House Environmental Resources & Natural Protection Committee

Public Hearing Agenda:

"Methane Emissions from The Oil and Gas Industry"
Tuesday, April 21st, 2026
10:00am – 12:00pm
G-50 Irvis Office Building, Harrisburg, PA 17120

10:00am – 10:10am	Call to Order Roll Call
10:10am – 10:40am	Seth Pelepko Deputy Secretary, Office of Oil and Gas Management Pennsylvania Department of Environmental Protection Ali Tarquino Morris Deputy Secretary, Office of Waste, Air, Radiation & Remediation Pennsylvania Department of Environmental Protection
10:40am – 11:10am	Andres Restrepo Senior Attorney, Environmental Law Program Sierra Club John Rutecki Regulatory and Legislative Manager, Appalachia Environmental Defense Fund
11:10am – 11:25am	Todd Pappasergi General Counsel and Vice President of Governmental Affairs Pennsylvania Independent Oil and Gas Association
11:25am – 11:55am	Josh Eisenfeld Oil and Gas Research and Accountability Manager Earthworks Alice Lu Policy Analyst Clean Air Council
11:55am – 12:00pm	Closing Remarks
12:00pm	Adjournment

Environmental & Natural Resource Protection Committee

State Representative Greg Vitali
Democratic Chairman
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MEMORANDUM

DATE:	4/10/2026
TO:	House Environmental & Natural Resource Protection Members
FROM:	Representative Greg Vitali, Majority Chairman House Environmental & Natural Resource Protection Committee
RE:	Environmental & Natural Resource Protection Committee Public Hearing – Tuesday, April 21st 2026

Dear House Environmental Committee Members and Staff,

The House Environmental Committee will hold a public hearing on **Tuesday, April 21st, starting at 10:00am in Room G50 Irvis Office Building, Harrisburg, PA 17120.**

The subject of this hearing is "Methane Emissions from the Oil and Gas Industry".

Please contact Hayley Shupe at 717-787-7647 or hshupe@pahouse.net with any questions. If you are unable to attend this meeting, please submit an Official Leave of Absence Form prior to the start of the meeting. Members will have the option to attend virtually if you cannot be there in person.

Thank you,

GV/hs

Testimony of Seth Pelepko

Deputy Secretary, Office of Oil and Gas Management

And

Ali Tarquino Morris,

Deputy Secretary, Office of Waste, Air, Remediation, Radiation

Department of Environmental Protection

Before the House Environmental and Natural Resources Protection Committee

April 21, 2026

Good morning, Chair Vitali, Chair Rader, and members of the Pennsylvania House Environmental and Natural Resources Protection Committee. On behalf of the Pennsylvania Department of Environmental Protection (DEP or Department), we want to thank you for the opportunity to provide testimony and a chance to discuss the Department's oversight when it comes to methane emissions from the oil and gas industry. As members of the Committee may be aware, Governor Shapiro has made reducing methane emissions a priority, and has directed the Department to work aggressively to plug orphaned and abandoned wells. Thanks to federal investments and collaborative efforts between DEP and the private sector, we have been tackling a significant source of greenhouse gas emissions and creating thousands of good-paying jobs in the process. We are proud to report that as of today, we have plugged nearly 400 wells, more wells than were plugged in the eleven years prior to this administration, and we are continuing to pick up speed.

Federal Government Greenhouse Gas Emissions Data for the Oil and Gas Industry

Much of what we know about the quantity of emissions associated with the oil and gas industry in Pennsylvania is based on annual industry filings with the United States Environmental Protection Agency (EPA). Historically and on an annual basis, EPA has released

what is known as the National Inventory, which is a report that compiles greenhouse gas emissions data from various sources. These emissions are determined in accordance with EPA methodologies. The most recent DRAFT National Inventory, consisting of data years 1990-2023, was released for public comment by the EPA about a year ago. Typically, it would have been finalized and published by now, but DEP is still waiting for that milestone to be achieved.

EPA also administers what is known as the State Inventory Tool. The State Inventory Tool provides state-level emissions data and DEP understands that the consultant who manages the State Inventory Tool has been contracted by EPA to update it again for this year. EPA has also provided a state-disaggregated inventory report the past couple of years. The state-level reports serve as references for sources such as abandoned wells, as well as natural gas and oil production. The federal government has rolled back greenhouse gas reporting requirements going forward and it is expected that this will make compiling the state inventory more difficult for some sectors. For example, the Greenhouse Gas Reporting Program (GHGRP) is a key source for federal datasets to compile emissions from the oil and gas sector and future inventories will be less complete without these sources of data.

A summary of greenhouse gas emissions data and associated emission factors for the following sources between 2000 and 2022 is provided in the tables appended to this testimony:

- Natural Gas Production
- Oil Production
- Abandoned Oil and Gas Wells

For the most recent validated year, 2022, emissions associated with natural gas production, oil production, and abandoned oil and gas wells are estimated at 9.35 million metric tons of carbon dioxide equivalent ($MMTCO_2e$), 0.01 $MMTCO_2e$, and 2.54 $MMTCO_2e$, respectively. Note that there is a 3-year lag for these data based on when the final, validated dataset is published by EPA. A more comprehensive summary of oil and gas sector emission estimates is provided in the Pennsylvania Greenhouse Gas Inventory Report for 2025.

How Does Methane Leak and Why is it Important to Control Leakage?

The oil and gas industry consists of various industry segments: 1) upstream activities, which are exploration and production activities that include the identification and production of oil and natural gas resources through characterization, well drilling, well construction, well completion, and well operation; 2) midstream activities, which include the transport of unrefined and/or unprocessed/partially processed gas through a series of pipelines, compressor stations, and/or overland or marine shipping routes; and 3) downstream activities, which focus on refining/processing, marketing, and distribution of finished products to consumers. For the purposes of this testimony, the focus will be on the upstream industry segment for which DEP has a primary regulatory oversight role. Scope 1 emissions are also the only emissions considered in this testimony. Scope 1 emissions are direct greenhouse gas emissions released to the atmosphere from sources that are owned or controlled by oil and gas operators. Finally, natural gas, which is the main hydrocarbon resource produced in Pennsylvania, consists primarily of methane (i.e., typically pipeline quality natural gas consists of 90-98% methane), a potent greenhouse gas with a Global Warming Potential (GWP) of 25. GWP is a metric used to

compare the heat-trapping ability of different greenhouse gases relative to carbon dioxide over a specific timeframe – typically 100 years.

During oil and gas drilling, operators may encounter flowing natural gas that is directed to the surface and managed. Typically, such natural gas is piped away from the well location to a flare system that combusts excess natural gas prior to releasing combustion products to the atmosphere. Depending on the levels, the natural gas may also be vented without combustion. The natural gas may also be kept in place through the use of drilling muds that apply hydrostatic pressure to geologic formations at levels greater than the reservoir pressure where the gas originates. The operator is required to maintain the control over the flow of fluids in the wellbore at all times.

After the drilling stage, a well is constructed with various barrier elements – casing, tubing, cement, and, potentially, other hardware such as casing packers. There barrier elements are designed to prevent commingling of buoyant oil and natural gas – and denser brines – in the subsurface with:

- other deposits of oil, natural gas, and brine;
- geologic formations bearing fresh groundwater; and
- geologic formations comprised of workable coal.

After a well is constructed, it is completed. This typically involves stimulating the well by way of hydraulic fracturing. A mixture of mostly water with a small fraction of chemicals is injected at a pressure high enough to fracture the reservoir rock. Sand, known as proppant, is then pumped into the open fractures, allowing great volumes of oil and natural gas to flow to the well. Due to Pennsylvania's geology, most wells – conventional and unconventional – must be completed using hydraulic fracturing to yield economic quantities of oil and natural gas.

Unconventional wells are typically much deeper and require significantly more water to complete than conventional wells. After hydraulic fracturing, fluids (e.g., mixtures of natural gas, water, chemicals, and residual proppant sand) flow back to the surface and are managed using piping, tanks, and other equipment. Most unconventional wells employ "green completions" that capture the natural gas produced during flowback rather than venting or flaring it.

Following completion activities, each oil and natural gas well is equipped with a wellhead and/or pumpjack that allows oil, natural gas, and brines to flow or be mechanically lifted to the surface and stored in tanks, vented, or transported downstream through a gathering system. In addition to tanks, separators and other surface equipment may be present at a well site to manage both hydrocarbon products and waste. The well is then produced until the operator decides that it is no longer economical to operate, at which point the state requires the well to be properly plugged and abandoned in accordance with the applicable regulations.

Throughout all of these upstream activities, there is the potential to release natural gas to the atmosphere, either intentionally or through leakage. Leaks are generally defined as the unexpected release of natural gas or liquids, such as oil and brine, due to an equipment integrity

failure. Leaks may occur in association with casing, cement, casing packers, wellheads and associated valving, or other piping.

Venting is an engineered release of natural gas in a controlled manner and is designed to manage equipment pressures and maintain well integrity. Vented natural gas must be managed safely at the surface in Pennsylvania. In some cases, vented natural gas may be piped to a flare stack for combustion prior to release to the atmosphere.

Any natural gas released at a well site is considered part of an operator's Scope 1 emissions, which are generally captured through EPA's greenhouse gas reporting requirements unless they are below regulatory thresholds. It is important to manage Scope 1 emissions due to the potency of methane as a greenhouse gas and for safety reasons. Uncontrolled releases of natural gas may impact water supplies or enter enclosed spaces and create conditions that may be dangerous to public health and safety. Although methane is not considered toxic, at certain concentrations it can contribute to an explosive atmosphere or result in asphyxiation.

What is DEP doing now to regulate methane?

DEP has addressed methane emissions from the oil and gas industry through various individual actions. The unconventional oil and gas industry has had state emissions requirements for new sources since 2013, and has controlled methane emissions for new sources since 2018 through general permits (GP-5 and GP-5A).

In 2024, the DEP promulgated two rulemakings for control of VOCs from existing sources in the oil and natural gas industry, one for conventional sources and the other for unconventional sources. This VOC rulemaking was part of an overall Methane Reduction Strategy because reducing VOCs also offers the co-benefit of methane reductions.

In addition, since 2024 DEP has administered the New Source Performance Standards for sources in the oil and natural gas industry through our state regulations, which incorporate federal regulations by reference. The New Source Performance Standards include requirements to reduce methane emissions from common sources in the oil and gas industry, without consideration of the conventional or unconventional nature of the individual wells to which the equipment is associated.

In 2024, EPA issued emissions guidelines that require states to develop a State Plan to address methane emissions directly. DEP must implement the requirements of the State Plan through a legally and practically enforceable document, which according to EPA can be a legal order, permit, general permit, or regulation. Because of the initial, short, regulatory deadline for the submission of the State Plan, DEP proposed to issue general permits as the legally and practically enforceable document. During the public comment period, DEP received over 10,000 comments. DEP is currently evaluating options in order to issue a final State Plan that addresses public comments, fulfills current federal legal obligations, and best prepares Pennsylvania to deal with any future federal policy changes.

What happens if the EPA regulations are weakened Under the Trump Administration?

The language of Subpart OOOOc was to guide states, serving as a model rule that could be used in implementing legally and practically enforceable requirements. However, the states have discretion to use different requirements as long as sufficient evidence shows that the requirements are necessary and EPA approves the requirements. EPA may reject the State Plan until each requirement is at least as stringent as the Model Rule. Under the Air Pollution Control Act (APCA), the Department has discretion when developing the legally and practically enforceable mechanism for State Plan implementation.

The Department also has the legal authority to develop a regulation, issue permits, issue general permits, or to issue legal orders to implement the State Plan under the Air Pollution Control Act (APCA). To use our state authority to develop regulations, the Department needs Pennsylvania-specific data on oil and gas facilities, businesses, and economics to serve as the basis for any rulemaking. In addition, any rulemaking affecting conventional and unconventional oil and natural gas industry sources must be undertaken separately; one for the conventional industry and another for unconventional industry.

As previously mentioned, DEP developed general permits that established methane emission thresholds for control and requirements to reduce methane emissions through work practices and regulations for the control of VOC emissions which provides significant methane co-benefit reductions using our existing State authority.

Regulatory Responsibilities of the Oil and Gas Program

The Oil and Gas Program has primary responsibilities for ensuring that oil and natural gas are produced in a manner that is protective of the environment, health, and safety. The Oil and Gas Program and other regulatory programs at DEP are responsible for ensuring that residual and hazardous wastes produced in association with oil and natural gas development are managed properly and in compliance with any relevant regulations and statutes. The Oil and Gas Program primarily ensures compliance through inspection activities and reporting requirements. Methane reductions may occur as a result of implementing the regulatory program, but are not addressed directly in the requirements,

The Pennsylvania oil and gas regulations in Sections 78.73 and 78a.73 require operators of conventional and unconventional wells, respectively, to ensure the integrity of the well is maintained and health, safety and the environment are protected. Excess gas that is encountered during drilling and completion must be flared, captured or diverted away from the drilling rig in a manner that does not create a hazard to public health and safety. Wells must also be constructed to prevent gas from entering the fresh groundwater system. Pursuant to Sections 78.74 and Section 78a.74, the venting of natural gas to the atmosphere from a well is prohibited when the venting produces a hazard to the public health and safety. In certain instances, the venting of natural gas is necessary in emergency situations; however, even under such situations the venting must be done in a manner to prevent health and safety impacts.

In addition to the proper construction and operation of wells, Sections 78.88 and 78a.88 of the oil and gas regulations require conventional and unconventional operators, respectively, to

inspect each operating well at least quarterly to ensure it is in compliance with the well construction and operating requirements. These regulations specifically allow for gas outside the production casing to be vented to the atmosphere. The Department can require additional mechanical integrity tests, including but not limited to, pressure tests to demonstrate the integrity of the well. Finally, operators must submit an annual report to the Department identifying the compliance status of each well to ensure the condition of the well and that it meets the mechanical integrity requirements outlined in the regulations. The Department has stepped up inspection and enforcement efforts over the past several years to ensure compliance with these reporting requirements.

Through its compliance and enforcement activities, DEP ensures that natural gas leaks or vents do not pose environmental, health, or safety concerns. Oil and Gas Inspectors complete well site inspections throughout the oil and gas producing regions of Pennsylvania. These inspections are focused on the well and not any ancillary equipment/infrastructure. There are several fields within DEP's oil and gas mobile inspection tool called SubSAIR that can capture whether combustible gas is detected at the well.

Typical leak detection equipment used by the Oil and Gas Program includes the Bascom Turner Gas-Explorer Detector, the HEATH Remote Methane Leak Detector, and the Aeries MIRA Pico Mobile Leak Detection System. The Pico Mobile Leak Detection System is a vehicle mounted unit that detects methane and ethane in real time at concentrations as low as 2 ppb/sec, and logs data for mapping. It is used to cover larger areas to locate potential persistent sources of methane and ethane leaks, but additional investigation is needed to locate the exact location of a leak. The HEATH Remote Methane Leak Detector is a handheld meter that can detect leaks from a distance down to 10 ppm/meter, thus creating safer surveys in areas that may be difficult to reach such as busy roadways, yards with dogs, fenced off areas, and other hard to access places. It operates under a variety of field conditions including a wide temperature range, light rain and fog. It is used to detect the presence or absence of methane during field surveys, leak detection for subsurface inspections, and to screen inaccessible locations for combustible gases (i.e., house explosions, confined spaces, unsafe areas). The handheld Bascom Turner portable methane, carbon monoxide, hydrogen sulfide, and oxygen detectors are intrinsically safe, microprocessor-based instruments designed to test ambient air and flue gas over a wide temperature range with sensitivities of 20 ppm methane and 1 ppm carbon monoxide and hydrogen sulfide. The Bascom Turner units are DEP's main investigative tool for leak detection during inspections of gas wells, soil stray gas surveys, and for screening ambient indoor air.

The Oil and Gas Program's inspections focus on well integrity and safe venting practices. Evidence of well integrity impairments or unsafe conditions at a well site due to venting or leaking gas are addressed through DEP's compliance and enforcement activities. Safe annular venting, which allows the space of the well outside of the production casing but inside of the next outer casting string to be open to the atmosphere, is allowed under the current regulations and the presence of annular gas alone is not necessarily evidence of failed well integrity. During the 2025 calendar year, violations were issued by Oil and Gas Program staff at 143 wells where gas leaks were detected at the well. These violations encompass multiple leak sources and well status types. A more specific summary of recent violations associated with the listed regulatory citations for operating wells are provided for reference:

Violations cited for leaking oil and gas wells from January 1, 2023 to December 31, 2025 (25 Pa. Code §§ 78.73, 78a.73, 78.74, and 78a.74)		
Year	**Conventional well violations**	**Unconventional well violations**
2023	257	30
2024	467	6
2025	185	22

To date in 2026, 24 violations have been cited to conventional well operators and 6 violations have been cited to unconventional operators for leaks. DEP requires that all operators submit mechanical integrity assessment (Integrity) data annually. The Integrity Program, which was implemented in 2015. The program requires operators to routinely submit data that can be used to screen wells for evidence of leaks and also compile statistics on controlled natural gas vents. For the 2025 calendar year, integrity reports have been submitted for 75.96% of conventional wells, and 99.77% of unconventional wells. Normalizing submissions by operator, only 9.7% of all operators have submitted integrity reports for the same period. Of the non-reporting operators, 99.79% are conventional operators and the remaining 0.2% are unconventional or operate both conventional and unconventional wells. These reporting statistics suggest that a relatively small number of operators are responsible for most of the wells in Pennsylvania. A recent statistical assessment of the data indicated that 2,431 out of 90,816 unique wells have a non-zero flow rate reported in associated with the production annulus. Another 4,028 wells has "not readily measurable" or "NRM" associated with the production annulus. These statistics yield some insight regarding the percentage (7.1%) of wells where methane is being discharged to the atmosphere under controlled conditions.

