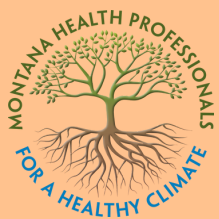




# STEP OFF THE GAS

HOW "NATURAL" GAS  
HARMS HUMAN HEALTH



OCTOBER 2021



Montana Environmental  
Information Center





Recent estimates found that pipelines leak about 2.3% per year, about 60% more than EPA estimates.

# THE LIFE CYCLE OF GAS HARMS HEALTH

The extraction, transportation, and use of "natural," or methane, gas in homes, businesses, and industry is a serious obstacle to tackling the climate crisis.

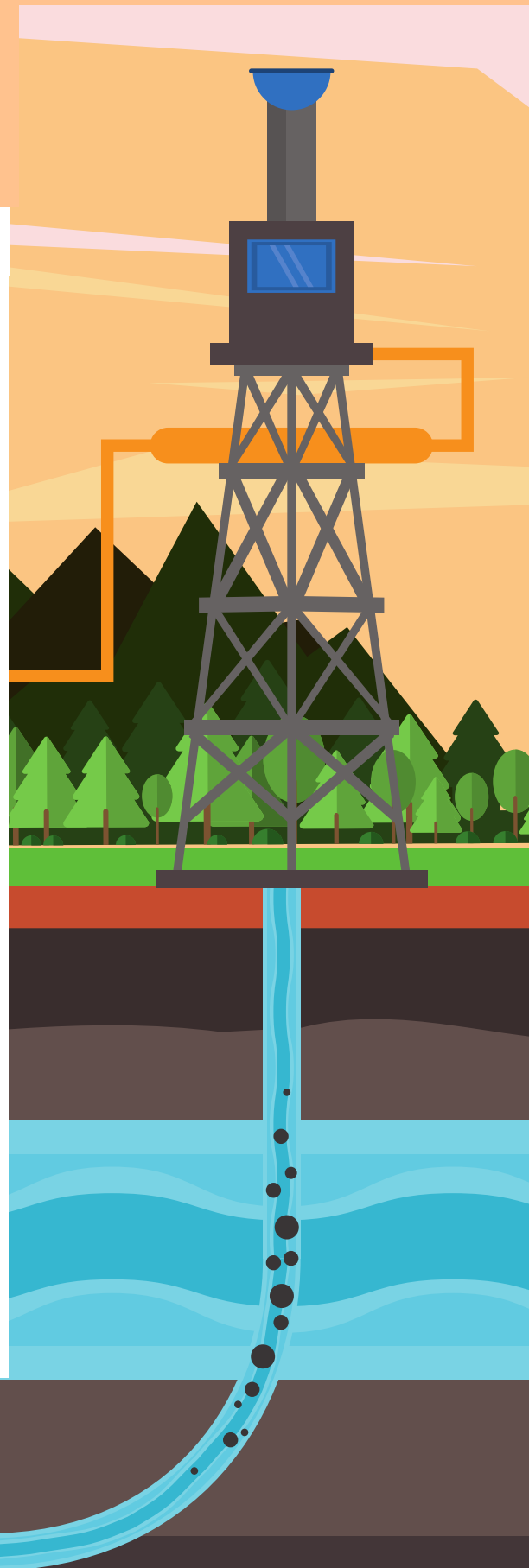
Whether it's deliberate emissions through venting or flaring, or leaking infrastructure from the drilling site all the way to your home, the methane gas system emits enormous quantities of greenhouse gases into our atmosphere each year.

# EXTRACTION:

## AIR, WATER AND CLIMATE CHANGING POLLUTION

Fracking is now the predominant method used to extract methane gas from beneath the earth's surface. It consists of injecting enormous volumes of water, “proppants,” and toxic chemicals into the ground to extract the gas. The industry uses a variety of toxic chemicals in the fracking process but is very secretive about the substances it injects underground.

