

Healthy Buildings: Designing for Life

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APPALACHIAN TRAIL



Appalachian Trail, Dauphin County, PA







Shelter is



Necessary for
survival, safety
and wellbeing



Essential for
emotional and
psychological
security

A true shelter includes all aspects of
Indoor Environmental Quality:

- ✓ Air Quality
- ✓ Lighting
- ✓ Thermal Comfort
- ✓ Acoustics
- ✓ Safe Water







90-75

ASHRAE STANDARD

ENERGY CONSERVATION IN NEW BUILDING DESIGN

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The American Society of Heating, Refrigerating,
and Air-Conditioning Engineers, Inc.

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STANDARD

ASHRAE Standard 241-2023

Control of Infectious Aerosols

Approved by the ASHRAE Standards Committee on June 24, 2023.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. Instructions for how to submit a change can be found on the ASHRAE® website (www.ashrae.org/continuous-maintenance).

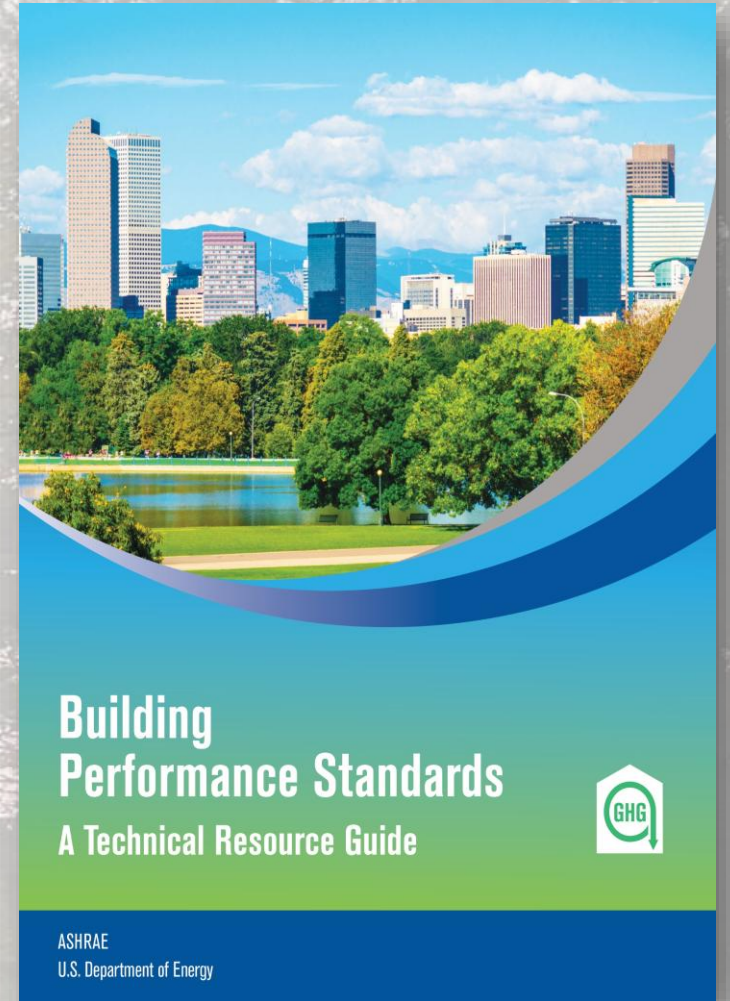
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**Sick Building
Syndrome**

1980's



COVID-19

2000's



1990's

**Indoor
Smoking**

Indoor Air Quality

Workers in offices with poor IAQ report **50% more fatigue** and discomfort compared to those in well-ventilated environments. Improved ventilation has been shown to **enhance productivity by 11%**, according to a study in the journal Environmental Health Perspectives. (Seppänen et al., 2006)

Poor indoor air quality is a leading cause of health problems. The World Health Organization (WHO) estimates **that 3.2 million deaths annually are attributable to indoor air pollution** caused by factors such as poor ventilation, pollutants, and allergens.



Sinoquipe Scout Reservation, Fulton County, PA



Thermal Comfort

Temperature-related discomfort is a major workplace issue, with research showing that **productivity decreases by 4% per degree Celsius when indoor temperatures rise above 77°F (25°C)**. (ASHRAE Standards, 2021)

A study by the Lawrence Berkeley National Laboratory found that optimizing indoor temperatures to the range of 21–23°C (69.8–73.4°F) can **improve performance and decision-making accuracy by 10–20%**. (Berkeley Lab, 2018)