- As a primary component of DEP's compliance and enforcement strategy, the agency routinely cites operators who fail to report Integrity data. The vast majority of these citations have been directed at conventional operators. A summary of recent citations for failure to report these data follows:

Violations cited for fialure to submit MIA data from January 1, 2023 to December 31, 2025 (25 Pa. Code §§ 78.88(e) and 78a.88(e))		
Year	**Conventional well violations**	**Unconventional well violations**
2023	828	7
2024	647	3
2025	692	4

To date in 2026, 167 violations have been cited to conventional well operators and 5 violations have been cited to unconventional operators for failing to submit annual integrity reports.

Regulatory Responsibility of the Air Program

DEP's Air Program is obligated by the Air Pollution Control Act to meet the requirements of the federal Clean Air Act. The Air Pollution Control Act also grants the power and duty to the Environmental Quality Board to establish regulations for the prevention, control,

and reduction of air pollutants. Typically, this applies to equipment associated with an oil or gas well, such as storage vessels, dehydrators, or fugitive emissions components.

Other Greenhouse Gas Emissions Reduction Activities Managed by the Oil and Gas Program

The Infrastructure Investment and Jobs Act (IIJA) makes $4.7 billion available through 2030 for plugging orphan oil and gas wells and remediating and restoring well sites on federal lands, tribal lands, state-owned lands, and privately owned lands. Thus far, DEP has been awarded the Initial Grant, the Phase I Formula Grant, and the Phase II Formula Grant – valued at approximately $215 million.

To date, DEP has documented about 27,000 abandoned wells; however, the agency estimates that there are as many as about 200,000 – 300,000 such wells that have yet to be located and documented in Pennsylvania. DEP is committed to using a portion of the Formula Grant funding to continue the work of locating and plugging such wells. A current partnership with the Indiana University of Pennsylvania (IUP) and Harrisburg University (HU) has also allowed DEP to digitize tens of thousands of potential undocumented orphan and abandoned wells.

Since the Initial Grant was awarded on August 24, 2024 – and as of the date of drafting of this testimony – the agency has plugged 381 wells using both federal grant monies and other sources of funding. Comprehensively, there are 3,741 wells listed as plugged by DEP in the agency's database. Based on conservative EPA emission factors and a crediting period of 20 years, this represents an emissions avoidance of over 500 $MMTCO_2e$.

DEP views well plugging activities as another mechanism for reducing Pennsylvania's carbon footprint and controlling methane emissions. It has partnered with the Environmental Defense Fund (EDF), the Department of Energy's (DOE) National Energy Technology Laboratory (NETL), and institutions of higher learning to trial equipment for quantifying emissions and finding undocumented orphan and abandoned wells. DEP is also in the process of standing up a methane measurement program under a request for proposal (RFP) contract that will allow the agency to more accurately estimate the benefits of well plugging when it comes to methane reduction.

On behalf of the DEP, we would like to thank you all for the opportunity to provide testimony. We are happy to answer any questions you may have.

Table 1

Greenhouse Gas Emissions Estimates in Pennsylvania Associated with Select Oil and Gas Industry Sources

CH_4 and CO_2 from Natural Gas Production Process Emissions ($MMTCO_2e$) - AR5											
	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022
Natural Gas Production	4.11	5.36	8.13	14.43	15.29	13.56	12.70	13.21	11.91	11.22	9.35
Oil Production	0.01	0.01	0.02	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.01
Abandoned Oil and Gas Wells	2.37	2.4	2.43	2.47	2.48	2.49	2.5	2.51	2.53	2.54	2.54
Total	**6.49**	**7.77**	**10.58**	**16.93**	**17.79**	**16.08**	**15.23**	**15.74**	**14.46**	**13.78**	**11.90**

Natural Gas Production emissions are calculated by applying an emissions factor to the overall # of producing gas wells, both unconventional and conventional.

Oil Production emissions are calculated by applying an emissions factor to the volume of oil produced each year. (Note the Annual PA GHG Inventory Report includes emissions from oil refining and transportation, while this table does not).

Abandoned Oil and Gas Wells emissions are calculated by estimating the number and type (plugged and unplugged) of abandoned oil and gas wells, and multiplying the total count for each well type by its respective emissions factor. We take this # from EPA's state-disaggregated GHG Inventory report. EPA's methodology is based on prior, peer-reviewed research.

Table 2

Emissions Factors for Data in Table 1

Natural Gas Production Emissions Factors

Year	Activity Data	Emission Factor	Metric Tons CH_4	$MMTCO_2E$
	Well count	metric tons CH_4 per year per activity unit		
2000	36,000	4.08	146,880	4.11
2001	40,100	4.08	163,608	4.58
2002	40,830	4.09	166,995	4.68
2003	42,437	4.10	173,992	4.87
2004	44,227	4.11	181,773	5.09
2005	46,654	4.10	191,281	5.36
2006	49,750	4.10	203,975	5.71
2007	52,700	4.10	216,070	6.05
2008	55,631	4.10	228,087	6.39
2009	57,356	4.10	235,160	6.58
2010	70,847	4.10	290,473	8.13
2011	70,565	4.10	289,317	8.10
2012	73,753	4.10	302,387	8.47
2013	73,731	4.10	302,297	8.46
2014	79,289	4.10	325,085	9.10
2015	79,283	6.50	515,340	14.43
2016	77,996	7.00	545,972	15.29
2017	78,126	6.20	484,381	13.56
2018	78,208	5.80	453,606	12.70
2019	78,625	6.00	471,750	13.21
2020	78,745	5.40	425,223	11.91
2021	78,544	5.10	400,574	11.22
2022	79,466	4.20	333,757	9.35

Petroleum Systems Emission Factors

Year	Activity Data	Implied Emissions Factor kg CH_4/1000 bbl	Metric Tons CH_4	Total Emissions ($MMTCO_2E$/yr) from
	Production ('000 Barrels/day)	Production	Production	Production
2000	1,500	744.23	1116.34	0.01
2001	1,620	748.17	1212.04	0.01
2002	2,324	752.41	1748.61	0.01
2003	2,466	770.92	1901.10	0.05
2004	2,396	799.30	1971.07	0.02
2005	2,460	792.52	1949.60	0.01
2006	2,589	857.24	2219.39	0.02
2007	2,788	849.63	2368.78	0.02
2008	2,999	888.61	2664.95	0.02
2009	2,967	808.50	2398.81	0.02
2010	3,238	788.08	2551.81	0.02
2011	3,431	777.09	2666.19	0.02
2012	4,319	651.62	2814.35	0.02
2013	5,303	714.56	3789.29	0.03
2014	6,850	645.83	4423.96	0.03
2015	7,091	601.73	4266.84	0.03
2016	6,183	439.43	2716.97	0.02
2017	6,461	619.14	4000.25	0.03
2018	6,389	513.07	3278.01	0.03
2019	6,486	402.45	2610.29	0.02
2020	5,532	448.41	2480.60	0.02
2021	6,253	411.01	2570.02	0.02
2022	4,509	314.68	1418.91	0.01

Abandoned Well emission factors (EF)

Source: 2018 GHGI Revision - Abandoned Wells

Table 3. Appalachian Basin Methane EFs Developed from Combining Studies

Data Source	Number of Measured Wells	Mean (g/h/well)
Plugged wells		
Kang et al. 2016 – All production types, noncoal areas	23	0.45
Townsend-Small et al. 2016 – Eastern U.S.	6	0
Combined	**29**	**0.36**
Unplugged wells		
Kang et al. 2016 – All production types, noncoal areas	36	31
Townsend-Small et al. 2016 – Eastern U.S.	6	28.01
Combined	**42**	**30.57**

Bold indicates value used in the 2018 GHGI.

Testimony Before the Pennsylvania House Environmental & Natural Resource Protection Committee

Subject: Protecting Our Families and Communities from Methane and Other Harmful Pollutants from Oil and Gas Industry

Andres Restrepo, Senior Attorney Sierra Club

April 21, 2026

Thank you, Chairman Vitali, Chairman Rader, and members of the Committee, for inviting me here to share my views on this important topic. My name is Andres Restrepo, and I am a senior attorney with Sierra Club, where I have worked for over 12 years on issues relating primarily to climate change and clean air. Founded in 1892, Sierra Club is the nation's oldest and largest grassroots environmental organization. Sierra Club currently has over 600,000 dues-paying members in 64 chapters, covering all 50 states plus the District of Columbia and Puerto Rico. The Club's Pennsylvania Chapter, which is organized into eleven local groups, currently has over 24,000 members.

In 2005, Sierra Club's members voted to make fighting change the organization's highest priority. In the two decades since, the Club has worked tirelessly to reduce greenhouse gas emissions, using all of the advocacy tools at its disposal. Sharply curbing methane emissions from the oil and gas sector is critical to achieving our goal—and, indeed, is a necessary component of *any* approach to fighting climate change. Methane, or CH_4, is the primary component of natural gas. An extremely powerful greenhouse gas, in the first 100 years after its release, methane is over 30 times more effective at trapping heat in the atmosphere than carbon dioxide. In the first 20 years after its release, methane is over *80* times more powerful than carbon dioxide. Globally, methane is responsible for approximately one-third of the warming that the planet has experienced to date.

Simply put, there can be no effective solution to climate change without a dramatic reduction in methane emissions, and the United States must be at the forefront of this effort. According to data published by the World Bank, the U.S. is second only to China in global methane emissions, contributing nearly 9 percent of the world's totals each year. U.S.-based emissions impose huge costs on society through their climate impacts. Using EPA's rigorously developed social cost of methane metric, as well as data from both the World Bank and EPA's Greenhouse

Gas Inventory, we find that methane emissions from U.S. sources impose no less than 35 billion dollars in costs on society each year, and as much as nearly 80 billion dollars.

The oil and gas sector is a key source of this pollution. Now the world's largest producer of both oil and gas, the U.S. is also the world's largest emitter of methane from the oil gas and industry. As the nation's leading gas-producing state after Texas, Pennsylvania makes an outsize contribution to these emissions. EPA's Greenhouse Gas Inventory lists Pennsylvania's oil-and-gas-sector methane emissions at approximately 489 million metric tons in 2022, imposing between $680 million and $1.2 billion in climate damages per year. To make matters worse, a large portion of methane emissions go undetected and unaccounted for, and so the true extent of this problem is almost certainly worse than official statistics would suggest.

Fortunately, there are readily available technologies and practices that can greatly reduce these emissions. The vast majority of methane released during oil and gas operations escape through one of three ways: first, accidental equipment leaks (including extremely large releases known as super-emitter events); second, the use of equipment that is designed to vent to the atmosphere, such as gas-driven pneumatic pumps and process controllers; and third, the practice of flaring associated gas produced at oil wells that could be captured and routed to a pipeline with the right equipment. Oil and gas operators can address these problems by, respectively, 1: regularly surveying facilities for leaks and making rapid repairs of malfunctioning equipment, 2. using the most state-of-the-art technology that minimizes or eliminates venting of gas to the atmosphere, and 3. capturing all gas that is produced at oil wells and routing that gas to a pipeline for sale, rather than flaring it. Research indicates that adopting a full and comprehensive suite of control measures can cut sector-wide emissions by approximately 65 percent, achieving a huge reduction in climate pollution for modest costs.

These methane abatement strategies have the added benefit of reducing other harmful pollutants. Alongside methane, oil and gas sites emit large quantities of hazardous air pollutants, such as benzene and formaldehyde, which are known human carcinogens, and volatile organic compounds, which react in the atmosphere to form particulate matter (also known as soot) and ozone (also known as smog). Particulate matter and ozone damage pulmonary and cardiovascular health, contributing to asthma attacks, shortness of breath, missed school and work days, ER visits, heart attacks, and premature death. Eight million Pennsylvanians—over 60 percent of the state's population—live in one of 17 counties that have levels of ozone that exceed EPA's federally permitted limits.

Thus far, however, Pennsylvania has not taken the steps necessary to ensure that its oil and gas producers limit their emissions of methane and associated co-pollutants. Several other oil- and gas-producing states *have* taken such action: Colorado first adopted comprehensive methane controls in 2014, with California following suit in 2019 and New Mexico in 2021. Yet Pennsylvania—despite producing more natural gas than those three states combined, and achieving its highest-ever gas production total in in 2025—has still declined to adopt mandatory methane standards at the state level.

In 2016, the federal EPA issued Clean Air Act standards requiring many important methane control measures at new and modified oil and gas sites, but declined at that time to cover already existing facilities, which account for 80 to 90 percent of all emissions. Indeed, in Pennsylvania, over 90 percent of wells currently listed as active by DEP were drilled before the effective coverage date of the 2016 EPA regulation. The Biden Administration took steps to address this gap in 2024, not only strengthening methane standards for new and modified sources but also issuing emission guidelines for existing sources. Under this federal Clean Air Act program, states adopt regulatory control plans to cover methane from existing oil and gas sources within their borders, and submit those plans to EPA for approval. If EPA approves a plan, it becomes federal enforceable. If the plan is inadequate, or the state chooses not to participate, EPA will create its own federal plan for existing sources within that state.

In principle, EPA's 2024 rule lays the groundwork for full, comprehensive methane control at both new *and* existing oil and gas sites nationwide. Unfortunately, what is true in principle can be stymied in practice. Since the second Trump Administration took office in 2025, EPA has already taken steps to delay the effective compliance dates of most aspects of the 2024 methane rule, including a delay of 10 months for states to submit their existing source implementation plans to the agency despite an initial allowance of two years. More recently, EPA finalized a rule that would relax limitations on flaring of associated gas at oil sites, and the agency has signaled that it will initiate an additional, broader reconsideration effort later this year that will likely further erode the 2024 rule's protections. The agency has also proposed to suspend for 10 years oil and gas companies' obligation simply to *report* their greenhouse gas emission totals to EPA. Finally, while doing so would run afoul of federal legislation passed in 2021 and certainly face vigorous court challenges, the current EPA may at some point attempt to rescind altogether federal standards under the Clean Air Act.

The reality is that Pennsylvanians cannot count on the current administration to protect them from methane and other harmful emissions from the oil and gas sector. Following in the footsteps of California, Colorado, and New Mexico, DEP must forge ahead now with the most protective possible methane controls, adopting standards that are informed by—and at least as strong as—those included in EPA's Biden-era methane emission guidelines for existing sources. Even if the current EPA weakens, delays, or seeks to abandon federal methane requirements that are currently on the books, the Clean Air Act grants states full authority to adopt and enforce stationary source standards—including methane controls for the oil and gas sector—that are more protective than federal requirements, and that apply as a matter of state law even when the federal government declines to take action. While DEP took initial steps toward developing such standards under Governor Wolf, those efforts ultimately stalled. It is time for DEP to finish the job and waste no time in adopting strong, protective methane standards for the oil and gas sector that benefit all of our families and communities in Pennsylvania. Thank you.

TESTIMONY BEFORE THE PENNSYLVANIA HOUSE ENVIRONMENTAL and NATURAL RESOURCE PROTECTION COMMITTEE

A Pragmatic Path Forward on Methane Emissions from Pennsylvania's Oil and Gas Industry

April 21, 2026

John Rutecki, Regulatory and Legislative Manager
Environmental Defense Fund

Opening

Chair Vitali, Chair Rader, and distinguished members of the Committee, thank you for the opportunity to testify today.

My name is John Rutecki, and I serve as the Regulatory and Legislative Manager at Environmental Defense Fund (EDF). EDF, which has over 150,000 members in PA, has worked to identify practical solutions that benefit all of Pennsylvania.

I. The Case for Action Rests on Science, Economics, and Sound Policy

My core message today is simple. Pennsylvania does not have to choose between a strong oil and gas industry and clean air. We can have both and Pennsylvanians support action. What remains is the hard but achievable work of getting the policy right.

Pennsylvania is the second-largest producer of natural gas in the United States.[1]. Like any major industrial sector, it produces emissions that we have both the tools and the responsibility to manage well. In 2023, oil and gas operations in Pennsylvania released an estimated 1.05 million metric tons of methane.[2] Methane is the primary component of natural gas. At 2023 natural gas prices, that wasted gas was worth approximately $178 million, enough to meet the heating and cooking needs of 820,000 households or every household in Philadelphia and Pittsburgh combined for a full year.[3]

II. Understanding Where the Emissions Come From

One of the most important developments in our understanding of methane emissions is understanding where emissions come from. A peer-reviewed study by Omara et al. found that low-producing, or marginal, wells, defined as those producing 15 barrels of oil equivalent per day or less, represent roughly 80 percent of all oil and gas production sites in the United States but contribute only about 6 percent of national production. Despite their small share of output, these sites are responsible for roughly half of all oil and gas well-site methane emissions nationally.

Pennsylvania reflects this national pattern, with around 75,000 marginal wells in Pennsylvania being responsible for approximately half, about 48.5 percent, of the Commonwealth's oil and gas methane pollution. Thus, making regulation of all existing sources an essential aspect of any policy .[6]

Recent basin-wide measurement data reinforce this picture. Independent aerial and satellite studies of the Appalachian Basin indicate a methane intensity of approximately 0.5 to 0.6 percent across the basin as a whole.[7] That places the Appalachia Basin among the lower-emitting basins in the country, but it still falls short of the voluntary industry standard of 0.2 percent. With a commonsense regulatory floor that regulates emissions from all wells, we can continue to drive down emissions.

