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Indoor Air Quality of Offices: Beyond CO2 to Chemical Pollutants

Tuesday, May 6, 2025 11:48 AM (12 minutes)

Objective
Poor indoor air quality (IAQ) can impact health, a concern emphasized during the COVID-19 pandemic. Belgium's Federal Public Services (FPS) of Health launched the Indoor Air Quality Platform to address this. This platform unites public agencies, academics, and industry representatives to enhance IAQ in public enclosed spaces (e.g., restaurants, hotels, cultural and sports venues) through knowledge-sharing, research, and policy support. Sciensano, Belgium's national public health institute, supports the FPS and the Platform by conducting IAQ studies in office environments and publicly accessible enclosed spaces.
Methods
Low-cost sensors measured the indoor and outdoor air quality in both office spaces and publicly accessible areas inside these office buildings across public entities. Monitoring the publicly accessible areas ensures a focus on environments with significant public interaction, while including office spaces added valuable data points thanks to their controlled conditions, extensive existing literature, and ease of comparison. Pollutants like carbon dioxide (CO2), carbon monoxide (CO), nitrogen dioxide (NO2), ozone, particulate matter (PM10, PM2.5), and total volatile organic compounds (TVOC) (more specifically formaldehyde), alongside temperature, relative humidity, and sound were monitored over periods ranging from two weeks to one month at various times throughout the year.
Results
These indoor air quality measurements conducted at various times throughout the year revealed a first view of differences in pollutant trends between buildings with and without HVAC systems and the influence of outdoor air on indoor levels.
Key findings included indoor CO2 levels often below 1000ppm, thanks to effective ventilation and low occupancy. Outdoor pollutant peaks, notably NO2, PM, and ozone, directly impacted indoor air quality, especially in HVAC-equipped spaces. At night, VOC and formaldehyde levels increased, probably due to the emission from building materials and furniture. Offices with HVAC systems often had reduced humidity (30%-40%) and, in the more recent buildings with large glass windows, summer temperature sometimes reached 30°C.
Conclusion
This monitoring campaign provided valuable insights into pollutant tendencies, HVAC system performance, and the interaction between outdoor and indoor air quality inside the office buildings across public entities. This research underscores the importance of well-maintained HVAC systems and highlights the role of sensors in detecting and identifying aberrant situations or events.
Future long-term measuring campaigns will soon expand to public enclosed spaces like sports and cultural centers and will allow us to create a mapping of the pollutants present in these different spaces and to develop an 'indoor barometer'. These efforts aim to improve IAQ in shared environments, benefiting public health and well-being.

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