most urgent problem facing humanity. It is difficult to conceive of a more irrational outcome than this. To the extent EPA concludes that the existing standards are not a sufficient step towards addressing that problem, the solution is to adopt *more* stringent standards, not to weaken those already in place.

The proposed rollback also constitutes an unexplained, unjustified reversal of EPA's own recently reaffirmed positions on the question of the need for reducing greenhouse gas emissions immediately. As the passage quoted above from the 2016 Rule demonstrates, just three years ago, EPA expressly acknowledged that the nature of the climate crisis urgently requires timely reductions in emissions. 81 Fed. Reg. at 35,834-37. Yet, in the Proposal—without having provided the slightest explanation or evidence to support a contrary view—EPA rushes in the opposite direction, removing standards *already in effect* and thereby disavowing its obligation and authority to curtail existing source emissions. This unexplained, unjustified change in position is unlawful.[149] By essentially ignoring the principal health and environmental risks at issue, and by proposing to remove methane regulation even as the science signals the urgent need for pressing action, EPA partakes in an arbitrary and unexplained about-face. The agency must abandon this irrational, misbegotten proposal and commit not only to fully enforcing (and strengthening) the 2016 NSPS, but to promptly develop existing source standards as well, as the Clean Air Act obligates it to do.

Conclusion

The Agency should withdraw this deeply flawed Proposal and immediately proceed to regulate the hundreds of thousands of existing sources emitting dangerous pollution.

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[149] *See Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117 (2016); *Fox Television*, 556 U.S. at 502, 515; *id*. at 537 (Kennedy, J., concurring); *State Farm*, 463 U.S. at 43.

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To: Peter Zalzal, EDF

From: Dana Lowell

Date: November 12, 2019

Re: **Overlap of Oil and Gas Upstream and Midstream Operations**

As requested, MJB&A investigated ownership of various types of facilities throughout the oil and natural gas value chain to identify overlap between companies operating upstream and those operating mid-stream. In this context "upstream" encompasses oil and natural gas well sites, gathering and boosting activities, and natural gas processing; while "midstream" includes transmission via inter- and intra-state pipelines, natural gas storage, and liquefied natural gas (LNG) production and storage.

MJB&A identified 50 of the largest companies operating upstream (by number of wells owned/operated) and determined that at least 20 of these companies (40%) also operate in the midstream. Of these 20 companies, 7 (30%) operate in at least two different areas of the mid-steam (transmission, storage, LNG).

As expected, the well-known "major" petroleum companies such as Chevron, Exxon Mobil, BP, and Conoco Phillips all own/operate a significant number of oil and gas wells, and also have significant operations in the mid-stream, including 2,900 miles of pipeline, 12 LNG facilities, and 3 natural gas storage facilities. Other less well-known companies together own a greater number of oil and natural gas wells, and a similar number of mid-stream assets.

Each of the 50 companies identified and investigated is shown in attachment 1 to this memo. For each company available data on the mid-stream assets they own/operate are also included.

Methodology

To identify companies operating in the upstream oil and gas segment, MJB&A used two different sets of data extracted from Well Drilling Info for previous projects. The first data set includes all oil and natural gas wells in operation as of December 2016 on federal land overseen by the Bureau or land Management (BLM). This data set includes 96,566 wells operated by 2,179 different companies. The second data set includes all wells newly drilled, or modified, between January 2013 and September 2018 across the entire U.S. This data set includes 18,578 wells owned by 3,177 different companies. Each of these data sets was sorted to identify the largest companies (by number of wells owned) which were operating on BLM land in 2016, and which drilled new wells between 2013 and 2018.

These two lists were then compared to identify the 50 largest companies on both lists – representing companies with both a significant base of existing wells and significant activity drilling new wells over the last five years. The 50 companies identified in this way operated 49,956 wells on BLM land as of December 2016 (52% of total BLM wells at the time) and also newly drilled or modified a total of 5,409 wells between 2013 and 2018 (29% of all new wells drilled in the US during that period).

Each of these 50 large companies operating in the upstream oil and gas segment was then investigated to determine whether or not they also operate in the midstream oil and gas segment. This investigation utilized three data sources:

1) The ABB Ability Velocity Suite™
2) EPA's Greenhouse Gas Reporting Program (GHGRP) data for reporting year 2017, and
3) Company websites and filings with the Securities and Exchange Commission (SEC)

The ABB Ability Velocity Suite is a database that includes most assets in the processing, transmission, storage, and LNG segments of the oil and gas industry. If available, miles of transmission pipeline, number of storage facilities, and number of LNG operating facilities were identified for each of the 50 large upstream companies.

EPA's Greenhouse Gas Reporting Program (GHGRP) includes ownership data for various types of facilities in the oil and gas value chain which have reported emissions data to the program. Reported data for 2017 was used to identify any companies among the 50 large downstream companies which reported emissions data to GHGRP from "gathering and boosting" facilities. GHGRP alone significantly under-reports the number and ownership of gathering and boosting assets nationwide, because there is a relatively high reporting threshold of 25,000 metric tons CO_2e for all facilities reporting to GHGRP. In 2017 data was reported to GHGRP from only 321 gathering and boosting facilities nation-wide. This is a very small fraction of all such facilities.

Company websites and SEC filings for the 50 large upstream companies were also reviewed to identify statements about ownership of mid-stream assets, or participation in midstream operations (transmission, storage, LNG) by the company.

All of the data gathered from all three above sources on each of the 50 companies investigated is summarized in Attachment 1. For data identified via the ABB Ability Velocity Suite, available scaling information is provided (number of LNG facilities, pipeline miles, processing plant capacity – MMcf/day, number of storage facilities). For gathering and boosting facilities identified via GHGRP the number of separate facilities reporting to GHGRP is also shown. In Attachment 1, if "Y" is listed under the columns "LNG" , "Pipeline" "Processing Plant", "NG Storage" or "Gathering and Boosting" it means that ownership/participation in the mid-stream sub-segment was confirmed by statement(s) on the company website or SEC filings, but information about the exact scale or scope of the activity(s) was not provided.

ATTACHMENT 1

COMPANY	UP-STREAM ASSETS				MID-STREAM ASSETS				Notes
	New Wells 2013-2018	Wells on BLM Land in 2016	Gathering and Boosting Facilities	Processing Plant (Capactiy in MMcf/day)	Owns Midstream Assets?	LNG (no. operating facilities)	Pipeline (miles in service)	NG Storage (no. existing facilities)	
CHEVRON, U.S.A., INC.	995	980	5	1,006	Y	2	2,157	2	LNG, pipeline, processing
AERA ENERGY SERVICES COMPANY	868	218	2	184					Jointly Owned by Shell (52%) and Exxon Mobil (48%)
BERRY PETROLEUM COMPANY	326	630	1						https://ir.berrypetroleum.com/static-files/803cf4ea-9675-4dee-874b-1296ce468f1a
CATALYST ENERGY, INC.	277	954		1	Y		Y		Owns 10 mcf/d processing faciltiy, intrastate pipeline transportation, https://www.catalystenergyinc.com/transport-processing
CALIFORNIA RESOURCES ELK HILLS, LLC	217	3,315	2	774					Joint venture of California Resources Corporation and Ares Management, LP
ENERVEST OPERATING, LLC	187	1,875	4						
NATIONAL FUEL GAS COMPANY	153	282			Y		2,084	Y	Owns interstate pipeline system and storage
APACHE CORPORATION	131	456		55	Y		290	Y	Owns Apache Midstream, which operates storage and processing facilities
HILCORP ENERGY COMPANY, INC.	123	8,631	Y	Y					Subsidiary Pennant Midstream LLC operates gas-gathering system and processing plant in Ohio
SENTINEL PEAK RESOURCES CA, LLC	118	131		15					
E & B NAT. RES. MGMT. CORP.	116	195							
EXXON MOBIL CORPORATION	111	3,209	1	3,438	Y	6	426		
CAMERON ENERGY CO	91	809							
OCCIDENTAL ENERGY COMPANY,INC.	85	850	2	2,571	Y	1	18		https://www.oxy.com/OurBusinesses/MidstreamMarketing/Pages/default.aspx
DENBURY RESOURCES INC.	81	179	5		Y		129		Primarily focused on Enhanced Oil Recovery w/ CO2 injection
HOWARD DRILLING INC	80	256							Small Drilling Company
BP AMERICA PRODUCTION COMPANY	79	3,272	1	2,200	Y	2	283		Website: "natural gas production assets include well, gathering centres, export systems, and LNG plant facilities"
DEVON ENERGY CORPORATION	77	1,081		270	Y		188		Website: "Devon's marketing function is responsible for… transportation, storage, processing, and treating of hydrocarbons"
MERIT ENERGY COMPANY	75	1,363	2	1,111					
CONOCOPHILLIPS COMPANY	68	2,562		2,034	Y	2	97	1	NGL liquid transport intra state, natural gas interstate
GAS & OIL MGMT ASSN INC	63	680							
CARBON CREEK ENERGY LLC	61	1,419			Y		Y		Operates an intrastate pipeline
URBAN OIL AND GAS GROUP LLC	53	155	1		Y				Purchase oil and gas wells with declining production
EQT PRODUCTION LLC	51	509	4		Y		1,177		
NOBLE ENERGY, INC.	49	125		23	Y		62		Noble Energy Midstream provides services for Noble Energy
DIVERSIFIED RESOURCES, LTD.	48	681	Y		Y		Y		Investor report mentions "midstream assets" and pipeline assets
ANADARKO E&P ONSHORE, LLC	46	196		2,025	Y		627		Anadarko purchased by Occidental, owns processing plants, pipelines

COMPANY	UP-STREAM ASSETS				MID-STREAM ASSETS				Notes
	New Wells 2013-2018	Wells on BLM Land in 2016	Gathering and Boosting Facilities	Processing Plant (Capactiy in MMcf/day)	Owns Midstream Assets?	LNG (no. operating facilities)	Pipeline (miles in service)	NG Storage (no. existing facilities)	
ARG RESOURCES INC	44	830							Seems to be wells only
WARREN E & P,INC.	43	167	1						Owns Gathering and boosting
EOG RESOURCES INCORPORATED	42	2,361	6		Y		57		Owns Gathering and boosting infrastructure
MINARD RUN OIL COMPANY	40	1,429	Y	4					website: "Minard Run Oil Company maintains and operates nearly 300 miles of midstream pipeline and facilities - including 11 compressor stations"
MSL OIL & GAS CORP	40	604							
EL PASO CORPORATION	39	70			Y			2	Owned by Kinder Morgan. KM owns pipelines, LNG facilities, gathering, compression, processing stations https://www.kindermorgan.com/pages/business/gas_pipeline
CONCHO RESOURCES INC.	36	1,863							Operates > 6000 wells, entered into a contract with Frontier to build crude oil gathering, transportation and storage in the Northern midland basin
BREITBURN ENERGY COMPANY LLC	35	412		214					Breitburn is now Maverick Natural Resources, LLC
CHESAPEAKE ENERGY CORPORATION	35	130	1		Y		56	1	May still partially own Access Midstream Partners
SCOUT ENERGY MANAGEMENT LLC	35	1,008							
WELDBANK ENERGY CORP	35	175							Oil and gas field services
FDL OPERATING, LLC	32	570							
SNYDER BROS INC	32	927							Potential to own gathering and boosting/distrubution systems. Has Marketing division and supply nd users in PA, OH, and WV
EOG Y RESOURCES, INC.	31	1,246	Y		Y		57		Gathering and processing facilities in Eagle Ford, Bakken, Three Forks, Barnett Shale, Permian Basin
M & R INVESTMENTS OHIO LLC	31	74							
HOWELLS OIL & GAS	29	59							
PETROHAWK ENERGY CORPORATION	29	704	Y						Petrohawk operates gathering and boosting infrastructure for BHP in Eagle Ford, Permian, Fayettville, Haynesville
VANGUARD OPERATING, LLC	29	824	2	202					Processing ABB
VINLAND ENERGY OPERATIONS, LLC	29	364		27					Processing ABB
DUGAN PRODUCTION CORP	25	550	1						GHGRP
OTTER EXPLORATION INC	25	50							
SUMMIT GAS RESOURCES, INC.	22	51							
CRESCENT POINT ENERGY US CORP	21	240	1						GHGRP
TOTAL	**5,409**	**49,956**	**42**	**16,154**	**20**	**13**	**7,708**	**6**	

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To: Peter Zalzal

From: Dana Lowell

Date: November 21, 2019

Re: **Rate of Equipment and Site Turnover to NSPS OOOOa Regulation**

This memo summarizes available information and analysis as to the rate at which existing, unregulated oil and gas equipment and facilities of various types will either be retired or fall under EPA's New Source Performance Standards (OOOOa) due to replacement or modification. The specific types of sites covered include oil and gas well sites, gas system gathering and boosting compressor stations, and transmission system compressor stations. The specific types of equipment covered include pneumatic controllers, pneumatic pumps, compressors, and storage tanks.

The analysis summarized here draws from numerous data sources, including the Regulatory Impact Analyses (RIA) and Technical Support Documents (TSD) developed by EPA over the last four years to support proposed changes to NSPS OOOOa, well data from Enverus™, data submitted to EPA from companies in the oil and gas industry under an Information Collection Request (ICR) in 2016 and 2017, NSPS OOOOa compliance reports submitted to EPA by oil and gas companies in 2017-2019, and prior research by MJB&A.

Table 1 Existing O&G Sources - Estimated Rates of Turnover to NSPS OOOOa Regulation

Facility/Equipment	Estimated Number of Existing Sources	NSPS OOOa Requirements	Time for All Existing Sources to be Retired or Regulated
Oil and Gas Well Sites	440,000	Fugitive emissions monitoring & repair	20+ years
Gathering and Boosting Compressor Stations	27,000 – 38,000	Fugitive emissions monitoring & repair	25+ years
Transmission Compressor Stations	1,872	Fugitive emissions monitoring & repair	Unknown
Transmission Pneumatic Controllers	84,000+	Emissions Limit	7 - 10 years*
Pneumatic Pumps	Unknown	Route emissions to control equipment	Unknown
Compressors	122,000 – 172,000	Maintenance requirements	30+ years
Storage Tanks	445,000+	Professional certification of design	Unknown

** This reflects EPA's own estimate. MJB was not able to separately substantiate EPA's assumptions*

See Table 1 for a summary of the number of existing sites/pieces of equipment of each type, the NSPS OOOOa requirements for new or modified facilities, and the estimated number of years before all in-use facilities will be subject to NSPS OOOOa requirements. The data sources and method(s) used to develop the data in Table 1 are described below.

The estimated turnover rates in Table 1 are based on average data and, while some individual sources might retire or be replaced more quickly, it is equally likely that other individual sources would be retired or replaced on a longer time frame. The timeframe for full retirement or replacement of every existing unit of each facility/equipment type could therefore be even longer than the averages suggest.

Oil and Gas Well Sites

According to the U.S. Energy Information Administration, in 2016 there were 566,930 existing natural gas wells and 442,790 existing oil wells in the U.S [1]. The current NSPS OOOOa requirements took effect in 2016; all new wells drilled, or wells modified since September 2015 are subject to these requirements. EPA assumes that there are an average of two wells per site across the country; based on this assumption, in 2016 there were approximately 505,000 well sites in the U.S.

While there is significant variability from well to well, the general industry consensus is that most oil and gas wells will continue to produce for 20 to 30 years. In the literature one can find numerous examples of statements such as this, from geology.com: "The typical well might yield as much as half of its gas in the first five years of production. Wells might then continue to produce for a total of twenty to thirty years but at lower and lower production rates".[2] The idea that wells will continue to produce for many years despite declining monthly production is supported by the fact that between 2000 and 2017 80 percent of all U.S. oil and gas wells were so-called "stripper wells" with very low production rates, less than 15 barrel-of-oil-equivalents per day (BOE/day); over this time period more than 40 percent of in-use wells produced less than 2 BOE/day [3].

Assuming an average 25-year life, about 4 percent of existing wells are retired or "shut-in" each year. As such, of the one million producing wells in existence in 2016, at least 88 percent (880,000 wells, at 440,000 well sites) are likely still producing, and some of these wells will continue to operate for another 20 years or more.

Existing wells will be subject to NSPS OOOOa if significantly "modified" in order to increase or prolong their production – for example by re-fracking an unconventional shale well. Available data suggests, however, that the number of well modifications each year is small. For a previous project completed for EDF, MJB&A analyzed data from Enverus™ [1] which included details of all new and modified wells developed in the U.S. between October 2015 and October 2018[2] [4]. Over this three-year period after the NSPS OOOOa implementation date, a total of 26,977 wells were determined to be "new" and a total of 6,733 wells were determined to be "modified". This is an average of 8,992 new wells and 2,244 modified wells per year. Between late 2015 and late 2018 approximately 0.67 percent of the wells in operation in 2016 were modified, or an average of 0.22 percent per year.

MJB&A also analyzed Air Emission Reports (AERs) submitted to EPA by oil and gas production companies in compliance with the reporting requirements of NSPS OOOOa [5]. Across all of the reports submitted as of

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[1] Enverus™ was previously called DrillingInfo.

[2] This includes all wells with listed "First Production Date" between 10/1/15 and 10/30/18, and total production over this time period >1 BOE.

October 2018 MJB&A was able to identify 3,116 unique wells for which the various companies had submitted the required data. This included reports submitted for reporting years 2017 and 2018. In late August 2019 MJB&A downloaded all additional reports which had been submitted since October 2018; this included reports for the 2018 and 2019 reporting years. MJB&A was able to identify a total of 5,122 unique wells among all of the submitted reports (2017, 2018, and 2019). This was an increase of 2,006 wells subject to NSPS OOOOa. This is in fact lower than the number of new wells (subject to NSPS OOOOa) that would be expected to come on line each year (see above), and is further evidence that only a small number of existing wells is "modified" each year in a way that would subject them to the fugitive emissions requirements of NSPS OOOOa.

