July 30, 2025

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Re: Proposed OOOOc State Plan

Dear Secretary Shirley,

Environmental Defense Fund ("EDF") and Pennsylvania Environmental Council ("PEC") greatly appreciate the opportunity to provide comments on the Pennsylvania Department of Environmental Protection's Proposed State Plan for 40 C.F.R. Part 60, Subpart OOOOc ("OOOOc").

A nonprofit organization with over 3 million members worldwide and over 16,000 members in Pennsylvania, EDF is deeply concerned about the pollution emitted from oil and natural gas development and operations. EDF brings a strong commitment to sound science, collaboration, and market-based solutions to our most pressing environmental and public health challenges. Through research and advocacy, EDF has been driving action to cut methane pollution for over a decade.

PEC is a statewide project- and policy-focused nonprofit organization that works with all stakeholders to seek innovative and effective solutions to the environmental challenges facing Pennsylvania. Along with EDF, PEC has a long history of working with the oil and gas industry to identify and establish leading practices within the Commonwealth.

I. Executive Summary

We appreciate DEP's commitment to protecting public health and the planet from climate-destabilizing methane and air pollution. We commend the state on moving forward with a state plan to implement OOOOc. DEP has authority to regulate methane from existing sources under the Pennsylvania Air Pollution Control Act ("APCA") as methane is a contaminant that contributes to air pollution as defined in the APCA and reducing methane implements the goals of APCA. Strong state action is particularly necessary given the unprecedented rollbacks of climate, air protection and public health rules at the EPA. The fate of the model rule, and many other EPA clean air and public health rules, are in peril. In the face of this uncertainty, it is imperative that DEP assert strong leadership to implement its duty to protect public health[1] and ensure that the standards of performance for existing sources it is adopting will be durable and resilient in the long run. Once the DEP has finalized a state plan that achieves equivalent emissions reductions as EPA's model rule, we recommend DEP start a regulatory rulemaking to

[1] 35 P.S. § 4002.

adopt standards for existing sources pursuant to state authority. Doing so will ensure such protections remain in place despite any potential reconsideration at the federal level while delivering clean air protections to the residents of the Keystone State.

Curbing methane pollution from existing oil and gas facilities is one of the most cost-effective ways to slow the rate of climate change in our lifetime. Climate change poses an existential threat to our planet and way of life, and we are at a point where deep and immediate reductions in methane are critically necessary to avoid some of the most devastating impacts of climate change. Per EDF estimates based on MethaneAIR overflights, in 2023, the oil and gas industry in Pennsylvania was responsible for the release of 1.05 million metric tons of methane – primarily from sources covered by OOOOc.[2] Implementation of the standards of performance for methane emissions contained in OOOOc's model rule would lead to estimated emissions reductions of 740,000 metric tons of methane between 2028 and 2030.[3]

Swift implementation of the model rule contained in OOOOc will help protect Pennsylvanians from unhealthy levels of ozone. Methane is a precursor to global ozone concentrations, and thus reductions of methane will also help reduce global concentrations of ground-level ozone. Volatile organic compounds ("VOCs") that are often co-released with methane during venting, flaring and when operators leak natural gas, contribute to the formation of regional ozone pollution. EDF estimates oil and gas sources in Pennsylvania emitted 0.32 million metric tons of VOCs in 2023.[4] In Pennsylvania, adoption of the standards of performance for existing sources contained in OOOOc will result in the removal of 228,000 metric tons of VOCs by 2030.[5]

Adoption of standards of performance for existing sources would also result in much-needed public health protections from hazardous air pollutants ("HAPs") and other toxic air contaminants such as hydrogen sulfide. Oil and gas facilities emit a suite of HAPs such as benzene and formaldehyde which are known carcinogens and contribute to respiratory and blood disorders.[6] In addition, maternal exposure to benzene has been associated with multiple adverse

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[2] EDF, Methodology for Developing MAIR Informed State-Level Estimates: Integrating MAIR Regional Level Estimates with Additional Measurement-Based Estimates (2025), (hereinafter "EDF MAIR estimates"), https://library.edf.org/AssetLink/8m16021t5ci0a70d260xc2274ii4g038.pdf

[3] EDF PA Emissions and Reductions, Ex. 1.

[4] EDF MAIR estimates, *supra* note 1. Emissions of VOCs and HAPs are derived from ratios of CH4 to VOC and HAP emissions from state-level data in EPA's 2020 Nonpoint Oil and Gas Emission Estimation Tool Version 1.3.

[5] EDF PA Emissions and Reductions, *supra* note 3.

[6] Agency for Toxic Substances and Disease Registry (ATSDR), Benzene ToxFAQs™, https://www.atsdr.cdc.gov/toxfaqs/tfacts3.pdf; EPA, Toxicological Review of Benzene (Noncancer Effects) (CAS No. 71-43-2), In Support of Summary Information on the Integrated Risk Information System (IRIS), (Oct. 2002), https://iris.epa.gov/static/pdfs/0276tr.pdf; Goldstein, Bernard D., PhD and Smith, Martyn T. PhD, Formaldehyde, IARC Monograph 88 (2006), https://iris.epa.gov/ChemicalLanding/&substance_nmbr=419; https://publications.iarc.who.int/_publications/media/download/3805/c24b0ad4f82efe0d57ddf335f2c12e9badb9507b.pdf.

developmental effects.[7] The oil and gas industry in Pennsylvania released approximately 0.07 million metric tons of HAPs in 2023.[8]

Persons living within a half mile of oil and gas facilities are particularly at risk of experiencing negative health effects due to exposure to toxic air contaminants including HAPs.[9] In Pennsylvania, approximately 1.1 million people, including children, the elderly, adults with asthma, and people living in poverty, live within a half mile of oil and gas operations.[10] Numerous studies have found increases in adverse health impacts related to air pollution exposure to children, the elderly, and other vulnerable groups living near oil and gas sites.[11] Implementation of the standards of performance for methane contained in OOOOc would reduce toxic air pollution by 47,000 metric tons of HAPs by 2030, thus helping to protect the health of those living near oil and gas facilities, including vulnerable populations.[12]

Zero emission standards such as EPA's zero methane emissions standards for pneumatic controllers and pneumatic pumps reduce combustion emissions. When operators flare or combust natural gas, the combustion releases oxides of nitrogen ("NOx"), VOCs, air toxics, black carbon and particulate matter. Adoption of rules that require operators eliminate emissions further protects the planet and public health.

Standards of performance for existing sources are a highly cost-effective, and largely economical, pathway to reduce oil and gas pollution. For each of the existing sources subject to the emissions guidelines, EPA determined that at least one compliance option fell below $2,185

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[7] Lupo P.J., Symanski E., Waller D.K., Chan W., Langlois P.H., Canfield M.A., Mitchell L.E., Maternal Exposure to Ambient Levels of Benzene and Neural Tube Defects Among Offspring: Texas, 1999-2004. *Environ Health Perspect*. (Mar. 2011), 119(3):397-402. doi: 10.1289/ehp.1002212. Epub 2010 Oct 5. PMID: 20923742; PMCID: PMC3060005.

[8] EDF MAIR estimates, *supra* note 1. Emissions of VOCs and HAPs are derived from ratios of CH4 to VOC and HAP emissions from state-level data in EPA's 2020 Nonpoint Oil and Gas Emission Estimation Tool Version 1.3.

[9] McKenzie, Lisa M. et al., Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources, *The Science of the Total Environment*, Vol. 424 (2012): 79-87, doi:10.1016/j.scitotenv.2012.02.018; Makri, Anna, Stilianakis, Nikolaos I., Vulnerability to air pollution health effects, *International Journal of Hygiene and Environmental Health*, Vol. 211, Issues 3–4 (2007), https://www.sciencedirect.com/science/article/abs/pii/S1438463907000971?via%3Dihub; Kingdon, Camilla, Air Pollution is the Largest Environmental Risk to Public Health and Children Are Especially Vulnerable, *BMJ (Clinical research ed.)*, Vol. 381 1037 (May 2023) doi:10.1136/bmj.p1037.