III. A Pragmatic Approach to Implementation

Acknowledging that all existing wells should be covered does not mean ignoring the legitimate operational realities. This is where pragmatic policy matters. Operations vary widely and we hear concerns that methane requirements could impose hardship on small, marginal well operators.

We must be clear-eyed about this. The national data shows that marginal well ownership is not confined to small, independent family operators. It ranges across a wide spectrum, including some of the largest and most well-capitalized companies in the industry. The "mom and pop" framing, while it fits a small number of operators, does not describe the majority of marginal well ownership. We should not allow the legitimate challenges facing a subset of operators to become a rhetorical shield that prevents action across the entire sector.

At the same time, good policy can, and should, include flexibility to account for specific operator circumstances. The federal methane rule provides exactly this kind of flexibility. This is not a one-size-fits-all framework. It is designed to be pragmatic.

That flexibility should be the starting point for any methane policy in Pennsylvania. If there are operators for whom compliance is demonstrably challenging, that is a conversation worth having through stakeholder engagement, during the policy development process. But that conversation should lead to a path forward, not a blanket exemption. If a well truly cannot support the cost of basic emissions controls, that tells us something important about its economic viability, and the appropriate response is to ensure it is properly plugged rather than leaking indefinitely at the public's expense. The acceptance of the public bearing these costs is not a solution.

IV. The Economics: Pennsylvania Jobs, and a Competitive Advantage

Methane mitigation is creating Pennsylvania jobs.

Methane mitigation is a growing segment of Pennsylvania's economy. The Commonwealth is home to 51 employee locations across the methane mitigation industry .[13] These are skilled, local jobs that cannot be offshored. Clear policy and a regulatory floor create the conditions for sustained investment in these good Pennsylvania jobs.

Commonsense standards support competitiveness in global markets.

Natural gas markets are changing. Buyers are increasingly scrutinizing the methane intensity of the gas they purchase. The European Union adopted regulations imposing methane intensity limits .[14] Japan and South Korea, launched the CLEAN Initiative that aims to reduce methane emissions across the LNG supply chain.[15] More than 150 countries have signed the Global Methane Pledge. Pennsylvania's gas industry will increasingly be asked to demonstrate that its production meets these rising standards. A clear, consistent regulatory framework provides Pennsylvania operators with the credibility they need to access these markets and is a competitive advantage to the operators doing the right thing.

Methane waste contributes to affordability pressures.

The U.S. Energy Information Administration projects that natural gas prices will rise more than 30 percent over 2025 levels by 2027.[16] EIA attributes this price pressure primarily to growing demand from LNG exports and from data centers. Every cubic foot of gas that is vented or leaked is a cubic foot not available to consumers. Reducing waste is not just an environmental goal. It is an affordability strategy.

Powering the digital economy should not come at the cost of our air.

Pennsylvania is in an active conversation about the growth of data centers and AI. Clean energy should be the priority for meeting the power demands of this new industry. At the same time, we recognize that much of the near-term power for these facilities will come from natural gas. If gas is going to power Pennsylvania's digital economy, it can and should be produced as cleanly and responsibly as possible.

V. Public Health and Our Communities

Methane itself is not the only concern. When natural gas escapes from oil and gas equipment, it carries with it a suite of harmful co-pollutants, including volatile organic compounds and hazardous air pollutants.[17.]

Approximately one million Pennsylvanians live within half a mile of oil and gas operations.[18] Peer-reviewed research conducted, including here in Pennsylvania, has documented adverse health outcomes associated with proximity to oil and gas operations.[19] When we reduce methane waste, we simultaneously reduce the co-pollutants that cause these harms. That is a direct benefit to real Pennsylvania communities, and it is one of the strongest reasons this work matters.

VI. Pennsylvania Has Both the Authority and the Experience to Act

Pennsylvania is not starting from scratch on methane. The Department of Environmental Protection has been working on this issue for more than a decade. This is not a new or untested role for DEP. It is a continuation of work the agency has been doing thoughtfully and with technical expertise for years.

DEP is, in our view, the right entity to continue leading on this issue. The agency has the experience to develop standards that fit Pennsylvania's specific circumstances. The federal landscape on methane is evolving, and underscores why Pennsylvania would benefit from having its own durable, state-level protections in place.

VII. Stakeholders Are Ready, and Pennsylvanians Support Action

The support for addressing methane waste and pollution in Pennsylvania is broad, deep, and diverse. This summer during DEP's 60-day public comment period, more than 30,000 individual public comments were submitted in support.[21] This is not a coalition of a single type of voice. It is a cross-section of the Commonwealth.

Recent polling confirms what that coalition demonstrated. A January 2026 statewide poll conducted by Global Strategy Group found that Pennsylvania voters support adopting stronger regulations to reduce methane emissions from the oil and gas industry by a 42-point margin.[22] They support action, and they believe it will be good for Pennsylvania.

VIII. Conclusion

Chair Vitali, members of the Committee, I want to return to where I began. Addressing methane emissions from oil and gas operations is not a choice between a healthy industry and a healthy environment. The data clearly shows we can have both. The authority rests with DEP, the right agency, with the right experience, to continue the careful work it has been doing for more than a decade.

What remains is the work of getting the policy right. That means ensuring protections cover all wells. It means building in flexibility to address legitimate operator circumstances, without allowing those circumstances to become an excuse for inaction.

It means drawing on the experience of other major producing states that have demonstrated that strong methane standards and a strong oil and gas industry can coexist. And it means allowing DEP to continue doing the thoughtful, technical work it has already begun, so that Pennsylvania ends up with strong and durable protections that will serve the Commonwealth for years to come.

Pennsylvania has an opportunity to lead. The path forward is obtainable and understood. I am grateful to this Committee for giving this issue the attention it deserves, and I look forward to your questions.

Endnotes

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Testimony Before the Pennsylvania House Environmental & Natural Resource Protection Committee

Subject: Methane Regulation, Subpart OOOOc, and Pennsylvania's Energy Future

Dated: April 21, 2026

Chairman Vitali, Chairman Rader, and members of the Committee, thank you for the opportunity to testify today on methane emissions and the role of Pennsylvania's oil and natural gas industry, particularly in the context of implementing federal Subparts OOOOb and OOOOc in Pennsylvania. My name is Dan Weaver, and I serve as President and Executive Director of the Pennsylvania Independent Oil and Gas Association. PIOGA represents all segments of the industry, including conventional operators, unconventional Marcellus and Utica producers, and the broad network of businesses that support energy production across the Commonwealth.

I. Methane Regulation Must Be Grounded in Reality

At the outset, it is important to establish a point of agreement. Methane emissions are a legitimate issue that should be addressed thoughtfully and effectively. Methane is a greenhouse gas, but it is also a valuable energy resource. Reducing methane emissions improves environmental outcomes, enhances safety, and ensures that more natural gas reaches consumers. The industry has strong incentives to minimize methane loss and has already made meaningful progress through improved technologies, operational practices, and compliance with currently existing state and federal regulations.

The question before this Committee is not whether methane should be regulated. The question is whether future methane regulation will be implemented in a way that reflects real world conditions, accurate data, and the operational realities of Pennsylvania's diverse oil and gas industry. Subparts OOOOb and OOOOc provides a framework for methane reduction, but also operational flexibility should states choose to take advantage of that flexibility appropriately.

II. Pennsylvania Has Three Fundamentally Different Oil and Gas Industries

Any discussion of methane regulation in Pennsylvania must begin with a clear understanding that the Commonwealth is home to three fundamentally different industries. Unconventional shale development in the Marcellus and Utica involves high pressure, high volume wells, advanced technologies, and large scale infrastructure. These operations are

central to national energy supply and are capable of deploying advanced monitoring and emissions control technologies.

By contrast, Pennsylvania's conventional oil and gas industry consists primarily of shallow, low pressure wells that produce at extremely low volumes. These wells are often decades old, and many have been producing for generations. They are typically operated by small businesses using minimal infrastructure. While unconventional wells produce the overwhelming majority of Pennsylvania's natural gas, conventional wells serve a different but equally important role in the state's energy system. Similarly, the third leg of the stool, the conventional oil industry, produces Pennsylvania Grade Crude oil, which is critical to the entire country's use of lubricating oils and the production of materials used in the medical field.

The differences between these three sectors are not minor. For example, data submitted during recent EPA rulemaking show that unconventional natural gas wells average approximately 5,876 thousand cubic feet of gas per day, compared to 532 thousand cubic feet per day for stripper gas wells and only 74 thousand cubic feet per day of associated gas for stripper oil wells. These are entirely different production profiles, and they reflect entirely different operational and economic realities. A regulatory framework that does not recognize these differences will inevitably produce unintended and harmful consequences, not just for the oil and gas industry, but for Pennsylvania as a whole.

III. The Unconventional Industry in Today's Energy Landscape

Pennsylvania's unconventional natural gas industry has fundamentally transformed Pennsylvania's role in the energy landscape. The development of the Marcellus and Utica formations has positioned the Commonwealth as a leading producer of natural gas, not just nationally, but globally. Pennsylvania is now a net energy exporter, supplying natural gas to other states and contributing to liquefied natural gas exports that reach international markets. This production has strengthened energy security, supported domestic manufacturing, and contributed to lower energy costs for consumers.

The growth of the unconventional sector has also played a significant role in reducing overall greenhouse gas emissions in the United States by enabling the transition from coal to natural gas in power generation. This transition has been one of the most significant drivers of emissions reductions over the past two decades. Pennsylvania's unconventional industry has been central to that achievement.

Pennsylvania's unconventional natural gas industry is distinct in scale, operating profile, and the methane management practices that have developed alongside Marcellus and Utica production over the past two decades. Operators in this sector have invested heavily in infrastructure, monitoring systems, and emissions control technologies designed to minimize methane releases, including reduced emissions completions, closed loop systems, advanced leak detection programs, and continuous monitoring at larger facilities. Many of the methane reduction strategies contemplated under Subparts OOOOb and OOOOc are already in use or are readily adaptable within unconventional operations because of their production volumes and centralized equipment layouts. This is an important point for policymakers because it demonstrates that when regulatory requirements are aligned with

the design and operating realities of a particular segment of the industry, meaningful emissions reductions can and do occur. Continued success in this sector, however, depends on maintaining a regulatory environment that supports investment and recognizes those operational realities. Policies that fail to account for economic impacts or impose unnecessary complexity can discourage development and shift production to other regions or countries with less stringent environmental standards.

It is also important to recognize that Pennsylvania's conventional and unconventional industries are interconnected. In many cases, conventional wells maintain leasehold positions that allow for future unconventional development. If those conventional wells are forced out of production prematurely, it could have unintended consequences for the future development of shale resources. This interdependence underscores the need for a balanced regulatory approach that supports both sectors.

In this context, the unconventional industry provides a useful model for how methane emissions can be effectively managed when regulatory requirements are aligned with technological capability and economic feasibility. At the same time, it highlights why those same requirements cannot simply be applied to the conventional sector without adjustment.

IV. The Scale and Importance of Pennsylvania's Conventional Industry

In contrast to the unconventional operations, Pennsylvania's conventional oil and gas sector is defined by its scale of well sites. The Commonwealth has more than 100,000 conventional wells, the vast majority of which are classified as marginal or stripper wells; that is, producing less than 15 barrels of oil equivalent per day as defined by the US Tax Code. According to the Interstate Oil and Gas Compact Commission, Pennsylvania has more than 21,000 marginal oil wells and more than 67,000 marginal gas wells. Specific to Pennsylvania, these wells produce at very low rates, often less than one barrel of oil equivalent per day, but collectively they provide significant benefits to the Commonwealth.

At first glance, it may be fair to ask why a sector comprised of such low producing wells is worth preserving at all, particularly when those wells are often operating at the margins of economic viability. The answer is that the value of Pennsylvania's conventional industry is not measured by the output of any single well, but by the cumulative impact of the system as a whole. These wells provide distributed, resilient, and locally controlled energy supply in areas that would otherwise lack access to natural gas. They sustain small businesses and local employment across large portions of rural Pennsylvania. They maintain legacy infrastructure and leaseholds that support future development, including unconventional production. They produce a specialized paraffin based crude oil that is essential for lubricants, medical products, and industrial applications. And perhaps most importantly, they provide a level of energy independence and affordability for certain communities that cannot be easily replaced by other sources without significant cost increases or infrastructure expansion.

These wells support rural economies, sustain small businesses, and generate local tax revenue. They also provide a unique form of energy supply known as local gas, which is delivered directly to homes and businesses in areas that lack access to large transmission pipelines. In many parts of northern and western Pennsylvania, this local gas is the primary

source of heating fuel. It is reliable, affordable, and largely insulated from the volatility of larger energy markets.

The economic consequences of losing this sector would be significant. The Interstate Oil and Gas Compact Commission has estimated that eliminating marginal gas production in Pennsylvania would result in a direct reduction of at least $250 million in oil and gas industry output. This figure does not capture the broader economic ripple effects discussed in further detail below, including job losses, reduced economic activity, and increased energy costs for consumers. In many communities, the loss of conventional wells would mean the loss of the only available source of affordable natural gas.

V. What the Data Actually Shows About Methane Emissions

Policy decisions must be grounded in accurate and comprehensive data. The U.S. Department of Energy's 2022 study of marginal wells provides one of the most robust datasets available for understanding methane emissions from low production wells. That study found that, nationwide, no detectable emissions were present at approximately 55 percent of natural gas production sites and approximately 60 percent of oil production sites. It also found that methane emissions are highly variable and follow a skewed distribution, with the top 10 percent of emitting sources accounting for 90 percent of total emissions observed.

This finding is critical. It demonstrates that methane emissions are not evenly distributed across all conventional wells. Instead, they are concentrated in a relatively small number of sources. This has direct implications for regulatory design. A uniform approach that imposes the same requirements on every well, regardless of its emissions profile, is unlikely to be efficient or effective. A targeted approach that focuses on the highest emitting sources will achieve greater emissions reductions at lower cost.

Regional data is similar. The DOE study shows that the Appalachian Basin, which encompasses Pennsylvania, accounts for a 29 percent share of methane emissions from marginal wells in the United States. However, context is important: those emissions represent only a very small fraction of global methane emissions. The DOE data indicates that emissions from marginal wells in the Appalachian Basin amount to approximately 290,000 tons per year, which is roughly **five hundredths of one percent** of global methane emissions. This does not diminish the importance of reducing emissions, but it does underscore the need for proportionality in regulatory responses and targeted enforcement.

VI. The Problem with Proposed Methane Regulations as Applied to Conventional Wells

Subpart OOOOc, the EPA's proposed regulatory framework for oil and gas facilities constructed prior to December of 2022, creates a fundamental mismatch between regulatory assumptions and the realities of Pennsylvania's conventional wells. The first issue is economic. Individual conventional wells generate limited revenue, often netting only a few thousand dollars per year. At the same time, compliance with OOOOc can require significant expenditures. Optical gas imaging equipment required under OOOOc for emissions monitoring and detection can cost anywhere from $36,000-$100,000, and even contracted services involve substantial recurring costs. An alternative monitoring method under OOOOc

known as EPA Method 21 similarly requires investment and ongoing operational and labor expenses. Annual leak detection and monitoring costs can cost thousands of dollars per site, and PIOGA estimates that monitoring costs alone will cost the conventional industry at least $175 million annually. On top of this, required facility upgrades can exceed $250,000.

When these costs are compared to the revenue generated by conventional wells, the imbalance becomes clear. In many cases, the cost of compliance exceeds the total annual revenue of the well. This creates a situation in which compliance is not merely burdensome, but impossible. Wells that cannot cover their costs will be shut in, leading to premature abandonment and loss of energy supply, which will be described in further detail below.

The second issue is the mismatch between assumed emissions reductions and actual conditions. EPA's modeling assumes that leak detection and repair programs will yield significant methane reductions. While this may be true for higher producing facilities, it does not hold for low producing wells. Because these wells produce very small volumes of gas, the amount of methane that can be captured is minimal. In many cases, the value of recovered gas is only a few hundred dollars per year, far below the cost of compliance. Moreover, and as indicated above, the amount of methane that is actually escaping from conventional wells already compliant with existing regulations is minimal, if not zero.

The third issue is operational. Many methane releases from conventional wells are intentional, necessary for safe operation, and actually required under current state law and regulations. Pennsylvania regulations recognize that venting may be required to manage pressure, maintain well integrity, and protect public safety. These practices are embedded in existing regulatory frameworks and are essential to safe operations. A regulatory approach that treats all methane releases as leaks fails to recognize this reality and risks creating conflicts between safety requirements and emissions compliance.

VII. The Energy Affordability Consequences of a One Size Fits All Approach

If Subpart OOOOc is implemented in Pennsylvania without meaningful adjustment for the conventional sector, the consequences will extend well beyond producers and into the homes, farms, and small businesses that depend on affordable energy every day. Pennsylvania is not simply a large natural gas producing state. It is also a state where natural gas is the dominant home-heating fuel. The U.S. Energy Information Administration reports that 52 percent of Pennsylvania households use natural gas as their primary fuel for home heating, which is above the national average. In much of rural Pennsylvania, especially in areas served by local gas systems tied to nearby conventional production, the affordability of heat is inseparable from the continued operation of conventional wells. That is why the affordability consequences of OOOOc matter so much. This is not an abstract regulatory issue. It is a kitchen-table issue for the people who pay heating bills in January.

