# PLUGGING THE LEAKS 2.0

## Protect Workers, Reduce Pollution, and Create Quality Jobs by Reducing Methane Waste in the U.S. Oil and Gas Industry

BLUEGREEN ALLIANCE

**The BlueGreen Alliance unites labor unions and environmental organizations to solve today's environmental challenges in ways that create and maintain quality jobs and build a clean, prosperous, and equitable economy.**

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# EXECUTIVE SUMMARY

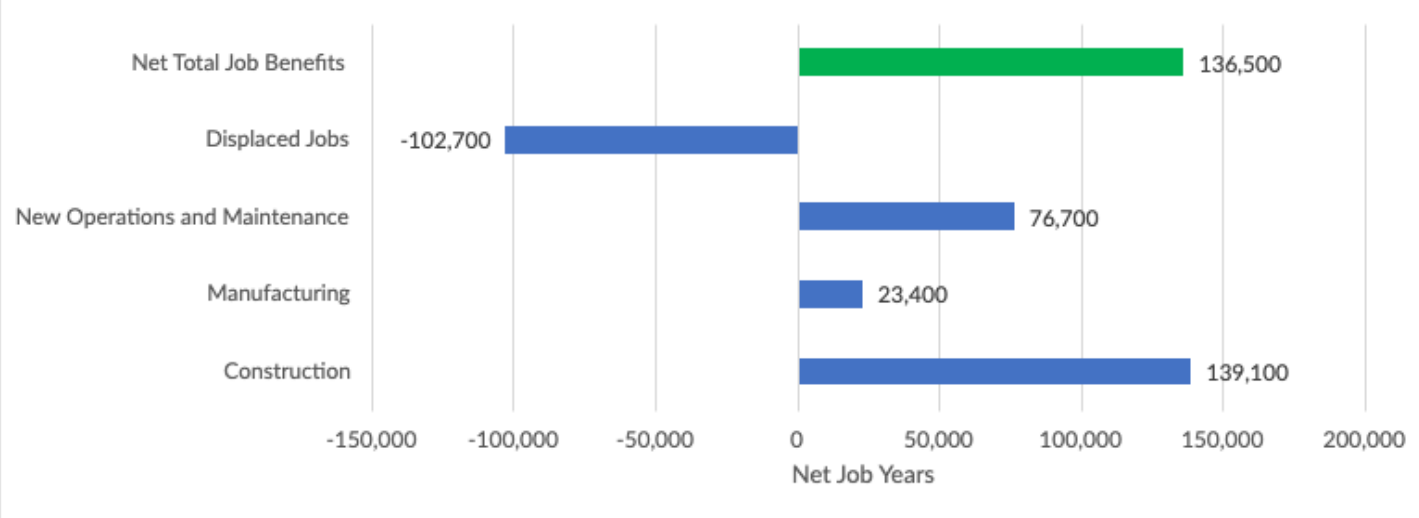
Reducing methane emissions in the United States is yet another example of how the nation's environmental challenges can also be economic opportunities. Methane is a greenhouse gas (GHG) that is many times more potent than carbon dioxide (CO2) and one of the largest contributors to climate change.[1] Reducing methane emissions can reap economic benefits for workers and communities across the country.

To address the problem of oil and gas methane emissions, the U.S. Environmental Protection Agency (EPA) issued a "Proposed Standards of Performance for New, Reconstructed, Modified, and Existing Sources in the Oil and Natural Gas Sector." These standards are intended to bring improved technologies and practices to the energy sector with the expressed purpose of reducing waste and pollution.[2] This report examines the impact of these standards through direct and indirect job creation, as well as through job quality. This report focuses on the impacts of the EPA's supplemental methane rule released in November 2022.

The analysis finds positive employment impacts from the proposed standards, which result from investments in emissions reduction technologies—specifically in leak detection and reduction systems, which are more labor intensive than current leak detection technology and practices used by the oil and gas extraction industry. This drives greater employment opportunities compared to the normal, business-as-usual oil and gas operations.

With full and continuing adoption of leak reducing technologies and practices at new, modified, and existing oil and gas facilities, this would suggest the creation of over 136,000 job-years through 2035.[3] Our assessment finds that over 10,000 net direct and indirect jobs will be created annually in a variety of sectors, including manufacturing, construction, operations, and maintenance. This is a two-fold increase in jobs compared to our analysis of the 2016 rule.[4]

**Figure A:** Total Direct and Indirect Jobs Created 2023-2035[5]



Activities in the U.S. oil and gas industry are, together with agriculture, the largest source of methane emissions.[6] These emissions result from both accidental leaks as well as outmoded practices and obsolete technology utilized by the industry in the gathering, transmission, production, and processing of natural gas. The anticipated investments discussed in this report could bring about emission reductions equivalent to the natural gas consumption of nearly 19.7 million households each year from 2023 to 2035.[7]

And the problem goes beyond impacts to our climate. Throughout this process, the nation's oil and gas sector leaks other dangerous and wasteful emissions into the air like smog- and soot-forming volatile organic compounds (VOCs) and benzene—a known carcinogen. The substances endanger workers and communities surrounding these facilities.[8]

Many companies are deploying low-cost solutions to plug industrial gas leaks. This report examines the employment impacts of clean technology investment incentivized by EPA's proposed rule. This standard would achieve cost-effective methane emissions reductions and provide greater certainty about Clean Air Act requirements for upstream natural gas activities, such as the gathering, transmission, production, and processing of natural gas. The standard would directly apply to new and modified facilities and would issue guidelines directing states to submit similar regulations for existing facilities. EPA would create plans for states that fail to submit their own.