MJB&A also analyzed Oil and Gas Industry data received by EDF from EPA under a Freedom of Information Act (FOIA) request [6]. This data was originally collected by EPA from companies in the Oil and gas industry under a 2016 Information Collection Request (ICR). This data, which was received by EPA prior to them withdrawing the request, includes details of the installed equipment at 160,929 oil and gas "well sites" and 20,263 oil and gas "central production sites"[3]. This represents approximately 36 percent of all existing oil and gas well sites, but an unknown percentage of gas gathering and processing facilities.

Under Part 1 of the surveys, due in January 2017 (roughly 15 months after September 2015 imposition of NSPS OOOOa) facilities were required to report whether they were subject to OOOOa. Only 3 percent of reported wells (4,880 of 160,929 reported wells) and 14 percent of reported central production sites (2,893 of 20,263 central production facilities) were reported as subject to OOOOa.

Based on the available evidence, MJB&A estimates that including both shut-ins and modifications, approximately 4.25 percent of existing wells and well sites will be either removed from service or will come under NSPS OOOOa regulation each year. That means that the NSPS OOOOa requirements will not apply to the entire universe of U.S. wells for at least another 20 years.

Gathering and Boosting Compressor Stations

In the Technical Support Document for the 2016 NSPS OOOOa rule making, EPA estimated that there were 8,015 compressor stations in the gathering and boosting system [7]. This estimate was based on their estimate of the number of gathering and boosting compressors, which itself was based on the then current national GHG inventory. As noted below in the discussion of compressors, based on new information provided to EPA in 2017 by companies in the O&G industry in response to an EPA Information Collection Request (ICR), it appears that EPA's estimate of the number of gathering and boosting compressors is significantly understated. As such, EPA's estimate of the number of gathering and boosting compressor stations is likely also significantly understated. Based on the ICR data, and EPA's original assumption that there are an average of 4.5 compressors

[3]In the ICR request, EPA defined central production sites as "Any onshore surface site that obtains crude oil or a mixture of crude oil and natural gas directly from multiple well surface sites without a custody transfer, and includes all equipment used in the transportation, compression, stabilization, separation, storing or treating of crude oil and/or natural gas (including condensate) located at the surface site under the control of the same person (or persons under common control)." EPA defined well sites as "One or more surface sites that are constructed for the drilling and subsequent operation of any oil well, natural gas well, or injection well. For purposes of this ICR, well surface site refers only to the well(s) and equipment at the disturbed area of land associated with the well(s) that are under the control of the same person (or persons under common control)."

per compressor station, MJB&A estimates that there are between 27,000 and 38,000 gathering and boosting compressor stations nation-wide.

Existing compressor stations installed prior to 2016 will become subject to the fugitive emission requirements of NSPS OOOOa if they are "modified". Only the expansion of a compressor station is considered a "modification" that triggers NSPS OOOOa applicability, either by 1) installation of an additional compressor, or 2) replacement of one or more compressors at a compressor station by compressor(s) of greater total horsepower than the compressor(s) being replaced. When one or more compressors is replaced by one or more compressors of an equal or smaller total horsepower than the compressor(s) being replaced, installation of the replacement compressor(s) is not considered modification of the station with respect to NSPS OOOOa [8].

The only reason to expand an existing gathering and boosting compressor station is to accommodate an increase in gas volume or pressure within the surrounding system. Such increases are highly unlikely in mature locations without much new drilling activity, as production from all gas wells falls quickly after completion. In built-out locations volume and pressure within the gathering system will be continuously falling, and it will be more likely that compressor stations will be down-sized (by removing compressors) than expanded. In areas with significant new drilling activity, it is possible that existing compressor stations will be expanded, in addition to new compressor stations being developed.

In their 2019 Annual Energy Outlook, the Energy Information Administration estimates that an average of 34,000 new oil and gas wells will be drilled each year between 2020 and 2030, and that in 2030 annual natural gas production will be 15 percent higher than in 2020 [9]. Given that the average productive life of most wells is 25 years, this is just enough new wells (~4 percent/year) to replace the wells projected to be shut-in, and the total number of active wells should stay relatively static. If all of this new drilling activity was in already developed areas, it would therefore affect about 4 percent of the existing boosting and gathering system each year, potentially requiring expansion of 4 percent of existing compressor stations. If all of this new drilling activity was in undeveloped areas, new compressor stations would be required, and up to 4 percent of existing compressor stations might be completely abandoned as old wells were shut in, and pressure and throughput in the surrounding gathering system fell. Either way, each year up to 4 percent of existing compressor stations could either be replaced with new stations (in a different location) or expanded. This means that it will likely take at least 25 years or more for all boosting and gathering compressor stations nation-wide to become subject to the fugitive emission requirements of NSPS OOOOa.

Transmission Compressor Stations

In the Regulatory Impact Analysis for the 2019 NSPS OOOOa reconsideration, EPA states that there were 1,800 transmission compressor stations in 2014, and that this number grew by an average of 36 stations per year in the 10 prior years; this data comes from the national GHG inventory [10]. Based on this data, the number of existing stations not subject to the NSPS OOOOa fugitive emission requirements is estimated to be 1,872 (the number existing in 2016).

MJB&A was not able to find any information on the number of transmission compressor stations that are expanded each year, thus triggering NSPS OOOOa fugitive emission requirements. We therefore cannot estimate how long it will take for all in-use transmission compressor stations to be subject to NSPS OOOOa.

Pneumatic Controllers

In the Technical Support Document for the 2016 NSPS OOOOa rule making, EPA estimated that there were 84,000 pneumatic controllers in the natural gas transmission and storage segment; the source of this estimate was

EPA's Gas Star Program [11]. The number of pneumatic controllers throughout the entire natural gas value chain, including at well sites, processing facilities, and gathering and boosting stations is likely significantly higher, but MJB&A was not able to find any additional information that would allow us to produce a better estimate.

In the Regulatory Impact Analysis for the 2019 NSPS OOOOa reconsideration, EPA states that "Pneumatic controllers are assumed to have a lifetime of ten years." [12]. No source or justification is noted for this assumption.

MJB&A was not able to find any information to confirm or refute EPA's assumption as to the useful life of pneumatic controllers.

Pneumatic Pumps

MJB&A was not able to find any information on the number of pneumatic pumps in the oil and gas supply chain, or any information on the useful life of this equipment. We therefore cannot estimate how long it will take for all in-use pneumatic pumps to be subject to NSPS OOOOa requirements to have emissions routed to control equipment.

Compressors

Number of Compressors

In the Technical Support Document for the 2016 NSPS OOOOa rule making, EPA estimated that there were 36,000 compressors installed in the natural gas gathering and boosting system, based on the then current GHG inventory [13]. This is almost certainly a significant under-estimate.

The ICR data received by EPA from oil and gas companies and analyzed by MJB&A (see discussion of Oil and Gas Well Sites above) included data on the number of compressors installed at reported well sites and central production sites. The companies reported a total of 8,201 compressors at the 160, 929 reported well sites (one for every 19.6 sites) and 53,335 compressors at the 20,263 reported central production sites (2.6 per site).

Based on this sample, it is likely that there are at least 22,000 compressors associated with the 440,000 existing wells sites, and between 100,000 and 150,000 associated with existing boosting, gathering, and processing facilities[4].

Compressor Turn-over Rate

In 2014 MJB&A conducted an extensive literature review to determine the turn-over rate of compressors used in the natural gas gathering and boosting system, and in the natural gas transmission system. This review included websites, press releases, and financial reports from the major compressor manufacturers and compressor service companies; a compressor database, environmental impact statements, and rate case files produced or maintained by the Federal Energy Regulatory Commission (FERC); air emissions permits and siting permits available online from Colorado state agencies; and air emissions permitting guidance from the Pennsylvania Department of Environmental Protection. In addition, MJB&A staff had conversations with air regulators in Pennsylvania, a

[4] The higher number would apply if the facilities for which EPA received data represent a similar percentage of all facilities as for well sites (36 percent).

former air emissions inventory expert from a gas producing state, and members of the environmental policy and permitting staff at a natural gas distribution company that owns and operates compressors for storage.

It is clear from this literature review that the in-service life of most large reciprocating compressors, like those used for gas gathering and transmission, is 30 – 50 years, indicating that the turnover rate of existing to new machines is generally less than 3% per year.

This conclusion is supported by anecdotal statements from companies and individuals that operate throughout the natural gas value chain and by numerical data on the actual age of a limited number of in-service compressors. The general consensus is that compressors are rebuilt regularly (every 3 – 6 years), but are only "replaced" if: 1) a compressor station is upgraded to increase capacity, 2) a compressor catastrophically fails in service, or 3) annual maintenance costs increase significantly compared to similar machines.

Some examples of industry statements that support this conclusion:

- [Rotary equipment] has a typical operating life of 30 years or more. [Dresser Rand annual report]
- Our compressors can operate 50 years or longer. [Neumann & Esser annual report]
- NiSource Midstream Services recently completed a significant compressor upgrade project at its Majorsville compressor station in Dallas, West Virginia. The project consisted of the replacement of four vintage Ingersoll Rand KVG412 compressors, installed in 1956 [56 years old], with four new CAT 3606 engines using Ariel JGC4 compressors. [Ariel Press Release]
- The first compressor ever sold by Ariel (the JG, serial no. 1) was found in 1995 still working, 27 years later. [Ariel website].
- "We estimate that roughly 50 percent of all of the units we've ever built are still in service," said Dave Morse, consultant, at Dresser-Rand, who has been with the company for more than 50 years…"Most recip units are designed for a minimum life span of 20 years. But many have reached the 40-year mark, and some have been operating for 50 years or more." [Dresser Rand press release]

In addition, at least two major manufacturers (Dresser, Neumann) advertise "Revamp and Modernization Programs" for older, in-service compressor units. Designed to replace original parts with new, upgraded parts that incorporate modern design elements, these programs are advertised to provide "cost advantages compared to new" and to include "structural improvements to extend the working life of a machine by a considerable factor."

Review of filings related to rate cases, which are maintained by the Federal Energy Regulatory Commission (FERC), yielded the following statements from utility companies related to compressor age:

- "The life expectancy for simple and complex gas transmission stations and PG&E's three gas terminals is based on the life expectancy of individual asset components, and typically is 40-50 years. Currently, there is a large population of M&C stations above this age." (Pacific Gas and Electric Company 2015 Gas Transmission and Storage Rate Case Prepared Testimony, Dec 2013)
- "It's selection for this account is supported by evidence on the average age of Viking's current compressor stations (41.6 years), the average age of compressors overhauled as capital overhaul projects during 2006-2011 (35.4 years), and the average age of compressors overhauled as operation and maintenance overhaul projects during 2006-2011 (42.1 years)" (Viking Gas Transmission Company Docket No. RP13-185-000 Direct Testimony of Commission Trial Staff, May 2013)

- "The Ruston Storage Compressor Station consists of one 4,000 hp Worthington MLV-14 Reciprocating Compressor unit that was originally installed 40 years ago. Worthington has since gone out of business and CEGT can no longer purchase replacement parts for the Worthington Unit, rendering it obsolete." (CenterPoint Energy Gas Transmission Company, LLC Ruston Storage Compressor Replacement Project, May 2012)
- In the document, "Summary of the Prepared Answering Testimony on NGA Section 5 Issues of Dennis D. Alters" which was prepared by Florida Gas Transmission Company, LLC a list of compressors by age and horsepower was provided as an attachment. The list contained a total of 92 reciprocating compressors with a total combined horsepower of 209,789 HP. Of the total number of compressors, 40 compressors (43%) were older than 50 years, 24 (26%) were between 40 and 50 years and 21 (23%) were between 20 and 30 years old.

Storage Tanks

The ICR data noted above in the discussion on well sites and compressors also included data on the number of "atmospheric storage tanks" at each well site and central production site reported by responding companies. The companies reported a total of 162,374 storage tanks at the well sites (1 per site) and 2,687 storage tanks at the central production sites (one for every 7.5 sites).

Based on this sample, it is likely that there are at least 440,000 storage tanks located at the existing 440,000 well sites, and between 5,300 and 8,000 storage tanks at existing boosting, gathering, and processing facilities[5].

MJB&A was not able to uncover data on the typical service life of storage tanks in the oil and gas industry, so it is not possible to estimate a turn-over rate for this equipment.

[5] The higher number would apply if the facilities for which EPA received data represent a similar percentage of all facilities as for well sites (36 percent).

REFERENCES

[1] U.S. Energy Information Administration, *U.S. Oil and Natural Gas Wells by Production Rate,* Appendix C, https://www.eia.gov/petroleum/wells/

[2] Geology.com, Geoscience News and Information, *Production and Royalty Declines in a Natural Gas Well Over Time*, https://geology.com/royalty/production-decline.shtml, accessed November 21, 2019

[3] U.S. Energy Information Administration, *The Distribution of Oil and Natural Gas Wells by Production Rate,* Figure 1, October 2018, https://www.eia.gov/petroleum/wells/pdf/full_report.pdf

[4] Three separate DrillingInfo queries were conducted to identify new and modified wells relative to September 18, 2015. Filters used were COUNTRY= 'USA' and PRODUCTION TYPE = 'CBM', 'GAS', 'O&G', 'OIL', 'OIL (CYCLIC STEAM)', 'STEAMFLOOD', and 'WATERFLOOD'. The first data pull filtered for spud dates on or after September 18, 2015. The second filtered for completion dates on or after September 18, 2015. The third filtered for first production dates on or after September 18, 2015. These three datasets were combined and narrowed to unique records. Wells were classified as new or modified as follows: If a well had a spud date on or after 9/18/15, it was classified as new. If a well had a missing spud and a first production date on or after 9/18/15, it was classified as new. If neither of the above were true, but the well had a completion date on or after 9/18/15, it was classified as modified. Wells not classified as new or modified were removed from the dataset. Yearly production data were pulled for this set of wells. For wells in which PRAC IP BOE was less than or equal to 15, monthly production data were also pulled.

[5] U.S. Environmental Protection Agency, Clearinghouse for Inventories & Emission Factors, Emission Factors & AP-42, webFIRE, https://cfpub.epa.gov/webfire/reports/eSearchResults.cfm; Accessed on July 31, 2018 and August 29, 2019

https://www.foiaonline.gov/foiaonline/action/public/submissionDetails?trackingNumber=EPA-HQ-2018-001886&type=request: Last accessed on October 9, 2018.

[6] https://foiaonline.gov/foiaonline/action/public/submissionDetails?trackingNumber=EPA-HQ-2017-003014&type=request.

[7] U.S. Environmental Protection Agency, *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*, May 2016; page 135

[8] Code of Federal Regulations, Part 40, Subpart 60.5365a (j); [40 CFR 60.5365a (j)]

[9] U.S. Energy Information Administration, *Annual Energy Outlook 2019*, Reference Case, Table 14, Oil and Gas Supply, January 2019

[10] U.S. Environmental Protection Agency, *Regulatory Impact Analysis for the Proposed Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review,* EPA-452/R-19-001, August 2019, page 2-8

[11] U.S. Environmental Protection Agency, *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*, May 2016; page 58

[12] U.S. Environmental Protection Agency, *Regulatory Impact Analysis for the Proposed Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review,* EPA-452/R-19-001, August 2019, pg 2-13

[13] U.S. Environmental Protection Agency, *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*, May 2016; page 135

Appendix D

Assessment of Harm to the Public from Foregoing Methane Guidelines for Existing Sources

November 21, 2019

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Appendix D

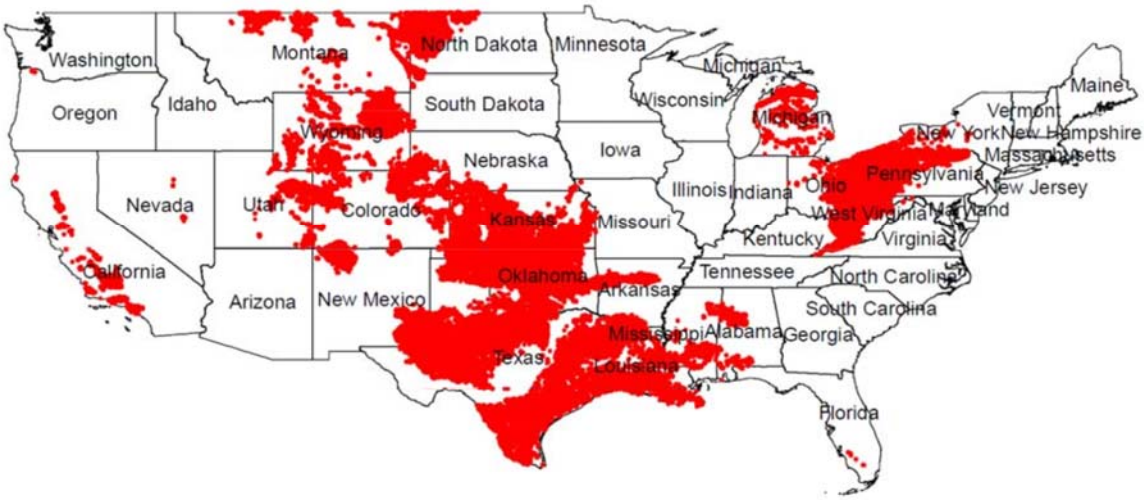
This report presents an analysis we performed to characterize sources that would be affected by emissions guidelines for existing sources issued under Section 111(d) of the Clean Air Act, 42 U.S.C. § 7411(d) ("Methane Guidelines"), along with emissions from these sources, in order to document harm to the public from EPA's failure to promulgate Methane Guidelines. Section I describes our methodology for identifying all affected sources and presents a map of affected wells. Section II characterizes total emissions that have occurred at affected facilities since the New Source Rule was promulgated in 2016, and quantifies the future emissions that will result if EPA does not issue Methane Guidelines. Section III focuses on the local impacts of not issuing Methane Guidelines.

SECTION I: EPA's Decision to Forego Methane Guidelines Allows Hundreds of Thousands of Oil and Natural Gas Facilities to Forego Emissions Reductions.

