Testimony Before the United States House of Representatives Select Committee on the Climate Crisis

Cutting Methane Pollution: Safeguarding Health, Creating Jobs, and Protecting our Climate

Testimony of Sarah Smith, Chief of Programs

Clean Air Task Force

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Madam Chair, Ranking Member, and Distinguished Members of the Committee:

My name is Sarah Smith and I am the Chief of Programs and former Director of Super Pollutants at Clean Air Task Force (CATF), an environmental organization founded in 1996. CATF is a global nonprofit organization working to safeguard against the worst impacts of climate change by catalyzing the rapid development and deployment of low-carbon energy and other climate-protecting technologies. With over 25 years of internationally recognized expertise on climate policy and a fierce commitment to exploring all potential solutions, CATF is a pragmatic, non-ideological advocacy group with the bold ideas needed to address climate change. CATF has offices in Boston, Washington D.C., and Brussels, with staff working virtually around the world. Thank you for the opportunity to be here today to testify.

Today I will share CATF's thoughts on how reducing methane emissions from the oil and gas sector can provide crucial climate benefits, as well as help communities that surround oil and gas developments by reducing harmful pollution and creating jobs using technologies that are already mature and available today.

[1] Methane is a greenhouse gas that is much more potent that carbon dioxide, and it is a primary driver of climate change. Addressing methane emissions, particularly from the oil and gas industry, is a critical piece of the climate action puzzle here in the United States and around the world.

The world stands on the brink of irreversible changes. As the Intergovernmental Panel on Climate Change ("IPCC") put it in its Sixth Assessment Report ("AR6"): "Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years."[1] The impacts of this warming climate are hitting the most vulnerable populations the hardest, and efforts to adapt to our new climate reality are being outpaced by those impacts.[2] As the scientific understanding of climate change impacts has evolved, it has revealed that we can pass catastrophic tipping points much more suddenly or at lower temperatures than once thought.[3] This means that the collapse of ice sheets or the loss of rainforests, and the resulting impacts on vulnerable populations, are likely much nearer than we thought.

Reducing emissions of methane, a potent greenhouse gas with a warming potential over 80 times greater than that of carbon dioxide over a twenty-year period,[4] must play a crucial role in any rapid greenhouse gas mitigation. Because of its warming potency and atmospheric lifetime—which is much shorter than that of carbon dioxide—establishing policies to quickly reduce methane emissions is the fastest way to slow the escalating rate of global warming, serving as a handbrake to slow the

[1] IPCC, AR6 Working Group I ("WGI"), *Summary for Policymakers* 6 (2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf.
[2] IPCC, AR6 Working Group II ("WGII"), *Summary for Policy Makers* SPM-27-28 (2022), https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf.
[3] IPCC, WGI, *Technical Summary* Box TS.9 (2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_TS.pdf.
[4] IPCC, WGI, *Full Report* Table 7.15 (2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf.

accelerating climate crisis. As of June 17, 2022, the U.S. has joined 119 other countries in pledging to reduce global methane emissions by 30 percent by 2030 under the Global Methane Pledge.[5]

In the U.S., the most cost-effective way to achieve this is by reducing methane emissions from the oil and natural gas sector. The oil and natural gas sector, comprised of the oil and natural gas production and natural gas processing, transmission and storage, and distribution segments, is the largest industrial source of methane emissions in the country, responsible for over 8 million tons in 2020, according to the U.S. Greenhouse Gas Inventory ("GHGI").[6] We know that this underestimates the true scale of the problem as the current version of the GHGI fails to capture the emissions from super-emitters: infrequent but large emission events that have been documented in many independent studies to arise at oil and gas sites.[7] CATF estimates the actual emissions to be approximately 12 million metric tons.[8] Fortunately, solutions to reduce methane emissions from the oil and natural gas industry which are already being used in various jurisdictions can jumpstart the curbing of these emissions.

a. <u>We have the solutions in hand to address the oil and natural gas methane problem.</u>