The problem is straightforward. Many Pennsylvania conventional wells produce such small volumes that the cost of complying with OOOOc will exceed the revenue those wells generate. Pennsylvania conventional wells average only 0.58 barrels of oil equivalent per day; using state production data and a $3.00 gas price assumption, an average conventional gas well may generate only about $2,875 per year before operating costs. After annual operating costs of roughly $2,000 to $3,000, the paper concludes that the funds necessary to

implement OOOOc simply do not exist for many wells. In other words, and put bluntly, compliance costs in many cases exceed revenue, forcing premature shut-ins and threatening energy affordability and access for rural and low-income communities.

Once those wells are shut in, the affordability problem moves directly to consumers. Conventional gas in Pennsylvania is not just another commodity sold into distant interstate markets. It is a local, low-pressure, locally distributed energy source that has for generations served as a primary heating fuel for hundreds of thousands of homes, businesses, schools, churches, and hospitals. Pennsylvania conventional gas has long served as a primary supply source of heating fuel for hundreds of thousands of Pennsylvanians and many rural and low-income areas depend on local, low-cost conventional gas because transporting gas long distances through interstate systems is often cost-prohibitive.

If those local supplies are regulated out of existence, consumers do not simply move seamlessly to an equivalent substitute. In many cases, they face fuel switching or more expensive delivered fuels. On a simple energy-content basis, Pennsylvania's 2025 average residential natural gas price was about $15.04 per Mcf, which is roughly $14.5 per MMBtu using EIA's standard heat-content conversion. Pennsylvania's 2025 average propane retail price was about $2.045 per gallon, or about $22.3 per MMBtu, and Pennsylvania's January 2026 residential electricity price was 20.19 cents per kilowatt-hour, or about $59.2 per MMBtu on an energy-content basis. Those comparisons are not a perfect substitute for a full appliance-efficiency analysis, but they make the basic point clearly: If local conventional gas disappears, the fallback options are often materially more expensive.

That is why the affordability risk is especially acute in rural and low-income communities. A crippled conventional industry will leave tens of thousands of Pennsylvanians without affordable heat and energy and will increase energy costs statewide. The broader economic impacts compound that consumer harm. The IOGCC estimates that eliminating marginal gas production in Pennsylvania would reduce direct oil and gas industry output by at least $250 million, before counting spillover effects through local service firms and surrounding communities. In practical terms, that means fewer local suppliers, fewer jobs, less maintenance of gathering and distribution systems, and more pressure on families and businesses already struggling with utility costs. A one-size-fits-all implementation of OOOOc would therefore not just regulate producers. It would re-price heat for consumers.

There is also a broader system consequence that the Committee should keep in mind. Pennsylvania is both a major unconventional producer and part of the Appalachian marginal-well base. The conventional sector helps preserve local supply, rural delivery arrangements, and, in many cases, the leasehold structure that supports future unconventional development so important for national development and security. Again, if conventional wells are forced out of operation, future shale development may also be impaired in some areas, which would weaken Pennsylvania's position as an energy exporter and put additional upward pressure on energy costs. Put simply, methane regulations that do not explicitly consider the difference between unconventional and conventional production does not just risk shrinking one legacy sector. It risks making energy less affordable for the Pennsylvanians who depend on it most.

VIII. Subpart OOOOc Provides the Tools for a Better Approach

Despite these challenges, Subpart OOOOc provides the tools necessary to develop a workable and effective regulatory framework. Under the Clean Air Act, states have the authority to tailor their implementation plans through the use of Remaining Useful Life and Other Factors, or RULOF. This provision allows states to adjust standards based on economic feasibility, technical limitations, and other site specific considerations.

In addition to RULOF, OOOOc allows for alternative compliance methods, site specific monitoring plans, and exemptions where appropriate. These provisions are designed to provide flexibility and to allow states to account for differences in equipment, operations, and economic conditions. The key question is whether Pennsylvania will use this flexibility effectively.

IX. A Practical Path Forward for Pennsylvania

A workable state plan for Pennsylvania should begin with the adoption of cost effective monitoring approaches for super low producing wells. Quarterly audio, visual, and olfactory (AVO) inspections, conducted in conjunction with existing mechanical integrity inspections, provide a practical and efficient method of detecting emissions. This approach leverages existing regulatory infrastructure, reduces costs, and aligns safety and environmental objectives. AVO already occurs today and is done by responsible operators to ensure that leaks absolutely do not exist. For the vast majority of Pennsylvania operators, the quantity of a leak is irrelevant, because any leak is too much and needs to be repaired immediately.

Indeed, alternative monitoring technologies should also be explicitly allowed. While optical gas imaging may be appropriate for certain facilities, it should not be mandated universally. Method 21 and AVO inspections can provide effective detection capabilities at a fraction of the cost. EPA's own Small Business Advocacy Review Panel recognized the need for such flexibility and recommended consideration of alternatives and reduced monitoring requirements for low production wells.

Pennsylvania should also make full use of RULOF to account for the economic realities of conventional wells. This could include establishing class based standards for low production wells, allowing reduced monitoring frequencies, and providing alternative compliance pathways where appropriate. For wells nearing the end of their productive life, less stringent requirements or extended compliance timelines may be appropriate.

Pennsylvania must also address intentional emissions. Pennsylvania should clearly define circumstances under which controlled releases are permissible and provide guidance on how such releases should be documented and reported. This will ensure that operators can comply with both safety requirements and emissions regulations without conflict.

Finally, Pennsylvania should consider exemptions or alternative requirements for specific categories of wells, including those operating under vacuum or those with minimal equipment. In these cases, the potential for emissions may be negligible, and the application of standard requirements may not be justified.

X. Protecting Pennsylvania's Energy Future and Conclusion

Pennsylvania's energy future depends on both its conventional and unconventional industries. The Marcellus and Utica formations have transformed the Commonwealth into a leading energy producer, driving economic growth and improving energy security. At the same time, the conventional industry provides local energy supply, supports rural communities, and maintains the infrastructure necessary for continued development.

A regulatory framework that fails to account for these realities risks undermining both sectors. Overly rigid requirements could discourage investment, reduce production, and shift development to other regions. A balanced approach that recognizes differences, targets high emitting sources, and allows flexible compliance pathways will produce better outcomes for both the environment and the economy.

Pennsylvania has an opportunity to lead in the development of a methane regulatory framework that is both effective and practical. By using the flexibility provided under Subpart OOOOc, the Commonwealth can reduce emissions while preserving the economic viability of its oil and gas industry.

A one size fits all approach will not work. A targeted, data driven approach will. By focusing on the highest emitting sources, aligning regulatory requirements with real world conditions, and providing flexible compliance pathways, Pennsylvania can achieve meaningful emissions reductions without sacrificing energy affordability, reliability, or economic stability.

Thank you for the opportunity to provide this testimony. I welcome your questions.

EARTHWORKS

Pennsylvania House Environmental and Natural Resource Protection Committee
Tuesday, April 21, 2026

Testimony: Josh Eisenfeld, Oil & Gas Research and Accountability Manager, Earthworks

My name is Josh Eisenfeld, I am the Oil & Gas Research and Accountability Manager with Earthworks. Earthworks' mission is to protect communities and the environment from the adverse impacts of mineral and energy development while promoting sustainable solutions.

I am here to share the results of a year-long satellite monitoring project in the Appalachian Basin using Carbon Mapper's publicly available satellite data. While industry leaders often claim this region has the lowest methane intensity in the country, the data in our report tells a different story.

To understand why this matters, we have to talk about methane. It is an invisible, odorless gas, but it's a climate powerhouse, trapping 80 times more heat than CO2 over a 20-year period.

Methane doesn't just leak, it is polluted at every stage of oil and gas production; this pollution is accelerating the rate of climate change and affecting frontline communities. Methane emissions represent a massive drain on resources, but they can be stopped if we use the technology available to see them.

For over a decade, Earthworks has been doing exactly that - detecting and recording methane pollution in the field using optical gas imaging cameras. I am one of 7 Earthworks staffers who are certified Optical Gas Imaging Thermographers with the Infrared Training Center. This is the industry standard certification for optical gas imaging.

Over the last few years, I have also led our efforts to incorporate satellite based methane detections into our ongoing work to track, attribute, and act on methane pollution from oil and gas basins across the country.

Alongside the Gas Leaks Project we used this new data to examine an important discrepancy between industry self-reporting and real-world emissions. The Appalachian Methane Initiative, whose financial supporters include Expand Energy and EQT, states that 'the Appalachian Basin is the lowest-emitting major oil and gas producing region in the United States.' However**,** a 2026 report by MacKay et al. in the peer-reviewed scientific journal Atmospheric Chemistry and Physics tells a different story.

Their analysis of MethaneAIR data, which is a different but similar sensor to the Planet Tanger-1 satellite we used in our study, reveals that the Appalachian Basin is actually the second most polluting basin after the Permian.

The important takeaway is that the methane emissions reported to the EPA by operators themselves (depicted in gray) remain significantly lower than these measured observations (depicted in blue).

And as a result of that, the industry-supported assertion that Pennsylvania produces the lowest methane intensity gas should be subjected to more rigorous scrutiny. Satellite data provides another growing body of evidence against this claim.

Now let's talk a little about the methods and the tools we used. I'll start with an explanation of satellites.

There are a number of state-of-the-art emissions-sensing satellites. For this report we used data from Planet Lab's Tanager-1 satellite made available via Carbon Mapper's online portal. The Tanager-1 satellite was launched in August of 2024 and began its measurements just a month later. It doesn't see colors like we do, but instead identifies the unique light-absorption 'fingerprint' of methane.

These satellites orbit hundreds of miles above us - some have a very wide area of focus and some are very narrow and precise. Tanager-1 has a 30-meter resolution - that is precise enough to look at a specific valley in Pennsylvania and point to the exact well pad or compressor station that is venting gas.

This is a basic illustration of how a point-source imaging satellite, like Tanager-1, works. OGI cameras and satellites are similar - they are designed to "look" at the atmosphere and "see" the infrared light wavelengths absorbed by specific gases, in this case they are looking at the spectrum specific to methane.

Data was collected between November 1, 2024, and early November 2025, covering the gas-producing regions of Pennsylvania, northern West Virginia, and eastern Ohio. During this period, Carbon Mapper's data portal identified 96 methane plumes from 70 distinct oil and gas sources. As shown on the map, our analysis cross-referenced these plume locations with publicly available facility records including records from the PA DEP, the EPA, the EIA, FERC, and others.

This process was intensive and explaining it won't fit into the 8 minutes I have but I would be happy to speak with you about it anytime.

With this robust dataset, we were able to successfully attribute 57 of these plumes (59%) to specific facilities and operators with a high level of certainty. I would be happy to follow up with more on that as well if any of you are interested.

From these 57 attributed methane emission sources we conducted analysis on size, persistence, and frequency on an operator by operator basis and overall. What we found was concerning.

Notably, approximately 90% of the documented plumes meet the EPA's definition of a 'super-emitter' event, exceeding 100 kg of methane per hour. To put that in perspective if just 1 plume of that magnitude continues for 1 full day it would be the equivalent of 42 average US cars driving for a year, for each plume, each day. While some events may be relatively short-lived, many of these plumes were detected emitting pollution on multiple days.

Current reporting provides an incomplete picture of our methane pollution problem. While operators continue to make claims about their methane reduction efforts, actions and the data should speak louder than their words.

Large methane releases are occurring regularly across the state of Pennsylvania- even from companies claiming to have low or zero emissions. We encourage the state to not take them at their word, but for the protection of our resources and our environment, check their words with all of the tools we have available. Satellites are a publicly available tool available for immediate use by the state.

We recommend Pennsylvania add satellite data to its toolbox for identifying and addressing methane emissions from the oil and gas industry. Again, Methane is invisible and odorless. Because of this, it can be emitted in enormous quantities and still go unreported or unaddressed without proper oversight. It's time for Pennsylvania to modernize methane regulations and make satellite data a regular part of the inspection and enforcement process in our state.

April 21, 2026

Clean Air Council Testimony Re: Methane Emissions from The Oil and Gas Industry
House Environmental & Natural Resource Protection Committee

Good morning Chairs Vitali and Rader, and Members of the House Environmental & Natural Resource Protection Committee. I thank you for this opportunity to speak today. My name is Alice Lu and I am the policy analyst at Clean Air Council. Clean Air Council is a nonprofit environmental health organization headquartered in Philadelphia, with an office in Pittsburgh as well. The Council has worked closely with frontline communities to protect everyone's right to a clean and healthy environment for over 50 years, and has thousands of members throughout Pennsylvania and the Mid-Atlantic region who support its mission.

Introduction

Pennsylvania is the country's second-largest gas-producing state — in 2024, gas produced in Pennsylvania accounted for about 20% of the United States' total gas output.[1] Pennsylvania is a proud energy exporter, and is well-positioned to equally lead in environmental and health protections, while promoting economic development. Gas development is well documented to contribute to climate- and health-harming pollution, which hurts Pennsylvanians and wastes gas product. In fact, leaks can occur throughout all segments of the gas system, from production, to transmission, to distribution, and even in the home.[2]

I'll be speaking to the environmental and health damages that emissions from the oil and gas industry can cause, and the Environmental Protection Agency's methane rule as an existing policy lever to protect Pennsylvanians. The Commonwealth can lead the nation by adopting strong methane standards that balance environmental and health safeguards alongside responsible economic development.

Methane emissions in PA

Fracked gas primarily consists of methane, which is a commodity when captured, but a powerful greenhouse gas (GHG) when released. Methane is 80 times more potent than carbon dioxide at warming the climate over 20 years.[3] In other words, every unit of methane emitted into the atmosphere traps the same amount of heat as 80 units of carbon dioxide.

Given Pennsylvania's role as a leader in energy production, especially shale gas production, methane emissions from the oil and gas industry contribute significantly to the Commonwealth's GHG emissions.

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[1] *Pennsylvania State Energy Profile Analysis.* (2026, February 19). U.S. Energy Information Administration. https://www.eia.gov/states/PA/analysis

[2] *Reality Check: Natural Gas's True Climate Risk.* (2023, July 13). RMI. https://rmi.org/reality-check-natural-gas-true-climate-risk

[3] Garthwaite, J. (November 2, 2021). *Methane and climate change.* Stanford Doerr School of Sustainability. https://sustainability.stanford.edu/news/methane-and-climate-change-0

According to the Department of Environmental Protection's (DEP) most recent GHG inventory based on data from 2022, estimated emissions from the industrial sector accounted for nearly 31% of Pennsylvania's greenhouse gas emissions; of this sector's emissions, 19% can be attributed to oil and gas processes.[4] This number likely underestimates actual emissions.

Reducing methane pollution, particularly from the oil and gas sector, can be one of the fastest, most cost-effective ways to rapidly slow global warming. Analysis by the Environmental Defense Fund (EDF) in 2020 using site-level measurement data from Pennsylvania wells suggests methane emissions from upstream oil and gas sources equate to more than 1.1 million short tons of methane emissions annually, or 57 billion cubic feet of gas.[5]

Recent global data from MethaneSAT underscores the fact that reported emissions estimates systematically underestimate methane emissions. The absolute emissions from basins that predominantly produce gas were three times higher than reported estimated emissions, with low-producing wells contributing significantly to overall emissions in several basins.[6]

These small, marginal wells in particular can benefit greatly from enhanced measures that reduce emissions and save gas product. According to FracTracker Alliance analysis of 2023 data from the DEP, between 99% of Pennsylvania's conventional wells and about 4% of the state's unconventional wells are likely marginal, stripper wells – in other words, wells that are not economically productive, but are nonetheless sources of methane emissions.[7] Much of the research on emissions from marginal well sites in the U.S. has found that these sites could be responsible for over 50 percent of the oil and gas sector's methane emissions.[8] There is tremendous opportunity to reduce the loss of methane from these sources

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[4] Department of Environmental Protection. (2025). *Pennsylvania Greenhouse Gas Inventory Report*. https://greenport.pa.gov/elibrary/GetDocument?docId=9972451&DocName=PENNSYLVANIA%20GREENHOUSE%20GAS%20INVENTORY%20REPORT%202025.PDF%20%3cspan%20style%3D%22color%3Agreen%3B%22%3e%3c%2Fspan%3e%20%3cspan%20style%3D%22color%3Ablue%3B%22%3e(NEW)%3c%2Fspan%3e

[5] EDF Analysis Finds Pennsylvania Oil and Gas Methane Emissions are Double Previous Estimate. (May 13, 2020). EDF. https://www.edf.org/media/edf-analysis-finds-pennsylvania-oil-and-gas-methane-emissions-are-double-previous-estimate

[6] *The world according to MethaneSAT: Oil & gas methane emissions vary widely by region, greatly exceed both reported inventories and industry goals*. (n.d.). MethaneSAT. https://www.methanesat.org/project-updates/first-look-system-wide-view

[7] Kelso, M. (2024, August 2). *Pennsylvania Oil and Gas Industry Trends: Drilled Wells, Violations, Production, and Waste*. FracTracker Alliance. https://www.fractracker.org/2024/08/pennsylvania-oil-and-gas-trends/. "Marginal wells" produced 15 barrels of oil equivalent or less per day and included wells with no listed production amount.