[10] EDF PA 2023 near oil and gas populations methodology, Ex. 2.

[11] McKenzie, Lisa M., et al., Exposures from Oil and Gas Development and Childhood Leukemia Risk in Colorado: A Population-Based Case-Control Study, Cancer Epidemiology, Biomarkers & Prevention : A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology, Vol. 34,5 (2025): 658-668. doi:10.1158/1055-9965.EPI-24-1583; Weisner, Meagan L., et al., Health Symptoms and Proximity to Active Multi-Well Unconventional Oil and Gas Development Sites in the City and County of Broomfield, Colorado, International Journal of Environmental Research and Public Health, Vol. 20,3 2634 (Feb. 2023) doi:10.3390/ijerph20032634; Clark, Cassandra J., Johnson, Nicholaus P., Soriano, Mario, Warren, Joshua L., Sorrentino, Keli M., Kadan-Lottick, Nina S., Saiers, James E., Ma, Xiaomei, and Deziel, Nicole C., Unconventional Oil and Gas Development Exposure and Risk of Childhood Acute Lymphoblastic Leukemia: A Case–Control Study in Pennsylvania, 2009–2017, Environmental Health Perspectives, Vol. 130:8 (2022) https://doi.org/10.1289/EHP11092; Cushing, L.J., Vavra-Musser, K., Chau, K., Franklin, M., Johnston, J.E., Flaring from Unconventional Oil and Gas Development and Birth Outcomes in the Eagle Ford Shale in South Texas, Environmental Health Perspectives, Vol. 128 (2020) https://pubmed.ncbi.nlm.nih.gov/32673511/.

[12] EDF PA Emissions and Reductions, *supra* note 3.

per ton of methane reduced – EPA's threshold for what constitutes a cost-effective control abatement option.[13] EPA also estimates that the total annualized compliance costs for the NSPS and Emissions Guidelines combined represent 0.5% of industry revenue,[14] accounting for gas savings. EPA analysis demonstrates that technologies and practices that eliminate or reduce methane emissions from existing oil and gas sources are low cost and achievable, even for operators of marginal wells and small operators. We estimate that marginal wells in Pennsylvania are responsible for roughly half (48.5%) of the oil and gas pollution in the state. Marginal wells emitted an estimated 485,000 tons of CH4, 150,000 tons of VOCs, and 31,000 tons of HAPs in 2023, [15] making standards of performance for existing sources important an important aspect of strong clean air protections.

Regulations like OOOOc that require operators to conserve, rather than waste, natural gas also means increased royalty and corporate tax revenue for provincial governments. Recent analysis conducted by EDF demonstrates that the Pennsylvania government would miss out on over $2.2 million in lost royalties from 2028-2030 due to wasted gas that could have been sent to sale. Gas that is vented, leaked, or flared is not subject to royalties or corporate taxes since the gas is not marketed. Using the 2023 Henry Hub Price for natural gas, EDF estimates that the gas lost by not implementing OOOOc would be worth $128 million. In addition to lost state royalties, the federal government and Pennsylvanians who own land or mineral rights would lose additional royalty revenue.[16]

Robust methane reduction measures can be implemented without negatively impacting production. New Mexico adopted comprehensive and strong rules to limit methane and VOC emissions in 2021. EDF analysis demonstrates that these rules had no impact on production, which continued to climb steadily in the face of such requirements.[17]

We urge Pennsylvania to leverage the availability of advanced methane detection technologies such as satellites to detect methane emissions. One way to do so would be for the state to engage with the UN Environment Programme's International Methane Emissions Observatory ("IMEO") to leverage methane emissions detection information received from satellites. IMEO collects and publishes data on methane emissions from oil and gas, as well as other, sources worldwide. Currently, sources of data include twelve high-resolution satellites capable of attributing methane emissions detection events to individual oil and gas facilities through IMEO's Methane Alert and Response System ("MARS"). Using enhanced AI

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[13] 89 Fed. Reg. at 16,864.
[14] 89 Fed. Reg. at 16,866. EPA did not separately analyze compliance costs for compliance with OOOOc alone.
[15] Methane emissions data comes from Omara, M., Zavala-Araiza, D., Lyon, D.R. et al. Methane emissions from US low production oil and natural gas well sites. Nat Commun 13, 2085 (2022). https://doi.org/10.1038/s41467-022-29709-3. Emissions of VOCs and HAPs are derived from ratios of CH_4 to VOC and HAP emissions from state-level data in EPA's 2020 Nonpoint Oil and Gas Emission Estimation Tool Version 1.3.
[16] To estimate lost royalties for different land owners in Pennsylvania, EDF used EI-ME, a spatially disaggregated oil and gas methane emissions dataset, to determine the percentage of emissions on each land type. Other publicly available spatial datasets were used to determine land ownership in Pennsylvania, State lands included DCNR datasets and state game lands, parks and forests. Federal land and mineral ownership were determined using BLM, NPS, USFS, and other federal agency datasets.
[17] EDF Blog, Clearing the Air: How New Rules for Oil & Gas Facilities Offer Major Wins for the Environment and Economy (June 7, 2024), https://blogs.edf.org/markets/2024/06/07/clearing-the-air-how-new-rules-for-oil-gas-facilities-offer-major-wins-for-the-environment-and-economy/.

capabilities and remote sensing experts, MARS is able to validate such detections within 15 days of image acquisition. Government entities may sign up to receive alerts of oil and gas methane emissions detections from MARS by nominating a "focal point" to receive notification directly from IMEO.[18] With this information, governments can take steps to mitigate high-emissions events, such as working with individual oil and gas companies to investigate and remediate the emissions. New Mexico has signed up to receive MARS alerts. We urge Pennsylvania to do the same.

Pennsylvania could also follow the lead of California. The California Air Resources Board recently amended its oil and gas methane rule to require oil and gas operators to investigate and repair, if appropriate, leaks detected using satellites.[19] This rule will help reduce large emission events that might otherwise go undetected between routine leak detection and repair inspections and further demonstrates how advanced detection technologies such as a satellite can help reduce methane pollution.

Our comments below provide support for a robust state plan that achieves equivalent or greater emissions reductions as EPA's model rule and documents the reasonableness of EPA's presumptive standards for existing sources, including lower-producing wells.

II. Background

On March 8, 2024, EPA finalized the first ever federal standards of performance to address methane pollution from existing oil and gas sources.[20] Existing sources (so called "designated facilities" in the EPA rule) are sources constructed on or before December 6, 2022.[21] According to EPA, implementation of standards of performance for existing sources will avoid the release of 35 million tons of methane to the atmosphere between 2024 and 2028.[22] The rules will also result in the reduction of harmful co-pollutants that contribute to direct public health impacts and regional ozone. EPA estimates that standards of performance for existing sources will reduce 8.6 million tons of VOCs that contribute to ground-level ozone[23] and approximately 320,000 tons of HAPs, including benzene—a known human carcinogen—that threaten public health, between 2024 and 2028.[24] Implementation of EPA's standards of performance for designated facilities nationally will result in gas savings that lead to increased revenue, royalties and taxes. Per EPA's Regulatory Impact Analysis, by 2033, the increased recovery of gas will offset $1.4 billion per year of compliance costs.[25]

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[18] UN Environment Programme, IMEO 2024 Report, Invisible but not unseen. How Data-Driven Tools Can Turn The Tide On Methane Emissions-If We Use Them, Ch.3, https://wedocs.unep.org/bitstream/handle/20.500.11822/46541/eye_on_methane_2024_invisible_but_not_unseen.pdf?sequence=3.

[19] 17 C.C.R. § 95669.1

[20] EPA, 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. 16,820 (Mar. 8, 2024).

[21] Consistent with its state approach, DEQ uses the term "source" to refer to a designated facility, and so we will do so here.

[22] EPA, Regulatory Impact Analysis of the Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, Table 1-3 (Dec. 2023) (hereinafter "RIA").

[23] *Id*.

[24] *Id.*

[25] RIA at Table 2-10.