To identify wells that would be subject to EPA Methane Guidelines, we obtained well data from Enverus (formerly known as DrillingInfo), a proprietary database that compiles a wide range of drilling- and production-related information from state oil and gas commissions. In September 2019, we obtained data for all wells in the U.S., filtering to include only onshore wells with active production during 2018 and 2019 in order to exclude abandoned and shuttered wells. We then excluded from the dataset wells that would be regulated as new or modified facilities under the New Source Rule.[1] The remaining wells, drilled or last modified before September 18, 2015 (denoted as "existing wells"), would be covered by Methane Guidelines issued by EPA. In total, there are over 850,000 producing existing wells that would be covered by EPA Methane Guidelines. Figure 1 displays a map of existing wells.

[1] The New Source Rule applies to facilities "constructed, modified or reconstructed" after September 18, 2015—the date of EPA's proposed rule. 81 Fed. Reg. 35824, 35844 (June 3, 2016). As described above, *id*. at 35826, EPA's LDAR standards apply to new well sites and compressor stations that commenced construction after September 18, 2015. The standards also apply to modified well sites and compressor stations. The New Source Rule defines particular circumstances that constitute a modification at each of these facilities. For well sites, these include when a well at an existing site is fractured or re-fractured, an operation that is designed to increase production of natural gas. 40 CFR § 60.5365a(i)(3). For compressor stations, the New Source Rule defines modifications to include the addition of a compressor at an existing station. 40 CFR § 60.5365a(j).
Enverus includes information on the "spud date" for wells, or the date on which drilling commenced. The database also includes information on well "completion dates," or the most recent date on which a well was cleared of flowback gas associated with hydraulic fracturing or re-fracturing. Using the database, we excluded wells with a spud date after September 18, 2015, which would be "new" for purposes of the 2016 Rule's LDAR requirements. Separately, we excluded wells with a spud date on or before September 18, 2015 but a completion date after September 18, 2015. This distinct category of sources includes both older, re-fractured wells and new wells with their initial fracture delayed to after September 18, 2015, which would be "modified" for purposes of the 2016 Rule's LDAR requirements.

Figure 1: Map of Total Affected Well Sources



SECTION II: EPA's Failure to Issue Methane Guidelines Has Resulted, and Will Continue to Result, in Substantial Emissions of Harmful Methane, Volatile Organic Compounds, and Hazardous Air Pollutants from Affected Facilities.

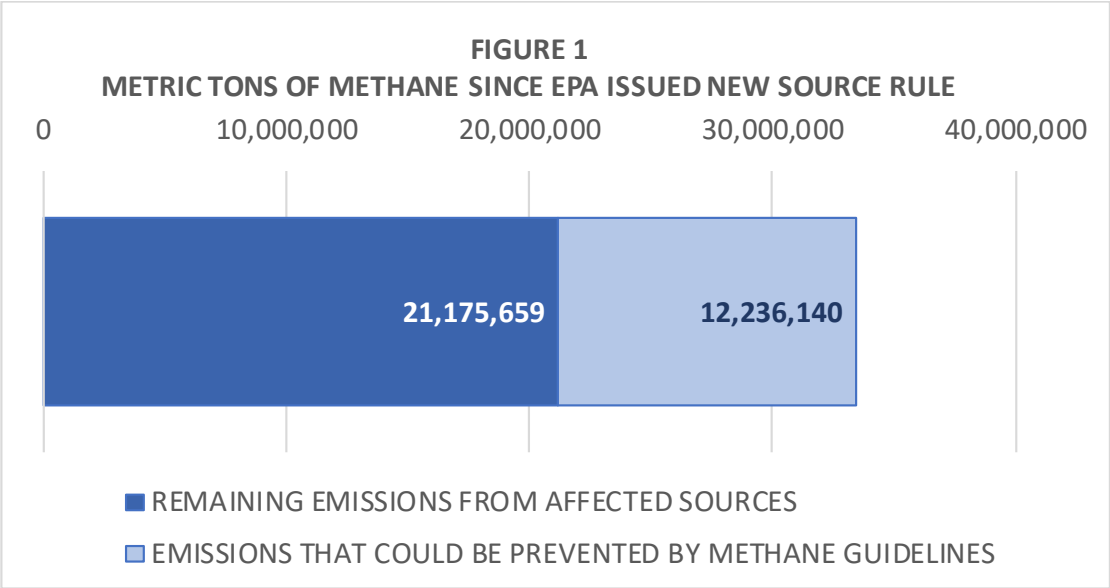
EPA's delay in promulgating Methane Guidelines for existing sources in the oil and natural gas sector has allowed substantial emissions of methane, VOC, and hazardous air pollutant ("HAP") emissions that would otherwise be remediated by Methane Guidelines. Substantial emissions will continue if EPA fails to promulgate Guidelines. Methane is a powerful short-term climate forcer with over 80 times the global warming potential of carbon dioxide on a mass basis over the first 20 years after it is emitted. VOCs react with nitrogen oxides to form ground-level ozone, or smog, which can cause respiratory disease and premature death. Other hazardous air pollutants emitted by oil and gas sources include benzene, a known human carcinogen.

We estimate the total emissions that have occurred at affected existing sources, as well as the amount of emissions that could have been prevented had EPA timely adopted Methane Guidelines. We further estimate the total amount of emissions that will continue to occur at affected existing sources in the near future if EPA does not promulgate Methane Guidelines, as well as the amount of these emissions that could be prevented if Guidelines are adopted.

For this analysis, we assume that Methane Guidelines will extend the methane emissions reduction requirements found in the New Source Rule to all affected existing sources, specifically covering high-bleed pneumatic controllers at well sites and transmission and storage compressor stations, all continuous bleed pneumatic controllers at natural gas processing plants, equipment leaks from gas processing plants, well sites, and compressor stations, reciprocating and centrifugal compressors at both processing plants and compressor stations, and pneumatic pumps at well sites and processing plants. Though new technologies and best practices have shown promise of even greater emission reductions, we conservatively assume that the same technologies used in the New Source Rule would apply equally to existing

sources. Several states that regulate both new and existing sources (including Colorado and California) largely apply the same measures at both sets of facilities, lending further support to this assumption.

To estimate the total emissions that have occurred at affected existing sources, as well as the amount of emissions that could be prevented had EPA adopted Methane Guidelines when it promulgated the New Source Rule, we used our EDF Methane Policy Analyzer model. Briefly, a baseline emissions inventory was developed for 2015, using a combination of EPA Greenhouse Gas Reporting Program data and previously published measurement studies, as reported in Alvarez et al 2018[2] for the alternative inventory (section S1.4). All emissions in 2015 were considered to be "existing" because the relevant date for the NSPS was near the end of 2015. We assumed that emissions attributable to existing sources decline year-over-year as existing sources are removed from operation or undertake modifications that subject them to regulation as modified sources under the New Source Rule based on a turnover rate of 5% for production sources, 4% for gathering and boosting sources, and 1% for all downstream sources. Emissions from sources subject to state regulations applicable to existing sources (California, Colorado, Utah, Wyoming in the Upper Green River Basin ozone non-attainment area, and Texas to a very limited extent) are subtracted from the projected emissions. We estimate that in the over three years since EPA has promulgated the New Source Rule, 33.4 million metric tons of methane have been emitted by existing oil and natural gas sources. We further estimate that 12.2 million metric tons of those methane emissions, or 37%, could have been avoided if Methane Guidelines were in effect.



To estimate the total emissions that will continue to occur at affected existing sources if EPA fails to promulgate Methane Guidelines, as well as the amount of emissions that could be

[2] Alvarez et al., *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, 361 SCIENCE, 186–188 (2018).

prevented if EPA promulgates Methane Guidelines, we extended the Methane Policy Analyzer to 2030. Each year that EPA does not promulgate Methane Guidelines will allow substantial additional emissions. For example, in 2021, 9.8 million metric tons of methane will be emitted by affected existing sources. We further estimate that 3.6 million metric tons of those methane emissions, or 37%, could be avoided if Methane Guidelines were in effect. Table 1 summarizes the emissions allowed by EPA's failure to adopt Methane Guidelines, as well as the emissions reductions possible if Methane Guidelines were promulgated.

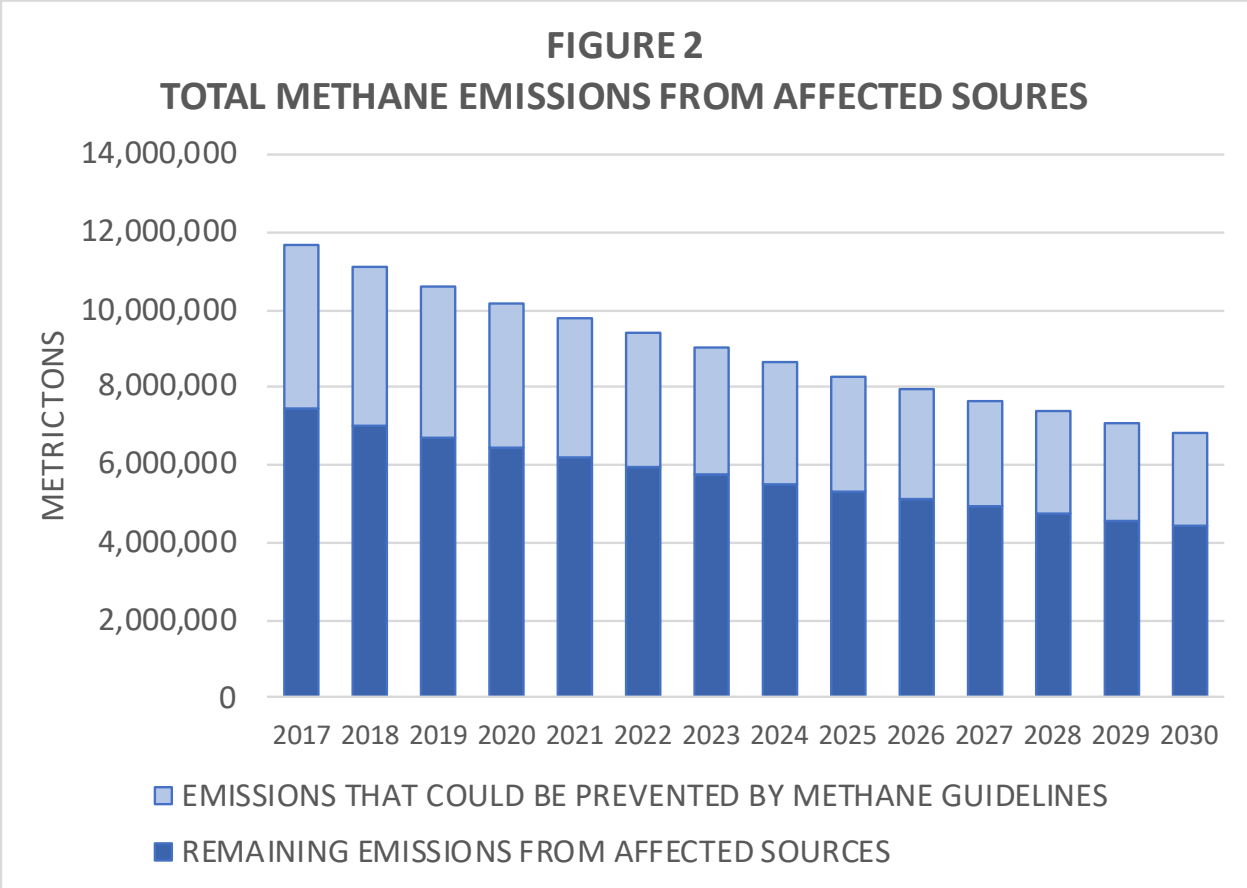


Table 1: Estimated Emissions at Affected Existing Sources and Potential Reductions Under Methane Guidelines

Time Period	Total Emissions from Affected Sources [metric tons]			Emissions that Could be Prevented by Methane Guidelines [metric tons[		
	Methane	VOC	HAPs	Methane	VOC	HAPs
2017	11,689,715	2,741,847	103,115	4,253,249	1,022,588	38,484
2018	11,099,151	2,597,590	97,684	4,067,664	977,969	36,805
2019	10,622,933	2,472,822	92,978	3,915,227	938,202	35,305
Total Emissions Since EPA Issued New Source Rule	**33,411,799**	**7,812,259**	**293,777**	**12,236,140**	**2,938,759**	**110,594**
2020	10,184,924	2,360,138	88,729	3,740,813	893,495	33,620
2021	9,785,180	2,256,193	84,809	3,583,294	852,460	32,072
2022	9,413,009	2,158,703	81,132	3,438,607	814,377	30,635
2023	9,025,023	2,059,736	77,402	3,287,058	775,799	29,181
2024	8,647,856	1,964,209	73,802	3,136,680	737,802	27,749
2025	8,294,707	1,874,858	70,434	2,997,488	702,609	26,423
2026	7,967,127	1,791,676	67,299	2,867,333	669,482	25,175
2027	7,657,181	1,712,896	64,330	2,744,475	638,148	23,994
2028	7,366,050	1,639,260	61,555	2,629,755	609,015	22,896
2029	7,099,500	1,571,426	58,998	2,524,569	582,076	21,880
2030	6,854,814	1,508,791	56,637	2,428,541	557,245	20,944

In its proposal to remove methane regulation, EPA claims that many states already regulate oil and gas methane emissions, and so a federal rule would be duplicative. 84 Fed. Reg. at 50,277. However, EPA has not analyzed in any meaningful way whether or not these state rules are applicable to existing sources. *Id.* at n. 104. We assessed the applicability of state standards to

existing sources in California, Colorado, Montana, New Mexico, North Dakota, Ohio, Pennsylvania, Texas, Utah, and Wyoming (states that EPA includes in their "Comparison of State Oil and Natural Gas Regulations" table in their proposal to remove methane). These states take widely divergent approaches that vary significantly in stringency, and most states have no standards applicable to existing sources. Appendix 1 to this report provides a detailed analysis of what state standards apply to existing sources.

Our Methane Policy Analyzer allows us to also look at the projected reductions from state standards for existing sources. In 2020, state standards applicable to existing sources (certain standards in California, Colorado, Utah, Wyoming in the Upper Green River Basin ozone non-attainment area, and Texas) will reduce only 180,000 metric tons methane, roughly 5% of what federal Methane Guidelines could achieve.

SECTION III: EPA's Failure to Promulgate Methane Guidelines Has Resulted in, and Will Continue to Result in, Substantial Local Air Pollution.

To look at the effect of EPA's failure to promulgate Methane Guidelines on other harmful air pollution (including ozone-forming volatile organic compounds and hazardous air pollutants like benzene), we focus exclusively on production emissions because we are able to say with a high degree of confidence precisely where these emissions occur. Because of that, we can assess emissions impacts in areas that already suffer from harmful levels of ambient air pollution, like ozone. As a result, the analysis in this section is not intended to capture the total, harmful emissions impact of the failure to adopt Methane Guidelines.

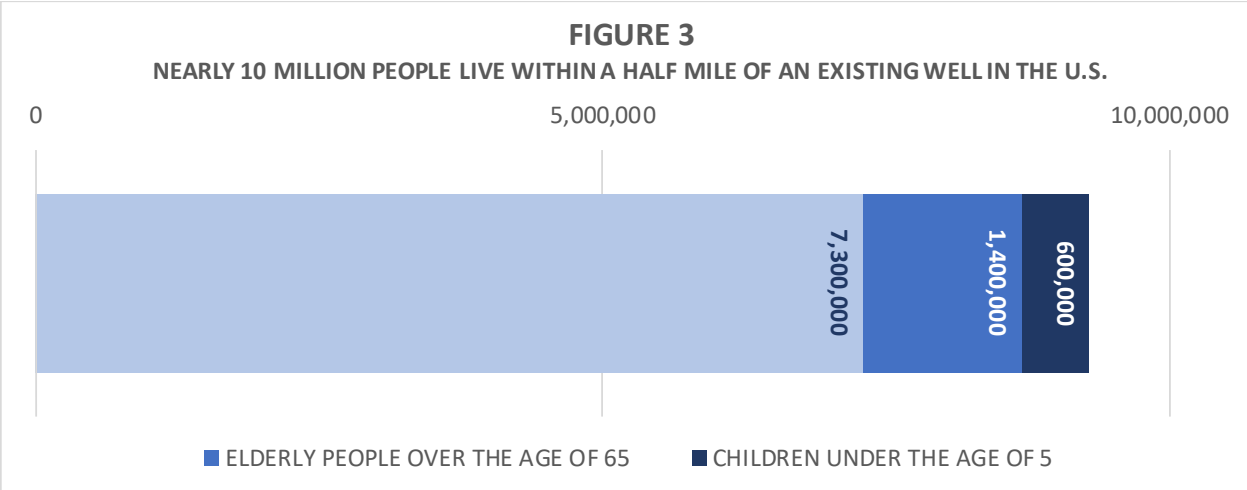
We have identified 97,000 wells that would be subject to Methane Guidelines in areas that are currently not in attainment with the 2015 national ambient air quality standards (NAAQS) for ozone. Appendix 2 to this report provides a full list of nonattainment area counties with existing wells. These sources will add an estimated 160,000 metric tons of VOCs to the atmosphere annually if EPA fails to adopt Methane Guidelines. VOCs contribute to ozone formation and exacerbate smog-related health issues.

This estimate is conservative and does not fully capture the effects of EPA's failure to promulgate Methane Guidelines. The analysis does not account for the many affected wells located just outside of ozone non-attainment areas, which can still contribute to the formation of ozone that can be transported into the non-attainment areas. Furthermore, the analysis in this section does not include additional emissions in these areas attributable to the midstream and downstream segments that would be mitigated by Methane Guidelines.