[8] Joint Environmental Commenters. (2023, February 13). *Joint Environmental Comments on EPA Supplemental Methane Proposal*. https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2023/02/Joint-Environmental-Comments-on-EPA-Supplemental-Methane-Proposal.pdf, Omara, M., Zavala-Araiza, D., Lyon, D. R., Hmiel, B., Roberts, K. A., & Hamburg, S. P. (2022). Methane emissions from US low production oil and natural gas well sites. *Nature Communications*, *13*(1), 2085. https://doi.org/10.1038/s41467-022-29709-3, and *Quantification of Methane Emissions from Marginal (Low Production Rate) Oil and Natural Gas Wells*. (April 28, 2022). GSI Environmental Inc for U.S. Department of Energy National Energy Technology Laboratory. https://www.osti.gov/servlets/purl/1865859
EDF estimates that emissions from single wellhead-only sites and small well sites are responsible for 24% of fugitive emissions in the U.S. The 2022 study published in *Nature* found low-producing well sites to produce only 6% of the nation's oil and gas output in 2019 while emitting nearly half of all methane emissions from the sector.

by, for example, simply improving the monitoring at these well sites to identify leaks that will need to be repaired.

Health impacts from fracking

Methane is a precursor to ground-level ozone, also known as smog, which has a direct, harmful impact on human health. Scientific-based, peer-reviewed, air modeling has estimated that 35% of the ground-level ozone burden is attributable to methane emissions.[9] According to the EPA, ground-level ozone has both immediate and long-term harmful effects when inhaled. Such exposure to ozone can lead to coughing and sore throat, difficulty breathing, airway inflammation and damage, worsened respiratory diseases, increased risk of asthma attacks, and a greater risk of premature death.[10] Long-term exposure to ozone is also thought to be a possible cause of asthma.[11]

In addition to methane, fracked gas also includes other hydrocarbons such as volatile organic compounds (VOCs) — a suite of compounds which are known or suspected human carcinogens and are also precursors to smog — and other hazardous air pollutants (HAPs).[12] These two classes of compounds are associated with serious health effects in humans: exposure to either can be associated with cancer, VOCs can worsen respiratory disease, and HAPs can lead to immune system, neurological, reproductive, developmental, and respiratory harms.[13]

Data from 2020 and 2021 shows that nearly 1.5 million people in Pennsylvania alone live within just half a mile of an active oil or gas well, compressor station, or processing plant.[14] These are the people living closest to upstream and midstream gas infrastructure, and are disproportionately exposed to pollution from the industry. Reducing methane emissions from oil and gas sources therefore has immense potential to also reduce health-harming co-pollutants that millions of Pennsylvanians are exposed to.

The Methane Rule can reduce emissions

The Environmental Protection Agency's (EPA) methane rule is an existing framework that can help reduce methane emissions and save gas product.[15] This rule was finalized in March of 2024 and aims to curb emissions of methane, and associated pollutants, from the oil and gas industry through the use of readily available and cost effective technologies. If fully implemented, the rule would phase out routine

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NETL estimates that marginal wells contributed to 60% of gas sector methane emissions and 40% of oil sector methane emissions in 2021.

[9] T. Butler, A. Lupascu, A. Nalam. *Attribution of ground-level ozone to anthropogenic and natural sources of NOx and reactive carbon in a global chemical transport model*. Atmos. Chem. Phys. Discuss., 2020 (2020), pp. 1-41

[10] EPA. (2025, March 13). *Health Effects of Ozone Pollution*. https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution

[11] *Id.*

[12] Lattanzio, R. K. (2016, February 4). An Overview of Air Quality Issues in Natural Gas Systems. https://nationalaglawcenter.org/wp-content/uploads/assets/crs/R42986.pdf

[13] *Volatile Organic Compounds*. (2024, October 21). American Lung Association. https://www.lung.org/clean-air/indoor-air/indoor-air-pollutants/volatile-organic-compounds and *Health and Environmental Effects of Hazardous Air Pollutants*. (2025, February 25). EPA. https://www.epa.gov/haps/health-and-environmental-effects-hazardous-air-pollutants

[14] *Oil and Gas Threat Map*. (n.d.). Oil and Gas Threat Map. https://oilandgasthreatmap.com/threat-map/

[15] Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, 89 Fed. Reg. 16820 (May 8, 2024) (codified at 40 C.F.R. 60)

flaring, require the adoption of emissions-free process controllers, bolster monitoring requirements, and hold operators accountable to timely repairs of leaks.

Some key provisions of the rule that would allow for timely detection and repair of leaks include:

- Improved monitoring standards for well sites of all sizes and configurations
    - Single wellhead only sites → quarterly audio, visual, olfactory (AVO) inspections
    - Small wellsites (only contains one piece of certain major equipment) → quarterly AVO
    - Multi wellhead only sites → semiannual optical gas imaging (OGI) (or Method 21) and quarterly AVO
    - Well sites with major production + process equipment and centralized production facilities → quarterly OGI (or Method 21) and bimonthly AVO inspections
- Enhanced leak repair timelines
    - First repair attempt of AVO-detected fugitive emissions within 15 days of detection; final repair within 15 days after first attempt
    - First repair attempt of OGI-detected fugitive emissions within 30 days of detection, final repair within 30 days after first attempt

Monitoring of a well site is required up until the site is closed, and a final OGI survey of the site is needed to ensure no remaining fugitive emissions. This provision could also be a useful tool in tackling the ongoing issue of well abandonment in Pennsylvania.

States are in the process of determining how they plan to meet emissions guidelines set forth in the rule for *existing* upstream and midstream oil and gas infrastructure. To be clear, implementing the methane rule is an opportunity for Pennsylvania to balance leading health and environmental protections alongside domestic gas production by preventing wasted gas.

Conclusion

Tackling methane emissions from oil and gas systems is a win-win: it prevents the waste of methane, which is gas product that companies sell, and it protects Pennsylvanians from being exposed to emissions that harm health and the environment. By adopting strong methane standards through the methane rule, Pennsylvania has the opportunity to lead the nation in reducing methane emissions while adopting protections that balance environmental protection, health safeguards, and economic development.

4/20/2026

Members of the House Environmental and Natural Resource Protection Committee
Re: Testimony submitted by the Better Path Coalition and No False Climate Solutions PA on Methane Emissions from the Oil & Gas Industry

Dear Committee Members,

You all know that methane is contributing significantly to the intensifying climate crisis. You all know that methane leaks throughout natural gas's product lifecycle and "beyond the grave" when it leaks from the hundreds of thousands of abandoned wells that dot the state, and that many of the wells are considered to be super-emitters. You all know that Pennsylvania is not doing its part in combatting the crisis as long as it continues to embrace and enable the natural gas industry. You all know that the only way to stop being part of the problem is to take aggressive action to transition from natural gas and other dirty energy to renewable energy. You all know the state lags behind every other state but one in the percentage of power produced by renewables.

You all know that methane has had profound on the ground impacts, contaminating private water supplies, causing explosions and fires, rendering homes unlivable, making people sick, and causing all of the other deleterious effects summarized in the *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure* .

We know you all know that, not just because we have told you many, many times, not just because ours are among the many groups that have shared with you the *Compendium* and many of the studies it summarizes, and not just because our briefings have introduced you to experts like Dr. Robert Howarth whom you have called on to testify before your committee, but because methane's adverse impacts have become common knowledge in recent years.

As we drafted this letter, we learned that Trump's Department of Energy has funded the two Biden-era hydrogen hubs that include Pennsylvania - ARCH2 and MACH2. Despite knowing what we know you all know, we also know many of you will cheer this development as part of a renaissance of the natural gas industry sparked by the rush to cover the state with natural gas-powered data centers and liquefy natural gas for export.

Some of you will express concern and talk about the need for strong regulation of methane. None of you will say we need to stop producing it. You regard those of us who take that stance as fringy. You believe you are the adults in the room who understand that the best you can do is go for what's gettable, always overlooking the fact that, for all your efforts, you've gotten almost nothing.

In fact, we have witnessed over two decades since the shale gas boom began in Pennsylvania what Kurt Klapkowski told this committee in March 2024 when he described "widespread non-compliance with laws and regulations in the conventional oil and gas industry." He was referring to the report written by

the DEP at the direction of Governor Wolf that found that 86% of conventional drillers did not file even the most basic of reports on production and waste for the previous year and that it was not an anomaly. The report tracked a deepening “culture of non-compliance” over a span of the five years the DEP analyzed. That December, Klapkowski, testifying once again before this committee, announced that Governor Shapiro and the DEP supported a ban on roadspreading of drilling waste, something that, among the endless problems brought about by natural gas development, should be legislative low-hanging fruit. It’s 2026 now, and there is no ban in sight. CDAC wouldn’t hear of it.

You might be thinking that we fringy activists don’t understand that nothing happens quickly in Harrisburg, that everything takes time. We do understand that, but we also know that time is exactly what we don’t have.

Respectfully,
Karen Feridun, Co-Founder, Better Path Coalition
Karen Elias, Co-Founder, No False Climate Solutions PA

4/20/26

Members of the House Environmental and Natural Resource Protection Committee

Re: Testimony submitted by B.W. Brandom, MD of the

the Concerned Health Professionals of Pennsylvania

Pennsylvania must not allow any lessening of rules restricting methane release from gas wells and all elements of the transfer and processing infrastructure for gas in this state. FLIR cameras and data obtained by satellites should one used to identify large and persistent leaks and place much heavier fines than previously on the industries responsible. These fines should support a fund to help further prepare Pennsylvania develop more resiliency for flooding and forest fires.

Remember that 18 million people in the United States, one million of whom are Pennsylvanians, live within 1 mile of an oil or gas well [https://doi.org/10.1289/EHP1535]. There are many serious adverse health effects associated with proximity to UOGD. Low birth weights are consistently reported in infants born close to oil or gas wells. The risk of acute leukemia in a child is increased more than 2 fold, if the mother lived within a mile (5,2800 feet) of UOGD while pregnant. Thus a setback of 2,500 feet does not remove increased risk of leukemia.

Significant adverse health outcomes are also reported in adults. In Pennsylvania ZIP codes where UOGD started between 2008 and 2010, wells, compressor stations and pipelines were built. In these regions there were more hospitalizations for cardiovascular diseases in 2012–15 than would be expected in the absence of UOGD. Specifically, in 2015, the authors estimated an additional 11·8, 21·6, and 20·4 hospitalizations for acute myocardial infarction, heart failure, and ischemic heart disease, respectively, per 1000 Medicare beneficiaries. Hospitalizations increased even as UOGD growth slowed. Results were robust in sensitivity analyses. So more Pennsylvanians suffer from ischemic heart disease and heart failure because they lived near UOGD https://doi.org/10.1016/S2542-5196(23)00009-8.

Methane release produces even more health risks because it captures more heat in the atmosphere. An immediate effect in Pennsylvania is the greatly increased population of ticks this year. The Lyme disease transmitted by a tick bite is only one of many diseases that are increasing because over all every year is warmer than the previous one. Rules to monitor and restrict methane release need to be stronger.

Testimony of the
Marcellus Shale Coalition

Submitted to the
House Environmental and Natural Resource Protection Committee

April 21, 2026

The Marcellus Shale Coalition (MSC) is a state-wide trade association representing more than 155 energy companies from the upstream, midstream, and downstream sectors, and those who supply goods and professional services to the industry, including our partners in the skilled building trades. Our members are fully committed to working with local, county, state and federal government officials to facilitate the safe development of natural gas resources in the Marcellus, Utica and related formations.

On behalf of the MSC and its members, we appreciate the opportunity to share this testimony with the committees regarding the issue of methane emissions from the oil and gas industry.

We express our appreciation to Chairman Rader for ensuring that – in a hearing focused on the oil and gas industry – there is at least one voice that is actually *from* the oil and gas industry. The Pennsylvania Independent Oil and Gas Association is well versed on this topic and will be invaluable for the Committee's education and understanding of this issue. However, it is disappointing that, on a topic as important as this, the committee continues to overwhelmingly solicit views not from technical professionals engaged in the underlying subject matter, but rather anti-energy activists that seek to ban domestic oil and gas production.

Introduction

What, exactly, is methane?

Methane is, quite simply, natural gas. You will hear from a litany of activists that engage in linguistic gymnastics to call it something else in casual conversation, like 'fracked' gas or 'methane gas'. These focus-group tested terms are intended to subconsciously create negative impressions in the mind of the general public as to the value and virtue of natural gas.

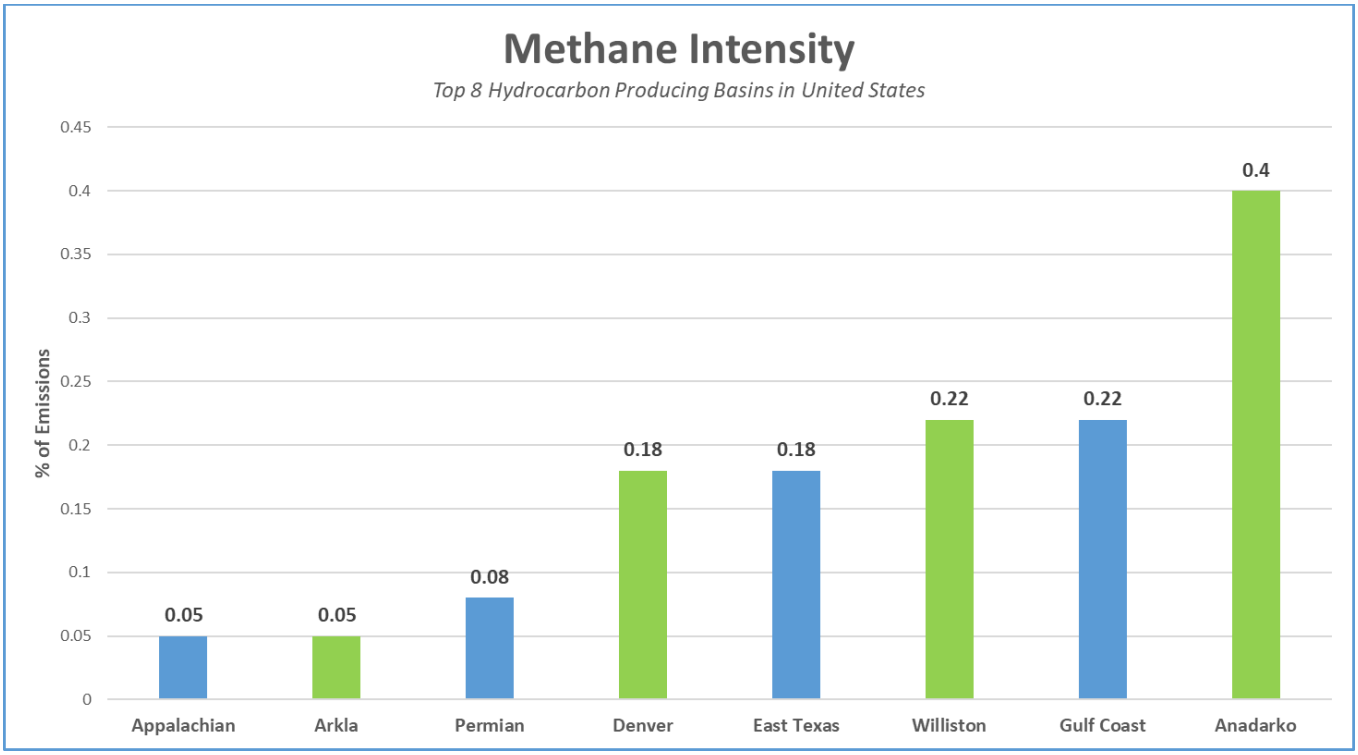
The natural gas produced in Pennsylvania differs based on geographic location, largely driven by the geologic aging of the underground resource. In northcentral and northeastern Pennsylvania, natural gas can be comprised of between 95% - 98% methane and is usually referred to as 'dry gas'. In parts of southwestern Pennsylvania, the natural gas may be comprised of 80%-85% methane, with the balance of produced gas containing ethane, propane, butane, pentane, natural gasoline and other hydrocarbons. This product is typically referred to as 'wet gas' because these added resources are separated and liquified for an abundance of commercial uses.

Natural gas (methane) is the very product that Pennsylvania's unconventional shale industry is in the business of producing. Pennsylvania's shale gas resources are unique compared to many other basins across the country because most of those basins produce both oil and natural gas. While there is a growing amount of information that will inform whether some shale formations underlying Pennsylvania might be capable of oil production in the future, as of today Pennsylvania's shale industry is exclusively producing natural gas.

Why is this important? Because Pennsylvania operators are solely focused on natural gas production and therefore have every incentive to capture as much of the natural gas produced as possible. It is simply not good business to let the very product you are producing escape into the atmosphere.

It is also important to recognize that the men and women in the Pennsylvania natural gas industry live, work and raise their families here. They are invested in their communities and take pride in being good stewards of their environment.

As a result, the Appalachian Basin has been recognized by third party evaluators[1] as having the lowest methane intensity of any major natural gas producing basin in the United States:



[1] Clean Air Task Force & Ceres: Benchmarking Methane & other GHG Emissions – June 2024

This conclusion was recently reinforced by the release of the Appalachian Basin Initiative's (AMI) second annual report[2]. The data examined covered over 17,000 unique sites and nearly 32,000 square miles and was analyzed by the University of Texas at Austin in collaboration with Colorado State University. Both are nationally recognized experts in this subject area.

Data continually reinforces that natural gas produced in the United States has a significantly lower methane intensity than foreign-produced natural gas. For example, while much focus has understandably been on the need for Europe to wean itself from Russian natural gas for national security purposes, it turns out that there is a huge environmental benefit as well. According to the International Energy Agency, Russian-produced natural gas has a methane intensity that can be 65% *higher* than U.S. produced natural gas – and exponentially higher than that when compared to Pennsylvania-produced natural gas.

Industry-Led Best Practices

In addition to complying with all state and federal statutes and regulations that govern air quality, Pennsylvania's natural gas industry has long led the effort to elevate its performance, apply emerging technologies and best practices, and further reduce emissions.