In Pennsylvania, adoption of the standards of performance for existing sources contained in OOOOc will result in the removal of 740,000 metric tons of methane, 228,000 metric tons of VOCs and 47,000 metric tons of HAPs by 2030.[26] These reductions are in addition to reductions that will occur due to the status quo, which accounts for reductions accruing from current Pennsylvania rules and permit requirements and OOOO, OOOOa and OOOOb.[27]

A. Adoption of the Standards of Performance for Existing Sources Contained in OOOOc is an Effective Way to Reduce Methane and Help Combat Climate Change

The oil and gas industry is the largest source of anthropogenic methane in the U.S., contributing approximately 213 MMT CO2e to the atmosphere in 2022.[28] Pennsylvania is the U.S.'s second largest producer of dry natural gas,[29] responsible for the release of 1.05 million metric tons of methane in 2023.[30]

Robust action to reduce methane is critically needed to combat climate change. Fossil-sourced methane is a dangerous and powerful greenhouse gas (GHG) that is 82.5 times more potent than carbon dioxide on a molecule per molecule basis over a 20-year timeframe, and 29.8 times more potent over a 100-year time frame.[31] Methane is a short-lived greenhouse gas, lasting only approximately a decade in the atmosphere.[32] These attributes make reducing methane emissions critical for achieving short-term GHG reductions and slowing the rate of climate change happening now.[33] For example, a recent study demonstrates that pursuing all mitigation measures now could slow the global-mean rate of near-term decadal warming by around 30%.[34]

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[26] EDF PA Emissions and Reductions, Ex. 1.
[27] *Id*.
[28] EPA (2024). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 U.S. Environmental Protection Agency, EPA 430R-24004, Table 2-1: Recent Trends in U.S. Greenhouse Gas Emissions and Sinks by Gas (MMT CO2 Eq.), https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-chapter-2-trends.pdf
[29] EIA FAQs, Which States Consume and Produce the Most Natural Gas?, https://www.eia.gov/tools/faqs/faq.php?id=46&t=8#:~:text=Texas%E2%80%949.75%20Tcf%E2%80%9425.8%25,Mexico%E2%80%942.89%20Tcf%E2%80%947.6%25
[30] EDF MAIR estimates, *supra* note 1.
[31] IPCC, 2021: *Climate Change 2021: The Physical Science Basis, Contribution of Working Group to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, p. 1017, Table 7.15., https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_FullReport_small.pdf.
[32] EPA, Atmospheric Lifetime and Global Warming Potential Defined, https://19january2017snapshot.epa.gov/climateleadership/atmospheric-lifetime-and-global-warming-potential-defined_.html.
[33] U.S. Climate Change Science Programs Synthesis and Assessment Product 3.2, *Climate Projections Based on Emissions Scenarios for Long-Lived and Short Lived Radiatively Active Gases and Aerosols*, p. 64-65 (Sept. 2008) https://pubs.giss.nasa.gov/docs/2008/2008_Levy_le07200r.pdf. The contribution of Working Group III to the IPCC Assessment Reports highlights the importance of near-term methane reductions, finding with "high confidence" that "[a]s methane has a short lifetime but is a potent GHG, strong, rapid and sustained reductions in methane emissions can limit near-term warming and improve air quality by reducing global surface ozone." IPCC, *Climate Change 2023: Synthesis Report, Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)], IPCC, Geneva, Switzerland, 184 pp. (2023), https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf, p.95.
[34] Ilissa B. Ocko, et al, *Acting rapidly to deploy readily available methane mitigation measures by sector can immediately slow global warming*, 2021 Environ. Res. Lett. 16 054042, https://iopscience.iop.org/article/10.1088/1748-9326/abf9c8.

In addition, new research shows that immediate action to reduce methane emissions could help preserve Arctic summer sea ice this century.[35]

Unfortunately, atmospheric methane levels have been increasing at an accelerating pace since 2007, with the largest yearly rise in methane levels ever recorded occurring in 2020 and 2021 (15 and 18 ppb respectively).[36] Reductions in methane, such as those that will accrue from Pennsylvania's adoption of the standards of performance for existing sources contained in OOOOc, are urgently needed to stave off disastrous climate change impacts, including to residents of the Keystone State.

Scientific evidence overwhelmingly demonstrates that climate change is already causing devastating impacts to Pennsylvania, and that these damages will worsen dramatically as methane emissions continue to rise. These harms include the following expected changes by mid-century compared to a historical 1971-2000 baseline:[37]

- a 6.7-degree Farenheit (F) increase in average, annual temperatures statewide;
- an increase in the intensity and frequency of extreme heat events, including an increase in the number of days reaching temperatures above 95 degrees F and 100 degrees F;
- An increase in heavier rain events. Such events will result in an overall increase in total average rainfall, but will occur less frequently, thus contributing to additional drought conditions;
- Tidally influenced flooding resulting from sea level rise and storm surges;
- Worsened air quality as higher temperatures increase concentrations of ground-level ozone;[38]
- Increased negative health impacts such as asthma rates due to deteriorating air quality;[39]
- Changes to the water levels, water temperature and coastline of Lake Erie.

While many impacts will occur statewide, climate change does not affect all residents of Pennsylvania equally. Some people are at greater risk of experiencing impacts due to their location while others face a greater risk of experiencing adverse impacts due to socioeconomic, health or housing factors (e.g., low-income communities are likely to be disproportionately impacted by power outages caused by extreme weather events).

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[35] EDF, *New study: Swift methane action could help save Arctic summer sea ice, forestall global warming impacts* (Mar. 15, 2022).
[36] World Meteorological Organization, More Bad News For the Planet: Greenhouse Gas Levels Hit New Highs (Oct. 26, 2022), https://wmo.int/news/media-centre/more-bad-news-planet-greenhouse-gas-levels-hit-new-highs.
[37] PA DEP Climate Impacts Assessment, 2024, Executive Summary, 7, file:///Users/Bessie/Library/Mobile%20Documents/com~apple~CloudDocs/EDF/state%20policy/PA/2025/state%20plan%20comments/PA_CLIMATE_IMPACTS_ASSESSMENT_2024%20(1).pdf.
[38] PA DEP, Climate Change in PA, https://gis.dep.pa.gov/ClimateChange/index.html.
[39] *Id*.

In summarizing the Climate Impacts Assessment, DEP warned "[c]limate risks and related impacts in Pennsylvania could be severe, potentially causing increased infrastructure disruptions, higher risks to public health, economic impacts, and other changes, unless actions are taken by the Commonwealth to avoid and reduce the consequences of climate change."[40] Swift implementation of technologies to eliminate or reduce methane emissions from existing oil and gas sources is a cost effective, proven way to take such action.

B. Reducing Methane Emissions and Co-Pollutant VOCs Also Helps Reduce Ozone Pollution

Adoption of standards of performance for existing sources such as those contained in OOOOc will also improve air quality by reducing concentrations of global and regional and ground-level ozone.

Methane is a precursor to global ground-level ozone.[41] Breathing ground-level ozone causes symptoms such as coughing, throat irritation, pain, burning, tightness or discomfort in the chest, and wheezing or shortness of breath.[42] Long-term exposure to ozone causes more frequent and severe asthma attacks, increased hospitalizations, emphysema, heart disease, and higher rates of illness and death.[43] Ozone also harms plants, crops and wildlife.[44] Ozone damages the cells of plants and reduces their ability to photosynthesize and produce their own food. Weaker plants are more susceptible to disease, pests, cold and drought. Weakened plants produce less fruits, roots and seed which would otherwise provide food for wildlife and diminish crop yields.[45] The reduction of 740,000 metric tons of methane from the state's oil and gas industry will help combat climate change and reduce global concentrations of ozone.