By identifying existing well sites, we are also able to identify the local communities that are disproportionately impacted by the air pollution allowed by EPA's failure to promulgate Methane Guidelines. Using the US Census Bureau's American Community Survey 5-year estimates for 2012-2016, we were able to estimate the populations living within a half mile radius of the previously identified existing wells using areal apportionment. This method determines the area encompassed within a half mile buffer radius of all affected wells, and

overlays those buffers onto census tracts to calculate the percentage of each tract comprised of buffers (i.e. the area of each tract within a half mile of an affected well). The areal apportionment method assumes that populations are spread evenly across a given census tract (excluding water bodies), and thus we are able to estimate the populations at a census tract level of those living within a half mile of an existing well. This method is commonly used in published literature utilizing distance-based analysis.[3] While some studies have used finer spatial resolutions such as census block groups, we performed our analysis using census tracts in order to minimize margin of error in census estimates. Census tracts, and even larger regions such as zip codes, have often been used in similar analyses.[4] We used a half mile radius because recent scientific evidence indicates close proximity to oil and gas development is associated with HAP exposure and other adverse health impacts for local populations.

Using this methodology, we find that approximately 9,300,000 people live within half a mile of an existing well in the U.S., including 600,000 children under the age of five years and 1,400,000 elderly people over the age of 65 years, who are especially sensitive to the health risks posed by ozone and other local air pollution. Additionally, approximately 1,400,000 people living below the poverty line live within half a mile of an existing well, who may face greater barriers such as accessing medical care.



Conclusion

[3] *See, e.g*. J. C. S. Long, L. Feinstein, J. T. Birkholzer, W. Foxall, "An Independent Scientific Assessment Of Well Stimulation In California, Vol. 3" (California Council on Science and Technology, 2016), *available at* https://ccst.us/publications/2015/2015SB4-v3.php; J. Chakraborty, J. A. Maantay, J. D. Brender, Disproportionate Proximity to Environmental Health Hazards: Methods, Models, and Measurement. American Journal of Public Health. 101, S27–S36 (2011).

[4] *See, e.g*., T. Srebotnjak and M. Rotkin-Ellman, "Drilling in California: Who's at risk?" Natural Resources Defense Council, 2014; Mohai P, Saha R. Reassessing racial and socio-economic disparities in environmental justice research. Demography. 2006;43(2):383–399; Kearney G, Kiros GE. A spatial evaluation of socio demographics surrounding National Priorities List sites in Florida using a distance-based approach. Int J Health Geogr. 2009;8:33.

EPA's delay in adopting Methane Guidelines for existing sources has already allowed significant air pollution. Further failure by EPA to promulgate Methane Guidelines requirements will allow numerous sources to continue operating without controls to reduce methane, VOC, and HAP emissions, allowing significant emissions to persist from these sources in the future.

Appendix 1

State Standards Applicable to Existing Source Emissions

In its proposal to remove methane regulation, EPA claims that many states already regulate oil and gas methane emissions, and so a federal rule would be duplicative. However, EPA has not analyzed in any meaningful way whether or not these state rules are applicable to existing sources. In fact, most states' regulations are only applicable to new sources, and thus would not apply to any existing sources. Of the ten states EPA includes in their "Comparison of State Oil and Natural Gas Regulations" table, 84 Fed. Reg. 50,277—California (CA), Colorado (CO), Montana (MT), New Mexico (NM), North Dakota (ND), Ohio (OH), Pennsylvania (PA), Texas (TX), Utah (UT), and Wyoming (WY), only six states were proposed to be considered for equivalency to the 2016 NSPS OOOOa[5] (CA, CO, OH, and PA for well sites and compressor stations, TX & UT for well sites only). Only five states currently have oil and gas regulations that would apply to any existing sources: California, Colorado, Utah, Wyoming, and Texas. (Montana, New Mexico, and North Dakota have either very weak permits or guidance applicable to existing sources that EPA previously determined were not equivalent to the NSPS). In Wyoming, only existing sources within the Upper Green River Basin above a certain emissions threshold are covered, so the majority of existing sources within that state are not covered. Texas regulations have various effective dates depending on the location of a facility, but at least one regulation applies to new sources that were constructed/modified after September 2000. Because this date predates the NSPS effective date, some sources considered "existing" for the NSPS will be considered "new" under Texas regulations. However, as detailed below, Texas regulations apply to significantly fewer sources than the NSPS. More detail on each state's regulation is provided below:

California oil and gas methane regulations apply to both new and existing sources and took effect in 2018/2019. The rules cover equipment leaks at well sites, processing plants, and compressor stations, pneumatic pumps at well sites, storage tanks at well sites with emissions greater than 10 MT/yr methane, compressors at well sites, processing plants, and compressor stations, and pneumatic controllers at well sites and compressor stations.

Colorado oil and gas regulations apply to both new and existing sources, often with different emission limits for new vs. existing sources. Most regulations took effect in 2015, with an update for sources in the ozone non-attainment area that took effect in 2017. The regulations cover equipment leaks at well sites and compressor stations (tiered LDAR frequency tied to VOC emissions), pneumatic controllers at well sites and processing plants, liquids unloading, tanks at well sites with VOC emissions greater than 6 tpy, associated gas venting, oil well completions, centrifugal compressors at well sites and processing plants, reciprocating compressors at processing plants, and dehydrators at well sites and processing plants.

[5] EPA, Memorandum: Equivalency of State Fugitive Emissions Programs for Well Sites and Compressor Stations to Proposed Standards at 40 CFR Part 60, Subpart OOOOa (April 12, 2018), *available at* https://www.regulations.gov/document?D=EPA-HQ-OAR-2017-0483-0041.

Montana's air quality permits cover oil and gas well facilities that were completed or modified after March 16, 1979 (beginning on July 1, 2006). While this is prior to the NSPS effective date, it does not cover all existing facilities. Additionally, facilities must have a PTE more than 25 TPY of VOC (or other specified pollutant not including methane), which will not cover all well sites covered by the NSPS. Monitoring only includes "VOC piping components" using AVO, a monitoring method considered inadequate by the EPA. Montana's regulation also does not cover compressor stations. If the EPA does not consider Montana adequately equivalent to the NSPS for new and modified sources, it should not consider it adequate for existing sources either.

While the New Mexico Administrative Code restricts production operators from allowing gas to "leak or escape", it does not specify whether this restriction applies to new or existing facilities, or how it enforces this requirement. Even though, as shown in Table 9, it technically covers well sites and storage vessels, the EPA could not evaluate its equivalency to the NSPS in 2018 because they were unable to determine the enforcement mechanism. Current New Mexico regulations therefore should not be considered to contribute to any meaningful emissions reductions should the primary proposal be finalized.

North Dakota regulations cover new and modified wells as of July 1, 1970. North Dakota exempts low-production wells from all monitoring (<15 bbl/day) and does not monitor compressor stations. Additionally, North Dakota's regulation is enforced through company-wide consent decrees, which are negotiated terms for non-compliance and include an expiration data (after which the companies return to compliance). Due to the flexible and temporary nature of these consent decrees, the EPA determined in 2018 that North Dakota's regulation was not equivalent to the NSPS. Even if the compliance could be guaranteed, approximately 4% of the wells covered by the NSPS would be exempt from regulation in North Dakota in addition to all wells existing before 1970.

Utah regulations apply to both new and existing sources. New sources were covered beginning in 2014, and existing sources were added in 2018. Regulations for well sites cover equipment leaks, tanks (with a emissions threshold), dehydrators, associated gas venting, and pneumatics. Regulations for processing plants and compressor stations cover pneumatics. Utah state regulations do not apply on tribal lands (approximately 20% of emissions are on tribal lands).

When analyzing the equivalency of Wyoming's regulation to the 2016 NSPS OOOOa, the EPA considered the version of Wyoming DEQ's regulation of PAD facilities that was finalized prior to that analysis in 2018. Since that analysis was conducted, Wyoming has released a more comprehensive update to that rule. While this update expands coverage to well sites outside of the Upper Green River Basin, many of the issues which prevented EPA from considering the previous rule adequate still apply. Wyoming regulations apply to new sources, as well as existing sources within the Upper Green River Basin (a nonattainment area). Regulations cover equipment leaks, pneumatic controllers, tanks (with an emissions threshold), oil well completions, pneumatic pumps, and dehydrators (with an emissions threshold). Less than 20% of total production emissions are within the UGRB. While the monitoring frequency and

monitoring instrument are acceptable, there is no specified initial monitoring date or repair deadline for facilities with emissions greater than or equal to 4 TPY of VOCs within the UGRB.

Texas regulations apply to new sources, relative to either 2000, 2011, or 2012 depending on location and type of permit. Texas requires a leak detection and repair ("LDAR") program for certain mid-sized to large oil and gas facilities. The specific requirements vary depending on the facility's location and potential to emit uncontrolled volatile organic compounds ("VOC"). Most well sites are not subject to LDAR due to the high emissions threshold uncontrolled VOC emissions (>10 or 25 tpy) and distance from a sensitive receptor, such as a home or school, that triggers the application of LDAR. EDF analysis of Texas Standard Permits found that only roughly 5.5% of well sites in Texas are required to conduct LDAR.

Appendix 2

Counties with wells that would be subject to Methane Guidelines in areas that are currently not in attainment with the 2015 national ambient air quality standards (NAAQS) for ozone are as follows:

Chambers (TX), Brazoria (TX), Harris (TX), Montgomery (TX), Galveston (TX), Fort Bend (TX), Parker (TX), Hood (TX), Palo Pinto (TX), Wise (TX), Jack (TX), Denton (TX), Tarrant (TX), Bexar (TX), Johnson (TX), Duchesne (UT), Uintah (UT), Los Angeles (CA), Orange (CA), San Bernardino (CA), Ventura (CA), San Luis Obispo (CA), Kern (CA), Tulare (CA), Fresno (CA), Kings (CA), Alameda (CA), Sacramento (CA), San Joaquin (CA), Solano (CA), Yolo (CA), Madera (CA), Santa Clara (CA), Contra Costa (CA), Adams (CO), Arapahoe (CO), Boulder (CO), Denver (CO), Larimer (CO), Weld (CO), Broomfield (CO), Ellis (TX), St Clair (MI), Oakland (MI), Livingston (MI), Macomb (MI), Wayne (MI), Washtenaw (MI), Allegan (MI), Monroe (MI), Muskegon (MI), Cuyahoga (OH), Delaware (OH), Fairfield (OH), Geauga (OH), Lake (OH), Licking (OH), Lorain (OH), Medina (OH), Portage (OH), Summit (OH), Mahoning (OH), Hill (TX), Dallas (TX), Kaufman (TX), Atascosa (TX), Morgan (CO)

Memo: Modeled impacts from EPA methane rollbacks

November 2019

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In 2016, U.S. EPA issued landmark standards for new and modified facilities in the oil production and natural gas production, process, and transmission and storage industries. These standards reduce methane and other harmful air pollutants from facilities they cover in several key ways. Furthermore, the promulgation of methane pollution standards from these new and modified sites (in addition to standards for ozone-smog precursors), triggered an obligation for EPA to issue corresponding standards for existing facilities – the vast fleet of oil and gas sites that were in place before the 2016 standards were first proposed.

In 2018 and 2019, EPA issued two proposals to weaken the 2016 standards. These proposals were designed to weaken the 2016 standards in several ways. First, they would revise the 2016 rules to weaken the standards, so that the oil and gas industry would need to perform less inspections to reduce leaks and other emissions of methane and other pollutants from their sites. Additionally, EPA is proposing to carve out the transmission and storage segment, removing all sources in that segment from applicability to the 2016 standards. EPA is also proposing to remove the standards for methane emissions from these sites from the rules (so that the standards would only apply to ozone-smog precursors), because doing so will remove EPA's obligation to issue standards to reduce methane pollution from existing facilities.

These two rollback proposals, if finalized and implemented (surviving legal challenges), would vastly increase climate pollution from the U.S. oil and gas industry. Together, the impacts from these two proposals will increase 2025 emissions by 4.3 million metric tons, VOC emissions by 1 million metric tons and HAP emissions by 38,000 metric tons. These estimates include the additional emissions that will occur if EPA does not issue standards for existing oil and gas sites, since EPA is obligated to do so under the current rules but will not be if the current rollback proposals are finalized and implemented. The additional oil and gas methane pollution emitted because of these rollbacks would, over the near-term, warm the climate as much as the carbon dioxide emissions of nearly 100 coal-fired power plants.

This memo provides a summary description of the rollback proposals and the increases in emissions that would result from them, and it describes how Clean Air Task Force has estimated these emission increases.

Summary of regulatory proposals

The first rollback proposal, published by EPA in 2018, would reduce the frequency of leak detection and repair (LDAR) surveys at several types of oil and gas facilities (See Table 1 below). We refer to this proposal as the "2018 LDAR Revision." The longer permissible time periods between inspections would mean that leaks of methane and other pollutants from these sites will persist for a longer period of time before they are identified and fixed, resulting in increased emissions. This would directly apply to new/modified sources that, absent the 2018 LDAR Revision, would be subject to the more stringent inspection frequency requirements of the 2016 standards. (The proposal would also revise the 2016 rules in several other ways, though the impacts of those changes are relatively minor compared to the proposed LDAR revisions.)

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Table 1: Required Inspection Frequency under EPA's 2016 Rules, and as Proposed in the 2018 LDAR Revision[1]

	2016 NSPS as proposed	2018 LDAR Revision (Option 3)
Well Pads	Semi-Annual	Annual
Gathering and Boosting Compressor Stations	Quarterly	Semi-Annual
Transmission and Storage Compressor Stations	Quarterly	Semi-Annual

The second rollback proposal, which EPA published in 2019, would remove all regulations from the entire natural gas transmission and storage segment of the industry, directly allowing more emissions from new/modified transmission and storage facilities. Additionally, the 2019 rollback would also remove all methane emissions standards for the entire oil and gas sector. As described above, this would arguably remove the duty for EPA to regulate existing sources in the oil and gas industry that it currently faces. We refer to this rollback proposal as the "2019 Methane / T&S Revision," where "T&S" is an abbreviation for the transmission and storage segments of the natural gas industry.

Emission Increases in 2025

Table 2 shows the increased emissions in 2025 anticipated as a result of EPA's 2018 LDAR Revision and the 2019 Methane / T&S Revision.

Table 2: Estimate of Increased Emissions Resulting from 2018/2019 EPA actions:

		Increased Emissions in 2025 (Metric Tons)		
		Methane	VOC	HAP
New & Modified Sources	2018 LDAR Revision*	980,000	260,000	9,800
	2019 Methane / T&S Revision	170,000	4,700	150
New & Modified Subtotal		**1,100,000**	**270,000**	**10,000**
Existing Sources: Obligation to regulate removed by 2019 Methane Rollback**		**3,200,000**	**750,000**	**28,000**
Total Increased Emissions		**4,300,000**	**1,000,000**	**38,000**

Note: Numbers may not sum due to independent rounding. *As noted above, Option 3 in 2018 LDAR Revision Proposal is modeled. **For existing source estimate, we have quantified emissions reductions foregone from an existing source rule modeled on the 2016 NSPS (rather than an existing source rule modeled on an NSPS weakened by the 2018 LDAR Revision).

Methodology

These emissions estimates are based on a model developed by Clean Air Task Force. The structure of the model is based on EPA's 2019 GHG Inventory, and the model uses as a primary input emissions for 2017 from that Inventory. To this baseline, we also add in an estimate of abnormal process conditions at production sites based on a 2018 study which estimated nationwide oil and gas methane emissions based on measurements at over 400 oil and natural gas sites in six states.[2]

[1] EPA's Option 3 from the 2018 LDAR Revision Proposal, one of two co-proposed options, is summarized in the table, and the estimates of additional emissions from the 2018 LDAR Revision presented below are based on Option 3.

[2] R. A. Alvarez et al. (2018), "Assessment of methane emissions from the U.S. oil and gas supply chain," *Science* 361 186-188. https://science.sciencemag.org/content/361/6398/186.

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For each of the dozens of categories of emissions in the EPA GHG Inventory, we project emissions in future years based on projections of gas and/or oil production from the U.S. Energy Information Administration's AEO 2019 Reference Case. This accounts for the increase in emissions from the larger amounts of equipment, etc., that will be in place as production grows in the future.[3]

We first create projections representing an estimate of oil and gas methane emissions in the absence of any state or federal regulations. Then, to create our baseline case, we then model the impacts of EPA's 2012 OOOO rule and existing source regulations in California, Colorado, and Wyoming's Upper Green River Basin. Because the EPA inventory contains estimates of emissions from many different types (leaks, venting from pneumatic controllers, venting from tanks, etc.), it is relatively straightforward to model the emissions reductions from regulations that require specific controls for certain types of equipment.

We then modeled emissions under four regulatory scenarios to assess the impact on EPA's proposals. First, under current rules (new/modified sources rule as finalized in 2016) and under two combinations of weakened new/modified source rules (reflecting the two recent rollback proposals), and finally under an existing source rule based on the new/modified source rule as finalized in 2016 (see Table 3).

Table 3: Nationwide emissions under various national regulatory scenarios

Regulatory Scenario	2025 methane emissions (metric tons)
New/Modified Source Rules Only	
1. As Finalized by EPA in 2016	12,300,000
2. With 2018 LDAR Revision	13,300,000
3. With 2018 LDAR Revision & 2019 Methane / T&S Rollback	13,400,000
New/Modified Source Rules and Existing Source Rules	
4. Based on NSPS OOOOa as finalized in 2016	9,100,000

Currently, the 2016 New/Modified Source Rules are in effect, and EPA has an obligation under those current rules to promulgate existing source standards. If EPA were to follow the law and comply with this obligation in a reasonable time frame and issue existing source rules based on the standards of the 2016 New/Modified source rule, we estimate that emissions in 2025 would be 9,100,000 metric tons of methane (**scenario 4**). By weakening the new source rules and changing the standards to eliminate the obligation to issue existing source rules, EPA will allow emissions to be far higher, as reflected in the second or third scenarios. If both of the rollback proposals are finalized as proposed, we estimate oil and gas methane emissions in 2025 will be 13,400,000 metric tons (**scenario 3**) – 4.3 million metric tons higher than they will be under current rules and law (**scenario 4**). Subtracting emissions under the scenarios in Table 3 produces the estimates of additional emissions that will occur in 2025 as a result of the rollback provisions EPA is currently considering, if they are finalized and implemented.

