



Methane Risk Map

What is the Methane Risk Map?

PSE Healthy Energy's Methane Risk Map ("MRM") is an interactive digital visualization tool that tells the unseen story of oil and gas methane emissions, hazardous air pollutants, and public health. The MRM connects methane emissions to people's lives by showing areas likely affected by hazardous air pollutants, such as benzene, that are emitted with methane.

How Does the Methane Risk Map Work?

The MRM leverages data from methane-sensing aircraft and satellites and pairs it with PSE's own peer-reviewed research on gas composition and air quality modeling, enabling people to see how and where methane emissions events create levels of hazardous air pollutants that may pose health and safety risks to nearby communities.

Built on peer-reviewed science, the MRM is designed to equip policymakers, advocates, communities, and others with the location-based scientific data they need to advance health-protective regulatory and policy solutions to methane emissions. The MRM is regularly updated with new events as methane data come online.

The Methane Risk Map is a cornerstone of PSE Healthy Energy's Methane + Health Initiative.

Above is a sample case study from the MRM.

A methane-sensing aircraft recorded a methane emissions event in Thornton, Adams County, Colorado on September 22, 2021. The MRM models the risk from the hazardous air pollutants—in this case benzene—resulting from the event using the methane emissions rate, site-specific gas composition sample, and information about the weather at the time of the event.

We can see from the red outline where calculated benzene concentrations exceeded health benchmarks—an area of approximately 3 square miles. The yellow to red color gradient shows the concentrations of benzene that exceeded health benchmarks, which extend into populated areas, impacting three sensitive facilities: a school and two childcare centers.





1,300+

UPSTREAM EVENTS



110

SENSITIVE FACILITIES



126,600

PEOPLE NEARBY



>99%

EVENTS MAY POSE A
HEALTH RISK

Methane Risk Map Fact Sheet

Methane is a colorless, odorless, potent greenhouse gas, and the primary component in natural gas. But natural gas also contains hazardous air pollutants, which are chemical compounds known to cause cancer or other serious health problems. When gas is leaked or vented throughout the gas system, the methane emissions harm the climate and can pose safety risks, while the hazardous air pollutants can pose health risks.

Benzene, toluene, ethylbenzene, xylene, and hexane, all hazardous air pollutants, are almost always released alongside methane across the oil and gas infrastructure. These pollutants can pose serious risks to the respiratory, reproductive, and nervous systems. Government agencies have set benchmarks to establish a concentration threshold below which each pollutant does not pose a health risk. Benzene, a carcinogen that damages bone marrow, is particularly dangerous.

The MRM is the only tool to combine methane emissions data with site-specific gas composition data and regulatory-grade air quality modeling to visualize the potential health risk posed by the hazardous air pollutants released alongside methane.

Using measurements from actual methane emissions events, PSE Healthy Energy modeled the concentrations of hazardous air pollutants emitted during those events and illustrated where concentrations could be high enough to pose health risks to people nearby.

At the time of its launch, the MRM models the hazardous air pollutants associated with 1,300+ upstream emissions events across the U.S. PSE uses our gas composition data and regulatory-grade weather models and dispersion models to calculate how the hazardous air pollutants from these events were dispersed over surrounding landscapes, and to determine where concentrations may have exceeded health benchmarks. The affected areas are home to roughly 126,600 people and cover rural, residential, and commercial zones. They include 110 sensitive facilities—such as day care centers, schools, nursing homes, hospitals and prison. Of the emissions events modeled in the MRM, virtually all of them—more than 99%—resulted in modeled benzene concentrations that exceeded health benchmarks.

The methane emissions data PSE relies on for modeling is an aircraft or satellite-derived methane emissions rate at a precise moment in time. There is not enough information to project long-term health impacts. Therefore, the MRM assesses short-term or acute health risks – not the long-term health risks that come from chronic exposure.

The emissions events plotted on the MRM are a small subset of a much larger, but unknown, number of such events. Many methane emissions events go undetected, are not shared publicly, or are not precise enough measurements to be modeled for the tool. However, when the right methane emissions data are available, we aim to add new events to the site regularly.

The MRM currently only models upstream gas-industry sector events; we expect midstream and downstream emissions events to be added to the tool soon.

Methane + Health

INITIATIVE

Methane

Benzene

About the Methane + Health Initiative

An ambitious global effort is underway to reduce methane emissions, due to methane's fast and powerful warming impact on the atmosphere. Significant investments in satellite technologies, for example, provide unprecedented visibility on methane emissions across the globe. But these tools are blind to the air quality and human health risks of emissions events, which limits their utility outside of climate applications.

PSE Healthy Energy launched the Methane + Health Initiative to solve this problem. **We study the hazardous air pollutants released in emissions from burned and unburned gas throughout the gas system—from the upstream wellhead to the downstream stove.** In doing so, we expand scientific and public understanding of the relationship between methane, air pollution, and public health.

Our work shows that the presence of methane emissions from natural gas almost always means benzene is present—often in concentrations that can degrade air quality and harm public health.

The Methane + Health Initiative provides the clearest picture available of the air quality impacts and human health risks of methane emissions.

Methane Risk Map

For more information or a tour of the MRM, contact:
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Methane + Health Initiative

For more information, visit:
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