Adoption of robust clean air measures for existing oil and gas sources will also reduce concentrations of regional ground-level ozone. VOCs that are co-emitted with methane from oil and gas sources contribute to regional ground-level ozone when combined with NOx emissions in the presence of sunlight. We estimate that the adoption of OOOOc will remove 228,000 metric tons of VOCs in Pennsylvania, thereby helping to reduce the presence of ozone precursors that contribute to regional ozone in the state.[46]

In addition to being a secondary air pollutant, ozone is also a greenhouse gas that contributes to climate change.[47] The warmer temperatures caused by climate change also

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[40] *Id*. at Executive summary, 6.
[41] Smith et al., Public Health Benefits of Strategies to Reduce Greenhouse-Gas Emissions: Health Implications of Short-Lived Greenhouse Pollutants, *Lancet* 374:2091-2013 (2009).
[42] Canadian Lung Association, https://www.lung.ca/air-quality/smog; EPA, *Health Effects of Ozone Pollution*, https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution (last updated Mar. 2025).
[43] *Id*.
[44] EPA, Ecosystem Effects of Ozone Pollution, https://www.epa.gov/ground-level-ozone-pollution/ecosystem-effects-ozone-pollution; CARB, How does ozone affect the environment?, https://ww2.arb.ca.gov/resources/ozone-and-health.
[45] *Id*.
[46] EDF PA Emissions and Reductions, Ex. 1.
[47] Univ. Corp. for Atmospheric Rsch., Ozone in the Troposphere (2014), https://scied.ucar.edu/ozone-troposphere; *see also* EPA, Climate Change Adaptation Resource Center (ARC-X), Climate Adaptation – Ground-Level Ozone and Health (last updated Jul. 2025), https://www.epa.gov/arc-x/climate-adaptation-ground-level-ozone-and-health.

contribute to worsening ozone pollution, thereby creating a cyclical reinforcement between ozone and the climate crisis.

C. Adoption of the Standards of Performance in OOOOc Will Result in Co-Pollutant Reductions and Concomitant Public Health Protections

Venting, flaring and leaks from oil and gas facilities emit air contaminants including HAPs that contribute to unhealthy air pollution that negatively impact people's health. Nationwide, pollution from venting and flaring operations at oil and gas facilities contributes an estimated $7.4 billion in health risks and 710 premature deaths annually.[48]

Numerous toxic air contaminants are co-emitted with methane when oil and gas operators vent, leak or flare natural gas. HAPs can contribute to cancer and non-cancer health impacts such as birth defects, reproductive disorders, respiratory ailments, blood and immune disorders. Benzene and formaldehyde, known human carcinogens,[49] and hydrogen sulfide are among the toxic air pollutants emitted from oil and gas. The oil and gas industry in Pennsylvania emitted 0.32 MM tons of HAPs in 2023.[50]

In Pennsylvania, more than 1.1 million people live within a half-mile of oil and gas operations and thus are at a higher risk of exposure to air toxics.[51] Of these residents, 96,000 are adults with asthma, 58,000 are children under five (5), 230,000 are adults over sixty-five (65), 64,000 are adults with CHD (Congenital Heart Defects and Coronary Heart Disease), 75,000 are adults with COPD, and 130,000 are below the poverty line.[52] Such individuals are more susceptible to developing adverse health impacts from exposure to toxic air pollution. Health risks and outcomes can vary significantly depending on factors such as age, preexisting health conditions such as asthma or heart disease, and socio-economic determinants like income and access to healthcare; populations that are more susceptible or more exposed—in other words, more vulnerable—may experience especially profound health impacts.[53] For example, since children breathe faster, they inhale more airborne toxins in proportion to their weight. Their organs and immune systems have not been fully developed, and exposure to air toxics is more likely to impact and damage their health.[54]

In Pennsylvania, evidence of negative health effects of in utero exposure to oil and gas sites was found to have the largest effects for exposures within 1 km (3,200 ft) of an

[48] EDF, New study Quantifies Health Impacts From Oil and Gas Flaring in U.S. (Mar. 12, 2024) https://www.edf.org/media/new-study-quantifies-health-impacts-oil-and-gas-flaring-us.
[49] See Roy, Ananya & Thompson, Tammy, Health Impact of Oil and Natural Gas Operations (Nov. 25, 2019), https://www.edf.org/sites/default/files/content/Appendix%20G%2C%20Roy%2C%20Thompson%2C%20Health%20Impacts%20of%20Oil%20and%20Natural%20Gas%20Operations.pdf, 7-9, for a summary of the health impacts of benzene emissions from oil and gas operations.
[50] EDF MAIR estimates, *supra* note 1.
[51] EDF PA 2023 near oil and gas populations methodology, Ex. 2.
[52] *Id*.
[53] Makri, *supra* note 9.
[54] Kingdon, *supra* note 9.

unconventional oil and gas site.[55] Negative health impacts included greater incidence of low-birth weight and significant declines in other measures of infant health. Additional studies find further evidence that inhalation exposure to benzene and alkanes emitted from oil and gas increase cancer risks and potential for acute health impacts to the neurological, hematological, and development systems.[56]

A recent cumulative risk assessment utilizing air monitoring data demonstrated that numerous air toxics were emitted from nearby oil and gas operations -- benzene, toluene, xylenes, and regional ozone were the main drivers increasing the potential for acute health risks to the respiratory, immunological, and developmental systems.[57] Additional studies find associations between air pollution from oil and gas and adverse human health outcomes including increased mortality risk in the elderly,[58] cardiovascular and atrial fibrillation exacerbations,[59] adverse birth outcomes[60], and childhood hematological effects.[61]

Reductions in flaring, such as may be achieved by the zero emissions standards for pneumatic devices and the use of capture technologies for associated gas from oil wells, further result in climate and public health protections. Combustion of natural gas through flaring produces carbon dioxide and black carbon that contribute to climate change.[62] Black carbon is a

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[55] Currie, J., Greenstone, M., Meckel, K., Hydraulic Fracturing and Infant Health: New Evidence from Pennsylvania, *Sci Adv.* (Dec. 2017), 3(12):e1603021. doi: 10.1126/sciadv.1603021. PMID: 29242825; PMCID: PMC5729015.

[56] McKenzie, L.M., Blair, B., Hughes, J., Allshouse, W.B., Blake, N.J., Helmig, D., et al., Ambient Nonmethane Hydrocarbon Levels Along Colorado's Northern Front Range: Acute and Chronic Health Risks, *Environ. Sci. Technol.* (2018) 52(8):4514–4525. https://pubmed.ncbi.nlm.nih.gov/29584423/.

[57] Weisner, et al., *supra* note 11.

[58] Li, L., Dominici, F., Blomberg, A.J., Bargagli-Stoffi, F.J., Schwartz, J.D., Coull, B.A., et al., Exposure to Unconventional Oil and Gas Development and All-Cause Mortality In Medicare Beneficiaries, *Nat. Energy* (2022) 7(2):177–185, PMID: 35425643, https://doi.org/10.1038/s41560-021-00970-y

[59] Denham, A., Willis, M.D., Croft, D.P., Liu, L., Hill, E.L., Acute Myocardial Infarction Associated with Unconventional Natural Gas Development: A Natural Experiment, *Environ. Res*. (2021) 195:110872, PMID: 33581094, https://doi.org/10.1016/j.envres.2021.110872.30; McAlexander, T.P., Bandeen-Roche, K., Buckley, J.P., Pollak, J., Michos, E.D., McEvoy, J.W., et al., Unconventional Natural Gas Development and Hospitalization for Heart Failure in Pennsylvania, *J. Am. Coll. Cardiol.* (2020) 76(24):2862–2874,PMID: 33303076, https://doi.org/10.1016/j.jacc.2020.10.023.31; McKenzie, L.M., Crooks, J., Peel, J.L., Blair, B.D., Brindley, S., Allshouse, W.B., et al., Relationships Between Indicators of Cardiovascular Disease and Intensity of Oil and Natural Gas Activity in Northeastern Colorado, *Environ. Res.* (2019) 170:56–64, PMID: 30557692, https://doi.org/10.1016/j.envres.2018.12.004; McKenzie, L.M., Allshouse, W.B., Abrahams, B., Tompkins, C., Oil and Gas Development Exposure and Atrial Fibrillation Exacerbation: A Retrospective Study of Atrial Fibrillation Exacerbation Using Colorado's All Payer Claims Dataset, *Front Epidemiol*. (2024) 4:1379271, PMID: 38962693, https://doi.org/10.3389/fepid.2024.1379271.