There are no technical barriers to rapidly reducing emissions from the oil and natural gas industry. Relying on technologies and practices that are in use *today*, CATF has laid out a pathway by which regulatory standards—all based on regulations in place today—can reduce methane emissions from the industry by 65 percent relative to 2012 levels.[9] The House-passed Build Back Better Act contains a complementary program, the Methane Emission Reduction Plan, to further reduce emissions to align with the industry's ambition by assessing a charge on the methane emissions above a specified leak

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[5] Press Release, *U.S.-EU Joint Press Release on the Global Methane Pledge Energy Pathway*, U.S. Dep't of State (June 17, 2022), https://www.state.gov/u-s-eu-joint-press-release-on-the-global-methane-pledge-energy-pathway/.

[6] EPA, *Greenhouse Gas Inventory Data Explorer*, https://cfpub.epa.gov/ghgdata/inventoryexplorer/#allsectors/allsectors/allgas/econsect/current (last accessed June 21, 2022).

[7] David Lyon et al., *Constructing a spatially resolved methane emission inventory for the Barnett Shale region*, 49 Env't Sci. Tech. 8147 (2015); Daniel Zavala-Araiza et al., *Reconciling divergent estimates of oil and gas methane emissions*, 112 Proc. Nat'l Acad. Sci. 15597 (2015); Daniel Zavala-Araiza et al., *Super-emitters in natural gas infrastructure are caused by abnormal process conditions*, 8 Nat. Commc'ns. 14012 (2017); Daniel Zimmerle et al., *Methane emissions from the natural gas transmission and storage system in the United States*, 49 Env't Sci. Tech. 9374 (2015); Mark Omara et al., *Methane emissions from conventional and unconventional natural gas production sites in the Marcellus Shale region*, 50 Env't Sci. Tech. 2099 (2016); Jeff Peischl. et al., *Quantifying atmospheric methane emissions from Haynesville, Fayetteville, and northeastern Marcellus shale gas production regions*, 120 J. of Geophysical Res.: Atmospheres 2119 (2015); Dana Caulton et al., *Importance of superemitter natural gas well pads in the Marcellus Shale*, 53 Env't Sci. Tech. 4747 (2019); Robertson et al., *New Mexico Permian Basin measured well pad methane emissions are a factor of 5–9 times higher than U.S. EPA estimates*, 54 Env't Sci. Tech. 13926 (2020); Yuzhong Zhang et al., *Quantifying methane emissions from the largest oil-producing basin in the United States from space*, 6 Sci. Advances 5120 (2020); David Lyon et al., *Concurrent variation in oil and gas methane emissions and oil price during the COVID-19 pandemic*, 21 Atmospheric Chemistry and Physics 6605 (2021); Ramón Alvarez, *Assessment of methane emissions from the U.S. oil and gas supply chain*, 361 Science 186 (2018).

[8] CATF, *Reducing Methane from Oil and Gas: A Path to a 65% Reduction in Sector Emissions* (Dec. 2020), https://cdn.catf.us/wp-content/uploads/2020/04/21092556/Path_to_65pc_OG_reduction-Dec2020_update.pdf ("65 Percent Memo").

[9] 65 Percent Memo at 8.

rate. Together, these two approaches provide two near-term, cost-effective solutions to address the industry's methane emissions.

b. There are Solutions Required by Leading States Today That, if Used Nationwide, Would Reduce Oil and Natural Gas Methane Emissions to 65 Percent Below 2012 Levels

Based on CATF's calculations, the oil and natural gas industry emits 12 million metric tons (MMT) annually, which using EPA's Greenhouse Gas Equivalency Calculator warms the climate in the decades after emissions as much as the carbon dioxide emissions from 260 coal-fired power plants.[10] Within the industry, those emissions primarily originate from: fugitive emissions ("leaks") and other improper conditions; intentional venting and flaring; and outdated equipment that is designed to emit gas. Standards on the books today in leading states address each of these sources.