To estimate the additional emissions VOC and HAP resulting from the NSPS rollbacks shown in Table 2, we multiply the figures for additional methane emissions by standard VOC/Methane

[3] Based on a comparison of past AEO Reference projections and industry growth in recent years, we believe that AEO Reference is a conservative projection of future industry growth. Therefore, our estimate of future baseline emissions and the additional emissions resulting from the rollbacks are conservative.

and HAP/Methane ratios for each equipment and segment category, based on the values of methane / VOC / HAP content in natural gas that EPA has used in prior rulemakings.[4]

Finally, we have noted that the additional 2025 methane emissions expected under the NSPS rollbacks (4.3 million metric tons of methane) will have the same near-term climate impacts as the CO_2 from about one hundred coal-fired power plants. To calculate this, we have converted this amount of methane to a corresponding carbon dioxide equivalent (CO_2e) using the twenty-year GWP for fossil methane (87) published in the most recent IPCC Assessment Report (AR5),[5] and then use EPA's Greenhouse Gas Equivalencies Calculator to compare this amount of CO_2e emissions to emissions from a coal-fired power plant.

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Comparison with EPA Estimates

Overall, our estimates are higher than those presented by EPA in its 2018 and 2019 RIAs (see Table 4). There are several reasons for this difference between CATF and EPA estimates; here we list some of the most important reasons.

First, EPA entirely ignores the abatement of emissions from sources existing before the 2016 rules. As described above, EPA is currently obligated to issue methane emission standards for these existing sources, but that obligation will be removed if EPA successfully finalizes the 2019 Methane / T&S Rollback. Because there are so many methane sources in oil and gas that predate the 2016 rules, the expected quantity of abatement from existing source rules is very large, and therefore if EPA successfully removes the obligation to reduce emissions from existing sources, 2025 emissions will significantly higher.

There are also significant differences in our estimates of additional emissions due to the rollbacks in the New Source rules from the 2018 and 2019 rollbacks, as shown in Table 4. The biggest difference arises from abnormal process condition emissions. While these emissions are well documented (see above), EPA does not include them in its GHG Inventory for oil and gas methane. As we noted above, they are included in our model. This increases the baseline emissions estimate by roughly 40%. Because LDAR standards are effective at reducing abnormal process emissions, including these emissions significantly increases potential abatement from LDAR programs.

There are other reasons that EPA underestimates the impact of the rollback for emissions from new sources. For example, CATF's estimate of the abatement from the new/modified source rule accounts for both new sources based on industry growth (and the accompanying expansion of the fleet of sources), new sources that are replacements of equipment in the field before the 2016 rules were issued, as that equipment wears out or reaches the end of its useful life, and modified sources where new wells have been drilled at existing sites or existing wells have been refractured (based on conservative assumptions about equipment and well turnover). EPA, in

[4] Memorandum from Heather P. Brown, P.E., EC/R Incorporated, to Bruce Moore, EPA, (2011) *Re: Composition of Natural Gas for use in the Oil and Natural Gas Sector Rulemaking*, Document ID No. EPA-HQ-OAR-2010-0505-0084. https://www.regulations.gov/contentStreamer?documentId=EPA-HQ-OAR-2010-0505-0084&contentType=pdf.

[5] The most accurate twenty-year GWP for methane from the oil and gas industry is 87. This is the value calculated accounting for the carbon-cycle feedback for both methane and CO_2, and accounting for the CO_2 produced by oxidation of methane in the atmosphere. See Myhre, G., et al. (2013) "Anthropogenic and Natural Radiative Forcing." In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the IPCC*. See Table 8.7 (including note b to the table), page 714. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf.

contrast, assumes no turnover of that equipment, which means that ignores substantial emissions abatement from the new source rule rollbacks. (Nevertheless, even with reasonable turnover assumptions, the existing source regulations that EPA is currently required to issue are critical for methane reductions, and will in fact reduce 2025 emissions millions of tons of methane below the emissions level the 2016 new source rules along would achieve, if left in place.)

In summary, there are several clear reasons that EPA is underestimating the benefits of the 2016 OOOOa rule, and therefore also underestimating the increased emissions from the proposed rollbacks.

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Table 4: CATF vs EPA Estimate of Increased Emissions

	Increased Emissions in 2025 (Metric Tons)	
	CATF Estimate	**EPA Estimate[6]**
2018 LDAR Revision*	980,000	69,000[7]
2019 Methane / T&S Revision	170,000	63,000[8]
Total	**1,100,000**	**130,000**

*As noted above, Option 3 in 2018 LDAR Revision Proposal is modeled.

[6] EPA figures have been converted from Short Tons to Metric Tons.

[7] EPA. "Regulatory Impact Analysis for the Proposed Reconsideration of the Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources." (2018). Table 2-13.

[8] EPA. "Regulatory Impact Analysis for the Proposed Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review (2019). Table 2-8.

Methane Emissions Contribute to Both Near- and Longer-Term Climate Damages

November 21, 2019

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Appendix F

This report aims to enhance public understanding of climate impacts over all timescales, both near- and long-term.

Methane is a considerable driver of near-term climate change, responsible for a quarter of the warming we are experiencing today.[1] This year's emissions of methane from human activities will contribute 30% more to warming over the next 10 years than this year's emissions of carbon dioxide from fossil fuels.[2] Globally, around a quarter of human-emitted methane comes from the oil and gas sector,[3] and current trends suggest that methane from global oil and gas will soon overtake livestock as the dominant source from human activities.[4] Domestically, the EPA recognizes that the oil and gas sector is the largest industrial source of methane emissions in the United States, accounting for nearly one-third of U.S. methane emissions.[5] However, the actual amount of emissions is almost certainly higher, as studies show the EPA underestimates methane emissions from the oil and natural gas section by approximately sixty percent,[6] and

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[1] Calculation from Shindell et al. 2009 of fraction of total positive radiative forcing that methane emissions are responsible for; Shindell, D.T., Faluvegi, G., Koch, D.M., Schmidt, G.A., Unger, N. and Bauer, S.E., *Improved attribution of climate forcing to emissions*, 326(5953) SCIENCE 716-718 (2009).

[2] Calculation based on current emissions of methane and carbon dioxide Environmental Protection Agency, Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030 (2012); International Energy Agency World Energy Outlook (2018), atmospheric lifetimes from IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* ("IPCC AR5 2013") ") (Chapter 8: Myhre, G., Shindell, D., Bréon, F.-M., Collins, W., Fuglestvedt, J., Huang, J., Koch, D., Lamarque, J.-F., Lee, D., Mendoza, B., Nakajima, T., Robock, A., Stephens, G., Takemura, T., and Zhang, H.: Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocke, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2013), and radiative properties for CO2 and methane indirect from IPCC AR5 2013 (WGI Chapter 8 – Myhre et al. 2013) and methane direct from Etminan, M., Myhre, G., Highwood, E. J., & Shine, K. P. (2016), *Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing*, Geophysical Research Letters, 43(24).

[3] EPA GLOBAL ANTHROPOGENIC NON-CO2 GREENHOUSE GAS EMISSIONS: 1990-2030, *available at* https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-anthropogenic-non-co2-greenhouse-gasemissions.

[4] Projections calculated from emissions data from livestock from Food and Agriculture Organization (FAO), *available at* http://www fao.org/faostat/en/#home; and emissions data from oil and gas from International Energy Agency World Energy Outlook 2018, *available at* https://www.iea.org/weo2018/.

[5] *Overview of Greenhouse Gases: Methane Emissions*, EPA.GOV, https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane (last visited Oct. 8, 2019).
[6] Ramon A. Alvarez, et al, *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, 361 SCIENCE 186, 186 (2018), *available at* https://science.sciencemag.org/content/361/6398/186 (last accessed Oct. 8, 2019).

nearly two percent of those emissions happens during extraction and delivery.[7] Of all methane sources from human activities, reducing waste of gas from oil and gas operations—whether that waste is through venting, flaring, or leaking—presents an important opportunity considering its cost-effectiveness, technological availability, and immediate impacts on climate.

For the same mass of carbon dioxide (CO_2) and methane emissions, methane can trap 120 times more heat than CO_2, both directly from methane as a greenhouse gas and indirectly from the production of further greenhouse gases: tropospheric ozone, stratospheric water vapor, and CO_2.[8] Over a twenty-year period, this number drops to 84 as methane dissipates from the atmosphere more quickly than CO_2.[9] The latest science suggests that methane absorbing shortwave radiation in addition to longwave significantly increases its radiative potency by nearly 25%.[10] Including the shortwave component in calculations, the twenty-year number jumps from 84 to 96.

Further, through the creation of tropospheric ozone, methane contributes to ground-level ozone, which is harmful to humans and is linked to short- and long-term negative health effects, including shortness of breath, decreased lung function, and chronic obstructive pulmonary disease (COPD). Ozone also aggravates existing cardiovascular and respiratory conditions, such as asthma, emphysema, and bronchitis, with long-term exposure increasing the risk of death from these conditions. As nearly one in three Americans are exposed to harmful levels of ozone,[11] reducing methane emissions would directly enhance human health while improving air quality and mitigating climate change.[12]

Methane only lasts for approximately a decade in the atmosphere (though its effects can last much longer),[13] because it is oxidized on average after 12.4 years, breaking down and forming

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[7] J.A. Littlefield, et al., *Synthesis of Recent Ground-level Methane Emission Measurements from the U.S. Natural Gas Supply Chain*, 148 Journal of Cleaner Production 118, 118 (2017).

[8] IPCC AR5 2013, Myhre, Gunnar et al*., Anthropogenic and Natural Radiative Forcing*, *available at* http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf.

[9] *Id.*

[10] Etminan, M., Myhre, G., Highwood, E. J., & Shine, K. P. (2016). Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing. Geophysical Research Letters, 43(24).

[11] U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES 518, D.R. REIDMILLER, ET AL . (eds., 4th ed, 2018).

[12] *Id.* at 512.

[13] For example, as discussed below, oceans absorb 90% of the excess heat trapped by greenhouse gases. Therefore, even though the methane is gone and no longer trapping additional heat in the atmosphere, the

other chemical species.[14] Methane reductions, therefore, can rapidly slow the rate of warming.[15] Even though methane forms tropospheric ozone, another strong greenhouse gas, when it oxidizes, the ozone does not last long in the atmosphere, contributing to the immediacy of the climate benefits of reduced methane.

It is crucial to limit both the rate of near-term warming and long-term warming, in order to reduce warming impacts during our lifetimes and for generations to come. Both near- and long-term warming are associated with specific sets of damages, and all must be reduced. Near-term warming impacts infrastructure, plant and animal species survival rates,[16] extreme events, and sea level rise.[17] Long-term warming impacts glacial melt, permafrost melt, tipping points, shifts in biomes, and more. Carbon dioxide is the main driver of long-term warming because of its long atmospheric lifetime.[18] Methane emissions are an important driver of near-term warming, and so taking immediate steps to reduce methane emissions can help to immediately impact warming rates.[19] Conversely, allowing near-term methane emissions to persist will accelerate this harmful warming.[20]

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warming that it had caused is now in the oceans, contributing to sea level rise decades to come. Hu, A., Xu, Y., Tebaldi, C., Washington, W.M. and Ramanathan, V., *Mitigation of short-lived climate pollutants slows sea-level rise*, 3 NATURE CLIMATE CHANGE 730 (2013).

[14] Myhre, *supra* note 8.

[15] Shoemaker, J.K., Schrag, D.P., Molina, M.J. and Ramanathan, V., *What role for short-lived climate pollutants in mitigation policy?*, 342(6164) SCIENCE 1323-1324 (2013); Shindell, D., Kuylenstierna, J.C., Vignati, E., van Dingenen, R., Amann, M., Klimont, Z., Anenberg, S.C., Muller, N., Janssens-Maenhout, G., Raes, F. and Schwartz, J., *Simultaneously mitigating near-term climate change and improving human health and food security*, 335(6065) SCIENCE 183-189 (2012).

[16] Settele, J. et al., *Terrestrial and Inland Water Systems*, CLIMATE CHANGE 2014: IMPACT, ADAPTION, AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2014), *available at* http://www.ipcc.ch/pdf/assessmentreport/ar5/wg2/WGIIAR5-Chap4_FINAL.pdf.

[17] Hu et al., *supra* note 13.

[18] Myhre et al., *supra* note 8.

[19] Shindell et al., *supra* note 15.

[20] *Id.*

Warming to date has already negatively impacted every continent and every ocean,[21] and resulted in tropical island villages disappearing,[22] Arctic houses sinking,[23] coral reefs dissolving and dying,[24] mosquito seasons growing weeks longer,[25] and worsened extreme heat events yielding high death tolls.[26] Continuing methane emissions will likely result in more pronounced impacts in the future. Further warming also enhances the risk that the climate surpasses irreversible tipping points that could render long-term climate stabilization difficult or impossible.[27] Immediate methane reductions can therefore also mitigate long-term warming and make it easier to stabilize global warming below 1.5 °C.[28] But inaction may cause permanent damage or irreversible impacts for thousands of years.[29]

Reducing emissions of methane will also help to limit sea level rise. Ninety percent of heat that is trapped in the atmosphere gets absorbed by the oceans.[30] While methane only lasts for about a decade in the atmosphere, a substantial fraction of the atmospheric heating that methane causes during this period is absorbed by the oceans, where the warming signal lasts

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[21] IPCC, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY, SUMMARY FOR POLICY MAKERS, http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf

[22] Albert, S., Leon, J.X., Grinham, A.R., Church, J.A., Gibbes, B.R. and Woodroffe, C.D*., Interactions between sea-level rise and wave exposure on reef island dynamics in the Solomon Islands*, 11(5) ENVIRONMENTAL RESEARCH LETTERS 054011 (2016).

[23] ALASKA CLIMATE CHANGE IMPACT MITIGATION PROGRAM, https://www.commerce.alaska.gov/web/dcra/planninglandmanagement/accimp.aspx.

[24] Muehllehner et al., *Dynamics of carbonate chemistry, production, and calcification of the Florida Reef Tract (2009-2010): Evidence for seasonal dissolution*, 30(5) GLOBAL BIOGEOCHEMICAL CYCLES 661, 661-688 (2016); ONLY 7% OF THE GREAT BARRIER REEF HAS AVOIDED CORAL BLEACHING, http://www.coralcoe.org.au/media-releases/only-7-of-the-great-barrier-reef-has-avoided-coral-bleaching.

[25] *Id.*

[26] EXPLAINING EXTREME EVENTS FROM A CLIMATE PERSPECTIVE, https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-societybams/explaining-extreme-events-from-a-climate-perspective/; WORLD WEATHER ATTRIBUTION, https://wwa.climatecentral.org/analyses/.

[27] Lenton, T.M., Held, H., Kriegler, E., Hall, J.W., Lucht, W., Rahmstorf, S. and Schellnhuber, H.J., *Tipping elements in the Earth's climate system*, 105(6) PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 1786-1793 (2008).

[28] W.J. Collins, et al*., Increased Importance of Methane Reduction for a 1.5 Degree Target*, Env't Res. Letters, 13, 054002, https://iopscience.iop.org/article/10.1088/1748-9326/aab89c (last visited Oct. 8, 2019); *see also* IPCC, SUMMARY FOR POLICYMAKERS OF IPCC SPECIAL REPORT ON GLOBAL WARMING OF 1.5 C APPROVED BY GOVERNMENTS, Chapter 2 (Oct. 8, 2018), *available at* http://www.ipcc.ch/sr15/chapter/chapter-2/.

[29] *U.S. Global Change Research Program* at 1357.

[30] IPCC, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, SUMMARY FOR POLICY MAKERS (2013), http://www.climatechange2013.org/images/report/WG1AR5 SPM FINAL.pdf.

far longer than in the atmosphere. Accordingly, near-term methane emissions can cause sea level rise for decades to come.[31]

In the three years since EPA issued the New Source Rule, existing oil and gas sources have emitted 33.4 million metric tons of methane.[32] This is equivalent to the 20-year[33] climate impact of nearly 600 million passenger vehicles driving for one year or over 3,000 billion pounds of coal burned. Federal emissions guidelines could have prevented 12.2 million metric tons of these methane emissions,[34] equivalent to the climate impact of over 200 million passenger vehicles driving for one year or over 1,000 billion pounds of coal burned.[35]

Each additional year EPA delays the adoption of federal emissions guidelines for existing sources will allow methane emissions that would otherwise be prevented. For example, in 2021, existing sources will emit 9.8 million metric tons of methane.[36] This is equivalent to the 20-year[37] climate impact of over 170 million passenger vehicles driving for one year or nearly 900 billion pounds of coal burned. Federal emissions guidelines could prevent 3.6 million metric tons of these methane emissions,[38] equivalent to the climate impact of over 60 million passenger vehicles driving for one year or over 330 billion pounds of coal burned.[39] Once released, methane emissions cannot be removed from the atmosphere and will contribute to both near- and longer-term climate damages, including impacts associated with an increased rate of warming, sea level rise, and others.

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[31] Hu et al., *supra* note 13.

[32] *See* Dr. Renee McVay and Hillary Hull (2019). Assessment of Harm to the Public from a Continued Delay by EPA Promulgating Methane Guidelines for Existing Sources. EDF.

[33] Calculation uses the IPCC AR5 WGI 20-year GWP. The latest science, *see* n. 10, *supra*, suggests that this GWP is 14% higher than what is reported in the IPCC and therefore the number of vehicles would be over 680 million and the number of pounds of coal burned would be over 3,500 billion.

[34] *See* Dr. Renee McVay and Hillary Hull (2019). Assessment of Harm to the Public from a Continued Delay by EPA Promulgating Methane Guidelines for Existing Sources. EDF.

