2025-26 ASHRAE President Bill McQuade, P.E., CDP, Fellow ASHRAE, LEED AP
Presidential Address Manuscript
"Healthy Buildings: Designing For Life"

I have always had a love for the outdoors. I would say, a real avid outdoor enthusiast. As a boy, I spent long summer days with my friends exploring the woods near our homes, building tree forts and primitive shelters using scrap lumber, logs, and tree branches. We had all kinds of adventures. I guess you could say that my interaction with the built environment started very early. Though I must admit, my structures would not have passed code. They were from the "perilous" movement in architecture, and I fell out of a few trees. At least my early structures were net-zero energy. Clearly, I was ahead of my time.

When I became a father, it was important to me that my sons, Alex, and Colin, experienced the outdoors and the values of scouting. As their troop leader from Tiger Scouts through their Eagle rank, we spent countless hours in the woods, camping in canvas tents, creating unforgettable adventures together.

Scouting is an outdoor activity and as the scouts get older and more capable, they are taught various survival skills so that they can protect themselves and assist others in times of danger. One of the first skills taught in the wilderness survival merit badge is constructing an emergency shelter.

Shelter is one of the most fundamental human needs, essential for survival, safety, and well-being. Throughout history, humans have sought shelter to protect themselves from the elements, including extreme weather, predators, and environmental hazards. In its simplest form, shelter provides physical protection, ensuring that individuals are shielded from rain, cold, heat, and wind. However, its significance extends beyond physical safety. It plays a vital role in providing emotional and psychological security, which fosters a sense of stability and comfort.

No matter where you are, whether you are in Los Angeles or Sri Lanka, having a safe, stable shelter provides more than protection, it offers a sense of belonging and permanence. It creates a space where individuals can rest and recover. A home, for example, is more than a physical structure – it becomes a place of personal identity, where people feel in control of their surroundings– a place that supports mental health and emotional stability. Without

secure shelter, individuals are far more vulnerable to health issues, violence, and emotional distress, as seen in populations affected by homelessness or displacement.

A true shelter serves as the foundation of communities, enabling people to engage in daily activities like working, studying, and raising families. A society's ability to provide adequate shelter is a direct reflection of its overall economic and social well-being. When housing is inadequate, whether overcrowded, unsafe, or unsanitary, it can not only threaten public health but also hinder social and economic progress.

Today, shelter is more than just a roof over one's head. Shelter encompasses the hospitals we are born in, the homes where we find comfort, the schools where we learn, and the buildings we work in. A well-designed shelter prioritizes indoor environmental quality, ensuring good air quality, proper lighting, thermal comfort, acoustics, and access to safe water, all essential for health and comfort. Providing safe, stable, and sustainable shelter is not just a basic human need, it is a fundamental pillar of societal advancement and long-term development.

The scout slogan is "do a good turn daily" meaning do acts of kindness every day that help humanity. The motto is "be prepared." In many ways, those two concepts remind me very much of what we do as ASHRAE members. Through advancing the arts and sciences of HVAC&R, we work to serve humanity. And our vision is a healthy and sustainable built environment for all.

There is no doubt we have had much success:

In the 1970s, during the oil embargo, ASHRAE was called upon to help reduce energy use in buildings, and we delivered. Over the 50-year history of ASHRAE Standard 90.1, the minimum energy efficiency requirement in buildings has improved by over 60% and equipment efficiencies have improved by 50% or more. Today, our design guidance enables the creation of practical and achievable net-zero energy buildings.

In the 1980's, when researchers discovered the link between ozone depletion and harmful refrigerants, ASHRAE played a key role in identifying and transitioning away from ozone-depleting CFC and HCFC refrigerants so the atmosphere could heal.

In recent years, we acted swiftly during the COVID-19 pandemic to identify transmission pathways and to provide guidance for building operators to minimize the risk to occupants, saving many lives. Our decarbonization efforts over the last four years have moved the concept of reducing building life-cycle carbon emissions to the forefront of the industry paving the way for a net-zero carbon future.

But have we done enough to truly fulfill the promise of a healthy built environment? Have we truly created shelter in every sense of the word?