Fugitive Emissions

Emissions from leaks and other improper conditions occur when the mechanical processes or pieces of equipment at an oil or natural gas facility deteriorate or fail to operate in the intended manner, and these constitute the single largest source of methane emissions within the oil and natural gas sector. Based on CATF's analysis, fugitive emissions accounted for 5.6 MMT of methane emissions in 2020. Most of these emissions arise from the abnormal process emissions and equipment failures that create super emitters.

To effectively reduce these fugitive emissions, the leak or problem must be detected as quickly as possible, and then rapidly fixed. Leak detection and repair ("LDAR") programs can be used to find and fix everything—from a simple leaking valve to super-emitters. The strength of a LDAR program, and thus its potential to reduce emissions, depends upon the capabilities of the detection technology, the frequency an operator deploys it to detect leaks, and the scope of components that are inspected.

A number of technologies to detect methane emissions are well-established, while newer powerful techniques have advanced rapidly in recent years. The rapidly growing list of LDAR technologies[11] can be divided into two groups: close-range technologies and screening technologies.

Close-range technologies are handheld instruments that can diagnose individual leaks on a component-by-component basis, such as optical gas imaging ("OGI") cameras, which produce an infrared light image in real time, making a normally invisible pollution stream visible to our eyes. Older handheld detectors are also used to detect hydrocarbon leaks. Close-range technologies are extremely useful to pinpoint exactly where individual leaks are, both big and small, so they can be fixed.

Screening technologies can quickly monitor larger areas, typically at a detection limit greater than close-range technologies. This means that screening technologies are only able to detect larger sources. Examples of screening technologies include instruments mounted on aircraft, drones, ground vehicles,

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[10] EPA, *Greenhouse Gas Equivalencies Calculator* (last updated Mar. 2022), https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results.

[11] According to at least one report, there are over 100 distinct methane measurement technologies. *See* Highwood Emission Management*, Technical Report: Leak detection methods for natural gas gathering, transmission, and distribution pipelines* 20 (2022), https://highwoodemissions.com/wp-content/uploads/2022/04/Highwood_Pipeline_Leak_Detection_2022.pdf.

and satellites, in addition to fixed monitors or measurement devices which continuously measure methane concentrations to monitor for higher levels indicating an increase in emissions.

These innovative technologies can bring the cost of monitoring sites for emissions down and offer the opportunity to find emitters faster, or perhaps much faster—especially for large super-emitters. In proposed regulations, EPA and other regulators have required operators to use close-range technologies such as OGI, which have long been proven to be cost-effective. Concurrently, EPA and other regulators are also working with operators and technology providers to evaluate approaches for innovative screening technologies to be used in alternative monitoring approaches that will further reduce emissions from leaks and improper emissions. Leading states have recognized that frequent inspection for emissions is the key to effective methane reduction. Colorado, which has years of experience in reducing emissions with LDAR inspections, requires all new and modified sites to be inspected *monthly*.[12] Some large existing sites are inspected monthly. Most operators in Colorado use optical gas imaging, but other technologies (including advanced technologies approved by the State) are allowed. New Mexico has very recently approved rules that require operators to regularly inspect *all* sites, including wellpads with very low-producing wells.[13]

Routine Flaring of Associated Gas and Intentional Venting

The oil and gas industry is currently venting and flaring huge amounts of associated natural gas from oil wells. While there are many reasons that operators flare gas, the vast majority of gas flaring occurs when operators do not have the infrastructure (such as gathering pipelines) in place to handle natural gas at oil well sites. This scenario is referred to as routine flaring. Routine venting from oil wells—simply dumping the gas produced along with the oil into the air—is even worse, because it releases all the methane and other pollutants directly into the air. But routine flaring is also extremely harmful. In the U.S., routine flaring wasted enough gas in 2019 to heat over 8.5 million homes.[14] Routine flaring is a source of huge amounts of harmful pollution, including vast amounts of carbon dioxide equivalent to driving 17 million gasoline-powered vehicles for a year.[15] Natural gas flares consistently malfunction or fail to completely burn gas (or go out entirely), leading to huge amounts of methane emissions. A recent study by Environmental Defense Fund found that in the Permian Basin region—which accounts for 46 percent of flaring in the U.S.—10 percent of flares were found to be malfunctioning and 5 percent were completely unlit.[16] Finally, flares also produce large amounts of harmful pollutants such as black carbon soot, which directly impacts the health of people in communities near oil production sites.