[35] Updated for the latest science, *see* n. 10, *supra*, the number of vehicles would be nearly 250 million and the number of pounds of coal burned would be over 1,200 billion.

[36] *See* Dr. Renee McVay and Hillary Hull (2019). Assessment of Harm to the Public from a Continued Delay by EPA Promulgating Methane Guidelines for Existing Sources. EDF.

[37] Updated for the latest science, *see* n. 10, *supra*, the number of vehicles would be nearly 200 million and the number of pounds of coal burned would be over 1 trillion.

[38] *See* Dr. Renee McVay and Hillary Hull (2019). Assessment of Harm to the Public from a Continued Delay by EPA Promulgating Methane Guidelines for Existing Sources. EDF.

[39] Updated for the latest science, *see* n. 10, *supra*, the number of vehicles would be over 70 million and the number of pounds of coal burned would be over 370 billion.

Appendix G

Health Impacts of Oil and Natural Gas Operations

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VOCs Form Ground-Level Ozone, or Smog, that Harms Human Health

Ozone forms when VOCs and oxides of nitrogen (NOx) react in the presence of heat and sunlight. This process becomes more pronounced in the summertime.

A longstanding body of scientific research, including numerous EPA assessments, demonstrates that exposure to ground-level ozone harms human health. In its 2013 Integrated Scientific Assessment for Ozone, EPA concluded that "a very large amount of evidence spanning several decades supports a relationship between exposure to [ozone] and a broad range of respiratory effects." *2013 Final Report: Integrated Science Assessment of Ozone and Related Photochemical Oxidants* ("ISA") (EPA/600/R-10/076F) at 1-6. These effects range from decreases in lung function among healthy adults to increases in respiratory-related hospital admissions and emergency room visits, to premature death. *Id.* at 6-131 to 6-158, 6-162 to -163.

Multiple studies across various states (California, Georgia, North Carolina), counties (Maricopa County, AZ; Erie County, NY) and cities (Seattle, New York, Newark, Atlanta, Houston, Dallas, San Antonio, Austin, Indianapolis, St Louis) have found that changes in ozone concentrations were associated with higher asthma emergency room visits, most at concentrations below the current standard.[1] It is estimated that up to 11% of all asthma Emergency Room visits in the United States are attributed to ozone.[2] According to the Centers for Disease Control and Prevention, asthma affects 25 million Americans and results in 1.7 million emergency room visits, 9.7 million visits to the physician and 188 thousand hospitalizations. CDC, Most Recent National Asthma Data.[3] Asthma costs the U.S. economy more than $80 billion annually in medical expenses, missed work and school days and deaths.[4]

Ozone pollution is particularly harmful for vulnerable populations, such as children, people with respiratory diseases or asthma, older adults, and people who are active outdoors, especially outdoor workers. *ISA* at 1-8. Children with asthma also face heightened risks from ozone

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[1] Stephanie Holm, John Balmes, Ananya Roy, *Human Health Effects of Ozone: The State of Evidence Since EPA's Last Integrated Science Assessment*, EDF 2018.

[2] Susan C. Anenberg, Daven K. Henze, Veronica Tinney, Patrick L. Kinney, William Raich, Neal Fann, Chris S. Malley, Henry Roman, Lok Lamsal, Bryan Duncan, Randall V. Martin, Aaron van Donkelaar, Michael Brauer, Ruth Doherty, Jan Eiof Jonson, Yanko Davila, Kengo Sudo, Johan C.I. Kuylenstierna, *Estimates of the Global Burden of Ambient PM2.5, Ozone, and NO2 on Asthma Incidence and Emergency Room Visits*, Environmental Health Perspectives, 2018; 126 (10): 107004.

[3] *Available at* https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm, last accessed on October 15, 2019.

[4] Tursynbek Nurmagambetov, Robin Kuwahara, Paul Garbe, *The Economic Burden of Asthma in the United States, 2008 – 2013,* Annals of the American Thoracic Society, 2018).

exposure. Many studies have demonstrated that children with asthma experience decrements in lung function and increases in respiratory symptoms when exposed to ozone pollution.[5]

EPA concluded that there is a causal relationship or likely causal relationship between both short- and long-term ozone exposure and a broad range of harmful respiratory effects in humans. *ISA* at 1-5–1-8, Table 1-1. Short-term exposure is defined as hours, days, or weeks, and long-term exposure is measured in months to years. *Id*. at 1-4.

Short-term exposure to ozone can have critical health implications. For instance, there is evidence of an association between out-of-hospital cardiac arrests and short-term exposure to ozone, as reported in Ensor, et al., 2013.[6] Time scales of exposure up to three hours in duration and also at the daily level on the day of the event were significant. Other studies indicate higher rates of stroke in populations following higher exposures to ozone. A study in Pennsylvania that used a time-stratified case-crossover analysis to evaluate the relationships between stroke hospital admissions and ozone, among 26,219 patients in Allegheny County, PA, between 1994 and 2000 found that exposures to ozone on the current day increased the risk of total stroke hospitalization.[7] Another study in Nunces County, Texas evaluated associations with incident stroke and stroke severity with cases identified in the Brain Attack Surveillance in Corpus Christi project between 2000 and 2012 and found elevated risk of having a first stroke with higher ozone concentrations in the preceding 2 days. Effect measure estimates were not changed in a model that included PM2.5.[8] This is supported by two independent meta- analyses of multiple studies.[9,10] This evidence augments the long-standing body of literature demonstrating the serious impacts from short-term exposure to ozone pollution, including the increased risk of premature death. *ISA* at 1-14 (concluding that there is "likely to be a causal relationship between short-term exposures to [ozone] and total mortality"). EPA has recognized that positive associations have been reported between "short-term [ozone] exposures and respiratory mortality, particularly during the summer months." EPA, *National Ambient Air*

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[5] K. Mortimer et al., *The Effect of Air Pollution on Inner-City Children with Asthma*, 19 EUR. RESPIRATORY J. 699 (2002), *ISA*, 6-120–21, 6-160.

[6] Katherine B. Ensor, *et al*., *A Case-Crossover Analysis of Out-of-Hospital Cardiac Arrest and Air Pollution*, 127 CIRCULATION 1192 (2013), https://www.ncbi.nlm.nih.gov/pubmed/23406673.

[7] Xu X, Sun Y, Ha S, Talbott EO, Lissaker CT, *Association between ozone exposure and onset of stroke in Allegheny County, Pennsylvania, USA, 1994-2000I,* Neuroepidemiology, 2013; 41(1):2-6.

[8] Wing JJ, Adar SD, Sánchez BN, Morgenstern LB, Smith MA, Lisabeth LD, *Short-term exposures to ambient air pollution and risk of recurrent ischemic stroke*, Environmental Research, Jan. 2017; 152:304-7.

[9] Shah, Anoop SV, et al., *Short term exposure to air pollution and stroke: systematic review and meta-analysis*, BMJ 350 (2015): h1295.

[10] Yang, Wan-Shui, et al., *An evidence-based appraisal of global association between air pollution and risk of stroke*, International Journal of Cardiology 175.2 (2014): 307-313.

Quality Standards for Ozone, 80 Fed. Reg. 65,292, 65,307 (Oct. 26, 2015); *see also ISA* 6-220 to 6-221.

Long-term exposure likewise has critical health implications. EPA has concluded that there is "likely to be a causal relationship between long-term exposure to [ozone] and respiratory effects." *ISA* at 1-8. Similarly, EPA notes that "recent evidence is suggestive of a causal relationship between long-term [ozone] exposures and total mortality." *Id.* Some longitudinal studies have further demonstrated that "long-term [ozone] exposure influences the risk of asthma development in children." *ISA* at 7-2.

A recent study of almost 61 million Medicare patients conducted nationwide indicates a significant association between short and long term ozone exposure and all- cause mortality, with effects strongest in minorities and those of low socio-economic status. These effects were seen at ozone concentrations well below the current standard of 70 ppb.[11,12]

Health effects other than cardiovascular or respiratory are also likely. A 2017 study suggested that ozone exposure may be linked to approximately 8,000 stillbirths per year.[13] Prolonged exposure to ozone may also accelerate cognitive decline in the early stages of dementia.[14] There is now accumulating evidence that suggests that ozone exposure during pregnancy can result in Autism Spectrum Disorders among children.[15,16]

In 2015, EPA strengthened the national health-based standard for ground-level ozone, lowering the standard from 75 parts per billion ("ppb") to 70 ppb.[17] The record for that rulemaking, however, along with subsequent scientific studies, demonstrates that health effects can occur at much lower levels, especially in sensitive populations. For that reason, EPA's independent scientific advisors recommended that the agency establish the standard in the range of 60–70 ppb. Many health and medical associations suggested that lower standards may be

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[11] Di et al., *Air Pollution and Mortality in the Medicare Population*, NEW ENGLAND J. OF MEDICINE (June 29, 2017)

[12] Di Q, Dai L, Wang Y, Zanobetti A, Choirat C, Schwartz JD, Dominici F, *Association of short-term exposure to air pollution with mortality in older adults*, JAMA (Dec. 26, 2017); 318(24):2446-56.

[13] Mendola et al., *Chronic and Acute Ozone Exposure in the Week Prior to Delivery is Associated with the Risk of Stillbirth*, 14 INT'L J. ENVT'L RESEARCH AND PUB. HEALTH 731 (2017).

[14] Galkina Cleary et al., *Association of Low-Level Ozone with Cognitive Decline in Older Adults*, 61 J. ALZHEIMERS DISEASE 1, 67-78 (2018).

[15] Becerra, Tracy Ann, et al, *Ambient air pollution and autism in Los Angeles county, California*, Environmental Health Perspectives 121.3 (2012) 380-386.

[16] Volk HE, Lurmann F, Penfold B, Hertz-Picciotto I, McConnell R, *Traffic-related air pollution, particulate matter, and autism*, JAMA Psychiatry (Jan. 1, 2013); 70(1):71-7.

[17] EPA, *National Ambient Air Quality Standards for Ozone*, 80 Fed. Reg. 65,292 (Oct. 26, 2015).

appropriate.[18] EPA has issued designations for counties under the 2015 ozone standards. EPA, *Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards*, 82 Fed. Reg. 54,232 (Nov. 16, 2017); Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards, 83 Fed. Reg. 25,776 (June 4, 2018); Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards—San Antonio, Texas Area, 83 Fed. Reg. 35,136 (July 25, 2018).

According to EPA calculations, there are over 120 million people living in ozone non-attainment areas in the U.S[19] and there is evidence that adverse health effects are being seen at lower concentrations too. These unhealthy levels of ozone air quality can result in acute respiratory illness and other damaging health outcomes.

The Oil and Natural Gas Sector Is a Substantial Source of Smog-Forming Emissions

The oil and natural gas sector is a substantial source of smog-forming emissions. According to EPA's most recent National Emissions Inventory (NEI), "Oil and Gas Production" is the largest source of human-caused VOCs nationally.[20] Regional analyses likewise underscore the significant ozone-forming emissions from these sources, including work in the Uinta Basin in Utah,[21] the Barnett Shale in Texas,[22] and in Colorado.[23]

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[18] *Id.* at 65,321-23; 65,355.

[19] https://www3.epa.gov/airquality/greenbook/popexp.html.

[20] Calculation based on EPA, National Emissions Inventory (NEI) Sector Data, *available at* https://edap.epa.gov/public/extensions/nei_report_2014/dashboard.html#sector-db.

[21] Warneke, C. et al., "Volatile organic compound emissions from the oil and natural gas industry in the Uintah Basin, Utah: oil and gas well pad emissions compared to ambient air composition," 14 Atmos. Chem. Phys., 10977–10988 (2014), *available at* www.atmos-chem- phys.net/14/10977/2014/; ENVIRON, "Final Report: 2013 Uinta Basin Winter Ozone Study," (Mar. 2014), *available at* https://deq.utah.gov/locations/U/uintahbasin/ozone/docs/2014/06Jun/UBOS2013FinalReport/Title_Contents_UBOS_2013.pdf.

[22] David T. Allen, "Atmospheric Emissions and Air Quality Impacts from Natural Gas Production and Use," Annu. Rev. Chem. Biomol. Eng. 5:55–75 (2014), *available at* http://www.annualreviews.org/doi/abs/10.1146/annurev-chembioeng-060713-035938.

[23] Brantley, et al., "Assessment of volatile organic compound and hazardous air pollutant emissions from oil and natural gas well pads using mobile remote and onsite direct measurements," Journal of the Air & Waste Management Association 1096-2247 (Print) 2162- 2906 (Online) (2015); Pétron, G., et al., "A new look at methane and non-methane hydrocarbon emissions from oil and natural gas operations in the Colorado Denver-Julesburg Basin," 119 J. Geophys. Res. Atmos., 6836–6852 (2014), *available at* http://onlinelibrary.wiley.com/doi/10.1002/2013JD021272/full.

Studies and analyses have linked ozone formation to emissions from oil and gas development. For example, a recent study by NOAA scientists at the Cooperative Institute for Research in Environmental Sciences ("CIRES") found that, on Colorado's Northern Front Range, oil and gas operations contribute roughly 50% to regional VOC reactivity and that these activities are responsible for approximately 20% of all regional ozone production.[24] Another study analyzing ozone impacts associated with unconventional natural gas development in Pennsylvania concluded that "natural gas emissions may affect compliance with federal ozone standards,"[25] and an analysis in the Haynesville Shale in Texas found that emissions associated with projected future production from the oil and gas sector could be responsible for as much as a 5 ppb increase in 8-hour ozone design levels.[26] There are also well-documented connections between oil and gas development and ozone formation in Wyoming's Upper Green River Basin and Utah's Uinta Basin, among others.[27]

EPA's Failure to Adopt Methane Guidelines Allows Substantial Harmful Ozone-Forming Pollution

Analysis completed by Dr. Renee McVay and Hillary Hull found that over 90,000 wells that would be subject to Methane Guideline are located in areas that are not in attainment with the 2015 ozone standard.[28] These wells emit 160,000 tons of VOCs annually.

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[24] McDuffie, E. E., et al. (2016), Influence of oil and gas emissions on summertime ozone in the Colorado Northern Front Range, J. Geophys. Res. Atmos., 121, 8712–8729, doi:10.1002/2016JD025265. http://onlinelibrary.wiley.com/doi/10.1002/2016JD025265/abstract. *See also* Gilman, J. B., B. M. Lerner, W. C. Kuster, and J. A. de Gouw (2013), *Source signature of volatile organic compounds from oil and natural gas operations in northeastern Colorado*, Environ. Sci. Technol., 47(3), 1297–1305, *available at* http://pubs.acs.org/doi/abs/10.1021/es304119a (finding 55% of VOC reactivity in the metro- Denver area is due to nearby O&NG operations and calling these emissions a "significant source of ozone precursors."); Cheadle, LC et al., *Surface ozone in the Colorado northern Front Range and the influence of oil and gas development during FRAPPE/DISCOVER-AQ in summer 2014*, Elementa (2017), *available at* http://doi.org/10.1525/elementa.254 (finding on "individual days, oil and gas O3 precursors can contribute in excess of 30 ppb to O3 growth and can lead to exceedances" of the EPA ozone standards).

[25] Swarthout, R. F., R. S. Russo, Y. Zhou, B. M. Miller, B. Mitchell, E. Horsman, E. Lipsky, D. C. McCabe, E. Baum, and B. C. Sive (2015), *Impact of Marcellus Shale natural gas development in southwest Pennsylvania on volatile organic compound emissions and regional air quality*, Environ. Sci. Technol., 49(5), 3175–3184, doi:10.1021/es504315f, *available at* https://www.ncbi.nlm.nih.gov/pubmed/25594231.

[26] Kemball-Cook, S., A. Bar-Ilan, J. Grant, L. Parker, J. Jung, W. Santamaria, J. Mathews, and G. Yarwood (2010), *Ozone impacts of natural gas development in the Haynesville Shale*, Environ. Sci. Technol., 44(24), 9357–9363, doi:10.1021/es1021137, *available at* https://www.ncbi.nlm.nih.gov/pubmed/21086985.

[27] *See* B. Rappenglück et al., *Strong wintertime ozone events in the Upper Green River basin, Wyoming*, Atmos. Chem. Phys. (2014), *available at* https://doi.org/10.5194/acp-14-4909-2014.

[28] Dr. Renee McVay and Hillary Hull (2019). Assessment of Harm to the Public from a Continued Delay by EPA Promulgating Methane Guidelines for Existing Sources. EDF.

Many Americans live in counties that experience unhealthy levels of ozone pollution. These counties have existing wells that will be able to emit harmful pollution if EPA continues to delay the promulgation of Methane Guidelines. Nationwide, it is estimated that almost 18 million people live within 1 mile of at least one active oil and/or gas site.[29]

Analysis carried out by the Clean Air Task Force found that 2,000 asthma-related emergency room visits and over 600 respiratory related hospital admissions nationally were due to ozone smog resulting from VOC and NOx emissions from oil and gas. Additionally, children miss 500,000 days of school each year due to poor health associated with smog pollution.[30] A recent study published by scientists at EPA found that oil and gas emissions in 2025 could be attributed to cause 1,900 deaths in that year alone.[31]

These impacts can disproportionately affect minority communities living in the vicinity of the oil and gas activity. For example, in Texas, there are over 800,000 Latinos living within half a mile of an oil or gas well, in Colorado nearly 3 out of 10 people living near a well are Latino, and in California 2 out of 5 people living in close proximity to a well are Latino.[32]

EPA's failure to adopt Methane Guidelines will allow additional emissions of smog-forming pollutants in these areas and communities already burdened with unhealthy levels of ozone pollution. This added pollution enhances the risk of near-term harm to children, older adults, those suffering from respiratory diseases such as asthma, low income populations, outdoor workers, and others recreating outdoors.