White Rock Acres, Cumberland County, PA



Thermal Comfort

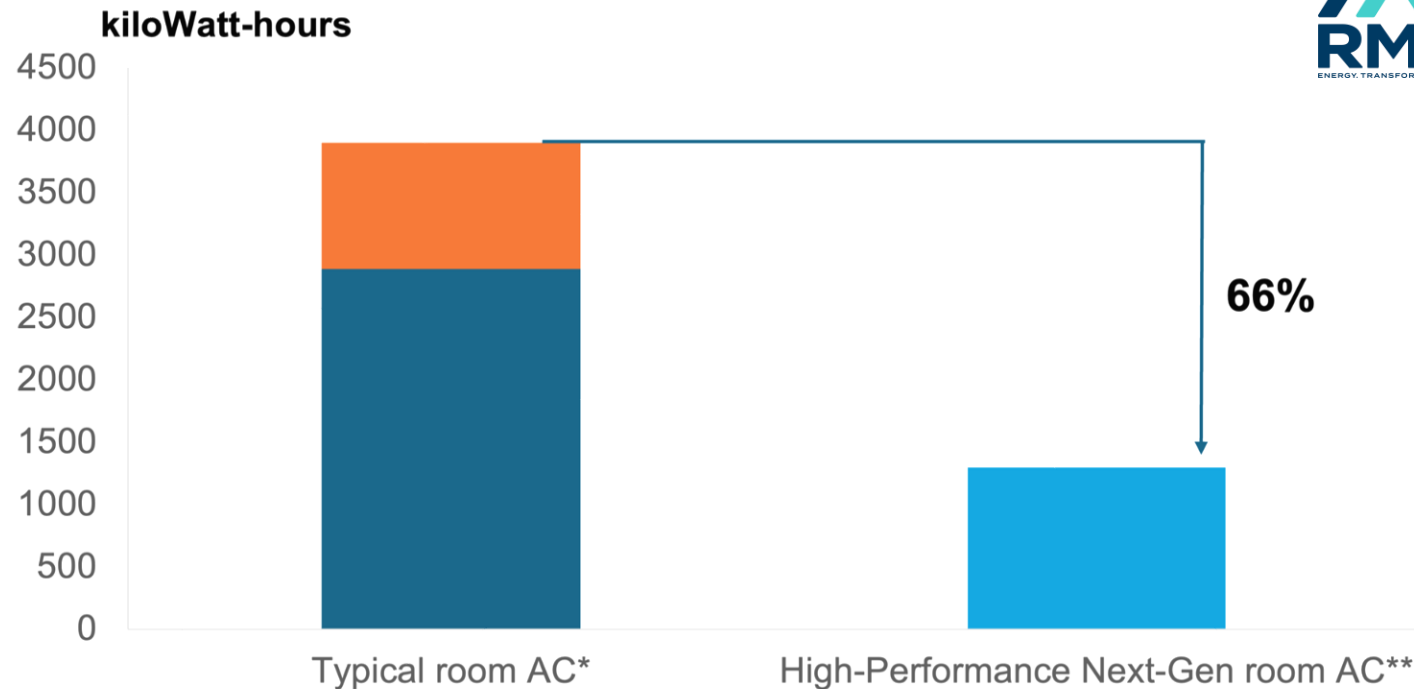
Today, it is common for users of air conditioners to turn down the thermostat setpoint significantly to manage humidity in the air. This results in overcooling of the air and consequently significantly higher energy consumption.

Fairbanks, AK



Thermal Comfort: India Case Study

Annual energy use of room air conditioners in India



- Energy use to achieve both T & RH conditions without significant overcooling
- Additional energy use to overcool and achieve target humidity in space (60%RH)
- Energy use to achieve 27C

25%+ more energy used to overcool and achieve target temperature and relative humidity conditions in the space. [**orange bar**]

Most room air conditioners control on temperature alone and do a poor job of dehumidification resulting in excessive energy and an overcool the space.