Despite our great achievements as an industry, we continue to find buildings designed, built, and or operated in a way that compromises our health and wellbeing rather than protect, comfort, and help us realize our full potential. Our efforts to achieve high levels of energy efficiency in buildings have sometimes been the cause of unintended negative impacts on indoor environment quality. Sick building syndrome in the mid 1980's is an example where a poor understanding of moisture control, ventilation, and the off gassing of volatile organic compounds in construction materials led to mold growth and consequently, sick occupants. Another example occurred in the late 1990s when outdoor air requirements were reduced following smoking bans. While the intent was to improve energy efficiency, some believe that these lower ventilation rates may have negatively contributed to the spread of infectious diseases like the flu or many years later theCOVID-19 pandemic.

Sometimes "doing a good turn" can have adverse effects or unintended consequences. However, engineering is about learning from our challenges, refining our approach, and finding a solution – and that is exactly what ASHRAE does well. Now that we have made significant progress in energy performance, it is time we turn our attention to IEQ with the same level of focus.

Anyone who has taken a brisk hike in the woods or around the neighborhood on a cool fall morning can attest to the value of clean fresh air. It sharpens your focus and awareness, improves your mood, and enhances your physical performance.

Scouts are taught that when setting up a tent for the night, they always need to ensure the opening faces away from the fire to avoid smoke and allow proper ventilation to prevent condensation buildup. I never miss an opportunity to teach my scouts about ASHRAE Standard 62.2 and proper ventilation during our outings. Of course, that sometimes results in a few of the scouts rolling their eyes when I explain how the standard emphasizes proper intake location and ventilation rates for residential buildings.

Indoor air quality is no less important in buildings. Humans breathe approximately 15,000 liters of air per day. It is no surprise then that poor indoor air quality in buildings has far-reaching global health implications, affecting millions of people annually. The World Health Organization (WHO) estimates that 3.2 million deaths annually are attributable to indoor pollution including 237,000 deaths of children under five. Prolonged exposure to pollutants, allergens, and volatile organic compounds increases the risk of heart disease, stroke, lung cancer, and lower respiratory infections. Fine particles can penetrate deep into lung tissue, leading to chronic respiratory issues and reduced lung function, especially in children and the elderly. Poor indoor air quality is associated with increased anxiety, depression, and fatigue, potentially due to exposure to chemicals and reduced oxygen levels. In low- and middle-income countries, reliance on solid fuels for cooking and heating significantly increase exposure to harmful pollutants for women and children.

Thermal comfort is an important factor whether you are choosing a sleeping bag for a cold fall night or considering how to optimize productivity of workers in an office building. We often think of thermal comfort in terms of what we see on the thermostat. However, ASHRAE guidance tells us many factors affect people's thermal perception. We can all think back to a “thermal comfort experience” such as when we were hot on a summer day and sought relief in a shaded grove of trees or experienced the cool while walking in an underground parking garage. Have you ever been walking on a trail and seen a snake or salamander warm itself on a rock or, you sat in the sunlight to warm up on a cool spring morning? This is the power of radiant heat and why building performance is so important. Another example is when a light breeze on a hot and humid day provides just enough cooling to make us feel comfortable. This is the power of elevated air speeds. Our perception of thermal comfort changes even when we wear different clothes and do other activities.

Though air temperature setpoints are in codes and easy to understand, they do not represent thermal comfort. During my presidential year, we will celebrate the 60th anniversary of ASHRAE Standard *55-Thermal Environmental Conditions for Human Occupancy*. Research shows that when spaces comply with Standard 55, we reduce discomfort and create environments that enhance learning and productivity. A bonus byproduct of creating compliant spaces, first with architecture and then with enclosure design and interior systems, is preserving a comfortable environment while using the least amount of energy to maintain proper temperature and humidity levels.

Have you ever been in a hotel, office building or convention center in a hot and humid climate and noticed that the rooms are too cold for comfort? You might have even had to wear a coat or sweater. Today, it is common for users of air conditioners to turn down the thermostat or the air conditioner setpoint significantly to manage humidity in the air. This results in overcooling of the air and consequently significantly higher energy consumption. This issue persists even when operating the most efficient air conditioners on the market. This is not just limited to space cooling in buildings, but it is a common theme across many cooling sectors. Although our industry has continuously optimized efficiency levels of their products to meet and exceed the efficiency ratings, these improvements have been focused on efficiently managing the temperature (or sensible load) and not much attention has been given to addressing the humidity (or latent load) in the indoor spaces. Configuring equipment to manage both humidity and temperature simultaneously can make a significant difference.