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[12] 5 Colo. Code Regs. § 1001-9 D.II.E.4.e.(ii).
[13] N.M. Code R. § 20.2.50.116 (approved May 27, 2022, publication pending).
[14] Flare volume [The World Bank, 2022 Global Gas Flaring Tracker Report (2022), https://thedocs.worldbank.org/en/doc/1692f2ba2bd6408db82db9eb3894a789-0400072022/original/2022-Global-Gas-Flaring-Tracker-Report.pdf]; Gas per household calculated from EIA data [EIA, Natural Gas Consumption by End Use, https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm (last accessed June 21, 2022); EIA, Number of Natural Gas Consumers, https://www.eia.gov/dnav/ng/ng_cons_num_a_EPG0_VN4_Count_a.htm (last accessed June 21, 2022)].
[15] EPA, *Greenhouse Gas Equivalencies Calculator* (last updated Mar. 2022), https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results.
[16] Permian Map, *Flaring Aerial Survey Results*, Env't Def. Fund, https://www.permianmap.org/flaring-emissions/ (last accessed June 21, 2022).

Routine flaring has been recognized as wasteful for many years. Many oil producers avoid routine flaring entirely by ensuring that they have adequate infrastructure in place to handle all the natural gas a well will produce before the well is completed. However, other producers have track records of continuing to flare large volumes of gas for long periods of time perpetuating the industry's flaring problems. Taking action to address this problem, leading states have now banned routine flaring entirely. New Mexico, one of the states with high levels of flaring in the Permian Basin, banned routine flaring with new rules in 2021.[17] Colorado enacted rules prohibiting routine flaring in 2020[18]. New Mexico's rules will also require operators to ramp down other types of flaring (such as that done for maintenance activities) over the next several years.[19]

In the standards EPA proposed last year, *venting* from oil wells would be prohibited (a valuable measure given the harm from venting), but routine flaring would not be prohibited if a wellsite did not have adequate pipeline capacity to take away the gas from the wells at the site. This is an enormous exception since this is the very reason most routine flaring occurs. If clear standards prohibiting routine flaring are put in place, oil producers will invest in the capacity they need to get gas from wells to market so flaring is not required. If those standards have loopholes, as is the case in EPA's proposal, operators will continue to wastefully and harmfully flare. EPA should follow the precedent set by New Mexico and Colorado and prohibit oil producers from harmful and wasteful routine venting and flaring of gas.

Outdated Equipment

Another large source of methane emissions comes from industry's reliance on outdated equipment that is designed to release gas into the air. Examples of such equipment are: tanks for storing crude oil and hydrocarbons that are designed to release vapors as they evaporate into the air, rather than control those emissions; automated equipment which uses pressurized natural gas to pump liquids or to open and shut valves, releasing natural gas into the atmosphere every single time the equipment operates (and often when not operating); and compressors with non-hermetic seals on moving parts that are designed to vent harmful gas into the air.

These types of outdated equipment emit millions of tons of methane a year. In each case, technologies exist today to greatly reduce or eliminate emissions from these types of equipment, and in fact standards on the books today in leading states require the use of lower- or non-emitting equipment. For example, both Colorado[20] and New Mexico[21] require operators to replace automated gas-driven valve controllers with non-emitting equipment, such as valve controllers powered by electricity or

[17] N.M. Code R. § 19.15.27.8 (Lexis, 2021).
[18] Colorado Oil & Gas Conservation Commission, Rule 903 (2021) https://cogcc.state.co.us/documents/reg/Rules/LATEST/900%20Series%20-%20Environmental%20Impact%20Prevention.pdf.
[19] N.M. Code R. § 19.15.27.9 (Lexis, 2021).
[20] 5 Colo. Code Regs § 1001-9 D.III.C.4.c.
[21] N.M. Code R. § 20.2.50.122 (approved 27 May 2022, publication pending).

compressed air. Colorado,[22] Pennsylvania,[23] and New Mexico[24] all have good standards in place for storage tanks, ensuring that emissions from the tanks are controlled to a low level.

