SHOULD I OPEN THE WINDOWS OR KEEP THEM CLOSED?

SOUTHEAST TEXAS
URBAN INTEGRATED FIELD LAB

Outdoor air pollution affects the air quality inside your home

WHY NOW?

People in the US spend on average 90% of their time inside buildings. In small, poorly ventilated spaces, air pollutants can build up quickly. Fresh outdoor air is usually cleaner, so opening windows to air out your home is generally a good idea. But during pollution events, like wildfires or industrial flares, outdoor air can become more dangerous than indoor air. That's when keeping windows closed can protect your family. In the Beaumont-Port Arthur area, industrial activity means pollution spikes can happen with little warning, so detecting these pollution episodes to know when to open or close your windows really matters.

WHAT WE DID

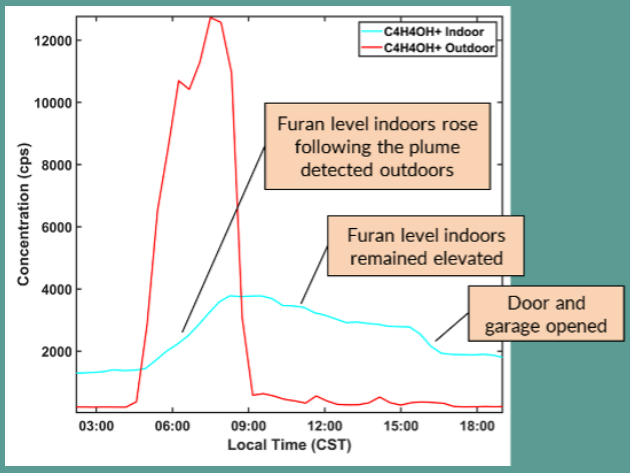
In October 2023, researchers set up air quality sensors (including the famous "Sniffer") inside and outside a single-family home in Port Neches. Every three minutes, the sensors automatically switched between sampling outdoor air and indoor living room air, around the clock for two weeks. This continuous back-and-forth comparison let the team track how outdoor pollution events, like wildfires, affected the air inside the home.

WHO WAS INVOLVED?

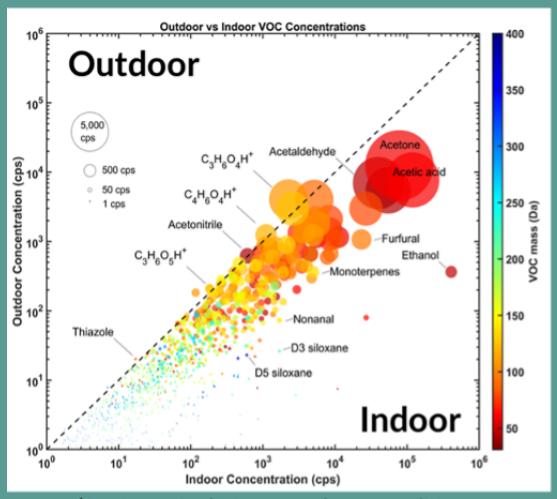
During our measurement period, local residents provided valuable insight on regional emission sources and the presence of wildfires, which constituted major air pollution events for this study. They also shared ideas about neighborhoods that would be suitable locations for further air quality measurements.

FINDINGS

Our study found that pollution from outdoor events, like wildfires, gets inside the home quickly and lingers. For instance, during the large marsh fires occurred in Jefferson County the levels of compounds associated with burning rose indoors just minutes after the outdoor levels spiked. Even after the wind shifted and outdoor air quality improved, indoor pollution stayed elevated for hours due to poor ventilation.The good news is that tracking outdoor pollution levels and wind direction can help residents decide when to seal up their home and when to open windows to flush out stale air. This kind of real-time information could serve as a practical tool for protecting your family's health.



Furan Penetration and Persistence Indoors during Wildfire Plume



I/O VOC Ratio during Non-Plume Conditions

This chart shows what happened during a wildfire plume that reached the house early one morning. Outdoor pollutant(red) spiked and then dropped once the wind changed. But indoor pollution (blue) kept rising and stayed high all day, until the homeowner opened the doors and windows to clear the air.

This is a diagram of the measurement setup. We housed the air quality instruments (including the "Sniffer") in a mobile laboratory and sampled both the air from outside and inside the house. Air quality sensors (Beacons) (bottom left) were also placed inside the house for additional long-term measurements.

MORE ABOUT SETX-UIFL

The Southeast Texas Urban Integrated Field Lab (SETx-UIFL) is one of four projects funded in 2022 by the U.S. Department of Energy to study how climate, environment, and urban changes affect cities. A team of over 80 researchers from UT, Lamar

University, Texas A&M, Prairie View A&M, Oak Ridge National Lab, and Los Alamos National Lab has collected data and conducted modeling across hazards including flooding, hurricanes, heat stress, and air quality. Our Why: Southeast Texas faces numerous hazards, yet smaller communities like this one have often felt forgotten compared to larger cities. The SETx-UIFL was designed to explore the complex dynamics of disaster vulnerability for this economically and culturally vibrant region. We believe Southeast Texas is a bellwether for the entire Gulf Coast, and an exemplar for strategies that protect people and places. We hope this effort supports your path toward lasting resilience.

PAWEL MISZTAL
University of Texas at Austin
misztal@utexas.edu

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