It was recently uncovered that the industry was using per- and polyfluoroalkyl substances, PFAS, and substances that could degrade into PFAS. These toxins, known as “forever chemicals,” do not break down and accumulate in the environment and our bodies. The effects of these toxins include harm to the reproductive system and human development, low infant birth weights, effects on the immune system, cancer, and hormone disruption.



# Methane gas and its related constituents are a mixture of dangerous pollutants.

## METHANE

Methane is about 85 times more potent than carbon dioxide (CO<sub>2</sub>) at trapping heat in the atmosphere over a 20 year period.

## VOCs

Volatile organic compounds (VOCs), some of which are known carcinogens with no safe levels of exposure, can harm the nervous system and result in blood disorders.

## NOx

Nitrogen oxides (NO<sub>x</sub>) can combine with VOCs to create ground-level ozone, which contributes to lung disease and asthma attacks.

## PARTICULATES

Particulate matter can contribute to heart disease, strokes, asthma, and cancer.



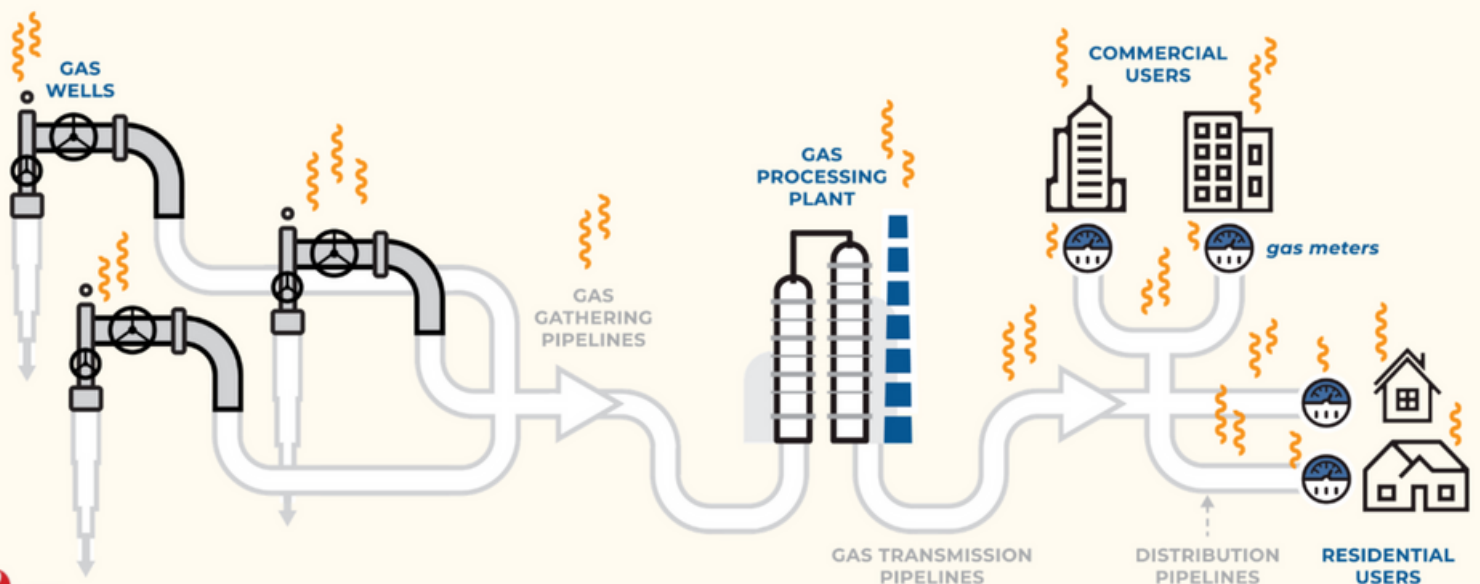
# TRANSPORTATION

More than 300,000 miles of pipelines transmit gas around the U.S., and 2.2 million miles of pipeline distribute it.

This infrastructure is notoriously antiquated and leaky. As gas travels through this pipeline system, methane and toxins are inadvertently or intentionally released into our air, contributing to air pollution and climate change, and threatening public safety through potential explosions.