The findings in this report are clear: updating industry practices and equipment to meet the EPA standards will not just make workers and communities around the facilities safer and healthier, but will also generate and support quality, family-sustaining jobs.

# I. INTRODUCTION

> Across the country, nearly 14 million people face a cancer risk greater than the EPA's one-in-a-million threshold because of oil and gas alone.

The threat of catastrophic climate change has reached a crisis point. According to the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report, the window to prevent the worst effects of warming is rapidly closing.[9] Keeping the world on its target of 1.5° of warming will require immediate action to reduce the emission of GHGs. Of the GHGs being emitted, methane is one of the most potent, with one ton of methane in the atmosphere having over 80 times the warming impact of a ton of CO2 in the twenty years after it is emitted.[10]

While methane emissions occur in many sectors, the oil and gas sector stand together with agriculture as the largest source of this pollution in the United States. Methane is emitted from oil and gas infrastructure like wells, compressor stations, and processing plants alongside other dangerous compounds, such as VOCs—which form smog and soot—and carcinogens like benzene, formaldehyde, and acetaldehyde.[11] The communities facing the greatest public health risk from these harmful air pollutants are in states with the greatest amount of oil and gas development, including New Mexico, Texas, Colorado, Pennsylvania, Oklahoma, Louisiana, West Virginia, and North Dakota.

Across the country, nearly 14 million people living in one of 236 counties in 21 states face a cancer risk greater than the EPA's one-in-a-million threshold because of oil and gas alone.[12] Oil and gas sector air pollution is particularly harmful to workers that serve in that industry, who face serious long term health challenges as a result of their labor. Emissions reduction for this sector can significantly improve air quality for workers and communities, preventing 255,000 premature deaths and more than half a million asthma-related emergency room visits globally each year.[13]

Making immediate investments in energy efficiency and fixing fugitive leaks in our gas infrastructure can create and maintain high-quality jobs. Congress has recently taken action on methane mitigation by passing the Inflation Reduction Act, which established the $1.5 billion Methane Emissions Reduction Program (MERP). The law invests in grants to monitor and reduce leaks and imposes a charge on each excess ton of methane an operator emits above threshold levels that are based on the oil and gas industry's targets for controlling pollution. Facilities that meet or beat these pollution thresholds will not pay the charge.

In November 2021, the EPA released its proposed Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources, which is intended to bring improved technologies and practices to the energy sector with the expressed purpose of reducing waste and pollution.[14] One year later, the EPA released a revised version of the proposed rule—a "supplemental rule" that aimed to modify and support the standards proposed in November 2021. Using economic modeling, this report estimates the job creation potential of the EPA's 2022 supplemental rule.[15]

# II. METHANE LEAKS AND THE OIL AND GAS SECTOR

Our nation's energy sector has made significant strides to increase the efficiency of gas and oil systems in recent years. However, emissions of methane and other pollutants continue to harm the economy and the environment by jeopardizing the health of workers and communities, wasting resources, and worsening climate change. Moreover, recent research suggests emissions from oil and gas activities are significantly underestimated in the EPA's latest GHG inventory.[16] In fact, the International Energy Agency's (IEA) 2022 Global Methane Tracker analysis found that national governments underestimated methane emissions from the energy industry globally by 70%.[17]

During natural gas gathering, transmission, production, and processing activities—otherwise known as upstream sources of methane emissions—oil and natural gas wells, pipelines, tanks, and other equipment leak industrial pollution like methane, benzene, and other pollutants into our air (for an illustration of upstream activities, see Figure B. Upstream activities are above the city gate).[18] These releases can be accidental, but often are due to outmoded practices and obsolete technology.[19] This lost and leaking natural gas costs billions of dollars every year, and nationwide, these upstream activities waste the amount of gas it takes to heat nearly 19.7 million homes each year.[20] Efforts to curtail this waste are vital to strengthening the economy, protecting public health, and reducing pollution.

Low-cost, proven measures and technologies are already commercially available to cut methane emissions from the oil and gas sector by 65% in the next five years.[21] While some companies have moved to adopt these improvements voluntarily, the prospect of capturing additional gas with available and cost-effective mitigation technology could improve with a larger market and level the regulatory playing field among energy companies.[22] Some states, such as Colorado, already have strong methane pollution standards in place. These standards have resulted in climate, public health, and economic benefits while stabilizing the industry by reducing energy waste.[23]

