

UNHEALTHY AIR, EXTREME HEAT IN GAS COMMERCIAL KITCHENS



Commercial kitchens are physically demanding workplaces, but relatively little research has measured the air pollution and heat that cooks and chefs experience during a normal shift.

PSE Healthy Energy, the [Stanford Doerr School of Sustainability](#), and [New York University Grossman School of Medicine](#), in collaboration with Chef [Christopher Galarza](#), conducted the first U.S. study to compare air quality in gas, propane, and electric commercial kitchens. Published in [Environmental Research Letters](#), the study monitored 27 commercial kitchens across California, Pennsylvania, and New York: 21 using natural gas, three using propane, and three all-electric. The study found that gas kitchens frequently exceeded health-based guidelines and benchmarks for air pollution and heat.



70%
of gas kitchens
exceeded the EPA's
one-hour NO₂ standard
(17 of 24 gas kitchens)

Gas and Propane Kitchens Frequently Exceeded Air Pollution Standards

- Approximately 70% of gas and propane kitchens exceeded the Environmental Protection Agency's (EPA's) one-hour outdoor air standard for nitrogen dioxide (NO₂) during working hours.
- One kitchen recorded a 15-minute NO₂ concentration above 1,000 ppbv, exceeding the NIOSH short-term recommended exposure limit.
- The pollution was not limited to NO₂: carbon monoxide levels exceeded California's one-hour exposure guideline in three gas kitchens, and benzene exceeded it in five.
- None of the all-electric kitchens exceeded health-based guidelines for pollution exposure during cooking hours.



Kitchens With Gas and Propane Appliances Frequently Exceeded Heat-Based Health Benchmarks

- 68% of gas kitchens with temperature data exceeded 90°F (32°C), the proposed federal OSHA high-heat threshold.
- Ten kitchens exceeded 100°F (37°C), and four exceeded 122°F (50°C).
- Even when outdoor temperatures remained below 75°F (23°C), 10 of 13 gas kitchens exceeded 90°F, suggesting that heat generated inside the kitchen drove the extreme indoor conditions.
- A chef-worn monitor recorded an average of 92°F (33°C) during five-hour cooking session and a 106°F (41°C) peak.

Air Pollution Can Increase Overnight When Pilot Lights Remain On

Pilot lights burn overnight while ventilation systems are typically off. This study found that overnight pollutant levels often exceeded those measured during working hours.

- Approximately two-thirds of gas kitchens with overnight monitoring recorded higher levels of NO₂, carbon monoxide, carbon dioxide, methane, and benzene overnight than during restaurant service.
- Seven gas kitchens exceeded the EPA's one-hour 100 ppbv NO₂ guideline during off-work hours.
- None of the all-electric kitchens exceeded pollutant thresholds overnight.

These findings raise concerns for cleaning crews and early-arriving staff who may enter kitchens before turning on ventilation systems.

New Insights for Commercial Kitchens

This study offers new insights into poor indoor air quality and extreme heat in commercial kitchens using gas and propane appliances. It provides restaurant owners, chefs, workers, and researchers with new information about how kitchen equipment and operating conditions can shape the workplace environment.

This research is part of PSE's [Methane + Health Initiative](#), a long-term research initiative to improve the scientific and public understanding of the link between methane emissions, air pollution, and public health.

[View full study.](#)



Who We Are

PSE Healthy Energy is an independent scientific research institute working at the nexus of energy, human health, and climate. We believe responsible energy and climate decision-making starts with strong, durable science. PSE conducts rigorous research and translates findings into clear, actionable guidance for policymakers, civil society organizations, government agencies, courts, and communities.