[60] Casey, J.A., Savitz, D.A., Rasmussen, S.G., Ogburn, E.L., Pollak, J., Mercer, D.G., et al., Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA, *Epidemiology* (2016) 27(2):163–172, PMID: 26426945, https://pmc.ncbi.nlm.nih.gov/articles/PMC4738074/; Currie, J., Greenstone, M., Meckel, K., Hydraulic Fracturing and Infant Health: New Evidence From Pennsylvania, *Sci. Adv.*, 3(12) (2017), e1603021, PMID:29242825, https://doi.org/10.1126/sciadv.1603021.

[61] Clark et al., *supra* note 11; McKenzie, L.M., Allshouse, W,B,, Byers, T.E., Bedrick, E.J., Serdar, B., Adgate, J.L., Childhood Hematologic Cancer and Residential Proximity to Oil and Gas Development, *PLOS One*, 12(2) (2017), https://doi.org/10.1371/journal.pone.0170423.

[62] Schwartz, et al., Black Carbon Emissions from the Bakken Oil and Gas Development Region, *Environ. Sci. Technol. Lett*. 2015, 2, 10, 281-285 (Sept. 3, 2015), https://pubs.acs.org/doi/abs/10.1021/acs.estlett.5b00225

major component of airborne particles that are commonly referred to as "soot." Black carbon is a product of the incomplete combustion of fossil fuels and biomass, and its absorption properties contribute to warming. It is also harmful to human health when inhaled.[63]

III. EPA's Model Rule is Necessary to Enhance DEP's Current Rules and Permit Requirements

DEP has taken important steps to reduce methane and VOC emissions from oil and gas facilities in the state since 2011. DEP first adopted requirements that reduce methane from oil and gas sources in 2011 with requirements for unconventional production operators to conduct annual LDAR as a condition in the exemption criteria. At the time, Pennsylvania also adopted a protective VOC tank control of 2.7 TPY which the state has continued to apply under its General Permit and CTG regulations. We recognize and commend DEP for the clean air protections it has adopted for operators of designated facilities. Nevertheless, there are several areas where adoption of the model rule will result in meaningful reductions of methane and co-pollutants. We highlight the gaps in state requirements below. For those sources where available data allows, we also estimate the additional emissions reductions that will result from adoption of the standards of performance in OOOOc.[64]

Most importantly, DEP's current approach to reducing existing source pollution does not regulate methane directly from all of the designated facilities. For example, Pennsylvania's General Permit 5A ("GP 5A") regulates CH_4 from certain sources constructed or modified after August 2018, however these permits do not apply to designated facilities constructed and not modified prior to August 2018. In addition, facilities are not required to retain authorization to construct or operate by seeking a general permit, and so there may be facilities that were constructed after GP 5A took effect, but who opted for authorization under a plan approval. In addition, Pennsylvania promulgated rules for existing conventional and unconventional sources that regulate VOCs (the CTG implementation rules) from sources constructed on or before December 10, 2022.[65] However, these rules regulate VOC directly, not methane.

Pennsylvania also does not regulate many sources in the transmission and storage segment. We estimate that adoption of OOOOc will achieve the following emissions reductions from facilities in the transmission and storage segment of the natural gas supply chain:[66]

- Abnormal process condition emissions decrease by approximately 16% by the imposition of LDAR;

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[63] Crouse, et al., Ambient PM2.5, O3, and NO2 Exposures and Associations with Mortality over 16 Years of Follow-Up in the Canadian Census Health and Environment Cohort (CanCHEC), *Environ. Health Perspect*. (2015), https://pubmed.ncbi.nlm.nih.gov/26528712/; Chen, et al., *C*hanges in exposure to ambient fine particulate matter after relocating and long term survival in Canada, *BMJ* (2021), https://www.bmj.com/content/375/bmj.n2368; Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder (CIRES), Emissions of Black Carbon from Flaring in the Bakken Oil and Gas Fields (Sept. 9, 2015), https://cires.colorado.edu/news/emissions-black-carbon-flaring-bakken-oil-and-gas-fields.

[64] EDF PA Emissions and Reductions, Ex. 1.

[65] 25 Pa. Code § 129.121.(a) (Rule for unconventional oil and gas stationary sources); 25 Pa. Code § 129.131 et seq., (Requirements for conventional sources).

[66] PA Emissions and Reductions, *supra* note 3.

- Pneumatic controller emissions decrease by approximately 47% (high bleed controllers) to 50% (low and intermittent bleed controllers);
- Reciprocating compressor emissions decrease by approximately 32%;
- Centrifugal compressor emissions decrease by approximately 28%;
- Equipment leaks decrease by approximately 36%.

Pennsylvania rules do not contain requirements for all of the designated facilities covered by OOOOc. For example, Pennsylvania does not have requirements for associated gas from oil wells, super emitter emissions, and dry seals on centrifugal compressors.[67] We estimate that adoption of OOOOc will decrease emissions from associated gas flaring by 22%.[68]

Lastly, in some instances, Pennsylvania does regulate the same designated facility as OOOOc, but the state requirement is not as protective as the federal rule. This is clearly the case for compressor emissions located at centralized production facilities, pneumatic controllers, and pumps. We estimate that adoption of OOOOc will achieve the following emissions reductions from these sources:[69]

- Equipment leaks decrease by approximately 4% in the production segment;
- Pneumatic controller emissions decrease by approximately 14% (high bleed controllers) to 36% (low bleed and intermittent bleed) in the production segment;
- Malfunctioning emissions from pneumatic controllers in the production segment decrease by approximately 26%;
- Reciprocating compressor emissions decrease by approximately 11% in the production segment and by approximately 16% in the processing segment;
- Centrifugal compressor emissions decrease by approximately 4% in the production segment.

In sum, full implementation of OOOOc would lead to estimated additional emissions reductions of 740,000 metric tons of methane by 2030.[70]

IV. DEP Has Authority to Regulate CH4 from Existing Sources

Pennsylvania has considerable authority and flexibility under the Air Pollution Control Act to regulate methane from oil and gas sources. Indeed, the Commonwealth Court recognized this authority in 2016, noting that "the current climate change legislative scheme is primarily comprised of the Pennsylvania Climate Change act (CCA), and the Air Pollution Control Act (APCA)." *Wolf v. Funk*, 144 A.3d 228, 250 (Pa. Cmwlth. 2016).

Methane meets the definition of an "air contaminant" in APCA. APCA defines an "air contaminant" as "[s]moke, dust, fume, gas, odor, mist, radioactive substance, vapor, pollen or

[67] *Id.*
[68] *Id*. We are not able to estimate reductions from super emitter emissions or dry seals on compressors.
[69] *Id*.
[70] *Id*.

any combination thereof." 35 P.S. § 4003. As a powerful greenhouse gas, methane meets the definition of an "air contaminant."

Methane further meets the definition of "air pollution" as that term is defined in APCA. APCA defines "air pollution" as "the presence in the outdoor atmosphere of any form of contaminant...in such place, manner or concentration inimical or which may be inimical to the public health, safety or welfare or which is or may be injurious to human, plant or animal life or to property or which unreasonably interferes with the comfortable enjoyment of life or property." *Id*. Methane contributes to climate change and global ozone pollution. Climate change threatens the health, safety and welfare of Pennsylvania's citizens and unquestionably harms the human, animal and plant species of this planet. Ozone pollution similarly causes adverse human health impacts, decreases the health and productivity of plants, and harms wildlife by diminishing available food supplies.

Combating climate change and reducing ozone pollution by reducing the release of methane to the atmosphere unequivocally fulfills the main goals of APCA. The goals of the APCA are to "protect the air resources of the Commonwealth to the degree necessary for the (i) protection of public health, safety, and well-being of its citizens; (ii) prevention of injury to plant and animal life and to property; (iii) protection of the comfort and convenience of the public and the protection of the recreational resources of the Commonwealth; (iv) development, attraction and expansion of industry, commerce and agriculture; and (v) implementation of the provisions of the Clean Air Act in the Commonwealth. [71] Warmer temperatures caused by climate change contribute to worsening air quality that causes or exacerbates asthma and other respiratory ailments, including cardiovascular disease. The warmer temperatures caused by change contribute to heat-induced illnesses and deaths, in particular among vulnerable populations who are least able to reduce exposure to heat waves. The increase in extreme weather events also directly threatens public health, safety and the well-being of the state's residents as severe storms and flooding can lead to injury, death and property loss and unquestionably "interfere[s] with the comfortable enjoyment of life or property." Ozone pollution harms the health of plants, animals and humans.