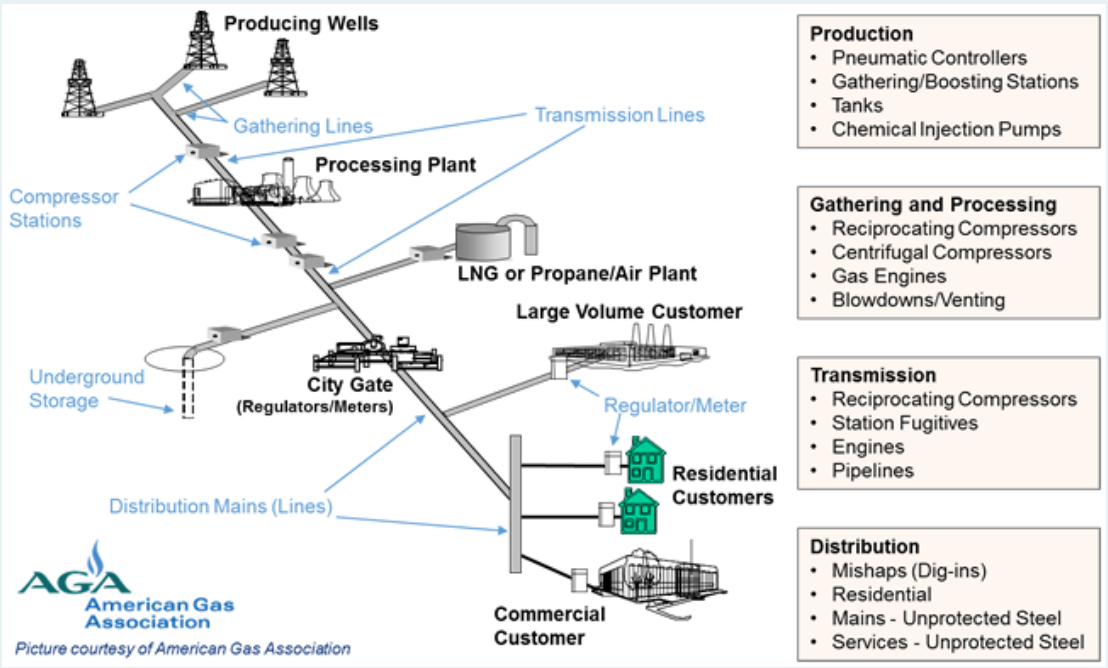



Figure B: The Natural Gas Production Industry[24]

# III. BACKGROUND: EPA METHANE STANDARDS

Low-cost solutions already exist to plug industrial methane leaks and provide more energy to homes and businesses.[25] Despite these readily available mitigation options, voluntary efforts by oil and gas companies have been sporadic. Limited federal regulations leave out most sources and sites, leading to emissions growth.[26, 27] The methane and VOC standards proposed by the EPA reflect the necessity to reduce waste and pollution at new, modified, and existing sources. Having the standard in place also provides an opportunity for companies to innovate in methane mitigation technology and strategies and provides greater regulatory certainty for the industry over the long run.

## About the Rule

The Clean Air Act directs EPA to create standards on emissions that endanger the health or welfare of the public. In 2012, the EPA released New Source Performance Standards (NSPS), better known as the "green completions" rule, which regulated conventional pollutants—including VOCs and sulfur dioxide—in products and processes for drilling and extraction of oil and natural gas, as well as processing and transportation of natural gas. The green completions rule represented a critical, initial step in protecting the health of workers and frontline communities by regulating gas emissions in the industry. In June 2016, the EPA published "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified sources; Final Rule," which created NSPS for GHG emissions and expanded the VOC standards in the 2012 rule. This included covering sources that were unregulated by the 2012 rule, such as fugitive methane emissions from well sites, and created GHG standards for sources covered by the previous rule, such as natural gas processing plants and pneumatic controllers.

In September 2020, the Trump administration's EPA released two rules that amended the previous 2012 and 2016 NSPS. The first, referred to as the 2020 Policy Rule, rescinded several regulations on the transmission and storage sources and direct regulation of methane. The second, referred to as the 2020 Technical rule, limited the monitoring and reporting requirements and exempted low-production well sites from fugitive emissions tracking. The 2020 Policy Rule was overturned in 2021 when bipartisan majorities in Congress passed a Congressional Review Act (CRA) resolution of disapproval. The EPA interpreted the CRA resolution to restore the methane requirements in effect before either of the Trump administration's rules.

The initial 2021 proposed methane standard builds on the 2012 and 2016 rules to adopt standards on methane and VOCs in the oil and natural gas industry, expand the sources covered, and repeal the 2020 Technical rule. Most notably, the rule also proposes emissions guidelines on methane and VOCs for existing sources in the oil and natural gas industry, adding to the previous guidelines for new sources. After a period of feedback from constituent organizations, advocates, and industry groups, the EPA released its supplemental methane rule in November 2022, which seeks to refine pieces of the standard to produce a more functional rule. The 2022 supplemental rule makes key policy changes that can strengthen the overall effectiveness of the standard, including by revising its leak detection and reporting requirements to include periodic monitoring of even small facilities that include leak prone equipment (Figure B). See Appendix A for more details on specific provisions of EPA's 2022 supplemental rule.

## Implementing the Standards

EPA's Regulatory Impact Analysis estimates the gross compliance cost of implementing the rule to be $4.4 billion for the new and modified source standards (NSPS) and $14 Billion for the existing source standard (EG).[28] However, the required emissions reduction technologies result in the retention and capture of natural gas that would have otherwise leaked. Accounting for this

recovered product mitigates the compliance costs, resulting in a net cost for the industry of $3.3 billion for the NSPS, and net cost of $11 billion for the EG. This does not account for the nearly $1.5 billion available to companies for compliance through the MERP.[29] Additionally, this analysis found the benefits of reducing methane emissions in the oil and gas industry far outweighed the costs. The EPA estimates the rule will generate climate benefits of $11 billion for the NSPS and $37 billion for the EG (with all values reported in 2019 constant dollars at a 3% discount rate).[30] Climate benefits are based on reductions in methane emissions. EPA calculates them using four different estimates of the social cost of methane.