Examples of these practices include but are not limited to:

- Eliminating venting and flaring by directing the natural gas which flows back during well completion activities directly into pipelines.
- Developing best practices for wellhead unloading operations to minimize venting and flaring.
- Using vapor recovery and destruction systems with compressor venting, dehydration, truck loading, tanks and other processes to control volatile organic compounds. This process has a significant co-benefit of reducing methane emissions.
- Using air instead of natural gas for pumps and pneumatic controllers.
- Using Leak Detection and Repair programs to identify and repair leaks.

In addition to these steps and other best practices, operators are engaged in a variety of air emission monitoring activities, including the use of advanced methane detection technologies. This is done through a combination of real-time emission monitoring systems, conducting routine aerial monitoring (drone, helicopter, fixed wing, and satellite) to identify potential leaks or anomalies, assessing process improvements and mitigation opportunities and working with third party certification companies (e.g. Carbon Mapper) to evaluate the success and progress of these measures.

[2]March 20, 2026: https://www.prnewswire.com/news-releases/appalachian-basin-once-again-conrmed-as-lowest-methane-intensity-major-oil-and-gas-basin-in-the-united-states-302719514.html

Most, if not all, of the MSC's operator companies belong to one or more voluntary initiatives to further reduce emissions like methane. Examples of these initiatives include AMI, the Oil and Gas Methane Partnership, One Future, The Environmental Partnership, Natural Gas STAR, and others.

Within the MSC, our operators and the professional contractors they work with are focused on continually raising the bar with respect to performance and emissions reductions. Our Air Quality Committee leads these efforts by engaging directly with regulators to help them better understand the dynamics of this industry and help industry participants understand their reporting and compliance obligations.

The Committee has created a variety of workgroups focused on specific aspects of air quality, including compliance, emerging technologies, and emissions inventories. It has also featured a number of technology and best practices seminars for the benefit of both other industry participants and regulatory staff.

In addition, workgroups are formed to assist with the implementation and compliance of key regulatory actions, such as the revision and creation of air quality permits for the industry (GP-5 and GP-5A), the U.S. EPA methane rule, the U.S. EPA existing source and new source rules, and Leak Detection and Repair obligations.

Putting Methane Emissions into Perspective

Methane emissions should be evaluated in the context of all sources, both human-induced and naturally emitting sources. For example[3]:

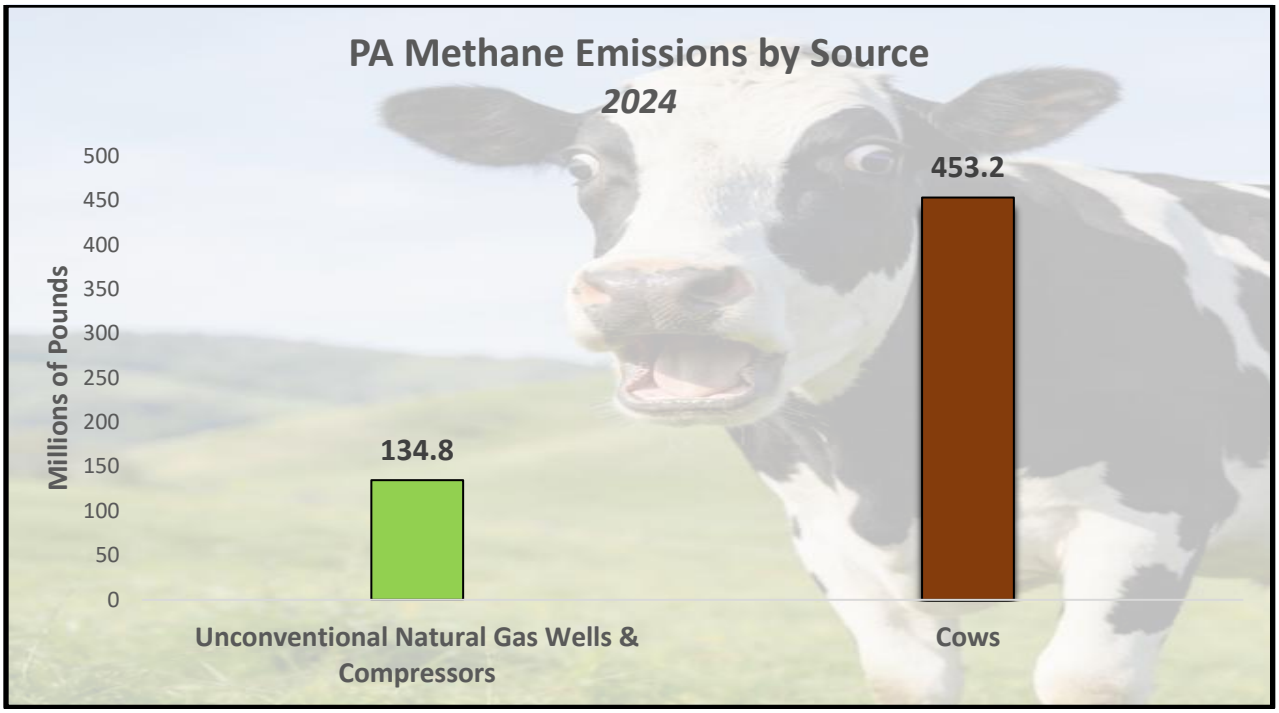
- Agriculture accounts for roughly 35% of human-induced methane emissions in the United States, roughly twice the contribution from natural gas production and processing.

- U.S. methane emissions from all human-induced sources are down 19% since 1990; this despite the fact that U.S. natural gas production has more than doubled over this time period.

- Wetlands are the single largest source of total methane emissions in the United States, responsible for roughly33% of all emissions.

- According to the PA DEP emissions inventory, Pennsylvania cows emit more than three times[4] the amount of methane as Pennsylvania's unconventional wells and compressor stations combined.

[3] Date sources include U.S. EPA and NASA
[4] PA DEP Emissions Inventory; UC Davis



Conclusion

Pennsylvania policymakers should be proud of the performance of the Commonwealth's unconventional natural gas industry and its commitment to meet and exceed compliance obligations. As demonstrated above, Appalachian produced natural gas is the cleanest in the nation and by extension, among the if not the cleanest in the entire world.

As a result, natural gas production continues to increase even as methane emissions continue their significant downward trend. This production is essential to meeting the energy needs of the nation, safeguards them against dependence on distant states or nations, and has contributed to historic improvements in our air quality. We urge this committee and the General Assembly to recognize and celebrate these successes, and work to ensure that Pennsylvania natural gas can continue to be produced safely and responsibly to meet the energy needs of our fellow citizens.

Respectfully Submitted,

Patrick Henderson
Vice President, Government Affairs and Communications

March 2026

Oil and Gas Methane Emissions in Appalachia:

The Polluters Revealed by One Year of Satellite Data

EARTHWORKS GAS LEAKS

The fossil fuel industry claims that gas produced in the Appalachian Basin has the lowest methane-emissions intensity of any oil and gas producing region in the United States. The value of making such a claim is both economic and reputational, especially as governments and private market actors increasingly prioritize reducing methane pollution – a greenhouse gas ~80 times more powerful at climate warming than carbon dioxide over a 20-year span. The credibility of industry claims, however, is challenged by an independent academic analysis that finds that the methane loss rate for gas produced from the Basin is several times higher than reported. Still, major producers from the region have repeated these assertions, with some executives even going further, stating, "... we are the biggest solution to lowering the biggest source of emissions on the planet."

With ground, aerial, and even space-based pollution observation data becoming more readily available, the world is entering a new era. Numerous methane plumes, otherwise invisible to the human eye, are now being documented over the operations of leading gas producers as well as the "midstream" facilities they rely on to transport their product to market. As methane pollution becomes easier to track, preferred industry talking points on the scale of the problem and the sector's ability to voluntarily address it are once again being challenged.

Following the one-year anniversary of Carbon Mapper data based on observations from Planet Lab's Tanager-1 satellite, researchers from Earthworks and Gas Leaks Project decided to examine the discrepancy between industry self-reporting and real-world emissions as measured by this emerging technology. In an effort to ground-truth the industry claims mentioned above, the investigation focused on the Appalachian Basin and found over 90 cases of excess methane pollution spanning November 1, 2024, through November 1, 2025. The researchers also identified the companies likely responsible for excess emissions for more than half of the recorded methane plumes.

This analysis shows that super-emitter methane release incidents, if not quickly identified and mitigated, could result in substantial additional emissions beyond companies' publicly reported inventories and undercut industry claims about efforts to mitigate climate and health harm.

Method and Findings

Data was collected between November 1, 2024, and the start of November 2025 across the gas-producing swath of Pennsylvania, northern West Virginia, and eastern Ohio. During this time period, Carbon Mapper's data portal identified 96 methane plumes from 70 sources attributed to the oil and gas sector.[1] This analysis examined the locations of those plumes relative to publicly available records of oil and gas facilities. In total, the team was able to identify likely sources by company for 57 (59%) of these plumes.[2] A vast majority of the documented plumes, about 90%, fit the EPA's definition of a super-emitter event.[3]

Of the 70 oil and gas methane plume sources, 16 (23%) were detected polluting on multiple days. The monitoring of individual oil and gas sites, at least from Carbon Mapper and other publicly available data aggregated into its portal, remains infrequent. For instance, Planet's Tanager-1 satellite scans a width of about 18 kilometers (~11 miles) with every pass through orbit around Earth, while publicly accessible flyover data also remains limited to periodic aerial campaigns. As a result, only 15 of these 70 (21%) sources were observed on at least four different days over the past year. Twelve (17%) sources were observed on only one day for the entire year. However, nearly 30% (20 sources) appeared to be polluting every day they were observed over the year (see Figure 1).

Topping the list is the gas-producer EQT Corporation, which had 16 observed methane plumes appearing adjacent to its facilities over these twelve months, followed by Expand Energy with 11 plumes. [**The full list of plumes and related details are provided in the Appendix.**]

Figure 1. Total Days Plume Locations Were Observed

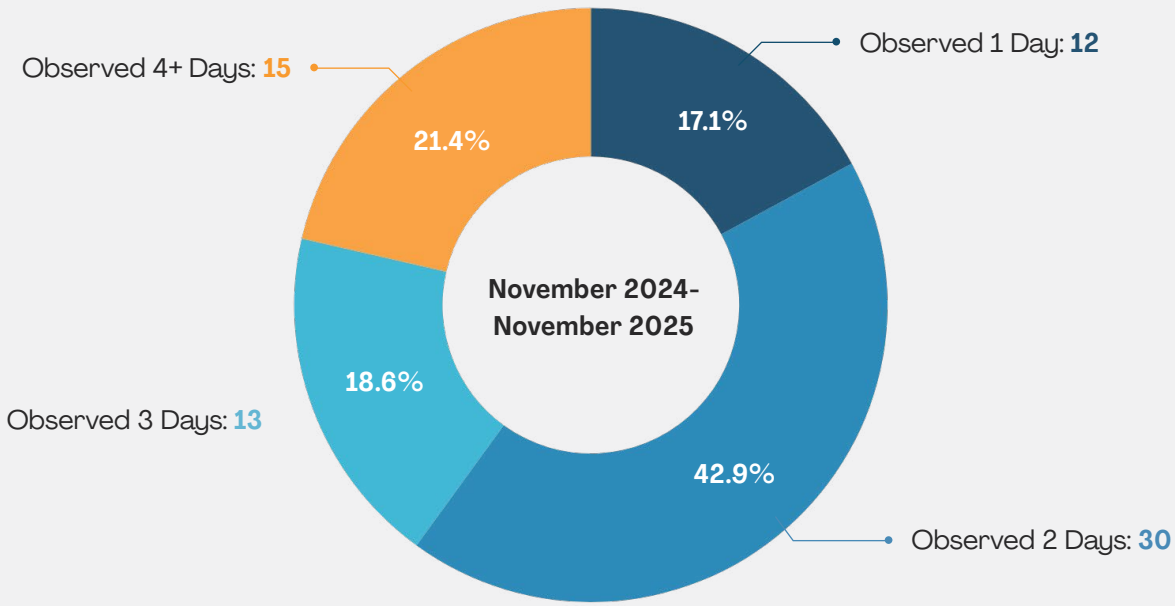


Figure 2. Map with Number of Carbon Mapper Plumes by Company

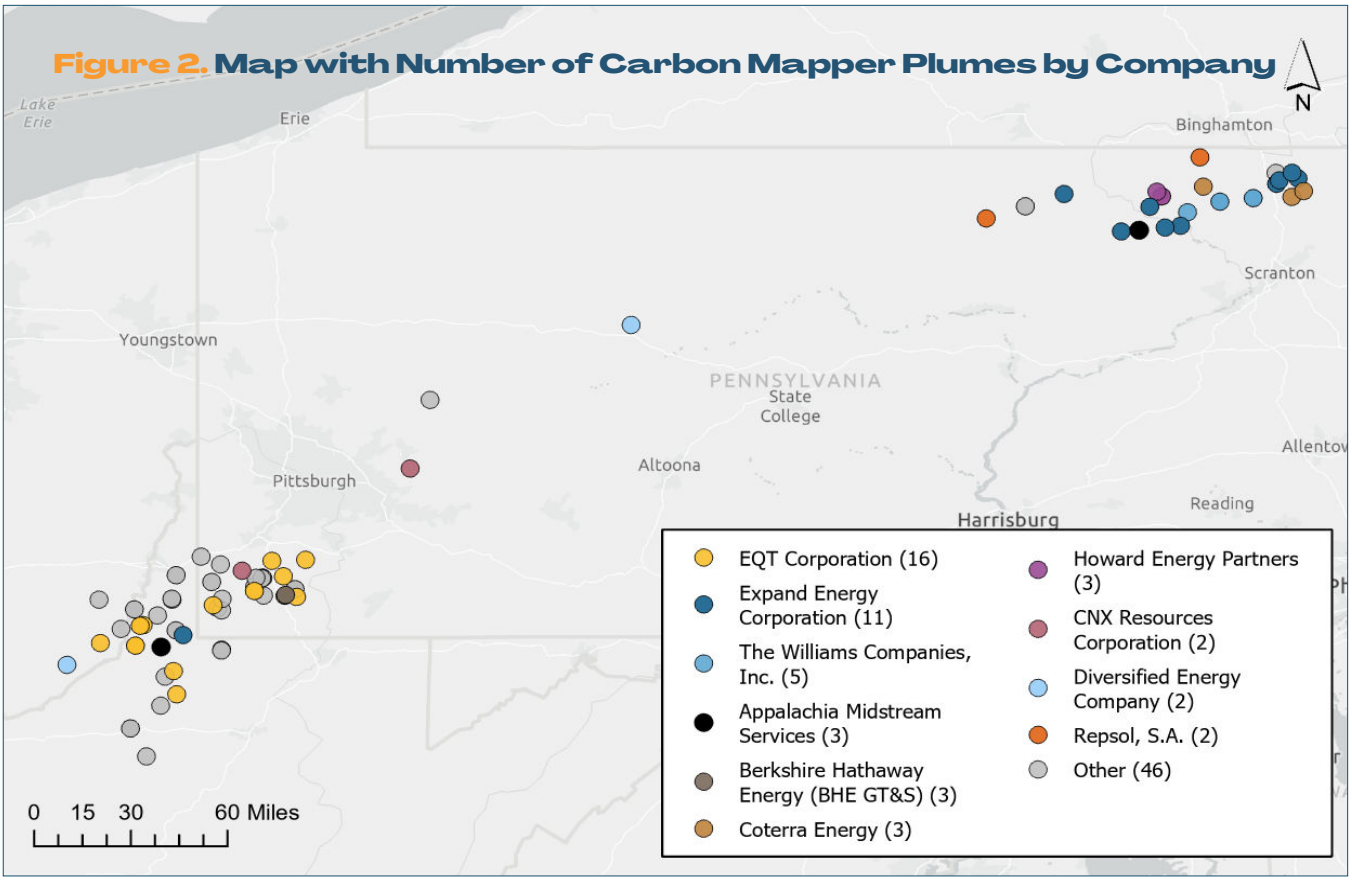
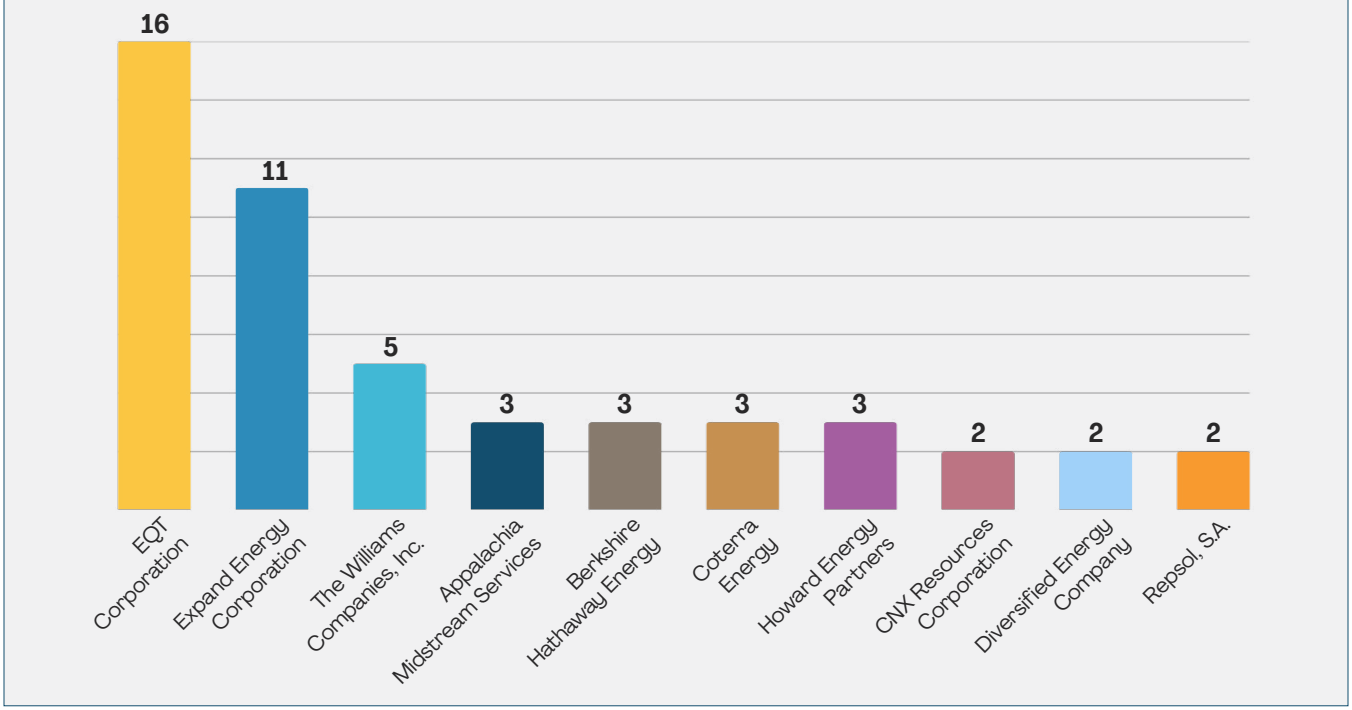


Figure 3. Count of Methane Plumes by Parent Company



Comparing the Significance of Super-Emitters to Reported Emissions

Historically, oil and gas companies have publicly reported their air emissions annually, using criteria specified by the Environmental Protection Agency (EPA). EPA's methodology for the oil and gas industry, referred to as the Greenhouse Gas Reporting Program's Subpart W, provides equipment emissions factors that companies use to self-report company-wide emissions estimates.