In 2020 alone, there were 578 pipeline safety incidents; 312 were classified as serious or significant, resulting in 15 deaths, 43 injuries, and \$340 million in damages. In 2018, the damage from pipeline incidents was estimated to be well over \$2 billion and resulted in seven deaths and 78 injuries.

## Gas Supply Chain Leaks





**Before: Three buildings leveled**



*Most Montanans remember the 2009 explosion in downtown Bozeman, which resulted in the loss of life and complete destruction of several buildings.*

# THE SILENT KILLER

## USING GAS INDOORS

Indoor air quality is largely unregulated and often more polluted than air outside the home. Toxic emissions emanate from leaking gas lines, appliances, and poor ventilation.

The health impacts are magnified by the fact that we spend a large part of our day inside of our homes and exposed to these emissions. Just like the leaky pipelines running from the well to our homes and buildings, which emit methane and other toxins, the gas pipes and fittings in our

homes and businesses are often leaky and expose us to toxins.

Furthermore, the normal use of gas appliances inside the home can result in air quality that fails to meet short- and long-term health-based air quality standards for outdoor air. High levels of carbon monoxide (CO), nitrogen oxides (NOx), nitrogen dioxide (NO<sub>2</sub>), fine particulates (PM<sub>2.5</sub>), and volatile organic compounds (VOCs) can be found inside homes that use gas.

Cooking on a gas stove can be an especially large source of indoor air pollution, reaching levels that would be illegal outdoors.

Outdoor Standards for NO <sub>2</sub>	1-hr average (ppb)
US National Standard (EPA)	100
Canadian National Standard	60
California State Standard	180
Indoor Guidelines for NO <sub>2</sub>	1-hr average (ppb)
Canada	90
World Health Organization	106

Measured NO <sub>2</sub> Emissions from Gas Stoves	Peak (ppb)
Baking cake in oven	230
Roasting meat in oven	296
Frying bacon	104
Boiling water	184
Gas cooktop - no food	82–300
Gas oven - no food	130–546

Rocky Mountain Institute



# There are well-documented health risks from gas stoves.

*Why are children more susceptible to health impacts from air pollution?*

Higher **breathing rates** and greater levels of **physical activity**



**Higher lung surface** to body weight ratios and smaller bodies



**Immature** respiratory and immune systems



# 42%

*Children living in a home with gas cooking have a 42% increased risk of having current asthma.*

# 24%

*Children living in a home with gas cooking have a 24% increased risk of lifetime asthma.*

# 32%

*Children living in a home with gas cooking have an overall 32% increased risk of having current and lifetime asthma.*



# ENVIRONMENTAL JUSTICE

Housing is often linked to socioeconomic status. Lower-income households may be at an even higher risk from gas stoves. Researchers have found lower-income households often contend with higher levels of exposure to indoor air pollutants.