Finally, the standards will have significant non-monetized climate benefits through emission reduction, including improvements in visibility and vegetation as well as public health. The NSPS will prevent 8.1 million tons of methane, 2.9 million tons of VOCs, and 110,000 tons of hazardous air pollutants (HAP) from being emitted 2023-2035, while the EG will prevent 28 million tons of methane, 6.8 million tons of VOCs, and 280,000 tons of HAP from being emitted over the same time period.[31]

These EPA estimates of savings and net benefits are different from the job benefits described in this report. The investment in products and processes resulting from this rule will create jobs in manufacturing—from construction and installation of products and technologies that reduce emissions, as well as expansion of traditional oil and gas jobs made possible by the recovery of fugitive emissions. Upgrading industry practices and outdated technology means better working conditions—with less exposure to carcinogens like benzene—and stronger job opportunities for oil and gas workers.

**Figure C:** EPA's Comparison of Historical and Current Rule Provisions

**Oil and Natural Gas Sources Covered by EPA's Proposed New Source Performance Standards (NSPS) and Emissions Guidelines, by Site**

| Location and Equipment or Process Covered | Required to or Would Be Required to Reduce Emissions under EPA Rules (if finalized as proposed) | Rules that Apply | | | |
|---|---|---|---|---|---|
| | | 2012 NSPS for VOCs (OOOO) | 2016 NSPS for Methane & VOCs (OOOOa) | 2021 & 2022 Proposed NSPS for Methane & VOCs (OOOOb) | 2021 & 2022 Proposed Emissions Guidelines for Methane (OOOOc) |
| **Oil and Natural Gas Well Sites** | | | | | |
| Completions of hydraulically fractured wells | ✓ | ● | ● | ● | |
| Compressors at centralized tank batteries | ✓ | | | ● | ● |
| Fugitive emissions | ✓ | | ● | ● | ● |
| Liquids unloading | ✓ | | | ● | ●[1] |
| Pneumatic controllers | ✓ | ● | ● | ● | ● |
| Pneumatic pumps | ✓ | | ● | ● | ● |
| Storage vessels | ✓ | ● | ●[3] | ● | ● |
| Sweetening units | ✓ | ●[2] | ●[2] | ●[2] | ●[2] |
| Associated gas from oil wells | ✓ | | | ● | ● |
| **Natural Gas Gathering and Boosting Compressor Stations** | | | | | |
| Compressors | ✓ | ● | ● | ● | ● |
| Fugitive emissions | ✓ | | ● | ● | ● |
| Pneumatic controllers | ✓ | ● | ● | ● | ● |
| Pneumatic pumps | ✓ | | | ● | ● |
| Storage vessels | ✓ | ● | ●[3] | ● | ● |
| Sweetening units | ✓ | ●[2] | ●[2] | ●[2] | ●[2] |
| **Natural Gas Processing Segment** | | | | | |
| Compressors | ✓ | ● | ● | ● | ● |
| Fugitive emissions | ✓ | | ● | ● | ● |
| Pneumatic controllers | ✓ | ● | ● | ● | ● |
| Pneumatic pumps | ✓ | | ● | ● | ● |
| Storage vessels | ✓ | ● | ●[3] | ● | ● |
| Sweetening units | ✓ | ●[2] | ●[2] | ●[2] | ●[2] |
| **Transmission and Storage Segment** | | | | | |
| Compressors | ✓ | | ● | ● | ● |
| Fugitive emissions | ✓ | | ● | ● | ● |
| Pneumatic controllers | ✓ | | ● | ● | ● |
| Pneumatic pumps | ✓ | | | ● | ● |
| Storage vessels | ✓ | ● | ●[3] | ● | ● |

*All of the sources listed above also would be covered by EPA's proposed Super-Emitter Response Program*

[1] Added in 2022 supplemental proposal
[2] Covered for $SO_2$ only
[3] Covered for VOCs only

# IV. FIXING LEAKS AND CREATING JOBS THROUGH BETTER TECHNOLOGY

Low-cost technology to curb emissions already exists, is readily available, and is being deployed now by many companies. A report from ICF International, *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*, explores what sources are responsible for a large portion of the emissions at existing facilities and what existing technologies can be used to reduce them. One key finding was that energy sector methane emissions could be cut dramatically—by 40%—at an average annual cost of less than 1¢ per thousand cubic feet of produced natural gas by adopting available emissions-control technologies and operating practices. These costs could be further offset by recovering the full market value of recaptured natural gas.[32] Even in times when the market price of gas fluctuates downwards, methane emissions mitigation remains a cost-effective approach to combating climate change. ICF found that even at a low gas price of $2 per Mcf, the cost of methane emissions mitigation is still just over 1¢ per Mcf of natural gas produced.[33] While we believe that higher emission reductions —on the order of 65%—are still achievable and necessary. This report demonstrates that methane emission reductions are low-hanging fruit in terms of improving public health, protecting workers, and mitigating climate change.

## Opportunities and Key Technologies

As the ICF International report notes, 80% of methane emissions are produced by 20% of the products and processes. The actions that we can take to reduce the largest emissions areas by volume include:

- Improving leak detection and repair of fugitive emissions ("leaks") at facilities and gas compressors;
- limiting flaring of associated gas and permitting it only for safety and maintenance reasons; and
- replacing high-emitting pneumatic devices, including pumps and bleeding equipment.[34]

ICF International found that more than half of methane reductions identified can be achieved at a negative net cost, accounting for the value of captured methane sold at $4 per Mcf. In many cases, more than 95% of emissions could be reduced at zero net cost.