A real-world demonstration of how achieving optimal thermal comfort can pay large dividends in energy efficiency was made during Rocky Mountain Institute’s Global Cooling Prize competition. The competition revealed that by shifting away from using temperature alone as a control proxy when operating in conditions where humidity management is critical, air conditioners can provide effective and efficient dehumidification without significantly overcooling the space. Extensive lab testing as well as nine months of field

testing in Palava City, India, showed that air conditioning units that are optimized for real-world conditions and control both humidity and temperature, used over 50% less energy to meet comfort needs than typical products available on the Indian market. Over 40% of that energy savings came from eliminating overcooling alone.

How many here today have struggled with noise in the new “open office format” work environments? Or have been distracted by a noisy air handler or air conditioning compressor?

Acoustics play a vital role in shaping the indoor environment by directly influencing occupant comfort, health, and overall productivity. In indoor spaces such as offices, schools, and homes, poor acoustic design can lead to excessive noise, echoes, and sound reverberation, which may cause discomfort, stress, and decreased concentration. In work environments, high noise levels can hinder communication, reduce focus, and lower productivity. If you said “yes” to struggling with noise in open office environments, then you are part of the 70% who reported noise impacted their focus per an Occupational Health study. Another study indicates you could be part of the 66% who experience reduced productivity or higher stress levels that negatively impact your health. By creating Healthy Buildings that include a focus on great acoustic performance, your spaces will have occupants that experience 48% fewer errors in tasks that require concentration. In educational settings, poor acoustics can affect speech intelligibility, making it difficult for students to understand lessons clearly. Effective acoustic management not only enhances clarity and communication but also supports mental well-being by reducing noise-related stress and fatigue.

Moreover, proper acoustics can contribute significantly to the overall functionality of indoor spaces. Good acoustic design also plays a role in promoting restful environments in spaces such as hotels or residential buildings, where noise control directly impacts sleep quality and relaxation.

During many campouts, I conducted my own personal acoustics research, and you might be surprised to find out that the noise of crickets and bull frogs makes it difficult to get 95% of middle school teenagers to fall asleep in tents after dusk!

Have you ever noticed how a beautiful sunrise can instantly change your mood? Whether it is watching from a high rock bluff on the trail or on my way to work, they can instantly change my mood, I always pause and take them in.

Lighting and daylighting play a crucial role in shaping health and productivity within indoor environments. Exposure to well-balanced light supports the body’s circadian rhythm, which regulates sleep-wake cycles, mood, and overall well-being. Proper lighting conditions can enhance sleep quality, support biological functions, and help mitigate symptoms of fatigue, stress, and mood disorders. Conversely, inadequate, or poorly designed lighting—whether too dim, excessively bright, or lacking in spectral quality—can

contribute to eye strain, headaches, and increased stress levels, negatively impacting both mental and physical health.

Beyond health benefits, well-designed lighting enhances focus, cognitive function, and overall work performance. Research indicates that environments with appropriate light levels and spectral composition contribute to higher alertness, reduced errors, and improved job satisfaction. Dynamic lighting solutions that adjust throughout the day to align with natural biological rhythms can further support concentration and mitigate the energy dips often experienced in poorly lit workplaces. Thoughtful lighting design, integrating both daylight and high-quality electric light, is essential in creating indoor environments that support well-being, comfort, and efficiency.

Lastly, no scout or hiker will spend time in the woods without access to clean water, even if it means purifying the water yourself. As we design buildings, many of us take it for granted that the water entering our buildings is clean and safe. After all, access to clean water should be a fundamental human right! Well, that is not the case in developing countries, and we are finding that is not the case in the developed world either.

Contaminated water supplies can cause serious health problems, from respiratory and gastrointestinal diseases to long-term illnesses caused by heavy metals or chemicals. Aging infrastructure, improper water treatment practices, and reduced flow devices that increase water age in pipes have led to an increased incidence of waterborne disease cases in both developed and developing countries. A 2022 study by authorities in Hamilton Township, New Jersey, found 50% of homes tested had legionella in their source water. Our hospitals, schools, offices, and eldercare centers are connected to the same system. We must monitor and treat water coming into our buildings, just like we do with air. Clean source water has become a critical factor in Indoor environment quality.

