U.S. Senate Committee on Environment and Public Works (EPW)
"Spotlight" hearing on methane

Statement on Methane Emissions and Health

July 24, 2025

Ranking Member Senator Whitehouse and Members of the Committee:
Thank you for the opportunity to provide this statement on the critical connection between methane emissions and health.
My name is Sarav Arunachalam. I am a Research Professor and Deputy Director of the Institute for the Environment at the University of North Carolina at Chapel Hill, and Adjunct Professor in the Department of Environmental Sciences and Engineering at the Gillings School of Global Public Health. My research examines the air quality and health impacts of multiple source sectors, and specifically from methane from the oil and gas sector.

The climate crisis is a public health crisis, and methane, due to its impact on warming and air quality, threatens human health. Cutting methane is the quickest, most effective way to address climate change while delivering significant near-term health benefits.

Human activities contribute significantly to methane emissions; from the oil and gas industry, landfills, and agriculture. Methane pollution has a significant impact on public health.

Methane emissions drive the climate crisis, resulting in more frequent extreme weather, increased food insecurity, increased infectious disease risk, and decreased air quality. And pollutants emitted alongside methane directly contribute to ground-level ozone and particulate matter pollution, which can cause respiratory and cardiovascular diseases, cancer, and stroke. Methane reacts with hydroxyl radicals (OH) to form various intermediate products, including carbon monoxide (CO) and other volatile organic compounds (VOCs). These VOCs, along with nitrogen oxides (NOx), react in the presence of sunlight to form ozone. Globally, every megaton of methane reduced prevents 1,430 premature deaths due to ozone pollution.

Nationwide Health impacts of Oil and Gas

Methane and other toxic air pollutants, like benzene, are co-emitted from oil and gas production processes such as drilling, hydraulic fracturing, and venting and flaring. Nationwide, Buonocore et al. found in 2023 that air pollution from the oil and gas industry results in 410,000 asthma exacerbations, 2,200 new cases of childhood asthma and 7,500 excess deaths, with $77 billion in total health impacts.

Health impacts related to Oil and Gas (focus on Texas)

Pollution from oil and gas, including methane pollution, drives the formation of ground-level ozone. (Francoeur et al., 2021). Reducing ozone pollution is critical to safeguard against health complications for mothers, newborns and the elderly. Studies find that exposure to ozone can accelerate cognitive decline and is associated with adverse neural effects in the elderly. (Qu et al., 2023).

The Permian Basin, which stretches across west Texas and southern New Mexico, ranks among the most productive oil and natural gas regions in the world. In 2022, it accounted for 43% of U.S. crude oil and 17% of U.S. natural gas output. The Permian also contributes heavily to methane and other air pollution emissions.. Unfortunately, although ample evidence indicates Permian Basin ozone concentrations exceed federal standards designed to protect human health, no ozone monitors exist in the Texas portion. But the public health impacts are clear: in 2016, Texas led the country with the number of deaths and asthma incidences that can be attributed to air pollution from oil and gas flaring and venting—practices wherein excess gas is burned or released directly into the air. Nationwide, flaring and venting emissions alone are found to cause over $7.4 billion in health damages, 710 premature deaths, and 73,000 asthma exacerbations among children annually. Flaring releases a variety of air pollutants, including black carbon particles, which are associated with an increase in respiratory diseases, heart diseases, and strokes. (Chen et al., 2020).

Associations between oil and gas development and adverse human health outcomes include increased mortality risk among older adults (Li et al. 2022), exacerbations of cardiovascular conditions such as atrial fibrillation (McKenzie et al. 2024), heightened risk of asthma attacks

(Willis et al., 2021; Rasmussen et al., 2016), increase in respiratory diseases, heart diseases, and strokes, and childhood hematological cancers (McKenzie et al., 2017). And oil and gas pollution drives adverse reproductive outcomes: Chen et al. found in 2022 that in the Eagle Ford shale of Texas, the high frequency of flaring was associated with adverse effects on birth outcomes among pregnant women living within 5 km of oil and gas wells and flares. In the Dallas-Fort Worth area, Whitworth et al. found evidence of associations between maternal residential proximity to oil and gas and preterm birth in two separate studies in 2017 and 2018.

Emissions from landfills

Landfills are a major, underrecognized source of methane pollution. When food and other organic waste decomposes in a landfill, it produces "landfill gas"—a dangerous mix of methane, carbon dioxide, and hazardous and health-harming pollutants. Landfills are the third-largest source of human-caused methane emissions in the U.S. The EPA estimates that landfills account for 3.7 million metric tons of methane per year, but satellite measurements suggest actual emissions could be much higher; over 6 million metric tons per year.

This pollution poses a severe threat to our climate and the health of communities living nearby. Nearly 2 million people, often vulnerable populations, live within a mile of these polluting sites, facing health risks from dangerous landfill gases. Landfill gas includes hazardous air pollutants like vinyl chloride and benzene, contributing to poor air quality and health issues. Over half of U.S. landfills are near communities of color or low-income populations.

I want to end by stating that despite these alarming health impacts of methane, solutions are available across all three major emission sectors to achieve these reductions. If implemented, currently available approaches including policy reforms, technological innovation, and research investments could reduce overall methane emissions by 55% by 2030, thus addressing both public health and the climate crisis. By committing to a comprehensive federal strategy for methane reduction, the U.S. has the opportunity to not only reduce methane emissions but also improve public health, protect vulnerable communities, and drive global leadership in the fight against climate change. We already have the technology; we just need the political will and federal coordination to scale it.

Reducing methane emissions in the Permian Basin and across the country is not only a matter of combating climate change, but also a public health imperative. The federal government must prioritize targeted regulations, expanded monitoring, and community-based health interventions to protect the health and well-being of those living in the Permian Basin and other high-emission zones.

Thank you for the opportunity to testify, and I would be pleased to answer any questions you may have.