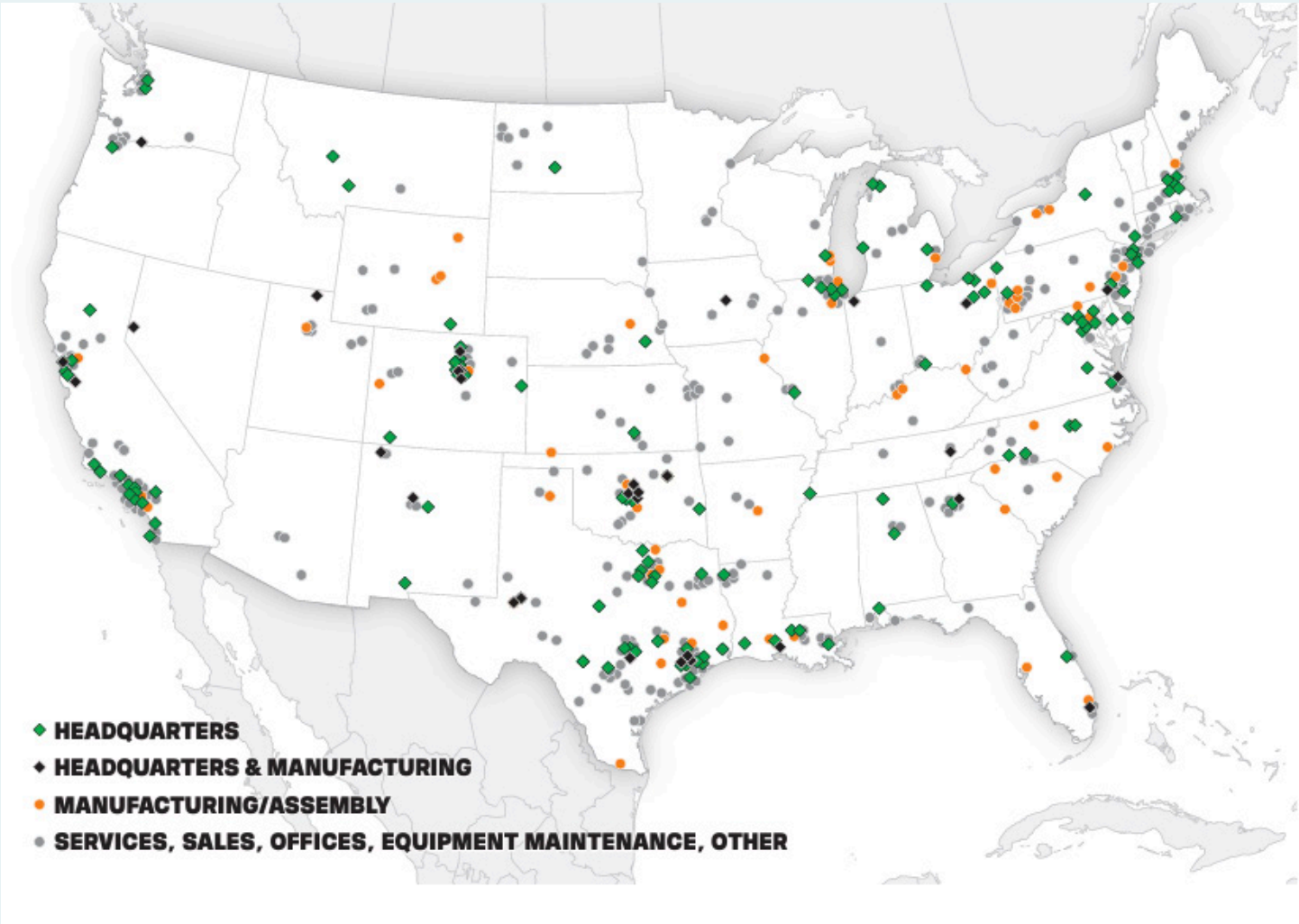
## Manufacturing Opportunities

A 2021 report from Datu Research, *Find, Measure, Fix: Jobs in the U.S. Methane Emissions Mitigation Industry*, further explains existing technologies with a focus on identifying and exhibiting companies that produce the products and services. They found that this sector is growing rapidly. Today there are 33% more firms manufacturing methane mitigation technologies than in 2014, and 90% more firms providing installation and other services than in 2017:

- at least 215 firms manufacture methane mitigation equipment in the United States and/or offer services;
- 70% of methane mitigation firms qualify as small businesses;
- methane mitigation companies provide U.S. jobs in at least 748 locations across 47 states (Figure C); and
- the methane mitigation industry employs at least 35 key job types.[35]

Jobs in the mitigation industry have the potential to provide pathways into the middle class for workers and families, and to support thousands of high-skill, high-wage jobs—particularly in manufacturing. As this sector grows, we need to ensure that the jobs created are good-paying, safe, and accessible union jobs. This means supporting and growing pathways into good union jobs in these and other sectors for workers of color and other segments of the population historically underrepresented in these jobs.

**Figure D:** U.S. Employee Locations of Firms in Methane Emissions Mitigation Industry.[36]
Visit www.edf.org/methanejobs to explore an interactive map with the location and distribution of methane mitigation industry firms.