The ASHRAE vision is “A healthy and sustainable built environment for all.” We are all so proud of the work that ASHRAE has done to protect our climate and outdoor environment by improving energy efficiency, eliminating ozone depleting refrigerants, conserving resources, and decarbonizing buildings. We have answered the call in the past and helped to solve the difficult problems in times of great need. It is a new day and time for another “good turn.” We can build on a half-century of progress in the energy performance of buildings and now focus the same effort on the indoor climate and environment. We need to become healthy indoor environmentalists!

There is no reason we cannot have both, but it will take a balanced approach. The methods and technology exist, there is no great innovation hurdle to overcome.

In short, 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.

But first, we must "be prepared." When Alex, Colin and I head out on a hike or some other outdoor adventure, we always have a map and carefully provisioned backpacks. So, the goal of my presidency over the next 12 months will be to help us be similarly prepared for our important IEQ journey.

First, we need a good map, so we will develop a comprehensive, multi-year roadmap for healthy buildings that outlines the necessary advancements in building design, operation, and maintenance to ensure superior indoor environmental quality. This roadmap will serve as a guiding document for the industry, setting clear goals and actionable steps to elevate IEQ while maintaining energy efficiency. The roadmap will:

- Identify and document best practices from across the industry that effectively balance occupant health with energy performance.
- Pinpoint gaps in research and standards. While ASHRAE has long been at the forefront of building science, we recognize that new research is needed to address emerging challenges in IEQ. The roadmap will highlight areas where further study is required and guide future research efforts.
- Set priorities for improving systems designs.
- Ensure practical implementation.

Second, education and accessibility are critical in making IEQ a central focus in building design and operation. ASHRAE will develop a suite of user-friendly tools and resources to equip building professionals with the knowledge and guidance they need to improve indoor environments effectively. These resources include:

- A web-based IEQ education platform that will serve as a centralized hub for content and resources.
- Downloadable IEQ checklists designed to assess and enhance indoor environmental quality in both new and existing buildings.
- A series of informational videos introducing IEQ concepts for building designers. These will be designed to inform not only building professionals but also building owners, tenants, and facility managers about the importance of a healthy indoor environment.
- ASHRAE Tech Hour session presentations providing deeper insights into areas such as indoor air quality management, moisture control, acoustics, and source water risk mitigation.

And third, we recognize that collaboration is at the heart of ASHRAE's work. To foster this collaboration, ASHRAE will organize and support events that bring together experts, policymakers, and practitioners to share knowledge and drive progress in indoor environmental quality.

As part of ASHRAE's IEQ 2025 Conference, we will host a one-day pre-conference workshop dedicated to important issues and building applications. This event will focus on topic areas including water quality, wildfire smoke mitigation, and explore IEQ challenges in specific building types, such as schools and eldercare facilities, where occupant health and safety are especially critical.

Finally, the ASHRAE Presidential Design Challenge will make indoor environmental quality the central focus of this Society Year. This year's challenge will encourage chapters to develop innovative solutions that enhance air quality, thermal comfort, lighting, acoustics, and overall occupant well-being while maintaining energy efficiency.

These initiatives will amplify ASHRAE's message that healthy indoor environments are not a luxury but a need. By engaging a broad spectrum of stakeholders, we will accelerate the adoption of IEQ-centered design and operational practices across the industry.

Just as building an emergency shelter in the woods requires careful planning, attention to the environment, and a deep understanding of what keeps us safe and healthy, so too must we approach the design and operation of modern buildings. Our work in the built environment must build upon our great achievements in energy efficiency and carbon reduction. We must now ensure that they also foster well-being and enhance productivity.

The challenges we face in improving indoor environmental quality—balancing energy efficiency with the needs of the occupants—are not insurmountable. We have developed the knowledge and tools to create buildings that are energy efficient and carbon neutral.

The same can be said for the knowledge and tools that create buildings that are healthy, comfortable, and safe. We just need to develop a process that pulls all of them together into a comprehensive approach. In this way, the future of our built environment can be as well-considered and effective as the shelters I once imagined as a boy and tried to construct in the woods.

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.