The standards proposed by EPA in 2021 address some types of outdated equipment (such as automated valve controllers) very well, while the treatment of other types (such as liquids storage tanks) is inadequate and far behind the standards in place for those types of equipment in leading states. CATF has provided EPA with detailed comments about how EPA should improve those provisions.[25]

Benefits of Nationwide Standards Based on Policies in Place in Leading States

Using a model of national methane emissions from the oil and gas inventory built by CATF that uses EPA's Greenhouse Gas Inventory and adjusts for emissions from super emitters as estimated by Alvarez et al.,[26] and using projections from the U.S. Energy Information Administration (EIA) to scale "potential emissions," CATF has projected methane emissions for future years assuming that specific regulatory standards are put in place. The documented benefits of each standard are used to quantify the benefits of the standard in the model. Based on this model, we see that nationwide EPA standards for methane emissions from new, modified, and existing sources can reduce methane emissions from the industry by 65 percent.

i. <u>The Environmental Protection Agency Has the Ability to Regulate Methane Emissions from the Oil and Natural Gas Sector</u>

As Congress has recognized, the EPA has clear authority under section 111 of the Clean Air Act to regulate methane for the oil and natural gas sector.[27] EPA first promulgated methane standards for new and modified sources in 2016.[28] But there are currently no nationwide standards for most existing sources: at present, sources that will account for about 60 percent of projected emissions in 2025 are not subject to any nationwide standard.[29] Such standards are an essential component to have in place for reliable reductions, as they are federally enforceable and would protect the health of people living near oil and gas production sites.

In November 2021, EPA proposed updated standards for new and modified sources and emissions guidelines for existing sources.[30] This proposal has several strong aspects, such as requiring operators to eliminate emissions from all gas-driven automatic valve controllers. However, the standards proposed

[22] 5 Colo. Code Regs. § 1001-9 D.II.C.1.c.
[23] Pennsylvania Dep't of Env't Protection, *Pennsylvania General Plan Approval And/Or General Operating Permit*, GP-5A, Section E, http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=36120.
[24] N.M. Code R. § 20.2.50.123 (approved 27 May 2022, publication pending).
[25] Clean Air Task Force, et al., *Comments on Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review* (Jan. 31, 2022), https://cdn.catf.us/wp-content/uploads/2022/05/11104718/Joint-Environmental-Comments-on-Proposed-OOOOb-and-OOOOc.pdf.
[26] Ramón Alvarez, *Assessment of methane emissions from the U.S. oil and gas supply chain*, 361 Science 186 (2018).
[27] 42 USC § 7411(b); H. Rep. 117-64.
[28] 40 C.F.R. §60.5365a *et seq.*
[29] Based on CATF model projection of oil and gas methane emissions (based on EPA's GHGI and EIA projections) and estimates of proportion of current and future equipment that will be subject to NSPS Subparts OOOO and OOOOa.
[30] 86 Fed. Reg. 63,110 (Nov. 15, 2021).

for other emissions sources are not as strong, and lag well behind the standards on the books and implemented in leading states. Deep reductions in methane pollution from this industry are needed, so EPA must strengthen the standards and guidelines it proposes in the upcoming supplemental proposal.[31]

One key improvement EPA must make is to require frequent and regular LDAR inspections for all sources, without exceptions, to reduce fugitive emissions by 80 to 90 percent. Additionally, EPA must follow in the steps of New Mexico and Colorado and ban the wasteful practice of routine flaring. As described in more detail above in section b, CATF has shown that those changes and others can reduce the sector's emissions by 65 percent in a cost-effective way.

ii. The House Has a Plan to Address Many of the Industry's Methane Emissions.