There should be no question that DEP has authority to regulate methane under APCA. DEP has previously recognized this authority and this authority has been acknowledged by the Commonwealth Court. DEP first acted to reduce methane from existing oil and gas sources in 2011 when it required operators to inspect unconventional well sites for leaks of methane as a condition to obtaining a permit exemption.[72] DEP took additional steps to limit methane from compressor stations in 2013 when it finalized GP 5. In 2018, DEP added additional controls for sources of methane located at unconventional well sites, remote pigging stations and compressor stations when it finalized GP 5A and updated GP 5.

V. The Presumptive Standards of Performance are Reasonable and Economical

[71] 35 P.S. § 4004(27).

[72] See DEP Comment and Response Document For the General Plan Approval and/or General Operating Permit for Unconventional Natural Gas Well Site Operations and Remote Pigging Stations (BAQ-GPA/GP-5A), reply to Comment 9 (noting that "DEP is currently controlling methane emissions under Exemptions 33 and 38 of the Exemptions List.") (hereinafter "RTC Document").

A. EPA Created Subcategories of Sources that Considered and Recognize the Different Risk of Pollution Posed by Each Subcategory

EPA's presumptive standards are carefully tailored to different subcategories of facilities and allow for the use of multiple compliance pathways to achieve the required methane reductions. As a result, the standards are highly cost effective and economical, even for operators of lower producing wells.

EPA's approach to leak detection and repair ("LDAR") requirements for existing well sites exemplifies its careful, tailored, and economical approach in designing standards of performance for existing sources. The frequency and type of inspection requirements differ based on the likelihood of leak-prone equipment at a site. Accordingly, single wellhead only sites and small well sites[73] are subject to only quarterly AVO requirements. Multi-well head only sites are subject to semi-annual optical gas imaging ("OGI") or Method 21 ("M21") inspections. Complex well sites are subject to quarterly OGI or M21 inspections. Thus, operators must inspect the riskiest well sites more frequently than less pollution prone well sites.

EPA's approach to other sources is in accord. EPA created two separate standards of performance for oil wells that produce associated gas (i.e., one for those that emit at least 40 tpy of methane and a separate standard for those that emit less than 40 tpy of methane), again tying the control requirement to the amount of pollution occurring at each type of well site. Another example is EPA's approach to storage well venting where EPA used an emissions threshold (i.e., 20 tpy of methane) to trigger emissions control requirements. Tanks that emit less than this amount are not required to install controls or capture methane emissions. Similarly, EPA created two different standards that apply to pneumatic pumps, depending on the location of pumps and the number of pumps at a particular location. Pumps located at sites with electricity, and sites without access to electricity but home to three or more pumps, must meet a zero-methane emissions standard. Pumps located at sites without electricity and that contain less than three diaphragm pumps may route the pump emissions to a control device or to a process.

EPA's use of subcategories to trigger compliance ties compliance costs to emissions potential, thus underscoring the reasonableness of the final standards.

B. EPA's Technology Neutral Standards Afford Industry with Substantial Flexibility to Determine How Best to Achieve each Pollution Reduction Standard

In addition to tying emissions control requirements to subcategories of existing sources and thereby incorporating reasonable off ramps and exceptions into the final presumptive standards for existing sources, EPA's technology-neutral standards of performance allow operators to choose from a suite of available control technologies to meet requisite standards. This technology neutral approach is a hallmark of CAA Section 111 and affords industry significant flexibility in determining how to eliminate or control pollution from stationary

[73] 40 C.F.R. § 60.5430c. *Small well site* means...a well site that contains a single wellhead, no more than one piece of certain major production and processing equipment, and associated meters and yard piping. Small well sites cannot include any controlled storage vessels (or controlled tank batteries), control devices, or natural gas-driven process controllers, or natural gas-driven pumps.

sources. For example, the following is a non-exhaustive list of the multiple technologies and approaches operators can use to reduce emissions from existing sources:

- Pneumatic controllers. There are upwards of six methods available to eliminate emissions from pneumatic controllers to achieve EPA's zero methane emissions standard for this source. Options include using self-contained process controllers, solar-powered controllers, controllers powered by electric generators, routing controller emissions to a process and using grid power to power electric or compressed air powered controllers.[74]
- Oil wells with associated gas. EPA identified four abatement options operators can use to eliminate methane emissions from the venting of associated gas at oil wells that produce 40 tpy or more of methane emissions. Specifically, operators can route associated gas to a sales line, use the associated gas on-site as an alternative source of fuel, use the gas for another useful purpose that a purchased fuel, chemical feedstock or raw material would serve, or reinject it into the well or another well. Operators of oil wells that produce less than 40 tpy of methane emissions from associated gas may use any of these abatement options and may also flare the gas.
- Reciprocating compressors. Operators can elect to use one of the three following approaches to reduce emissions: (1) monitor and repair the rod packing to maintain a volumetric flow rate at or below 2 scfm per cylinder; (2) change out the rod packing every 8,760 hours of operation; or (3) route emissions to a control device or to a process.
- Centrifugal compressors. EPA allows for the use of two options: (1) monitoring and repairing the compressor to maintain a volumetric flow rate at or below 3 scfm per cylinder; or (2) routing emissions via a closed vent system to a control device or to a process.
- Fugitive emissions. Operators may use a suite of technologies to conduct instrument inspections, where such inspections are required. Options include optical gas imaging cameras, Method 21 compliant devices, aerial surveys, continuous monitors, other approved advanced leak detection technologies, or a combination of such approaches. In some instances, operators need only conduct AVO inspections.
- Storage tanks. Operators can use an efficient combustion device or vapor recovery unit to reduce emissions.

In addition to the built-in flexibilities of the rule stemming from EPA's subcategorization of sources and the technology-neutral performance standards, existing sources have a full five years to come into compliance from the date EPA promulgated the final rule. This protracted compliance implementation timeline allows operators time to plan for retrofits or retire assets that are at the end of their useful economic life.

C. EPA's Standards of Performance for Existing Sources are Cost Effective

[74] 89 Fed. Reg. at 16,923-25.

EPA's presumptive standards of performance are also highly cost effective. For each of the existing sources subject to the emissions guidelines, EPA determined that at least one compliance option fell below $2,185 per ton of methane reduced – EPA's threshold for what constitutes a cost-effective control abatement option.[75] We lay out some of the compliance pathways below, along with EPA's estimated costs for each, not including savings from gas savings:

- Conduct quarterly AVO inspections at single wellhead only and small well sites: $1,181 per ton of methane reduced.[76]
- Conduct semi-annual OGI inspections at multi-wellhead only sites: $1,331/ton of methane reduced.[77]
- Conduct quarterly OGI inspections at well sites with major production and processing equipment and centralized production facilities: $611/ton of methane reduced.[78]
- Conduct quarterly OGI inspections at compressor stations: $707/ton of methane reduced.[79]
- Conduct LDAR at gas processing plants: $850/ton methane reduced.[80]
- Replace gas-powered pneumatic controllers with solar at small model plant sites without electricity. $329 per ton of methane reduced.[81]
- Convert natural gas-powered pneumatic controllers to electric powered controllers at sites with access to grid-powered electricity: $449 per ton of methane reduced.[82]
- Route associated gas produced at an oil well to a flare: $110 per ton of methane reduced.[83]

Many of these technologies would be even more economical if gas savings were accounted for, since operators can monetize such savings.