For years, EPA's reporting program has been criticized for underestimating real-world emissions, such as not having a process for including super-emitter events. Experts from the energy consulting firm Rystad Energy recently reiterated this fact, writing:

> *"A lot of large leak events are also not found in most exploration and production [E&P] company reporting, which needs to be addressed."*

While EPA finally sought to address some of the concerns by finalizing updated reporting rules in May 2024, the agency under the Trump administration is seeking to end the entire Greenhouse Gas Reporting Program – a move that has generated considerable opposition from the oil and gas industry, which relies on the reporting to demonstrate its environmental performance to both domestic and international shareholders and the public.

Many of these methane plumes reveal extremely large pollution events, but their total duration is unknown. Satellite or flyover observation data effectively captures a single moment in time. It allows entities like Carbon Mapper to quantify emissions rates, but until a satellite or airplane makes another pass or a site inspection is performed, it is impossible to know when a particular methane emissions event started and how long it continued – e.g., an hour, a day, or even longer than a week.

EQT as a Case Study

In the case of America's second-largest gas producer, EQT Corporation, the company has used the results of its greenhouse gas reporting, combined with carbon offsets, as the basis for prominently claiming that "EQT Has Achieved Net Zero" emissions. Yet, our examination of the Carbon Mapper data revealed at least 16 super-emitter events close to EQT facilities over the past year (twelve near the company's well sites and another four appearing next to facilities operated under its Equitrans pipeline subsidiary).

To provide just one comparison of the potential significance of these events, if just those eleven[4] quantified plumes captured at EQT well sites emitted at the average rate estimated by Carbon Mapper for 48 hours, that alone would represent an additional 2.7% of the company's reported emissions for all of 2024.[5]

Large methane release events can result from a wide variety of causes, such as equipment failures, intentional venting, and flare malfunctions. While some events may be relatively short-lived, others have been known to persist for weeks or even longer.

Of the plumes observed over the past year in parts of Appalachia, Tanager detected a large plume in West Virginia on March 2, 2025. When the site was next observed again, one week later, a massive plume of methane remained visible from the same location. The site was observed again months later, on July 12, 2025, and methane pollution continued. This analysis aligned the geocoordinates of these plumes and saw that they overlap with EQT's Erlewine well pad.

According to recent reporting from the Financial Times, a spokesperson for the company confirmed it experienced operational issues at the site in March, while stating it did not detect any anomalies or maintenance events on July 12th. The AVIRIS-3 instrument that observed methane directly over this same location in July is the most advanced imaging system developed and operated by NASA's Jet Propulsion Laboratory and has undergone robust calibration and validation to ensure data accuracy.

Are these companies already using and responding to satellite data to mitigate pollution events?

Possibly yes, though when and where, and by which companies, is not publicly accessible information. In some instances, Carbon Mapper may notify operators of large methane events they observe to inform potential fixes. There are also various for-profit companies, like GHGSat, Insight M, and Kayrros, that offer oil and gas companies satellite or other aerial monitoring and alerting services. It is unclear how widely utilized these products are across the industry.

But one thing known is that the vast majority of companies are not responding even when notified of events. According to a recent report from the U.N.'s International Methane Emissions Observatory, 88% of the agency's alerts notifying oil and gas companies about methane super-emitter events are getting ignored.

Not just climate wrecking: potential health-damaging pollutants

Methane emissions from oil and gas facilities are a key source of climate pollution. However, recent research has shown that hazardous air pollutants are also often co-emitted with emissions, like benzene, which has been linked to a range of detrimental health effects, such as cardiovascular disease, diabetes, lung cancer, and leukemia.

Scientists from PSE Healthy Energy have used Carbon Mapper measurements from actual methane emissions events alongside their comprehensive gas composition database to model the concentrations of hazardous air pollutants co-emitted during particular oil and gas super-emitter events. Their work illustrates incidents where concentrations may have put public health at risk through exposure to air pollution concentrations exceeding government health or safety benchmarks.

Of the 96 Appalachian oil and gas plumes examined in this report, 28 have been investigated and included in PSE's Methane Risk Map. Their modeling research finds that, across all 28 of these events, a total population between 1,249 and 5,788 people may have been at risk of unsafe benzene exposure.

Figure 4. Methane Risk Map Visualization for an Emissions Event on July 12, 2025

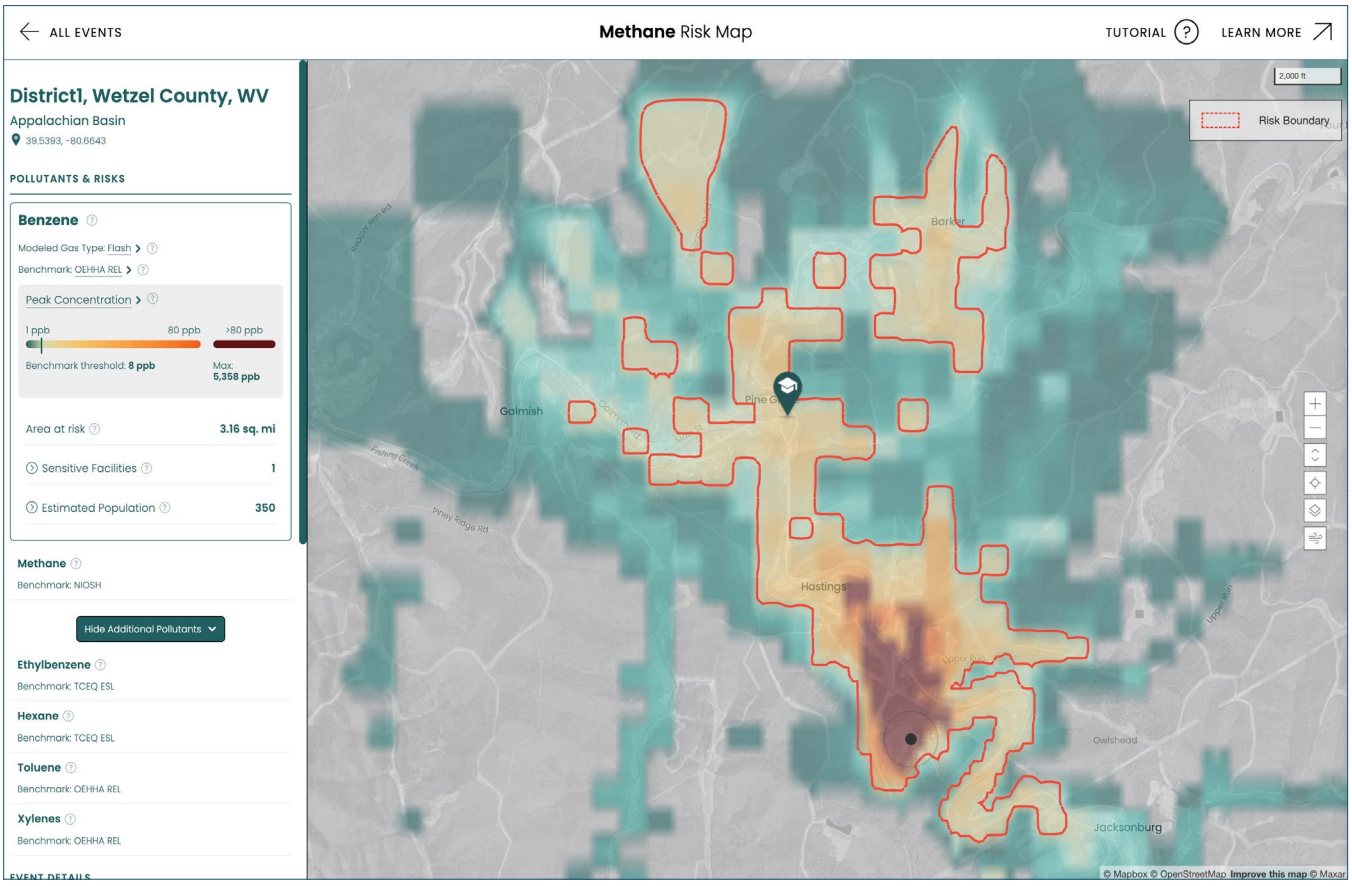


Figure 4 illustrates just one of these events, where PSE's data shows how a methane plume on July 12, 2025, observed venting gas at an estimated rate of 384 kilograms per hour, may have exposed an area just over 3 square miles with an estimated population of 350 people to unsafe levels of air pollution. Included inside this zone was a high school in Pine City, West Virginia, that is less than 2 miles from the source of the incident. According to our research, this plume was spotted near a gas facility operated by Eureka Midstream Holdings.

Conclusion and Recommendations

Even somewhat limited satellite and aerial coverage of the Appalachian Basin in 2025 revealed nearly 100 super-emitting incidents. Many of these appear near the operations of companies that claim to produce gas with very low emissions intensity, and, even in the dataset considered here, there are examples of methane super-emitter events that may have persisted for weeks to months. Therefore, claims regarding methane emissions by industry and companies operating in the Appalachian Basin should not be accepted without further investigation or without noted exceptions.

Our recommendations on improving data accuracy and methane mitigation measures include:

- **Oil and gas companies must employ proven routine monitoring and mitigation strategies for methane emissions.** Satellite and aerial observation data are increasingly available; there is no excuse for oil and gas companies to continue to ignore it. Routine monitoring and rapid mitigation of emissions incidents are a public health imperative for communities living near oil and gas infrastructure. Watchdog organizations like ours will continue to monitor publicly accessible data, and shareholders should demand that industry best practices, which also serve to mitigate risk, are implemented and reflected in company policies and reporting.

- **EPA's Greenhouse Gas Reporting Program must be preserved – and improved.** It is critical in order to regain public trust that the federal government abandons its misguided attempt to end this public data reporting program. Without an independent third-party setting the criteria, reviewing, and verifying this data, the company self-reporting risks losing its remaining credibility.

- **Oil and gas companies must accurately incorporate large-scale incidents and quantifications of emissions into publicly available inventories.** EPA provided an initial pathway for companies to include super-emitter incidents in their annual emissions inventory reporting. Moving forward, company inventories omitting those quantifications should be considered misleading to the public as well as company shareholders.

- **State regulators and policymakers in oil and gas-producing regions should communicate to the public how they are integrating space and/or aerial monitoring to improve their rules and enforcement activities.** The emergence of satellite imaging provides states with new options to help reduce emissions through establishing their own super-emitter monitoring and notification programs. The EPA established a federal Super Emitter Program to promptly notify companies and the public when large release incidents were identified near a company's assets. EPA under the current administration has delayed the program at least until 2027, but states need not, and should not, wait for the federal government to implement their own large-emission monitoring and notification programs. States should provide clear data on when observed large-release emissions events fall within, or exceed, a facility's permitted air emissions thresholds. Communities living near industrial facilities deserve clear information on the air they are breathing, especially in instances where concentrations of otherwise invisible air pollution are putting public health at risk.

Endnotes

1. Carbon Mapper's portal aggregates data collected by the Tanager satellite as well as other publicly accessible sources, such as NASA's EMIT sensor, airborne sources such as NASA AVIRIS-NG, and the Global Airborne Observatory at Arizona State University. Of the 96 Appalachian oil and gas plumes observed between November 1, 2024 and November 1, 2025 that were examined in this report, 32 were observed by the Tanager-1 satellite, 62 were observed by the NASA Jet Propulsion Laboratory's Airborne Visible InfraRed Imaging Spectrometer (AVIRIS-3), and 2 were observed by NASA's Earth Surface Mineral Dust Source Investigation instrument on the International Space Station (ISS-EMI).

2. The remaining 41% of plumes where this analysis was unable to identify a likely source were due to a combination of: 1) a plume existing near multiple potential source facilities; 2) plumes where no nearby oil and gas facility was readily identifiable, or; 3) plumes adjacent to infrastructure where asset owner information was not readily, publicly available.

3. The Environmental Protection Agency has referred to super-emitters as methane release events with an emission rate of 100 kilograms per hour of methane or greater. Only three of the 96 plumes analyzed in this report fall below that threshold, while nine of the documented plumes did not have estimated emissions rates available at the time this report was published.

4. An emissions rate has not yet been provided for one of these twelve observed plumes, and therefore that incident has not been included in this example.

5. This estimate was calculated as follows: 48 [hours] * (660 + 735 + 343 + 2,300 + 2,200 + 1,300 + 1,100 + 629 + 2,400 + 708 + 1,000 = 13,375) [plume emissions rate kg/hr] * 28 [100-year Global Warming Potential value for methane as used by EPA in its Subpart W reporting requirements] / 1,000 [conversion from kg to MT] = 17,976 /661,557 [EQT's 2024 reported Scope 1 GHG emissions MT CO2e, including emissions from Tug and Alta acquisitions and excluding Equitrans] = 2.7%. This estimate assumes constant emissions rates over 48 hours, as well as source persistence of 100%.

Appendix:
Appalachian Basin Plume Records

November 2024 - November 2025

Parent Company										Company Facility Data			Potential Health Risks
	Plume event link from Carbon Mapper	Date Acquired	Emissions rate (kg CH4/hr)	Instrument	State	Latitude	Longitude	Days Observed (Nov. 2024 - Oct. 2025)	Days Detected (Nov. 2024 - Oct. 2025)	Operator	Facility Name	Location link	Methane Risk Map event report
Antero Midstream Corporation	Link	Jul 12, 2025	213+/-25	AVIRIS-3	WV	39.404338	-80.684392	2	1	ANTERO MIDSTREAM LLC	CANTON NORTH COMPRESSOR STATION	Link	
Antero Resources Corporation	Link	Mar 09, 2025	1.3K+/-0.2K	Tanager	WV	39.168530	-80.747947	2	1	ANTERO RESOURCES CORPORATION	MORRIS, I.L. - OXFD13 WELL PAD	Link	
Appalachia Midstream Services	Link	Jul 12, 2025	[Not yet quantified]	AVIRIS-3	WV	39.676912	-80.682149	2	1	APPALACHIA MIDSTREAM SERVICES	BLAKE RIDGE COMP FACILITY	Permit (Lat/Long: 39.676780,	
	Link	Jul 11, 2025	247+/-97	AVIRIS-3	PA	41.614199	-76.293402	4	2	APPALACHIA MIDSTREAM SERVICES	WILMOT COMPRESSOR STATION	Link	Link
	Link	Jul 15, 2025	[Not yet quantified]	AVIRIS-3									
Berkshire Hathaway Energy (BHE GT&S)	Link	Jul 12, 2025	2.0K+/-0.1K	AVIRIS-3	PA	39.918917	-80.123677	2	2	DOMINION TRANSMISSION INC.	CRAYNE STATION	Link	
	Link	Aug 03, 2025	1.2K+/-0.3K	AVIRIS-3									
	Link	Aug 03, 2025	2.5K+/-0.2K	AVIRIS-3									
Blue Racer Midstream	Link	Aug 03, 2025	307+/-61	AVIRIS-3	WV	39.761025	-80.861934	2	1	BLUE RACER MIDSTREAM, LLC	NATRIUM EXTRACTION AND FRACTIONATION PLANT	Link	
CNX Resources Corporation	Link	Aug 03, 2025	822+/-252	Tanager	PA	40.031608	-80.318866	4	1	CNX GAS CO LLC	CONSOL NV57CHS WELL PAD	Link	Link
	Link	Mar 21, 2025	2.1K+/-0.3K	Tanager	PA	40.506478	-79.564696	1	1	CNX MIDSTREAM OPR CO LLC	MAMONT COMPRESSOR STATION	Link	Link