## What Kinds of Technology?

When it comes to the energy technology driving America's 21st century economy, many of the techniques and equipment date back several decades to the 20th century. Newer, less leak-prone machinery for oil and gas operations is increasingly available. A Datu report identifies 584 work sites (referred to in the report as "employee locations") for manufacturing, assembling, and providing installation and other services for methane mitigation technologies that could help reduce leaks and achieve the emissions reduction goals of the EPA methane standards.[37]

For example, compressors have long used a "wet" seal system, using high-pressure oil to seal moving parts. Newer "dry" seal technology, using high pressure gas, is increasingly available and substantially reduces emissions. In addition, dry seals significantly reduce operating costs and improve efficiency; some types of dry seal compressors are estimated to pay back their costs in less than a year.

Pneumatic controllers are devices that use energy from pressurized gas to create mechanical action. In oil and gas operations, devices often use natural gas as an operating element, as it is readily available and flows under pressure. Newer technology uses compressed instrument air to deliver the same mechanical effect. Other non-emitting options, like solar-powered controllers or those connected to the electric grid, are also available and cost-effective, removing the need to vent natural gas in order to operate this equipment safely and effectively.

In addition, regular leak detection and repair inspections are critical for reducing emissions from this sector. Large quantities of methane and other pollutants are released every year through inadvertent equipment leaks at well sites and compressor stations. Particularly concerning are "super-emitter" events, which can go for weeks or months without being detected. These events are responsible for a substantial percentage of total emissions from this sector. EPA's standards require regular inspections to find and fix leaking equipment at all well sites and compressor stations, and will allow qualified third parties to provide data identifying super-emitter events. These standards will avoid emissions, improve operations, and require skilled, proficient workers to ensure strong guidelines are met.

# V. FINDINGS

Our analysis finds that with full and continuing adoption of leak reducing technologies and practices at new, modified, and existing oil and gas facilities, the EPA's proposed rule would create over 136,000 job-years over the 13-year period of full implementation of methane standards.[38] Job creation from the EPA's proposed standard is supported by the infrastructure investments needed to mitigate methane leaks. Especially when done at scale, infrastructure investments will drive new employment opportunities. The proposed rule will drive infrastructure investment as a critical step to reduce fugitive methane emissions. The EPA estimates it will reduce emissions by an estimated 36 million cumulative tons between 2023 and 2035, along with 9.7 million tons of volatile organic compounds, and 390,000 tons of HAP.[39]

Figure D and Table 1 show the employment impacts as measured in annual full-time job equivalents (FTE) for the economy as a whole. We expect that both the construction and manufacturing sectors will show positive gains in employment as they both produce and install critical upgrades in a variety of oil and gas operations which deliver the estimated emission reductions. This is because the emissions reduction technologies modeled reduce leaks and are more labor intensive than the oil and gas extraction industry on average. As a result, job losses that result from reduction in traditional extraction operations are more than offset by a shift to jobs required to sustain emissions reduction efforts and process additional captured oil and gas. These jobs require similar skill sets, meaning many of the new jobs could be filled by workers with skills and experience in the oil and gas industry.

**Figure E:** Total Direct and Indirect Jobs Created 2023-2035

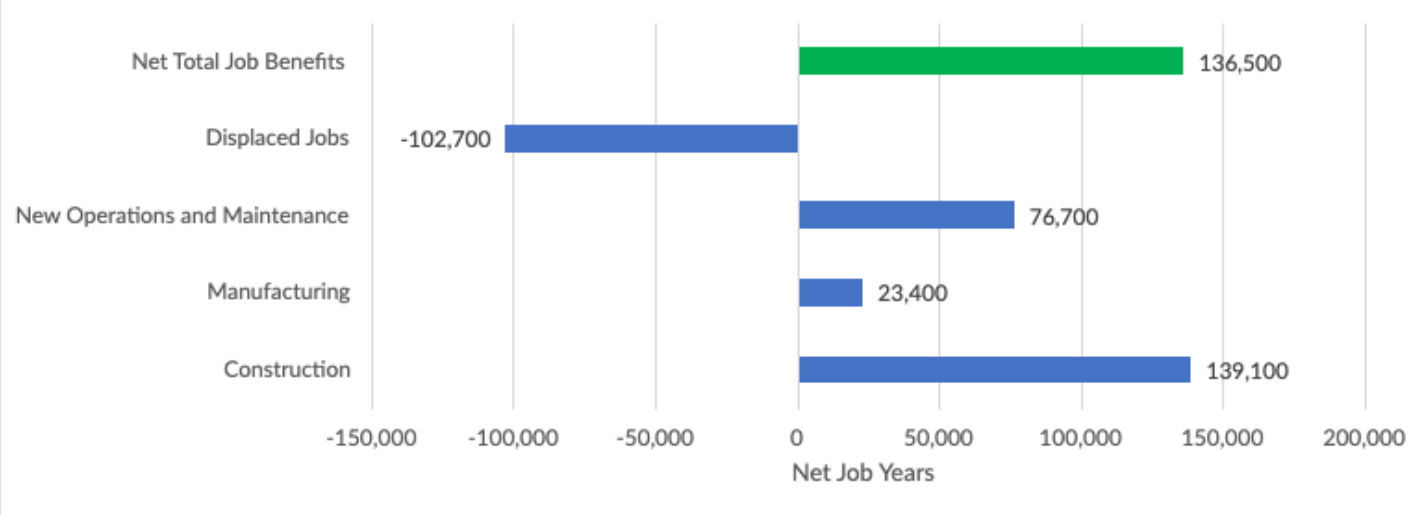


**Table 1:** Direct and Indirect Jobs Created (Annually and Total)

| Category | Per Year | Total (2023-2035) |
|---|---|---|
| Construction | 10,700 | 139,100 |
| Manufacturing | 1,800 | 23,400 |
| New Operations and Maintenance | 5,900 | 76,700 |
| Displaced Jobs | -7,900 | -102,700 |
| Net Total Job Benefits | 10,500 | 136,500 |

The need to implement and operate more advanced equipment and apply more comprehensive leak detection and mitigation technologies over time suggests jobs directly created in the oil and gas sector would not necessarily require relocation. While some jobs would engage engineering and other technical professions requiring advanced degrees, they mostly also employ high-skilled labor and trades professions complementing the current workforce at oil and gas operations.