D. EPA's Methane Rule for Existing Source is Economical, Even for Small Producers and Marginal Wells

Nationally, and in Pennsylvania, marginal wells are responsible for an oversized amount of pollution in comparison to their production. Marginal wells are oil wells producing less than 15 BOE per day or gas wells producing less than 90,000 cubic feet of natural gas per day or less.[84] Nationally, EPA estimates that marginal wells account for approximately half (47-53%)

[75] *Id*. at 16,864.
[76] 87 Fed. Reg. 74702, 74738, Table 15.
[77] *Id*. at 74738, Table 17.
[78] *Id*. at 74739, Table 19.
[79] *Id*. at 74735.
[80] *Id*. at 74809.
[81] *Id*. at Table 19.
[82] *Id*. at Table 19.
[83] U.S. EPA, Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, Supplemental Background Technical Support Document for the Proposed New Source Performance Standards and Emissions Guidelines 40 CFR Part 60, subpart OOOOb (NSPS) 40 CFR Part 60, subpart OOOOc (EG) (Oct. 2022).
[84] U.S. EPA, Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, Background Technical Support Document (TSD) for the Final New Source Performance Standards (NSPS) and Emissions Guidelines (EG), 40 CFR Part 60, subpart OOOOb (NSPS), 40 CFR Part 60, subpart OOOOc (EG) (Nov. 2023) [Hereinafter "2023 TSD"], Section 6-2, https://downloads.regulations.gov/EPA-HQ-OAR-2021-0317-3988/content.pdf.

of well site emissions and 49-55% of reductions for quantified emissions due to the implementation of OOOOc.[85] We estimate that marginal wells in Pennsylvania were also responsible for roughly half (48.5%) of the oil and gas pollution in the state. Marginal wells emitted 485,000 tons of CH4, 150,000 tons of VOCs, and 31,000 tons of HAPs in 2023.[86]

EPA analysis demonstrates that technologies and practices that eliminate or reduce methane emissions from existing oil and gas sources are low-cost and achievable, even for operators of marginal wells and small operators. EPA's carefully tailored approach that pairs the best system of emissions reduction ("BSER") to subcategories of sources based on the amount of pollution that such sources emit ensures an equitable application of the standards. We provide an example below for well sites.

1. EPA's Marginal Well Analysis Demonstrates that Inspections and Pneumatic Controller Retrofits are Economical for Marginal Wells

EPA conducted an analysis to determine the impact of standards of performance on low producing wells – i.e., oil wells producing less than 15 BOE per day or gas wells producing less than 90,000 cubic feet of natural gas per day or less.[87] For this analysis EPA created a marginal well financial analysis model. The model estimated single year profits and operating costs other than regulatory costs for oil and gas wells separately, assuming high, average, and low commodity prices.

Per EPA's model, all marginal oil wells are profitable assuming low, average and high oil prices. For example, the lowest producing oil wells-those producing less than 1 BOE/d yield are still profitable at a one-year net profit of $2,163, assuming low oil prices.[88] Higher producing oil wells are significantly more profitable. The highest marginal well bracket containing those producing between 12 and 15 BOE/d are profitable at a rate of $189,598 annually, assuming low oil prices.[89]

Marginal gas wells are less profitable than oil wells although the higher-producing wells still turn considerable profits. Marginal wells that produce between 12 and 15 BOE/d operate at a profit of over $36,444 per year, assuming average gas prices.[90] The lowest producing marginal wells- those producing less than 1 BOE/d- are unprofitable before the addition of any regulatory costs. Marginal wells that produce at least 1 BOE/d annually operate at a profit ranging from $538 (producing in the 1-2 BOE bucket) to $36,444 per year, assuming average gas prices.[91]

EPA did not estimate compliance costs for all marginal wells. Compliance costs will vary from facility to facility due to the inherent flexibility operators have when determining how to meet each applicable standard of performance (e.g., operators can use any type of technology to eliminate emissions from pneumatic controllers as long as the technology meets the zero

[85] *Id*. at 6-4.
[86] PA Emissions and Reductions, *supra* note 3.
[87] 2023 TSD, *supra* note 84, Ch. 6
[88] *Id*. at Table 6-5.
[89] *Id*.
[90] *Id*. at Table 6-4.
[91] *Id*.

emissions standard). Compliance costs also turn on individual facility characteristics such as the type of, and number of, affected sources at a facility (e.g., operators of single wellhead only sites need only conduct quarterly AVO inspections whereas operators of multi-wellhead only well sites must conduct quarterly OGI inspections) and the dominant hydrocarbon resource produced at each well.

Importantly, as EPA notes, many factors feed into an operator's decision to close permanently a marginal well. Some operators may choose to temporarily shut-in rather than permanently close a well pending commodity price changes, tax credits, availability of plugging and abandonment funding, or the operator's business model.[92] Some operators, such as Diversified, are in the business of buying and operating marginal wells and thus may choose to purchase a marginal well that a different operator may opt to close permanently. Federal tax credits have been available for operators during times of low commodity prices. These tax credits reduce the costs of operating marginal wells and may result in operators deciding to temporarily shut-in versus permanently close a low-producing well.[93]

Under the Inflation Reduction Act, Congress allocated of $1.55 billion in funding for methane emissions reductions like mitigation and monitoring activities, with $700 million dedicated specifically for marginal conventional wells In December 2023, the U.S. EPA awarded $350 million to states for plugging marginal, conventional wells at the end or nearing the end, of their useful life – including $44.5 million to Pennsylvania.[94] In 2024, DOE and EPA announced $850 million in funding for 43 projects for mitigation, monitoring, and technology development, including $560 million for financial and technical assistance for marginal wells and small operators.[95]

When analyzing the impact of regulatory costs on marginal wells, it is important to keep in mind the multiple factors that impact an operator's decision to continue to operate versus permanently close a marginal well.

While EPA did not analyze compliance costs for all the OOOOc standards of performance, it provided a few examples to illustrate the affordability of two standards: LDAR and the zero-methane emission standard for pneumatic controllers. EPA estimates that roughly 50-60% of existing well sites are wellhead only single-well sites.[96] Single wellhead only sites only need to conduct quarterly AVO inspections pursuant to OOOOc. EPA estimates the costs of these inspections to range from $336 to $630 per site per year, depending on whether the inspection would result in additional travel costs.[97]

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[92] Id. at 6-11 to 6-14.
[93] *Id*. at 6-12.
[94] EPA, Biden-Harris Administration Announces $350 Million to 14 States to Reduce Methane Emissions from Oil and Gas Sector as Part of Investing in America Agenda (Dec. 2023), https://www.epa.gov/newsreleases/biden-harris-administration-announces-350-million-14-states-reduce-methane-emissions.
[95] U.S. Dept. of Energy, Project Selections for FOA 3256: Methane Emissions Reduction Program Oil and Gas Methane Monitoring and Mitigation, https://www.energy.gov/fecm/project-selections-foa-3256-methane-emissions-reduction-program-oil-and-gas-methane-monitoring.
[96] 2023 TSD, *supra* note 84 at 6-8.
[97] *Id*.

Comparing these inspection costs to the EPA's estimated average annual profits for marginal gas wells reveals that compliance with LDAR is likely affordable for all but the lowest producing marginal gas wells. Gas wells that produce at least 2 BOE/d yield an annual profit of $4,609, assuming average gas prices.[98] Under a high gas price scenario, gas wells that produce at least 1 BOE/d yield an annual profit of $6,608. Accounting for quarterly AVO inspections and assuming the highest estimate for those inspections, these wells would still be profitable. Wells producing 2 BOE/d during average gas prices would still yield an annual profit of $3,979 ($4,609 - $630 BOE/d) while wells that produce at least 1 BOE/d assuming high gas prices would still net $5978 ($6,608-$630).

Similar results are evident if one looks at potential compliance costs at marginal wells for compliance with the zero-methane emissions standard for pneumatic controllers. EPA estimates that roughly half of sites do not have pneumatic controllers. For those that do, EPA estimates 60% have no more than two gas-powered pneumatic controllers.[99] These operators have a choice as to how to eliminate methane emissions from gas-powered pneumatic controllers. Assuming such operators chose to use solar to power electric controllers for the two pneumatic controllers, the annualized compliance cost would equal $1,312.[100] This does not include $639 in gas savings. Id. Accounting for gas savings, annualized compliance costs equal $673.