An important complementary tool to the EPA source-specific standards is the Build Back Better Act's Methane Emissions Reduction Program ("MERP"), which would assess a charge on methane emissions from the oil and natural gas sector.[32] In general, this program would establish a charge levied to operators that would be assessed based on the methane emissions reported to EPA's Greenhouse Gas Reporting Program (GHGRP) if they are above a threshold established by the legislation. An operator would calculate the natural gas production in each basin, the volume of methane it reported under the GHGRP for that basin, and if the methane emissions were to exceed the threshold leak rate, the operator would pay the charge on those emissions.

This program would incentivize larger operators to reduce emissions quickly and efficiently. If operators emit at levels below the threshold level, they pay no fee. For oil and gas producers, the threshold level of emissions is a level targeted by the Oil and Gas Methane Partnership, a group of leading producers. Because there are many cost-effective ways to reduce emissions at costs below the amount of potential fees, operators with emissions above the threshold level will rapidly do so. The fee level ($1500 per metric ton of methane after full implementation of the legislation) is well below the societal damage caused by emitting a metric ton of methane.[33]

The MERP represents a valuable complement to the regulations EPA is developing. First, any reductions required by EPA's rules will reduce the fees operators will need to pay under the MERP. For some operators, especially those who start with relatively low emissions given the amount of gas they produce, the reductions required by the EPA rules will eliminate the MERP fee. But, given the long lead time required for EPA's rules to be implemented, the MERP's more immediate applicability will incentivize more rapid adoption of the established technologies available to operators.

Second, the MERP's emissions-based fee will incentivize ongoing efforts for mitigation beyond that achieved by the EPA standards. The EPA standards that we advocate for would not eliminate methane emissions from the oil and gas sector—opportunities will still exist for further reductions. The MERP will focus efforts on finding innovative ways to further reduce emissions. This will also help drive further innovation and growth in the methane emissions reduction industry.

[31] *See* 86 Fed. Reg. at 63,115 (announcing plans to issue a supplemental proposal)
[32] Build Back Better Act, H.R. 5376, 117th Congress (2022).
[33] Drew Shindell, *The social cost of methane: theory and applications*, 200 Faraday Discuss 429 (2017).

Notably, only operators emitting above the GHGRP reporting threshold (25,000 metric tons per year of CO_2 equivalent) would need to pay any fees under the MERP; smaller operators would be entirely exempt.

[2] Implementing these solutions will provide welcome and much-needed benefits to communities and populations around oil and natural gas development.

Strengthening and finalizing EPA's methane standards and emission guidelines and passing the MERP provisions of the Build Back Better Act will provide important climate benefits, improve the health of communities and workers around oil and natural gas development, and add jobs. It's a win-win-win.

Climate Benefits

Beyond the impacts that rapidly reducing methane has on decelerating the warming rate, methane reductions provide significant value to society. Under the current EPA regulations and state policies in place,[34] CATF estimates that the oil and natural gas industry would emit 11.8 million metric tons of methane in 2025. Thus, by reducing methane emissions by 65 percent, after adjusting for the actual emissions from super emitters, would prevent over 7.8 million metric tons of methane emissions.[35] Using the Interagency Working Group's social cost of methane,[36] these reductions would save society over $13 billion annually by 2025.