Coterra Energy	Link	Apr 09, 2025	1.6K+/-0.1K	Tanager	PA	41.769169	-75.608337	4	1	COTERRA ENERGY INC	BOLCATO G WELL PAD	Link	Link
	Link	Jul 16, 2025	1.3K+/-0.1K	AVIRIS-3	PA	41.817003	-76.005616	2	1	COTERRA ENERGY INC	REYNOLDS R WELL PAD	Link	
	Link	Oct 27, 2025	227+/-115	Tanager	PA	41.79629	-75.55507	2	1	COTERRA ENERGY INC	LERNER G 4	Link	
Diversified Energy Company	Link	Mar 12, 2025	1.6K+/-0.3K	Tanager	PA	41.173966	-78.573094	3	1	DIVERSIFIED PROD LLC	TURKEY 590983 WELL PAD	Link	Link
	Link	Jul 23, 2025	881+/-344	AVIRIS-3	OH	39.59405	-81.10457	2	1	DIVERSIFIED PRODUCTION LLC	POOL 3 UH	Link	
DT Midstream	Link	Oct 27, 2025	693+/-210	Tanager	PA	41.88047	-75.67934	5	1	Susquehanna Gathering Company	Susquehanna Gathering Company CDP 2	Link	
EQT Corporation	Link	Aug 03, 2025	660+/-272	Tanager	PA	40.005751	-80.133651	4	1	EQT PROD CO	GREGOR WELL PAD	Link	
	Link	Jul 12, 2025	735+/-64	AVIRIS-3	WV	39.457213	-80.612164	2	1	EQT PRODUCTION COMPANY	TRANS ENERGY INC. - ANDERSON 5H	Link	
	Link	Jul 12, 2025	343+/-30	AVIRIS-3	WV	39.565059	-80.626373	2	1	EQT PRODUCTION COMPANY	SCYOC, SHARON ANN - 513976 - D. H. COX	Link	Link
	Link	Jul 12, 2025	2.3K+/-0.1K	AVIRIS-3	WV	39.778394	-80.762719	3	1	EQT PRODUCTION COMPANY	DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO - OLD CROW S-16HM	Link	
	Link	Jun 22, 2025	2.2K+/-0.3K	Tanager	WV	39.775844	-80.776060	3	2	EQT PRODUCTION COMPANY	CNX LAND RESOURCES INC. - BRYAN N WELL PAD	Link	Link
	Link	Aug 3, 2025	1.3K+/-0.2K	AVIRIS-3									
	Link	Mar 02, 2025	1.1K+/-0.5K	Tanager	WV	39.683303	-80.797195	4	3	EQT PRODUCTION COMPANY	ERLEWINE, RICHARD - ERLEWINE 6H WELL PAD	Link	Link
	Link	Mar 09, 2025	629+/-193	Tanager									Link
	Link	Jul 12, 2025	[Not yet quantified]	AVIRIS-3									
	Link	Nov 8, 2024	2.4K+/-0.4K	Tanager	PA	40.0774	-80.1849	3	1	RICE DRILLING	CAPTAIN PLANET WELL PAD	Link	Link
	Link	Jul 23, 2025	708+/-118	AVIRIS-3	OH	39.69541	-80.95472	2	1	RICE DRILLING D LLC	COLLECTORS TRIANGLE S U1H	Link	Link
	Link	Oct 10, 2025	1.0K+/-0.1K	Tanager	PA	40.08217	-80.03402	2	1	RICE DRILLING B LLC	WIGGIN OUT 6H	Link	
	Link	May 26, 2025	6.1K+/-3.2K	ISS-EMI	PA	39.910092	-80.074080	3	1	EQUITRANS L.P.	JEFFERSON COMPRESSOR STATION	Link	
	Link	May 26, 2025	[Not yet quantified]	ISS-EMI	PA	39.937468	-80.263548	2	2	EQUITRANS MIDSTREAM LLC	CALLISTO COMP STATION	Link	
	Link	Aug 03, 2025	307+/-64	AVIRIS-3									
	Link	Aug 03, 2025	760+/-282	Tanager	PA	39.871084	-80.448747	4	1	EQUITRANS MIDSTREAM LLC	SNAPPING TURTLE COMP STATION	Link	
Eureka Midstream Holdings	Link	Jul 12, 2025	384+/-53	AVIRIS-3	WV	39.539292	-80.664265	2	1	EUREKA MIDSTREAM LLC	CARBIDE STATION	Permit (Lat/Long: 39.539560,	Link

Expand Energy Corporation	Link	Jul 28, 2025	308+/-34	AVIRIS-3	PA	41.634825	-76.107555	2	1	CHESAPEAKE APPALACHIA LLC	BOYANOWSKI WELL PAD	Link	Link
	Link	Apr 23, 2025	585+/-258	Tanager	PA	41.626769	-76.177115	7	1	CHESAPEAKE APPALACHIA LLC	TIFFANY 3H WELL PAD	Link	Link
	Link	Aug 02, 2025	770+/-88	AVIRIS-3	PA	41.723205	-76.245569	2	1	CHESAPEAKE APPALACHIA LLC	CERCA 123HC WELL PAD	Link	Link
	Link	May 16, 2025	1.7K+/-0.5K	Tanager	PA	41.608652	-76.373706	5	1	CHESAPEAKE APPALACHIA LLC	CRAWFORD 124HC WELL PAD	Link	Link
	Link	Jul 15, 2025	126+/-27	AVIRIS-3	PA	41.782828	-76.630342	2	1	CHESAPEAKE APPALACHIA LLC	SGL 289B 2H WELL PAD	Link	Link
	Link	Mar 09, 2025	1.4K+/-0.2K	Tanager	WV	39.732476	-80.583588	4	1	SWN PRODUCTION COMPANY, LLC	YOCUM MSH WELL PAD	Link	Link
	Link	Aug 18, 2025	438+/-187	Tanager	PA	41.83015	-75.67673	5	2	SWN PROD CO LLC	WARNER 1H	Link	
	Link	Oct 27, 2025	412+/-159	Tanager									
	Link	Oct 27, 2025	486+/-193	Tanager	PA	41.84613	-75.66454	5	1	SWN PROD CO LLC	SWEENEY 1H	Link	
	Link	Oct 27, 2025	589+/-236	Tanager	PA	41.85466	-75.58052	4	1	SWN PROD CO LLC	LEONARD 3H	Link	
	Link	Oct 27, 2025	490+/-192	Tanager	PA	41.8818	-75.60734	1	1	SWN PROD CO LLC	DROPP 6H	Link	
EXCO Resources, Inc.	Link	Mar 21, 2025	1.2K+/-0.3K	Tanager	PA	40.825479	-79.475313	2	1	EXCO RESOURCES PA LLC	SCHRECENGOST PAD 8 WELL PAD	Link	Link
Howard Energy Partners	Link	Aug 02, 2025	414+/-41	AVIRIS-3	PA	41.771752	-76.192367	1	1	HEP Pennsylvania Gathering	WHITE CPF-1	Link	Link
	Link		131+/-20	AVIRIS-3									Link
	Link	Jul 11, 2025	[Not yet quantified]	AVIRIS-3	PA	41.793339	-76.214068	2	1	HEP Pennsylvania Gathering	GREENZWEIG #1 COMPRESSOR STATION	Link	
Laurel Mountain Midstream, LLC	Link	Jul 12, 2025	505+/-46	AVIRIS-3	PA	39.916134	-80.222122	1	1	LAUREL MTN MIDSTREAM OPR LLC	CANTARAL COMPRESSOR STATION	Link	
Repsol, S.A.	Link	Apr 23, 2025	510+/-119	Tanager	PA	41.953094	-76.020554	3	1	REPSOL OIL & GAS USA LLC	TRAVER 07 081 07 E 7H WELL PAD (TANK)	Link	Link
	Link	Jul 11, 2025	430+/-119	AVIRIS-3	PA	41.66901	-76.9795	2	1	Repsol Oil & Gas USA	DCNR 010 COMPRESSOR STATION	Link	Link
The Williams Companies, Inc.	Link	Jul 15, 2025	36+/-13	AVIRIS-3	PA	41.697777	-76.076469	3	1	WILLIAMS LLC	RATTLESNAKE HILL COMPRESSOR STATION	Link	
	Link	Jul 28, 2025	[Not yet quantified]	AVIRIS-3	PA	41.76363	-75.78174	3	2	Williams	Potter Compressor Station	Link	
	Link	Oct 27, 2025	1.7K+/-0.4K	Tanager									
	Link	Jul 28, 2025	[Not yet quantified]	AVIRIS-3	PA	41.74707	-75.93116	3	2	WILLIAMS FIELD SVC CO LLC	Church Compressor Station	Link	
	Link	Jul 15, 2025	165+/-60	AVIRIS-3									

Unknown	Link	Feb 23, 2025	1.7K+/-0.2K	Tanager	WV	39.754403	-80.615306	4	2					
	Link	Mar 09, 2025	883+/-153	Tanager										
	Link	Jul 11, 2025	570+/-172	AVIRIS-3	PA	41.725489	-76.804100	3	2					Link
	Link	Jul 15, 2025	[Not yet quantified]	AVIRIS-3										
	Link	Aug 03, 2025	265+/-31	AVIRIS-3	PA	39.999995	-80.227265	1	1					
	Link	Jul 12, 2025	354+/-25	AVIRIS-3	WV	39.665013	-80.410703	2	1					
	Link	Aug 03, 2025	1.3K+/-0.4K	Tanager	PA	40.060798	-80.415702	3	1					
	Link	Jul 12, 2025	[Not yet quantified]	AVIRIS-3	WV	39.298377	-80.819759	4	4					
	Link	Jul 23, 2025	1.0K+/-0.3K	AVIRIS-3										
	Link	Jul 24, 2025	1.6K+/-0.3K	AVIRIS-3										
	Link	Aug 03, 2025	1.5K+/-0.1K	AVIRIS-3										
	Link	Nov 08, 2024	1.8K+/-0.2K	Tanager	PA	39.99751	-80.22529	1	1					
	Link	Jul 12, 2025	155+/-13	AVIRIS-3	WV	39.660459	-80.411403	2	1					
	Link	Jul 12, 2025	206+/-18	AVIRIS-3	PA	39.857696	-80.427951	1	1					
	Link	Jul 23, 2025	1.1K+/-0.1K	AVIRIS-3	WV	40.010950	-80.614708	2	2					
	Link	Aug 03, 2025	1.1K+/-0.1K	AVIRIS-3										
	Link	Jul 12, 2025	217+/-20	AVIRIS-3	PA	39.915507	-80.126648	2	2					
	Link	Aug 03, 2025	464+/-111	AVIRIS-3										
	Link	Aug 03, 2025	886+/-92	AVIRIS-3										
	Link	Aug 03, 2025	290+/-28	AVIRIS-3	WV	39.85186	-80.8021	2	2					Link
	Link	Aug 03, 2025	341+/-31	AVIRIS-3										Link
	Link	Jul 23, 2025	113+/-26	AVIRIS-3										
	Link	Jul 23, 2025	198+/-38	AVIRIS-3										Link
	Link	Aug 03, 2025	427+/-147	Tanager	PA	39.95813	-80.26284	3	1					
	Link	Aug 03, 2025	1.2K+/-0.3K	Tanager	PA	39.99595	-80.23064	3	1					
	Link	Aug 03, 2025	1.1K+/-0.1K	AVIRIS-3	PA	39.94586	-80.081	2	2					
	Link	Aug 03, 2025	700+/-188	AVIRIS-3										
	Link	Jul 12, 2025	292+/-35	AVIRIS-3										
	Link	Jul 12, 2025	162+/-19	AVIRIS-3										
	Link	Jul 23, 2025	81+/-15	AVIRIS-3	WV	39.8969	-80.63308	1	1					
	Link	Jul 23, 2025	137+/-20	AVIRIS-3	WV	39.90179	-80.63434	1	1					

Unknown	Link	Jul 23, 2025	49+/-5	AVIRIS-3	WV	39.82365	-80.6982	1	1				
	Link	Jul 23, 2025	566+/-147	AVIRIS-3	PA	40.09707	-80.50265	2	1				
	Link	Jul 12, 2025	272+/-38	AVIRIS-3	PA	39.84719	-80.41052	1	1				
	Link	Jul 12, 2025	662+/-58	AVIRIS-3	PA	39.99856	-80.25654	2	1				Link
	Link	Oct 26, 2025	325+/-114	Tanager	OH	39.89717	-80.96067	1	1				
	Link	Aug 03, 2025	619+/-77	AVIRIS-3	PA	39.97921	-80.45522	2	2				
	Link	Jul 24, 2025	238+/-26	AVIRIS-3									
	Link	Jul 12, 2025	212+/-15	AVIRIS-3	PA	39.90075	-80.40809	2	1				

EARTHWORKS GAS LEAKS

This report was researched and written by Geoff Bromaghim of the Gas Leaks Project and Ekaterina Larina, Josh Eisenfeld, and Dakota Raynes of Earthworks. It was edited by Javi Garcia of Gas Leaks and Justin Wasser of Earthworks.

Co-published by Earthworks and Gas Leaks Project

BIG GAS POLLUTERS

BigGasPolluters.org is a product of a coalition including Earthworks and Gas Leaks Project. It was launched to provide credible, evidence-based information on the claims and actions of the fossil fuel industry. The campaign includes a database documenting reported methane emissions, commitments made to reduce methane, evidence of leakage events from Earthworks, and more information about the 100 largest oil and gas companies in the US. Our goal is simple: we want a world with as little pollution from oil and gas as possible.

March 2026

Pennsylvania House Environmental Committee Hearing
Written Testimony on Methane Emissions from the Oil and Gas Industry
PSR PA

April 2026

RE: Testimony on Methane Emission from Oil and Gas

Chairman Vitali, Minority Chairman Rader, and Members of the House Environmental Committee:

Thank you for the opportunity to provide testimony on methane emissions from the oil and gas industry. Physicians for Social Responsibility Pennsylvania (PSR PA) is a nonprofit organization of physicians, public health professionals, and concerned citizens working to protect human health from the impacts of environmental hazards.

Methane pollution is not only a climate issue, it is a public health emergency. The oil and gas sector is the largest industrial source of methane emissions in Pennsylvania, and these emissions are often accompanied by harmful co-pollutants that directly affect the health of our communities.

Methane is a greenhouse gas over 80 times more powerful than carbon dioxide over a 20-year period, making it a major driver of near-term climate change. Rapid methane reductions are one of the most effective ways to slow warming in the coming decades. However, methane emissions do not occur in isolation. They are released alongside hazardous air pollutants, including: Benzene, Formaldehyde, and Volatile organic compounds (VOCs). Exposure to these pollutants has been linked to: Increased asthma attacks and respiratory illness, Cardiovascular disease, Adverse birth outcomes, including low birth weight and preterm birth, and Elevated cancer risks. Communities living near oil and gas infrastructure, particularly in rural and economically disadvantaged areas, bear a disproportionate burden of these health risks.

Pennsylvania is one of the nation's leading natural gas producers, with hundreds of thousands of active and abandoned wells, as well as extensive pipeline and compressor station infrastructure. Key concerns include:

- Leakage across the supply chain: Methane escapes during drilling, processing, transmission, and storage.

- Abandoned and orphaned wells: These wells can leak methane for decades if not properly plugged.
- Outdated infrastructure: Older equipment is especially prone to leaks and venting.
- Insufficient monitoring: Current detection and reporting requirements often underestimate total emissions.

Recent studies suggest that actual methane emissions may be significantly higher than reported, due to undercounting and gaps in monitoring.

From a medical perspective, reducing methane emissions is essential to protecting patient health. Physicians across Pennsylvania are already seeing the impacts of: Increased respiratory distress during high-ozone days, Heat-related illness exacerbated by climate change, and Stress and anxiety in communities facing environmental exposure. Children, the elderly, and individuals with pre-existing conditions are particularly vulnerable. Importantly, these harms are preventable. Many methane emissions come from avoidable leaks or outdated practices that can be addressed with existing technology.

PSR PA urges the Committee to advance policies that significantly reduce methane emissions while protecting public health:

1. Strengthen Methane Emission Standards

- Require comprehensive leak detection and repair (LDAR) programs with frequent inspections
- Mandate the use of proven technologies to capture methane rather than venting or flaring
- Apply standards to both new and existing sources

2. Improve Monitoring and Transparency

- Expand requirements for continuous monitoring and public reporting
- Utilize advanced detection technologies, including satellite and aerial monitoring
- Ensure data is accessible to communities and public health researchers

3. Address Abandoned and Orphaned Wells

- Increase funding and staffing for well-plugging programs
- Prioritize wells near homes, schools, and water sources
- Hold industry accountable for cleanup costs where possible

4. Limit Routine Flaring and Venting

- Prohibit routine flaring except in true emergencies
- Require operators to capture gas whenever feasible

5. Center Environmental Justice

- Prioritize protections for communities disproportionately impacted by oil and gas development
- Ensure meaningful community input in permitting and regulatory decisions

Reducing methane emissions is both feasible and cost-effective. Captured methane can be sold, offsetting compliance costs. Many companies are already implementing these practices voluntarily. Strong methane regulations have the ability to create jobs in monitoring, repair, and well plugging and improve air quality and reduce healthcare costs. Methane mitigation represents a critical opportunity to protect both public health and the climate. The science is clear, the technology exists, and the need is urgent.

PSR PA urges the Committee to take decisive action to reduce methane emissions from the oil and gas industry and safeguard the health of all Pennsylvanians.

Thank you for your time and consideration.

Matt Shorraw

Policy and Program Coordinator, PSR PA