Creating and sustaining jobs is tied strongly to the investment and implementation of a well-defined set of cost-effective technologies and practices in the oil and gas sector. The skill level needed, and consistent nature of leak detection and mitigation activities entailed by the methane standard—employed industry-wide versus at a fraction of companies—offer a new avenue for steady job sustainment compared to "business as usual" prior to the NSPS. These activities will also rely on the existing oil and gas workforce, which is a good-paying, highly unionized sector.

According to Table 5-4 of the EPA estimates, and assuming a 3% annual discount rate over the 13-year period of analysis, the net compliance costs of the proposed rule are $19 billion while the climate benefits approach $48 billion. Hence, the elimination of 36 million tons of methane emissions generates net economic benefits of nearly $34 billion (with all values expressed in 2019 dollars, see Table 2 below). EPA also expects that this reduction will improve public health, visibility, and vegetation. The new Methane Emissions Reduction Program will also provide $1.5 billion to incentivize methane reductions and offset some compliance costs in the oil and gas industry.

**Table 2:** Costs and Benefits of the 2022 EPA Methane Standards, Based on EPA's Regulatory Impact Analysis[40]

| Regulatory Measure | Net Total Compliance Costs (million 2019 $) | Total Climate Benefits (million 2019 $) | Net Benefits (million 2019 $) |
|---|---|---|---|
| NSPS | $3,300 | $11,000 | $7,600 |
| EG | $11,000 | $37,000 | $26,000 |
| Total | $14,000 | $48,000 | $34,000 |

While this report does not include induced jobs, it is worth noting that the increase in employment results in a further expansion in household incomes, which in turn results in increases in household purchases. This tends to be relatively concentrated in more labor-intensive industries—notably in services—accounting for the increase in employment in that sector as well as in other sectors, including government, transportation, utilities, and agriculture. In effect, induced incomes might effectively double the net gain in direct and indirect employment reflected here.

# VI. CONCLUSION

The EPA's proposed rule has the potential to achieve cost-effective methane emissions reductions and provide greater certainty. The proposed rule would create and retain jobs in proportion to a very nominal cost for upgrades in technology, equipment, and practices for the industry. However, we still need to ensure that the jobs created are good-paying, safe, accessible union jobs. This means supporting and growing pathways into good union jobs. Updating industry practices and equipment to meet these proposed standards will not just make workers and communities around the facilities safer and healthier, but will also generate and support quality, family-sustaining jobs—over 136,000 direct and indirect jobs over 13 years. This is a two-fold increase in jobs compared to our analysis of the 2016 rule.[41]

Implementing these standards is a win-win-win. With these standards, workers and communities will be protected, jobs will be created, and our nation will take another concrete step toward reducing toxic air pollution and the emissions driving climate change.

# APPENDIX A: EPA'S 2022 SUPPLEMENTAL RULE

The EPA's proposed 2022 supplemental rule improves industry accountability and mitigates methane leaks in the following ways:

## Leak Detection and Reporting

The proposed rule would direct states to create emissions standards on thousands of oil and natural gas sites around the country, and encourage the deployment of innovative new technologies that are designed to detect leaks and cut costs for the industry. To be in compliance with the rule, the oil and natural gas industry will have to find and repair methane leaks from well sites and compressor stations, transition to zero-emitting technology for pneumatic controllers, eliminate venting from associate gas wells, and improve their storage facilities to reduce leaks.

The EPA incorporated technological flexibility into these standards to promote innovation. This includes giving firms the ability to utilize a diverse array of technologies to observe leaks, such as continuous monitoring systems, apart from conventional optical gas imaging (OGI). In making these modifications the EPA provides full access to the technologies in the burgeoning methane mitigation industry, providing a potential catalyst for further job growth. The 2022 supplemental proposed rule also devised a standard for periodic monitoring at all well sites—regardless of production levels—with requirements oriented around the number of wellheads and the type of equipment used. Under the 2022 proposal, facilities with leak-prone equipment and multiple wellheads will be required to conduct more extensive OGI monitoring, while sites with fewer wellheads and equipment would conduct audio-visual-olfactory inspections.

## Flaring

The EPA also used its 2022 Supplemental Rule as an opportunity to address the practice of routine flaring from wellheads. In the oil and gas industry, flaring is a practice in which excess natural gas is burned off during production as waste. This could contribute as much as 4%-10% of total U.S. methane emissions by some estimates.[42] Under the 2022 Supplemental Rule, the EPA will restrict the ability of firms to continue in this practice of routine flaring. Instead the agency has identified four potential compliance options for firms dealing with excess gas: route the gas to a sales line; recover the gas and use the recovered gas as an onsite fuel source; recover the gas and use the recovered gas for another useful purpose that a purchased fuel or raw material would serve; or recover the gas and reinject the recovered gas into the well or inject the recovered gas into another well for enhanced oil recovery. Only when firms have demonstrated to the EPA that none of these options are feasible for the facility will the agency permit associated gas to be flared.