Oil and Natural Gas Operations Emit Hazardous Air Pollutants like Benzene, a Known Human Carcinogen

Oil and natural gas operations also emit several different hazardous air pollutants ("HAP") from equipment leaks, processing, compressing, transmission and distribution, and storage tanks. HAPs emitted from oil and gas operations include benzene, a known carcinogen. In issuing the New Source Rule, EPA recognized the negative health and welfare consequences of HAPs

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[29] Eliza D. Czolowsk et al., *Toward Consistent Methodology to Quantify Populations in Proximity to Oil and Gas Development: A National Spatial Analysis and Review,* 125 Envtl. Health Perspectives 6, *available at* https://doi.org/10.1289/EHP1535.

[30] Clean Air Task Force, *Gasping for Breath: An analysis of the health effects from ozone pollution from the oil and gas industry* (2016).

[31] Fann, Neal, et al., *Assessing human health PM2. 5 and ozone impacts from US oil and natural gas sector emissions in 2025*, Environmental Science & Technology 52.15 (2018): 8095-8103.

[32] *Latino Communities at Risk: The Impact of Air Pollution from the Oil and Gas Industry*, Clean Air Task Force (CATF), League of United Latin American Citizens (LULAC), National Hispanic Medical Association (NHMA) 2016.

emitted from oil and gas extraction and the health benefits the Rule provides by reducing HAP emissions in addition to methane and VOC emissions.[33]

There is no safe level of human exposure to many of the toxic pollutants released as a result of oil and gas extraction. Exposure to HAPs can cause cancer and seriously impair the human neurological system. For example, EPA has found that benzene, found naturally in oil and gas, is a "known human carcinogen (causing leukemia) by all routes of exposure, and… that exposure is associated with additional health effects, including genetic changes in both humans and animals."[34]

Further, a "number of adverse noncancer health effects including blood disorders, such as preleukemia and aplastic anemia, have also been associated with long-term exposure to benzene."[35] Along with benzene, EPA has also catalogued the harmful effects of other specific air toxics emitted from oil and gas operations, including toluene, carbonyl sulfide, ethylbenzene, mixed xylenes, n-hexane, and other air toxics.[36] Each of these hazardous pollutants is harmful to human health. For example, the serious health effects associated with exposure to toluene range from the dysfunction of the central nervous system to narcosis, with effects "frequently observed in humans acutely exposed to low or moderate levels of toluene by inhalation."[37]

Recently, the Colorado Department of Public Health and Environment and consulting firm ICF released a Quantitative Human Health Risk Assessment based on advanced air pollution modeling.[38, 39]The study estimated exposures from specific oil and gas activities including drilling, fracking, flowback and production, over different time durations (acute/worst case-scenario exposure, multi-day exposure, and long-term chronic exposure over years), from different sized well pads (one, three and five acres), and different basins in the state. Calculated

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[33] EPA*, Regulatory Impact Analysis of the Final Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector Sources* ("EPA RIA")*,* EPA-452/R-16-002, 4-28–4-37 (May 2016), *available at* https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-7630.

[34] EPA RIA at 4-33.

[35] *Id.* at 3-34.

[36] *See id*. 4-33- 4-37.

[37] *Id.*

[38] C. Holder, et al, *Evaluating Potential Human Health Risks from Modeled Inhalation Exposures to Volatile Organic Compounds Emitted from Oil and Gas Operations*, Journal of the Air & Waste Mgmt. Ass'n (Oct. 17, 2019), *available at* https://doi.org/10.1080/10962247.2019.1680459.

[39] Ed Carr, Raga Avanasi, Bill Mendez, Graham Glen, John Hader, Tao Hong, Jess Wignall, YiHua Wei, Belle Guelden, & Chris Holder (ICF); Arsineh Hecobian (Colorado State University). ICF report. Oct 2019. Final Report: Human Health Risk Assessment for Oil & Gas Operations in Colorado. (https://drive.google.com/file/d/1pO41DJMXw9sD1NjR_OKyBJP5NCb-AO0I/view) Accessed 11/25/2019

population exposures were compared against established health-based guideline concentrations (considered safe) at increasing distances from the well pad.

The study found elevated lifetime cancer risk from benzene exposures from production emissions alone, and all activities combined (drilling, fracking, flowback and production), were associated with an increased lifetime risk (above one in a million) of leukemia for the average individual at 500 feet; as well as risks in the most exposed populations (people who live downwind and spend more time outdoors) only dropped below the one-in-a-million risk threshold after a distance of 2000 feet. Nearly 240,000 Coloradoans living within 2000 ft of an oil and gas well pad.

The study also found non-cancer health risks, including that benzene and 2-ethyltoluene emissions resulted in maximal one hour (acute) exposures higher than considered safe for most simulated populations 500 feet away and exposures of benzene were more than 10 times higher than considered safe for this acute exposure and are a risk for blood disorders. Blood disorders could result in anemia, disturbances in clotting or the ability to fight infections, and could manifest as fatigue, nose bleeds or infections. The study also found the potential for neurotoxic effects, such as headaches, blurred vision and dizziness, from combined acute exposures of benzene and 2-ethyltoluene. Risks were seen with acute exposure in every age group assessed. Exposures and risks during the flowback stage were found to be higher than those from other drilling and fracking activities. Specifically, long term exposure to multiple VOCs (n-nonane, benzene, m+p-xylene, and trimethylbenzenes) during prolonged flowback activities in large well sites resulted in elevated risks for neurotoxicity and blood disorders.

Many Americans live in very close proximity to these wells. These Americans will be exposed to additional hazardous air pollutants, increasing their risk of experiencing adverse health outcomes.

Recent Studies Suggest Proximity to Oil and Gas Development Is Associated with Adverse Health Outcomes

In addition to the threats to public health posed by exposure to HAPs and ozone, new studies document associations between proximity to nonconventional oil and gas development and human health effects. While these studies do not evaluate concentrations of specific air pollutants, they document health effects that are consistent with exposure to smog and hazardous air pollutants.

Air pollutants associated with oil and gas operations are known to cause serious health impacts in sensitive populations such as pregnant women, babies, and children. Studies have documented that living near natural gas wells is associated with lower birth weight babies[40] and

[40] *See* Stacy, et al., *Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania*, PLoS ONE (June 3, 2015), *available at* https://doi.org/10.1371/journal.pone.0126425.

preterm birth.[41] Other studies have found an association between oil and gas proximity and congenital heart defects in infants.[42] Congenital heart defects (CHDs) are the leading cause of death due to birth defects.[43] A 2014 Colorado study found that babies whose mothers had large numbers of natural gas wells within a 10-mile radius of their home had an increased risk of birth defects of the heart, compared to babies whose mothers had no wells within 10 miles of their home.[44] A 2019 follow-up study by the same research team fortified these results.[45] Perhaps most notably, a recent study of over 1.1 million births in Pennsylvania demonstrated evidence for negative health effects (including low birth weight) from in utero exposure to fracking sites within 3 kilometers of a mother's residence, with the largest health impacts seen for in utero exposure within 1 kilometer of oil and gas sites.[46]

Other studies also document correlations between proximity to oil and gas drilling and human health effects in otherwise healthy populations. This emerging body of scientific literature includes several new studies documenting negative human health impacts based on proximity to oil and gas wells. For example, a study from 2016 demonstrated that oil and gas well proximity was correlated with an increase in the likelihood of asthma exacerbations, including mild, moderate, and severe asthma attacks.[47] A 2015 study documented increased hospitalization rates in counties with a high density of oil and gas wells.[48] Similarly, other

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[41] Casey et al., *Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA,* Epidemiology (Mar. 2016), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4738074/.

[42] McKenzie et. al., *Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado,* Envtl. Health Perspectives (Jan. 28, 2014) *available at* https://ehp.niehs.nih.gov/1306722/; McKenzie et al., *Congenital Heart Defects and Intensity of Oil and Gas Well Site Activities in Early Pregnancy,* Environment International (July 28, 2019), *available at* https://www.sciencedirect.com/science/article/pii/S0160412019315429.

[43] McKenzie et al., *Congenital Heart Defects and Intensity of Oil and Gas Well Site Activities in Early Pregnancy,* Environment International (July 28, 2019), *available at* https://www.sciencedirect.com/science/article/pii/S0160412019315429.

[44] McKenzie et. al., *Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado,* Envtl. Health Perspectives (Jan. 28, 2014), *available at* https://ehp.niehs.nih.gov/1306722/.

[45] McKenzie et al., *Congenital Heart Defects and Intensity of Oil and Gas Well Site Activities in Early Pregnancy,* Environment International (July 28, 2019), *available at* https://www.sciencedirect.com/science/article/pii/S0160412019315429.

[46] Currie, Janet, et al., *Hydraulic Fracturing and Infant Health: New Evidence from Pennsylvania*, Science Advances, American Association for the Advancement of Science (Dec. 1, 2017), *available at* advances.sciencemag.org/content/3/12/e1603021.

[47] Rasmussen et al, *Association between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations,* 176 J. Am. Med. Assn. Internal Med. 1334-43 (Sept. 2016), *available at* https://www.ncbi.nlm.nih.gov/pubmed/27428612.

[48] Jemielita et al., *Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates,* PLoS ONE (July 15, 2015), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4503720/.

studies, including a 2017 study, have demonstrated an increase in the reporting of nasal, sinus, and migraine headaches, and fatigue symptoms in areas with high volumes of oil and gas drilling.[49]

A 2018 study in Colorado found that communities living in close proximity to oil and gas activity had higher measured exposures to HAPs and face increased risks to their health, including a heightened risk of cancer.[50] The study found that the lifetime cancer risk was 8.3 per 10,000 people for populations living within approximately 500 feet of oil and gas activity, above EPA's allowable risk. The study also found elevated levels of acute and chronic blood system and developmental risks, and acute nervous system risks for the same population. Benzene exposures contributed to 80-95% of risks across the different health effects.

While this literature is developing, it substantiates that people living in close proximity to oil and gas development are exposed to air pollution from these sources and experience acute, adverse, and often near-term health impacts.

Conclusion

As long as EPA fails to issue Methane Guidelines for existing sources in the oil and gas sector, these sources will continue to emit harmful methane, VOC and HAP pollution that would otherwise be abated. Individuals exposed to these emissions face a higher risk of adverse health effects, including acute and immediate respiratory ailments like asthma and enhanced risk of longer term, deleterious health effects associated with toxic pollution exposures.

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[49] *See* Tustin et al., *Associations between Unconventional Natural Gas Development and Nasal and Sinus, Migraine Headache, and Fatigue Symptoms in Pennsylvania,* 125 ENV. HEALTH PERSPECTIVES 189 (Feb. 2017), *available at* https://ehp.niehs.nih.gov/EHP281/.

[50] Lisa McKenzie et al., Ambient Non-Methane Hydrocarbon Levels Along Colorado's Northern Front Range: Acute and Chronic Health Risks, forthcoming in Envt'l Sci. & Tech. (Mar. 27, 2018), *available at* https://pubs.acs.org/doi/10.1021/acs.est.7b05983.

COMPENDIUM OF RECENT SCIENTIFIC STUDIES (2016-2019): METHANE AS A CLIMATE CHANGE AGENT; OIL AND GAS CONTRIBUTION TO METHANE EMISSIONS

Steiner, Irena & Schwartz, Brian. (2019). Environmental Health Concerns From Unconventional Natural Gas Development. 10.1093/acrefore/9780190632366.013.44.

- "Beyond its direct health impacts, UNGD [unconventional natural gas development] may be substantially contributing to climate change (due to fugitive emissions of methane, a powerful greenhouse gas), which has further health impacts."
- Emissions of methane result from pressurized UNGD equipment due to leaks during drilling, storage, and transport operations

FOURTH NATIONAL CLIMATE ASSESSEMENT

USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

Chapter 1: Overview

- "Some of the other greenhouse gases released by human activities, such as methane, are removed from the atmosphere by natural processes more quickly than carbon dioxide; as a result, efforts to cut emissions of these gases could help reduce the rate of global temperature increases over the next few decades."

Chapter 13: Air Quality

- Figure 13.1: *Pathways by Which Climate Change Will Influence Air Pollution* "Climate change will alter chemical and physical interactions that create, remove and transport air pollution. Human activities and natural processes release precursors for ground-level ozone (O3)...including methane."
- "Future ozone levels in the United States will also be affected greatly by domestic emissions of ozone precursors as well as by international emissions of ozone precursors and global methane levels. Studies suggest that climate change will decrease the sensitivity of regional ozone air quality to intercontinental sources." (Doherty et al. 2013 linked here)
- "Many emissions sources of greenhouse gases also emit air pollutants that harm human health. Controlling these common emission sources would both mitigate climate change and have immediate benefits for air quality and human health. Because methane is both a greenhouse gas and an ozone precursor, reductions

of methane emissions have the potential to simultaneously mitigate climate change and improve air quality."

- "Methane is both a GHG and a slowly reactive ozone precursor that contributes to global background surface ozone concentrations. Some monitoring stations in remote parts of the western United States have recorded rising ozone concentrations, resulting in part from increased global methane levels." (Lin et al. 2017, linked here)
- "The magnitude of the human health benefit of lowering ozone levels via methane mitigation is substantial and is similar in value to the climate change benefits." (Sarofim et al. 2017, linked here; Shindell et al. 2017, linked here)

Chapter 22: Northern Great Plains

- "The energy sector is also a significant source of greenhouse gas emissions in the Northern Great Plains, … Methane is released during the production, processing, transmission, storage, and distribution of natural gas."
- "Strategies being employed in the region to reduce greenhouse gas emissions from the energy sector include … conducting methane leak detection and repair programs using remote sensing technologies at natural gas operations; upgrading the equipment used to produce, store, and transport oil and gas …."

Alvarez, Ramón A., Daniel Zavala-Araiza, David R. Lyon, David T. Allen, Zachary R. Barkley, Adam R. Brandt, Kenneth J. Davis, et al. 2018. "Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain." *Science*, June, eaar7204. https://doi.org/10.1126/science.aar7204.

- Estimates methane emissions associated with U.S. oil and natural gas supply chain
- 2.3% of gross U.S. gas production, 60% higher than the U.S. EPA's estimate
- This magnitude of emissions per unit natural gas consumed produces radiative forcing over a 20-year timescale comparable to the CO2 from natural gas combustion
    - However, substantial emissions reductions are feasible through rapid detection of the root causes of high emissions and deployment of less failure-prone systems

Collins, W. J., Webber, C. P., Cox, P. M., Huntingford, C., Lowe, J., Sitch, S., Chadburn, S. E., Comyn-Platt, E., Harper, A. B., Hayman, G., and Powell, T.: Increased importance of methane reduction for a 1.5 degree target, Environ. Res. Lett., 13, 054003, https://doi.org/10.1088/1748-9326/aab89c/, 2018.

- early mitigation of CH_4 emissions would significantly increase the feasibility of stabilizing global warming below 1.5 °C, alongside having co-benefits for human and ecosystem health.

[$] Shindell, D. T., Fuglestvedt, J. S., and Collins, W. J. 2017. "The social cost of methane: theory and applications" *Faraday Discuss.* **200** 429–51

- The social cost of methane is approximately 50-100 times greater than the accepted social cost for carbon dioxide
    - This value takes into account the impacts "beyond those directly proportional to global mean temperature change and includes human and ecosystem impacts driven by emissions regardless of the process by which they occur"

J. A. Littlefield, J. Marriott, G. A. Schivley, T. J. Skone, Synthesis of recent ground-level methane emission measurements from the U.S. natural gas supply chain. J. Clean. Prod. **148**, 118–126 (2017). doi:10.1016/j.jclepro.2017.01.101

- "Since one quarter of total estimated U.S. anthropogenic CH_4 emissions is from natural gas systems (EPA, 2015), it is critical to understand the sources, magnitude, and variability of CH_4 emissions to prioritize opportunities for GHG emissions reductions."
- "Natural gas gathering facilities are a significant and previously-overlooked emission source."
- "1.7% of the CH4 in natural gas is emitted between extraction and delivery."

[$] A. M. Robertson, R. Edie, D. Snare, J. Soltis, R. A. Field, M. D. Burkhart, C. S. Bell, D. Zimmerle, S. M. Murphy, Variation in methane emission rates from well pads in four oil and gas basins with contrasting production volumes and compositions. Environ. Sci. Technol. **51**, 8832–8840 (2017).

- Methane emissions from production sites were quantified in four major U.S. basins (Upper Green River, Denver-Julesburg, Uintah, Fayetteville
- Consolidation of operations onto single pads may reduce normalized emissions

D. Zavala-Araiza, R. A. Alvarez, D. R. Lyon, D. T. Allen, A. J. Marchese, D. J. Zimmerle, S. P. Hamburg, Super-emitters in natural gas infrastructure are caused by abnormal process conditions. Nat. Commun. **8**, 14012 (2017). doi:10.1038/ncomms14012pmid:28091528

- "Quantifying methane (CH_4) emissions from the natural gas supply chain is an active area of research [citing 21 recent studies from 2012-2015], with consistent findings that high-emitting sources disproportionately affect overall emissions."

S. Schwietzke, G. Pétron, S. Conley, C. Pickering, I. Mielke-Maday, E. J. Dlugokencky, P. P. Tans, T. Vaughn, C. Bell, D. Zimmerle, S. Wolter, C. W. King, A. B. White, T. Coleman, L. Bianco, R. C. Schnell, Improved mechanistic understanding of natural gas methane emissions from spatially resolved aircraft measurements. Environ. Sci. Technol. **51**, 7286–7294 (2017). https://pubs.acs.org/doi/pdf/10.1021/acs.est.7b01810?rand=alcxym3z

- "Reducing the amount of leaked and vented natural gas (NG) during its production, processing, transport, and use has become a high priority in U.S. efforts to cut anthropogenic emissions of methane (CH4) and in some cases also of nonmethane hydrocarbons that can cause tropospheric ozone pollution or pose direct health risks."
- "Our paper is part of a comprehensive study to expand and improve the top-down vs bottom-up reconciliation effort by providing for the first time a spatially resolved aircraft-based midday CH4 emission estimate for comparison with a temporally and spatially consistent bottom-up inventory."

