

Gas Stoves in Residential Homes

GAS EMISSIONS AND CHANGES IN CLIMATE

Natural gas stoves

Recently gas stoves have come under fire. Many Minnesotans use natural gas stoves for cooking at home. Across the United States, over one third of households use gas for cooking.¹ Gas stoves emit methane, a greenhouse gas that contributes to changes in climate with consequential effects to the environment and human health. Recent studies have shown that even when turned off, gas stoves continue to emit low levels of methane.

Methane is not the only risk from gas stoves. Methane emitted by gas stoves breaks down into carbon monoxide (CO), fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), and other oxides of nitrogen (NO_x). These by-products of methane also contribute to poor indoor air quality and may increase the risk of asthma exacerbations, wheezing, and other troubles with breathing.

By reducing the use of gas stoves, Minnesotans can make progress on reducing greenhouse gas emissions and improve indoor air quality.

Sources responsible for gas emissions

Greenhouse gases are gases that warm the atmosphere and the earth's surface and lead to changes in climate. Greenhouse gas emissions from Minnesota residences have increased 14% over the past 15 years.² The largest source of these emissions from our homes is natural gas used for heating and appliances. The 2021 American Housing Survey outlines the prevalence of natural gas as a fuel source in Minneapolis-St. Paul and estimates that nearly 94% of occupied resident units in the metro area use natural gas as a fuel source.³ Natural gas is a significant contributor to the rise in atmospheric greenhouse gases and thereby to changes in climate.

- Natural gas appliances contribute to climate change in two ways: first, by generating carbon dioxide as they burn natural gas as a fuel and second, by leaking unburned methane into the air.⁴
- Even when turned off, gas stoves continue to emit methane through small persistent leaks.
- In Minnesota, CO₂ emissions account for most greenhouse gas emissions, followed by methane and oxides of nitrogen.⁵
- Annual methane emissions from all gas stoves in U.S. homes have an estimated climate impact comparable to annual carbon dioxide emissions of 500,000 cars.¹

Gas stoves and changes in climate

Statewide, Minnesota is experiencing more variability in weather conditions, including warmer and shorter winters and fewer cool nights in the summer.

New studies estimate how the use of gas stoves accelerates changes in climate. Methane emitted from natural gas stoves contributes to the rise in atmospheric greenhouse gases and to subsequent changes in climate. Released into the atmosphere, greenhouse gases, including methane and oxides of nitrogen, trap heat and raise temperatures. Hotter temperatures in Minnesota have a cascading effect, impacting the long-term health of the environment, livestock, farming, and fishing, and the overall health of people.

Climate change caused by methane emissions, particularly from the use of indoor gas stoves, can be prevented. It is important for policymakers to take action to mitigate changes in climate by finding solutions to reduce greenhouse gas emissions.

Action steps and recommendations

Minnesota plans to reduce greenhouse gas emissions.

Minnesota's Climate Action Framework addresses changes in climate throughout the state to improve both people's health and the environment.⁶ Goals of this framework include:

- Expanding the use of carbon-free energy and creating healthy, efficient buildings that pollute less.
- Connecting communities through cleaner transportation initiatives, such as walking, biking, and electric vehicles.
- Offering funding for climate adaptation in residential and commercial buildings.
- Protecting the health and wellbeing of all Minnesotans in the face of climate change.

These climate actions are initiatives for a long-term healthier environment.⁷

All fuel-burning appliances should be vented to the outdoors.

Proper and consistent ventilation of gas stoves protects household health by reducing indoor air pollutants, including methane, NO₂, and NO_x, and minimizing the risk for the development of asthma, COPD, and other respiratory conditions. As gas stoves emit pollutants into indoor air, it's very important that they be vented outside, and ventilation systems need to be on and working to remove contaminants from the air.

All fuel-burning appliances need to be vented to the outdoors. Have and use proper ventilation, such as hoods and exhaust fans, regularly. Using air exchangers or ventilation fans throughout the house, especially in bathrooms and the kitchen, can help remove pollutants from the home and increase outdoor air ventilation. Increasing the intake of outdoor air will further help to lower the concentrations of indoor air pollutants in your home.⁸

When cooking with a gas stove, consider ways to help reduce exposure to indoor air pollutants.

- Limit time spent near the gas stove and in the kitchen, especially for children.

- Open windows and doors, turn on ceiling fans, or run a window air conditioner in warmer seasons to increase outdoor ventilation.
- Favor use of back-burners on a gas cooktop. Range hoods are more effective in ventilating emissions from back-burners than front burners.⁹
- Use range hoods with exhaust fans that vent outdoors on high when regularly cooking.
- Properly install, monitor, and maintain gas stoves to be most effective and efficient.¹⁰ A gas stove that isn't properly installed and maintained can emit more methane and by-products of combustion.¹¹

Switch to the use of electric instead of gas.

To help reduce air pollutants, switch out gas cooking appliances for electric, including stoves, ranges, and cooktops. If you're looking for a cooktop, consider an induction cooktop as a way to help reduce by-products of combustion. Induction is an option that has responsiveness similar to gas when adjusting the heat level. Switching to electric instead of gas will help to reduce indoor air pollutants.

Federal legislation

The widespread use of indoor gas stoves is a considerable public health issue. While no legislation has been introduced at the federal level to ban gas stoves, there has been a lot of discussion. U.S. Regulators and State Lawmakers, and the US Consumer Product Safety Commission are considering a ban on gas stoves. Minnesota's Climate Action Framework is actively addressing greenhouse gas emissions and changes in climate throughout the state.

References

1. ACS Publications. Methane and NOx Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes (<https://pubs.acs.org/doi/10.1021/acs.est.1c04707>)
2. Minnesota Pollution Control Agency. Climate change trends and data (<https://www.pca.state.mn.us/air-water-land-climate/climate-change-trends-and-data#:~:text=Greenhouse%20gas%20emissions%20from%20Minnesota,for%20home%20heating%20and%20appliances.>)
3. United States Census Bureau. 2021 American Housing Survey (https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=33460&s_year=2021&s_tablename=TABLE3&s_bygroup1=1&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1)
4. Stanford University. Climate and health impacts of natural gas stoves (<https://earth.stanford.edu/news/climate-and-health-impacts-natural-gas-stoves>)
5. Minnesota Pollution Control Agency. Greenhouse gas emissions in Minnesota (<https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf>)
6. Minnesota Department of Health. Minnesota's Climate Action Framework (<https://climate.state.mn.us/sites/climate-action/files/Climate%20Action%20Framework.pdf>)
7. Minnesota Department of Health. Minnesota's Climate Action Framework: Summary of climate actions (<https://climate.state.mn.us/sites/climate-action/files/State%20action%20steps.pdf>)
8. United States Environmental Protection Agency. Improving Indoor Air Quality (<https://www.epa.gov/indoor-air-quality-iaq/improving-indoor-air-quality>)
9. The New York Times. Worried About Your Gas Stove? Here's What to Do. (<https://www.nytimes.com/wirecutter/blog/worried-about-your-gas-stove/>)
10. Minnesota Department of Labor and Industry. 2020 Minnesota State Mechanical Code MN rule chapter 1346 (http://www.dli.mn.gov/sites/default/files/pdf/BOL_Mechanical_Fuel_Gas_Code.pdf)
11. United States Environmental Protection Agency. Introduction to Indoor Air Quality (<https://www.epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality#causes>)

Contact Information

Asthma Program

health.asthma@state.mn.us | 651-201-5909 | www.health.state.mn.us/asthma

Climate and Health Program

health.climatechange@state.mn.us | 651-201-4899 | <https://www.health.state.mn.us/climate>