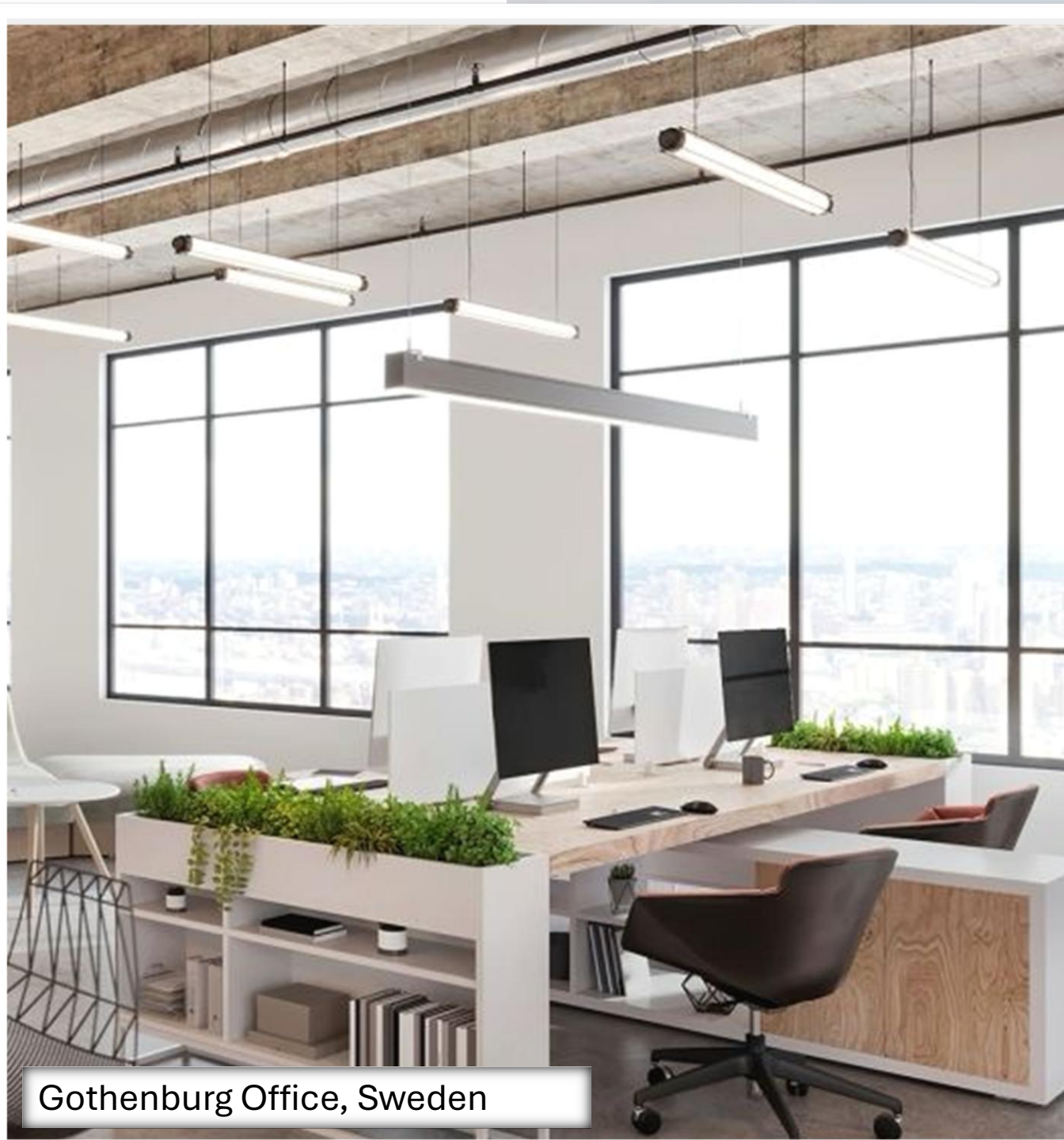


Acoustics

Noise is the top complaint in open-office environments, with **70% of employees reporting that workplace noise** affects their ability to focus. (Occupational Health Science, 2021)

Excessive workplace noise can **reduce productivity by as much as 66%** and increase stress levels, which in turn elevates the risk of cardiovascular disease. (American Psychological Association, 2019)

Acoustic improvements can lead to **48% fewer errors** in tasks requiring concentration, as shown in studies by the British Council for Offices. (BCO, 2017)



Gothenburg Office, Sweden



Lighting

Natural light is critical for well-being. A study published in the Journal of Clinical Sleep Medicine found that workers with **access to daylight reported 46 minutes more sleep** per night and better overall quality of life. (Cheung et al., 2017)

Poor lighting costs businesses billions annually due to reduced productivity and absenteeism. Enhanced lighting conditions can **increase performance by 23%**, as observed in a study by Cornell University. (Cornell University, 2018)

Blue-enriched lighting during the day can improve alertness and **reduce fatigue by 30%**. (Lighting Research Center, 2020)

Water Quality

The WHO reports that 785 million people globally lack access to clean drinking water, leading to a range of health issues like diarrhea, **which kills 485,000 people annually.** (WHO, 2023)

U.S. CDC estimates waterborne diseases affect **over 7 million people in the U.S.** every year and cost our healthcare system over **\$3 billion.** That is **1 in 50 people, annually.**



Alex at the Baltimore Zoo

Balancing energy efficiency with good IEQ ensures that buildings are not only environmentally sustainable but also conducive to the health and productivity of their occupants, creating a win-win situation for both people and the planet.