Health Benefits

Methane emissions from oil and gas production have serious negative impacts on public health. Using publicly available data, research from Earthworks and the Fractracker Alliance indicates that over 17 million people live within a half-mile of oil and gas production, of whom nearly 6 million are people of color. Furthermore, 3.1 million children attend the more than 12,000 schools located within half a mile of oil and gas production.[37]

Methane contributes to the formation of ground-level ozone, or smog, by reacting with sunlight in a photochemical reaction in the lower atmosphere. Other air pollutants are also co-emitted when methane is leaked or vented. These co-emitted pollutants include volatile organic compounds (VOCs), which are also smog-forming, as well as a variety of toxic hazardous air pollutants (HAPs). The oil and gas industry emitted 2,504 kt of ozone smog-forming volatile organic compounds (VOCs) in 2017.[38]

Methane, VOC, and HAP emissions from the oil and gas industry are typically emitted as a mixture. This means that technological solutions which reduce methane emissions will also significantly reduce emissions of VOCs and HAPs, providing critical public health benefits to vulnerable communities. A 65

[34] *See* 40 C.F.R. Part 60, subpart OOOOa.
[35] 65 Percent Memo at 2, Table 1.
[36] $1,700, based on a 3 percent average discount rate for the year 2025. *See* EPA, *Regulatory Impact Analysis for the Proposed Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review*, 3-11, Table 3-3 (October 2021), https://www.epa.gov/system/files/documents/2021-11/proposal-ria-oil-and-gas-nsps-eg-climate-review_0.pdf ("Proposed Rule RIA").
[37] Oil & Gas Threat Map, https://oilandgasthreatmap.com (last accessed June 21, 2022).
[38] *See* 86 Fed. Reg. at 63,132, Table 11 (sum of VOC emissions from oil and natural gas production, natural gas processing, and natural gas transmission and storage).

percent reduction of methane emissions in line with what CATF has shown is possible by a nationwide implementation of solutions on the books in leading states right now would prevent 2.3 million tons of VOCs and 165,000 tons of HAPs from being emitted each year.

Reducing methane and VOC emissions will directly reduce the health risks associated with ground-level ozone. Epidemiologically derived research suggests that methane-induced changes in ground-level ozone levels can impact air quality, human health, and even agricultural productivity.[39] Reducing methane emissions can therefore change ground-level ozone levels in ways that provide significant value to society, including reduced risks of adverse health impacts.

Scientific research has firmly established that exposure to ground-level ozone smog harms human health. Such harms include asthma, decreased lung function among healthy adults, increases in respiratory-related hospital admissions and emergency room visits, and premature death.[40] Long-term exposure can be particularly severe: EPA has found that there is "likely to be a causal relationship between long-term exposure to [ozone] and respiratory effects."[41]

For vulnerable populations, exposure to ground-level ozone can be particularly harmful. Many studies have demonstrated that children with asthma lose some lung function and face worsened respiratory symptoms when exposed to ozone pollution.[42] Moreover, people with respiratory diseases or asthma, older adults, and people who are active outdoors (including outdoor workers) can face adverse respiratory effects.[43] In total, ozone smog attributable to oil and gas contributes to more than 750,000 summertime asthma attacks in children every year, children miss 500,000 days of school each year, and adults take approximately 1.5 million personal days when they are forced to rest or reduce activity due to high smog levels.[44]

Long-term exposure to HAPs can be life-altering for communities living near oil and gas operations. One such HAP emitted in large amounts, benzene, 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"[45] that is naturally present in underground oil and natural gas. Chronic inhalation of benzene is also associated with noncancer health effects like the arrested development of blood cells, anemia, leukopenia, thrombocytopenia, and aplastic anemia.[46] When natural gas leaks or is otherwise emitted in the production segment, benzene is often present in the emitted gas. EPA has also documented the harmful effects of other specific toxic air pollutants emitted from oil and natural gas operations, including toluene, carbonyl sulfide, ethylbenzene, mixed xylenes, n-hexane, and other air toxics.[47] In total, 234 counties in 20 states face cancer risk, due to oil and gas air