### Orphaned Wells

The EPA proposal creates new standards that seek to prevent the creation of orphaned wells, which is a term given to leak-prone abandoned well sites that have no party liable for maintenance. By some estimates, there are nearly 120,000 of these abandoned wellsites across the United States that have been documented, posing a risk to nearly 14 million Americans living nearby.[43] These abandoned wells pose a threat to communities by contaminating surface and groundwater and degrading entire ecosystems. These wasteful sites directly degenerate human health, livestock, and economies based on outdoor recreation or tourism. The EPA has taken action to mitigate the proliferation of these orphaned wells by requiring operators to submit detailed well closure plans to the EPA that ensure the wellsite is plugged and no emissions are observed before the site is closed.

### Super-Emitter Response Program

The EPA also made modifications in its 2022 supplemental proposal that replaced the earlier system of community monitoring with a new Super-Emitter Response Program. The EPA currently estimates that roughly half of all fugitive emissions come from a relatively small number of oil and natural gas sources, suggesting that a few "super emitters" may be responsible for a disproportionate amount of pollution.[44] Under the program, regulators or qualified third parties would monitor for super-emitter events, then notifying the facility operators of the event so they could address the leak. This program not only provides targeted action at the worst emitters, but potentially opens a pathway for groups like labor unions to qualify as third-party monitors, expanding the number of high-quality jobs created by this action.

## APPENDIX B: METHODOLOGY

For this assessment, we begin with the EPA Regulatory Impact Analysis (RIA) for the 2022 Supplemental Standards of Performance to lay out the complete set of costs and benefits to deploy the mix of existing technologies that reduce future methane emissions.[45] Table 2-8 of the EPA analysis lays out, in millions of 2019 constant dollars, the array of annual compliance costs necessary to reduce emissions by a cumulative 36 million short tons between 2023 and 2035. The categories of costs include capital expenditures, operating and maintenance costs, the annualized costs as investments are financed over time, and the increased revenue from product recovery as the more productive mix of technologies and practices greatly reduce previously lost emissions which increase the availability of natural gas supplies.

All of these expenditures are matched with an appropriate set of job coefficients from the U.S. 2019 data set from the IMPLAN group, including: (i) the direct jobs of those working within the different industries including oil and gas operations, construction and manufacturing businesses—as well as the financial community—and (ii) the indirect jobs or those employed within the supply chain companies which provide the needed goods and services to maintain oil and gas operations and other industrial activities. Finally, using data from the Bureau of Labor Statistics, each of the job coefficients are adjusted to reflect the anticipated annual labor productivity improvements within each sector of the economy.[46] If, for example, BLS suggests an average 1.42% labor productivity rate within the U.S. economy, 100 jobs in 2019 (the base year of this analysis) might become only 80 total jobs by the year 2035.

# ENDNOTES


1 U.S. EPA, Overview of Greenhouse Gases. Available online: https:// www.epa.gov/ghgemissions/overview-greenhouse-gases

2 U.S. EPA, Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review. Available online: https://www.federalregister.gov/documents/2022/12/06/2022-24675/standards-of-performance-for-new-reconstructed-and-modified-sources-and-emissions-guidelines-for

3 Note that the jobs estimates reported here are more appropriately called "job-year equivalents." Each "job" represents an increase in demand for employment sufficient to employ one-person full time for one year. When labor markets are tight, it is possible that a significant number of jobs created will be workers hired away from other jobs, so not all of the jobs created will be net new employment. In the current economic situation with high unemployment in construction and other key sectors, this problem is largely minimized.

4 BlueGreen Alliance, *Plugging the Leaks*, 2016. Available online: https://www.bluegreenalliance.org/wp-content/uploads/2016/09/PluggingtheLeaks-vFINAL.pdf

5 New Source Performance Standards (NSPS), Emissions Guidelines for Existing Sources (EG), full-time job equivalents (FTE)

6 U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks, April 2022. Available online: https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf

7 Calculated as 920 million metric tons of carbon dioxide equivalent (MT CO2e) project methane emissions reduction with proposed standards 2023-2035 (from Regulatory Impact Analysis (RIA)), converted to 920 billion kilograms (kg) of CO2ee, divided by the carbon dioxide emissions coefficient for natural gas 54.87 kg CO2ee/thousand cubic feet (cf) methane (CH4) (from https://www.eia.gov/environment/emissions/co2_vol_mass.php) to get 16,766,903,590.30 thousand cf CH4, then divided by 65.56 thousand cubic feet natural gas delivers per customer (https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm*1000/ https://www.eia.gov/dnav/ng/ng_cons_num_dcu_nus_a.htm).

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13 UN Environment Programme, *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions*, May 2021. Available online: **https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions**

14 U.S. EPA, Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, November 2021. Available online: **https://www.epa.gov/system/files/documents/2021-11/san-8510-ong-climate-review-proposal-frn-2021-11_1.pdf**

15 When EPA released the supplemental proposed rule in November of 2022, it included a revised RIA based on new provisions the agency had incorporated into the standards. This new assessment included higher compliance costs and climate benefits, with a marginal decrease in projected reduction of methane emissions and smaller net benefits.

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17 IEA, "Methane emissions from the energy sector are 70% higher than official figures," February 23, 2022. Available online: **https://www.iea.org/news/methane-emissions-from-the-energy-sector-are-70-higher-than-official-figures**

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19 ibid.

20 See endnote #7.

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