A. Gvakharia, E. A. Kort, A. Brandt, J. Peischl, T. B. Ryerson, J. P. Schwarz, M. L. Smith, C. Sweeney, Methane, black carbon, and ethane emissions from natural gas flares in the Bakken Shale, North Dakota. Environ. Sci. Technol. **51**, 5317–5325 (2017). doi:10.1021/acs.est.6b05183pmid:28401762

- "Incomplete combustion during flaring can lead to production of black carbon (BC) and loss of methane and other pollutants to the atmosphere, impacting climate and air quality."
- "We use airborne data of plume samples from 37 unique flares in the Bakken region of North Dakota in May 2014 to calculate emission factors for BC, methane, ethane, and combustion efficiency for methane and ethane."

M. L. Smith, A. Gvakharia, E. A. Kort, C. Sweeney, S. A. Conley, I. Faloona, T. Newberger, R. Schnell, S. Schwietzke, S. Wolter, Airborne quantification of methane emissions over the Four Corners region. Environ. Sci. Technol. **51**, 5832–5837 (2017) doi:10.1021/acs.est.6b06107pmid:28418663

- "Methane (CH4) is a potent greenhouse gas and the primary component of natural gas. The San Juan Basin (SJB) is one of the largest coal-bed methane producing regions in North America and, including gas production from

conventional and shale sources, contributed ~2% of U.S. natural gas production in 2015."

- "In this work, we quantify the CH4 flux from the SJB using continuous atmospheric sampling from aircraft collected during the TOPDOWN2015 field campaign in April 2015."

Z. R. Barkley, T. Lauvaux, K. J. Davis, A. Deng, N. L. Miles, S. J. Richardson, Y. Cao, C. Sweeney, A. Karion, M. K. Smith, E. A. Kort, S. Schwietzke, T. Murphy, G. Cervone, D. Martins, J. D. Maasakkers, Quantifying methane emissions from natural gas production in north-eastern Pennsylvania. Atmos. Chem. Phys. **17**, 13941–13966 (2017). doi:10.5194/acp-17-13941-2017

- "Natural gas infrastructure releases methane (CH4), a potent greenhouse gas, into the atmosphere. The estimated emission rate associated with the production and transportation of natural gas is uncertain, hindering our understanding of its greenhouse footprint. This study presents a new application of inverse methodology for estimating regional emission rates from natural gas production and gathering facilities in north-eastern Pennsylvania."

C. S. Foster, E. T. Crosman, L. Holland, D. V. Mallia, B. Fasoli, R. Bares, J. Horel, J. C. Lin, Confirmation of elevated methane emissions in Utah's Uintah Basin with ground-based observations and a high-resolution transport model: Methane emissions in Utah's Uintah Basin. J. Geophys. Res. D Atmospheres **122**, 13026–13044 (2017).

- "Large CH_4 leak rates have been observed in the Uintah Basin of eastern Utah, an area with over 10,000 active and producing natural gas and oil wells."
- "These findings corroborate emission estimates from the NOAA inventory, based on daytime mass balance estimates, and provide additional support for a suggested leak rate from the Uintah Basin that is higher than most other regions with natural gas and oil development."

T. N. Lavoie, P. B. Shepson, M. O. L. Cambaliza, B. H. Stirm, S. Conley, S. Mehrotra, I. C. Faloona, D. Lyon, Spatiotemporal variability of methane emissions at oil and natural gas operations in the Eagle Ford Basin. Environ. Sci. Technol. **51**, 8001–8009 (2017). doi:10.1021/acs.est.7b00814pmid:28678487

- Results indicate that understanding temporal emission variability will promote improved mitigation strategies and additional analysis is needed to fully characterize its causes.

J. D. Goetz *et al*., Analysis of local-scale background concentrations of methane and other gas-phase species in the Marcellus Shale. Elem. Sci. Anth. **5**, 1 (2017). doi:10.1525/elementa.182

- "…there has been growing concern about the emissions of greenhouse gases (largely methane), criteria pollutants, and air toxics from all stages of shale gas development."
- "…increased monitoring is needed to assess the air quality impact of shale gas activity."

P. Balcombe, K. Anderson, J. Speirs, N. Brandon, A. Hawkes, The natural gas supply chain: The importance of methane and carbon dioxide emissions. ACS Sustain. Chem.& Eng. **5**, 3–20 (January 2017). doi:10.1021/acssuschemeng.6b00144

- "While natural gas emits less CO2 when burned than other fossil fuels, its main constituent is methane, which has a much stronger climate forcing impact than CO2 in the short term."
- "This Perspective presents a comprehensive compilation of estimated CO2 and methane emissions across the global natural gas supply chain, with the aim of providing a balanced insight for academia, industry, and policy makers by summarizing the reported data, locating areas of major uncertainty, and identifying where further work is needed to reduce or remove this uncertainty."
- "The presence of "super emitters", a small number of facilities or equipment that cause extremely high emissions, is found across all supply chain stages creating a highly skewed emissions distribution. However, various new technologies, mitigation and maintenance approaches, and legislation are driving significant reductions in methane leakage across the natural gas supply chain."

M. Etminan, G. Myhre, E. J. Highwood, K. P. Shine, Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing. Geophys. Res. Lett. **43**, 12614–12623 (2016). doi:10.1002/2016GL071930

- New calculations of methane's radiative forcing are presented (the difference between incoming and outgoing radiation, influencing how much the planet warms given a concentration of the gas) showing the 1750-2011 radiative forcing is about 25% higher compared to the value in the IPCC 2013 assessment; the 100-year global warming potential is 14% higher than the IPCC value

B. K. Lamb, M. O. L. Cambaliza, K. J. Davis, S. L. Edburg, T., W. Ferrara, C. Floerchinger, A. M. F. Heimburger, S. Herndon, T. Lauvaux, T. Lavoie, D. R. Lyon, N. Miles, K. R. Prasad, S. Richardson, J. R. Roscioli, O. E. Salmon, P. B. Shepson, B. H. Stirm, J. Whetstone, Direct and indirect measurements and modeling of methane

emissions in Indianapolis, Indiana. Environ. Sci. Technol. **50**, 8910–8917 (2016). doi:10.1021/acs.est.6b01198pmid:27487422

- "…methane (CH4), the main component of natural gas, is a powerful short-lived greenhouse gas, and the emission of CH4 associated with the natural gas supply chain can offset the climate benefits of reduced CO2 emissions relative to other fossil fuels."
- "…an accurate estimate of the CH4 lost to the atmosphere from the natural gas infrastructure and usage is needed to understand the climate impacts of using natural gas as an energy source and to identify viable opportunities for overall reductions in CH4 emissions."
- "This paper describes process-based estimation of CH4 emissions from sources in Indianapolis, IN and compares these with atmospheric inferences of whole city emissions."

D. Wunch, G. C. Toon, J. K. Hedelius, N. Vizenor, C. M. Roehl, K. M. Saad, J.-F. L. Blavier, D. R. Blake, P. O. Wennberg, Quantifying the loss of processed natural gas within California's South Coast Air Basin using long-term measurements of ethane and methane. Atmos. Chem. Phys. **16**, 14091–14105 (2016). doi:10.5194/acp-16-14091-2016

- "Anthropogenic sources of the potent greenhouse gas methane (CH4) constitute about 60 % of the global total CH4 emissions … Urban regions are thought to be an important contributor to this flux …"
- "…more than half of the excess methane in the SoCAB between 2012 and 2015 is attributable to losses from the natural gas infrastructure."

M. Omara, M. R. Sullivan, X. Li, R. Subramanian, A. L. Robinson, A. A. Presto, Methane emissions from conventional and unconventional natural gas production sites in the Marcellus Shale Basin. Environ. Sci. Technol. **50**, 2099–2107 (2016). doi:10.1021/acs.est.5b05503pmid:26824407

- "Methane (CH4) emissions from the natural gas (NG) supply chain have attracted significant interest in recent years because CH4, the principal component of NG (e.g., 76% to 92% CH4 in produced NG), produces 30 times more radiative forcing than CO2 over a 100-year time frame. These CH4 emissions may offset potential benefits of NG as a transition fuel between more carbon-intensive fossil fuels (e.g., coal) and renewable energy systems."
- The study data suggest that the recently instituted Pennsylvania CH4 emissions inventory substantially underestimates measured facility-level CH4 emissions by >10-40 times for five unconventional natural gas sites in this study.

[$] A. R. Brandt, G. A. Heath, D. Cooley, Methane leaks from natural gas systems follow extreme distributions. Environ. Sci. Technol. **50**, 12512–12520 (2016).

- "… leaking natural gas causes climate damage because methane (CH4) has a high global warming potential."
- "A unifying result is that the largest 5% of leaks typically contribute over 50% of the total leakage volume."

D. R. Lyon, R. A. Alvarez, D. Zavala-Araiza, A. R. Brandt, R. B. Jackson, S. P. Hamburg, Aerial surveys of elevated hydrocarbon emissions from oil and gas production sites. Environ. Sci. Technol. **50**, 4877–4886 (2016) doi:10.1021/acs.est.6b00705pmid:27045743

- "Methane, the primary constituent of natural gas, is a short-lived greenhouse gas with 28−34 and 84−86 times the cumulative radiative forcing of carbon dioxide on a mass basis over 100 and 20 years, respectively. Burning natural gas instead of other fossil fuels may increase net radiative forcing for some time, even if carbon dioxide emissions decline, depending on the loss rate of methane across the O&G supply chain."
- Tanks represent a key mitigation opportunity for reducing methane and VOC emissions.

J. D. Albertson, T. Harvey, G. Foderaro, P. Zhu, X. Zhou, S. Ferrari, M. S. Amin, M. Modrak, H. Brantley, E. D. Thoma, A mobile sensing approach for regional surveillance of fugitive methane emissions in oil and gas production. Environ. Sci. Technol. **50**, 2487–2497 (2016). doi:10.1021/acs.est.5b05059pmid:26807713

- "Leaks at [] well production and pipeline facilities release methane (CH4) directly to the atmosphere, thus reducing the potential greenhouse forcing advantage over competing fossil fuels such as coal. Significant debate surrounds the aggregate magnitude of these fugitive emissions. Much of the debate centers on whether the total losses are above or below the tipping point of 3.2%, beyond which natural gas is considered to be worse than coal from a greenhouse forcing perspective."
- This paper addresses the need for surveillance of fugitive methane emissions over broad geographical regions.

D.J. Jacob, A.J. Turner, J.D. Maasakkers, J. Sheng, K. Sun, X. Liu, K. Chance, I. Aben, J. McKeever, C. Frankenberg, Satellite observations of atmospheric methane and their value for quantifying methane emissions. Atmos. Chem. Phys. **16**, 14371–14396 (2016). doi:10.5194/acp-16-14371-2016

- "Methane is a greenhouse gas emitted by anthropogenic sources including livestock, oil–gas systems, landfills, coal mines, wastewater management, and rice cultivation. ... The atmospheric concentration of methane has risen from 720 to 1800 ppb since preindustrial times."
- "Here we review present, near-future, and proposed satellite observations of atmospheric methane and assess their value for quantifying emissions, from regional scales down to the scale of individual point sources."

A. Townsend-Small, T. W. Ferrara, D. R. Lyon, A. E. Fries, B. K. Lamb, Emissions of coalbed and natural gas methane from abandoned oil and gas wells in the United States. Geophys. Res. Lett. **43**, 2283–2290 (2016). doi:10.1002/2015GL067623

- "Recent work indicates that oil and gas methane (CH_4) inventories for the United States are underestimated. Here we present results from direct measurements of CH_4 emissions from 138 abandoned oil and gas wells, a source currently missing from inventories."

J. Peischl, A. Karion, C. Sweeney, E. A. Kort, M. L. Smith, A. R. Brandt, T. Yeskoo, K. C. Aikin, S. A. Conley, A. Gvakharia, M. Trainer, S. Wolter, T. B. Ryerson, Quantifying atmospheric methane emissions from oil and natural gas production in the Bakken shale region of North Dakota. J. Geophys. Res. D Atmospheres **121**, 6101–6111 (2016) doi:10.1002/2015JD024631

- "…studies that estimate CH_4 emissions from the oil and gas industry are necessary to constrain regional and national GHG emissions inventories and ultimately inform decisions based on the climate impacts of U.S. fuel choices."

J. D. Maasakkers, D. J. Jacob, M. P. Sulprizio, A. J. Turner, M. Weitz, T. Wirth C. Hight, M. DeFigueiredo, M. Desai, R. Schmeltz, L. Hockstad, A. A. Bloom, K. W. Bowman, S. Jeong, M. L. Fischer, Gridded national inventory of U.S. methane emissions. Environ. Sci. Technol. **50**, 13123–13133 (2016). doi:10.1021/acs.est.6b02878pmid:27934278

- "Here we present a spatially disaggregated version of the GHGI at 0.1° × 0.1° spatial resolution and monthly temporal resolution, including detailed information and error characterization for individual emission types. Our goal is to enable the use of the GHGI as an a priori estimate for inversions of atmospheric methane that may guide improvements in the inventory."
- "Total US anthropogenic emission is 29.0 Tg a−1 , including major contributions from natural gas systems (24%), enteric fermentation (23%), landfills (20%), coal mining (9%), manure management (9%), and petroleum (or equivalently oil) systems (8%)."

C. Frankenberg, A. K. Thorpe, D. R. Thompson, G. Hulley, E. A. Kort, N. Vance, J. Borchardt, T. Krings, K. Gerilowski, C. Sweeney, S. Conley, B. D. Bue, A. D. Aubrey, S. Hook, R. O. Green, Airborne methane remote measurements reveal heavy-tail flux distribution in Four Corners region. Proc. Natl. Acad. Sci. U.S.A. **113**, 9734–9739 (2016). doi:10.1073/pnas.1605617113pmid:27528660

- "Methane (CH_4) impacts climate as the second strongest anthropogenic greenhouse gas and air quality by influencing tropospheric ozone levels. Space-based observations have identified the Four Corners region in the Southwest United States as an area of large CH_4 enhancements."
- "We conducted an airborne campaign in Four Corners during April 2015 with the next-generation Airborne Visible/Infrared Imaging Spectrometer (near-infrared) and Hyperspectral Thermal Emission Spectrometer (thermal infrared) imaging spectrometers to better understand the source of methane by measuring methane plumes at 1- to 3-m spatial resolution. Our analysis detected more than 250 individual methane plumes from fossil fuel harvesting, processing, and distributing infrastructures, spanning an emission range from the detection limit ~ 2 kg/h to 5 kg/h through ~ 5,000 kg/h."

A. Townsend-Small, E. C. Botner, K. L. Jimenez, J. R. Schroeder, N. J. Blake, S. Meinardi, D. R. Blake, B. C. Sive, D. Bon, J. H. Crawford, G. Pfister, F. M. Flocke, Using stable isotopes of hydrogen to quantify biogenic and thermogenic atmospheric methane sources: A case study from the Colorado Front Range. Geophys. Res. Lett. **43**, 11462–11471 (2016). doi:10.1002/2016GL071438

- "Global atmospheric concentrations of methane (CH_4), a powerful greenhouse gas, are increasing, but because there are many natural and anthropogenic sources of CH_4, it is difficult to assess which sources may be increasing in magnitude."
- "…at least 50% of CH_4 emitted in the region is biogenic, perhaps because regulatory restrictions on leaking oil and natural gas wells are helping to reduce this source of CH_4."

M. F. Hendrick, R. Ackley, B. Sanaie-Movahed, X. Tang, N. G. Phillips, Fugitive methane emissions from leak-prone natural gas distribution infrastructure in urban environments. Environ. Pollut. **213**, 710–716 (2016). doi:10.1016/j.envpol.2016.01.094pmid:27023280

- "Fugitive emissions from natural gas systems are the largest anthropogenic source of the greenhouse gas methane (CH_4) in the U.S. …"
- "Fixing 'superemitter' leaks will disproportionately stem greenhouse gas emissions."

Appendix I

Operator	API Environmental Partnership	Individual Methane target	OGCI	One Future
Aera	x			
Alta Resources Development	x			
Anadarko	x	x	x	
Antero Resources	x			x
Apache	x	x		x
Ascent Resources, LLC	x			
BHP	x	x		x
BP	x	x	x	
Cabot Oil and Gas	x			
California Resources Corporation	x	x		
Callon Petroleum	x			
Chesapeake	x			
Chevron	x	x	x	
Cimarex Energy	x			
ConocoPhillips	x			
Continental Resources	x			
CrownQuest	x			
Denbury Resources	x			
Devon Energy	x	x		
Encana	x			
Eni		x	x	
EOG Resources	x	x		
EQT Corporation	x			x
Equinor	x	x	x	
Extraction Oil & Gas	x			
ExxonMobil	x	x	x	
Felix Energy	x			
Fieldwood Energy LLC	x			
Flywheel Energy	x			
Gulfport Energy	x			
Hess	x			x
High Point Energy	x			
Hunt Oil	x			
JKLM Energy, LLC	x			
Kinder Morgan		x		x
Lime Rock Resources	x			
Marathon Oil	x			
Murphy Oil	x			
Noble Energy	x			x
Oasis Petroleum	x			
Oxy	x	x	x	
PDC Energy	x			
PennEnergy Resources, LLC	x			

Pennsylvania General Energy	x			
Pioneer Natural Resources	x			
QEP Resources	x			
Range Resources	x			
Repsol	x		x	
Riviera Resources	x			
Sable Permian Resources LLC	x			
Sequitur Energy Resources	x			
Shell	x	x	x	
SM Energy	x			
Southwestern Energy	x			x
Summit Natural Resources	x			
Surge Energy	x			
Total	x	x	x	
Trinity Operating & Production	x			
Whiting Petroleum	x			
WPX Energy	x			
XTO Energy	x			
American Petroleum Partners	x			
HHEX Energy	x			
Red Bluff Resources	x			
Seneca Resources	x			
Warwick Energy	x			
Western Gas	x			