ASHRAE Global Headquarters,
Peachtree Corners, GA



The Trail Forward: Be Prepared

Presidential Initiatives

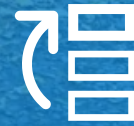
Roadmap for Healthy Buildings



Compile
Best
Practices



Identify
Gaps



Set
Priorities



Action
Plan

Presidential Initiatives

Resources and Tools

IEQ
Resource
Hub



Downloadable
Checklists



Informational
Video Series



IEQ Tech Hour
Sessions



Presidential Initiatives

Collaboration

IEQ Focused
Conference
Sessions



Presidential
Design
Challenge –
IEQ

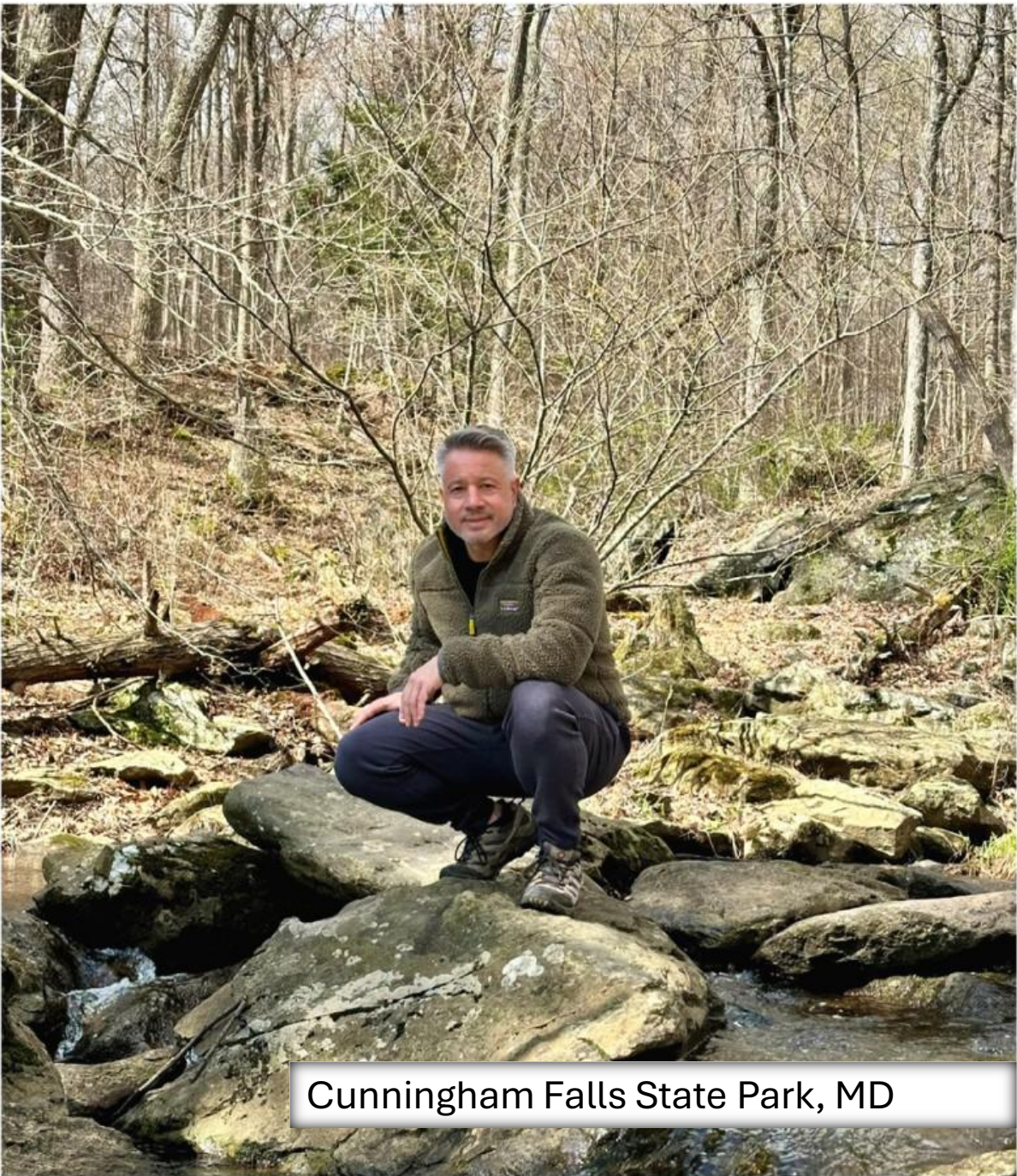


Skogafoss, Skogar, Iceland



It is our time to do another “good turn.” A time to prioritize the human experience within the built environment, ensuring that every space we create serves its most important purpose: to protect and nurture those who live and work within it.





Cunningham Falls State Park, MD



Thank you!

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