[39] Drew Shindell, The social cost of atmospheric release, 130 Climatic Change 313 (2015).
[40] EPA, *2013 Final Report: Integrated Science Assessment of Ozone and Related Photochemical Oxidants* 1-6, EPA/600/R-10-076F ("ISA").
[41] ISA at 1-8.
[42] Kathleen Mortimer et al., *The Effect of Air Pollution on Inner-City Children with Asthma*, 19 European Respiratory J. 699 (2002); ISA at 6-120, 6-121, 6-160.
[43] ISA at 1-8.
[44] CATF, Gasping for Breath (Aug. 2016), http://www.catf.us/wp-content/uploads/2018/10/CATF_Pub_GaspingForBreath.pdf.
[45] Proposed Rule RIA at 3-22.
[46] Proposed Rule RIA at 3-23.
[47] Proposed Rule RIA at 3-23 - 3-26.

pollution, that exceeds the EPA's one-in-a-million threshold, placing approximately 14 million people at risk. Some of the areas with the greatest health risk are found in New Mexico, West Virginia, Colorado, Texas, Louisiana, and North Dakota.[48]

Taking action to reduce methane emissions from the oil and natural gas industry will thus provide additional health benefits by reducing the risks of adverse health impacts associated with smog-forming pollution (VOCs and methane) as well as benzene and other toxic air pollution.

Employment Benefits

Implementing strong methane standards would result in a significant number of U.S.-based manufacturing jobs from upfront capital investments, as well as ongoing maintenance, repair, and inspections jobs. According to a forthcoming report, the CATF 65 Percent Plan will result in nearly 64,000 direct jobs, compared to just over 27,000 direct jobs for the EPA proposal. In both cases, indirect and induced jobs are also significant: indirect jobs reflect inter-industry purchases and arise from firms purchasing inputs from their suppliers, while induced jobs result from wages paid to workers, who may spend these wages on consumer electronics, clothing, etc. Overall, the CATF 65 Percent Plan results in nearly 220,000 total jobs compared to 92,000 for the EPA proposal, a difference of 120,000 jobs.

There are several reasons why the jobs created by oil and gas methane standards will be good-quality jobs, which add value both for the workers themselves and for their communities.

Technologies exist which will help companies to comply with regulations, but firms will have to ramp up production of equipment in order to meet demand that will be driven by compliance with the standards. Such equipment includes optical gas imaging cameras, air compressors, electric pumps and actuators, solar panels and batteries, and vapor recovery units. In at least one important case—the manufacture of optical gas imaging cameras—CATF has information indicating that 70 percent of the manufacturing will take place domestically in the U.S.[49]

Globalization has undoubtedly had an impact on the American labor market through practices such as offshoring and outsourcing. However, the many jobs generated by standards would be inherently non-offshorable. Many of the jobs required entail the installation of equipment, ongoing maintenance, and leak inspections and repairs, all of which require U.S.-based workers.

Many of the jobs, particularly those involving installation, maintenance, and inspections at well sites and compressor stations, are likely to be filled by employees with oil and gas industry experience, using transferable skills and experience.

Some degree of upfront jobs is associated with initial capital investment in equipment. But most of the other jobs are ongoing, not time-limited jobs. These are jobs that provide stability to both the workers themselves and the communities in which they live.

Finally, we estimate that at least 10 percent of the jobs will be union jobs. There are unionization rates well above 10 percent in many of the top job categories that we identify.

[48] CATF, Fossil Fumes (forthcoming report update).
[49] Based on CATF conversations with OGI camera manufacturers.

Impact of regulations on industry

Strong standards for methane emissions from the oil and gas industry will lead to climate, public health, and economic benefits, and they will achieve these benefits with minimal negative impact on the industry and its workforce.

CATF analyzed data on oil and gas well drilling in several U.S. states and conclude that strong methane standards have not impacted activity in the oil and gas industries. As shown in the figure below, while the number of drilling rigs in each state changes over time, the number of rigs follows the price of oil, not whether the state has passed protective methane rules. Colorado has strong methane pollution standards in place (while Oklahoma and North Dakota do not), but changes in Colorado's rig count are consistent with those in the other two states and shows no decrease as a result of the state's methane standards. Rig counts in all three states decreased substantially in late 2014, early 2015, and early 2020 due to a substantial decrease in oil prices. This indicates that methane regulations do not have a demonstrable effect on the level of drilling activity.