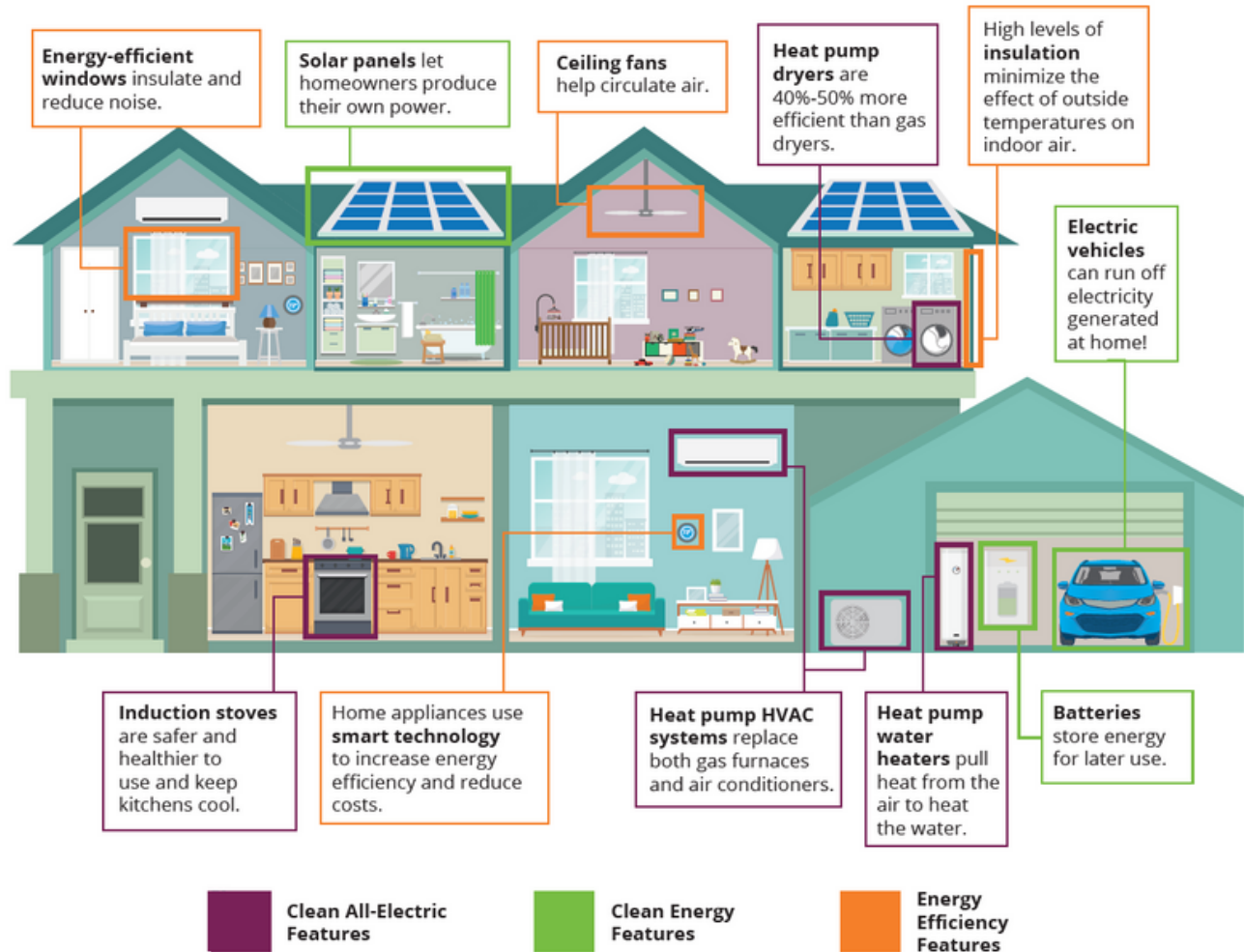
Lower-income households often have smaller homes, and frequently without adequate stove ventilation. Some households resort to using their ovens to heat their homes during cold weather, which consistently raises the level of dangerous air pollution indoors

Lower-income households are also more likely to suffer from the health impacts associated with higher exposure to outdoor air pollution. Combined with the increased risk from indoor air pollution, our reliance on methane gas often places an undue burden on lower income individuals and families.



# SOLUTIONS

THERE ARE MANY WAYS TO PROTECT OURSELVES FROM POLLUTANTS IN OUR HOMES.



- **Replace gas stoves with electric stoves**, including induction stoves and individual induction burners. This yields the greatest decrease in air pollutants at the source.
- **Install or enhance ventilation systems.** Though most gas appliances are required to vent outdoors, gas stoves are often an exception. Adding effective, reliable kitchen ventilation that exhausts to the outside reduces indoor air pollution, but it can be expensive.
- As heating and powering our homes and businesses becomes more efficient, the exchange of indoor and outdoor air can also be reduced, potentially resulting in the trapping of air pollutants indoors. **Increasing electrification** along with energy efficiency is one key to protecting indoor air quality and human health.