Complying with the zero-methane emissions standard is affordable for operators of marginal gas wells producing at least 1 BOE/d, assuming high gas prices. Such operators would still net at least $5,297 ($6,608-$1,312). Complying with the zero-methane emissions standard is affordable for operators of marginal gas wells at least 2 BOE/d, assuming average gas prices. Such operators would still net at least $3,297 ($4,609-$1,312).

EPA's marginal well analysis demonstrates that quarterly AVO inspections and compliance with the zero-methane emissions standard for pneumatic controllers are economical for all but the lowest producing gas wells, under a high commodity price environment, and all marginal gas wells that produce at least 2 BOE/d under an average natural gas price environment.

2. EDF's Economic Analysis Supports EPA's Analysis

EDF conducted its own economic analysis of the Methane Rule. This analysis further demonstrates the reasonableness of the rules, including as applied to owners of marginal wells.

EDF economists and third-party experts retained by EDF to evaluate EPA's cost estimates and analysis conclude that "EPA's analysis and conclusions are reasonable and well supported..."[101] These experts reviewed the Methane Rule (both the requirements for new sources and existing sources), Technical Support Document and Regulatory Impact Analysis. They also reviewed information regarding the production levels of new and existing wells, industry profits in 2021, 2022 and 2023, and EPA's estimate of total annualized compliance

[98] *Id*.
[99] *Id*.
[100] *Id*.
[101] Decl. of Lucija Muehlenbachs, Lauren Beatty, and Maureen Lackner at 2, Opp. of Environmental and Health Respondent-Intervenors to industry Petitioners' Motion for Stay, Exhibit 3.

costs for the Methane Rule. Their review and analysis confirmed the reasonableness of EPA's estimate that the Methane Rule's total annualized compliance costs for new and existing owners and operators are estimated to represent just 0.5% of industry revenue:[102] The EDF experts concluded:

> EPA's compliance cost projections are derived from reasonable cost estimates associated with each standard multiplied by the estimated number of sources that will be subject to those standards. In determining the costs of each standard, EPA relied on numerous data sources, including data from past federal and state rulemakings and, in many cases, industry supplied data.[103]

EDF's experts also agree that EPA's analysis of the costs of LDAR inspections and associated gas flaring rules "are reasonable and are based on reliable data from state regulators and industry."[104] Indeed, EDF estimates that "costs may be lower in reality than assumed by EPA,"[105] due in part to studies documenting that "compliance costs decline over time as operators learn how to comply at lower costs and as manufacturers ramp up production of equipment and devices."[106]

EDF's experts also agree with EPA that operators of existing wells will be able to absorb compliance costs. Based on an analysis of revenue and ownership profiles, EDF estimates that operators of these wells generated $608 billion in 2022, with a per operator average revenue of $53 million. In 2019 and 2021, the average per operator revenue for operators of existing sources was $24 million and $32 million, respectively.[107] EPA estimates that the total annualized compliance costs for the NSPS and Emissions Guidelines represent 0.5% of industry revenue,[108] accounting for gas savings. EPA does not separately evaluate compliance costs for the emissions guidelines. Nevertheless, the significant average revenues generated by owners of existing sources (nearly half a billion in the most recent year evaluated) indicate that the majority will be able to absorb compliance costs that represent less than 1% of their revenue.

E. <u>DEP's Approach to State Implementation Can be Leveraged to Facilitate Compliance, Including Through Addressing Exceptions During an Existing Source Rulemaking Pursuant to APCA.</u>

As demonstrated above, EPA's presumptive standards include cost effective and economical standards of performance for categories and subcategories of sources that are based on a suite of available and demonstrated technologies. The structure of the final standards thus accounts for differences in production and/or pollution potential and assigns costs accordingly. Compliance costs are economical, even for marginal wells. Nevertheless, Section 111(d) of the CAA and EPA's implementing regulations also allow states to depart from the presumptive standards in the EGs for an individual facility or class of facilities by invoking the remaining useful life and other factors (RULOF) exception.

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[102] *Id*. at 3.
[103] *Id*. at 5.
[104] *Id*. at 6.
[105] *Id*. at 7.
[106] *Id*. at 9.
[107] *Id*. at 13
[108] 89 Fed. Reg. at 16,866.

DEP's proposed state plan describes this structural flexibility within the CAA's implementing regulations while moving forward with applying performance standards to designated facilities. We appreciate DEP's solicitation of comments on application of RULOF and largely agree with DEP's characterization of the RULOF standard and process.[109]

We appreciate DEP's commitment to advancing a timely proposal of a state plan in reliance on EPA's 2024 Section 111 notice and comment rulemakings. However, we urge DEP to expeditiously *initiate* a regulatory rulemaking, pursuant to state law and DEP's authority to regulate methane pursuant to APCA. Doing so will ensure that standards of performance for existing sources of methane are resilient and durable regardless of revisions to the federal model rule or emissions guidelines. As a part of this rulemaking, DEP can address unique factual circumstances presented by Pennsylvania's vast and historically underregulated well population. It will also ensure Pennsylvania retains authority to implement and enforce standards of performance for existing sources.

For these comments, we urge DEP to finalize its General Permit approach to establish performance standards as applicable requirements for all sources in the state and carefully review stakeholder input on RULOF as grist for a future rulemaking proposal. In lieu of detailed comments on which designated facilities or class of facilities may be able to justify RULOF, we make three high level comments. First, EPA developed the BSER after an extensive review of a wide review of sources common in Pennsylvania and documented economical, available solutions to reduce emissions from existing sources. Second, since General Permits are not ideal mechanisms for site specific permit conditions DEP should consider specific exceptions in a regulatory rulemaking, where the agency can develop information to identify sources where an exception may be appropriate.[110] Finally, since marginal wells[111] are responsible for roughly half of oil and gas pollution in the state, DEP can leverage compliance timeframes to facilitate permanent emissions reductions from end-of-life wells, focusing historic levels of financial and assistance for operators, while acting now to protect public health.

E. Methane Controls are Needed to Remain Competitive

This existing source rule will provide another economic benefit by keeping the Pennsylvania oil and gas industry competitive as foreign and domestic markets demand cleaner sources of energy. In October, more than twenty companies joined an expansion of Japan and South Korea's CLEAN Initiative, a public-private partnership collectively representing 25% of global demand for LNG, aimed at reducing the LNG supply chain's methane footprint through

[109] For an example of EDF's detailed stakeholder comments on RULOF in initial OOOOc stakeholder engagement see TCEQ Rule Project No. 2024-027-113-AI at 21 (Jan. 15, 2025).
[110] For example, an oil well that produces a very low of amount of methane in its associated gas. *See* 89 Fed. Reg. at 16947.
[111] In response to comments about potential impacts to marginal wells, EPA found "marginal wells may continue to operate at low or negative profits rather than be shut-in and plugged due to a variety of reasons, including low operating costs, high plugging costs, low state bonding requirements, accounting practices, and tax credits available to the oil and gas industry." EPA, Response to Public Comments on the November 2021 Proposed Rule and the December 2022 Supplemental Proposed Rule at I-20-59 (Nov. 2023).

transparency and cooperation.[112] In May, the European Union adopted a new law to impose methane intensity limits on oil and gas imports.[113] And leaders in the oil and gas industry have committed to rising to that challenge. To date, 159 participants have signed the Global Methane Pledge to reduce emissions 30% from 2020 levels by 2030.[114] If Pennsylvania wants to remain competitive, steps such as implementing OOOOc are essential.

VI. Conclusion

We appreciate Pennsylvania DEP's consideration of these comments and welcome the opportunity to discuss them and answer questions at DEP's convenience.

Respectfully submitted,

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[112] Natsuki Yamamoto and Daishi Chiba, Japan, South Korea LNG Buyers Seek Transparency on Methane Emissions, *Nikkei Asia*, (Oct. 4, 2024), https://asia.nikkei.com/Business/Energy/Japan-South-Korea-LNG-buyers-seek-transparency-on-methane-emissions.
[113] Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector and amending Regulation (EU) 2019/942, Text with EEA relevance https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401787
[114] Global Methane Pledge https://www.globalmethanepledge.org/#pledges.