



Shaping Tomorrow's
Built Environment Today

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November 12, 2021

The Honorable Michael S. Regan
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, DC 20460

Submitted through the Federal Rulemaking Portal

**Re: Comments on FY2022-2026 EPA Strategic Plan (Draft: October 1, 2021)
Docket Number EPA-HQ-OA-2021-0403**

Dear Administrator Regan:

ASHRAE appreciates the opportunity to submit comments to the U.S. Environmental Protection Agency on its *FY2022-2026 EPA Strategic Plan* (“*Strategic Plan*”).

ASHRAE, founded in 1894, is a not-for-profit global technical society with the mission of serving humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration and their allied fields. The Society and its more than 51,000 individual members worldwide focus on building systems, energy efficiency, indoor environmental quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow’s built environment today. ASHRAE’s vision is to advance a healthy and sustainable built environment for all, which is aligned with much of EPA’s work and mission. To that end, ASHRAE proposes some additions to your Strategic Plan to bolster engagement and technical expertise from the private sector. In addition, with 119 U.S. chapters, ASHRAE’s extensive grassroots network of members can be useful for connecting with communities across the country to disseminate technical information and provide guidance, training, and education.

Continue to Engage with Technical Organizations

ASHRAE believes the EPA Strategic Plan would be strengthened by bolstering EPA engagement with technical organizations such as ASHRAE to leverage their expertise and gain crucial perspective. This engagement will help to advance EPA's seven strategic goals and will also align with the agency's principles including of following the science.

ASHRAE appreciates that EPA scientists, researchers, and policy makers have engaged with ASHRAE in a variety of efforts including in ASHRAE standards and guideline development and on technical committees. We hope this involvement and collaboration will continue to grow and strengthen.

As a not-for-profit professional and technical society, ASHRAE has technical expertise in many areas identified in the strategic plan including:

- Reducing emissions from buildings and tackling the climate crisis;
- Phasing down the production and use of HFCs through the use of low-GWP refrigerants;
- Improving the resilience of the built environment, so that occupants are safer;
- Improving indoor environmental quality and water system safety to promote the health and well-being of building occupants including through reducing risks from harmful pathogens;
- Advancing international and subnational climate efforts including through the effective adoption and implementation of building standards.

Reducing Emissions from Buildings and Tackling the Climate Crisis

Energy Efficiency and Building Decarbonization

In line with the EPA Strategic Plan Goal 1: Tackle the Climate Crisis, and Objective 1.1: Reduce Emissions that Cause Climate Change, ASHRAE has a variety of technical resources and expertise to address energy efficiency and the decarbonization of buildings.

Since 1894, ASHRAE has been involved in improving technology for the built environment, which includes the development of energy conservation standards used worldwide and advancing the decarbonization of buildings. ANSI/ASHRAE/IES Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings* ("ASHRAE Standard 90.1") is the benchmark for commercial building energy codes in the United States and has been a key basis for codes and standards around the world for more than 45 years. Compared to a building built using ASHRAE Standard 90-1980, a building built to ASHRAE Standard 90.1-2019 will use less than half the energy. More recently, compared to the standard about a decade ago, Standard 90.1 can now generate a 30% reduction in energy use.¹

¹ Pacific Northwest National Laboratory, "Impacts of Model Building Energy Codes – Interim Update," Prepared for the U.S. Department of Energy, July 2021.

Decarbonization of buildings is being pursued by ASHRAE through the development of technical and educational resources that address operational carbon, embodied carbon, the grid-building intersection, carbon sequestration on building sites, and standards and codes. While the U.S. Department of Energy has been heavily involved with energy conservation in buildings, including through codes and standards, EPA also has a vital and visible role through its ENERGY STAR program. While the Strategic Plan states that “ENERGY STAR will achieve significant and growing GHG reductions by promoting the adoption of cost-effective, energy-efficient technologies and practices and by working with state and local governments to improve efficiency in the residential, commercial and industrial sectors,” the program could also benefit from improved engagement with technical organizations such as ASHRAE. In particular, ASHRAE’s work in decarbonization² could be useful for further development of EPA’s ENERGY STAR program if it evolves to address carbon. In addition, ASHRAE’s Building EQ program could be leveraged as the next step beyond EPA ENERGY STAR Portfolio Manager to improve building performance through a Level 1 energy audit and the actionable recommendations it provides.

Safe Use of Low-GWP Refrigerants

In parallel with efforts to reduce energy use in buildings, shifting to lower global warming potential (GWP) refrigerants in building systems will also help address the climate crisis. ASHRAE recognizes the need to phase down the production and consumption of hydrofluorocarbons (HFCs), which can be hundreds to thousands of times more potent than carbon dioxide, from a perspective of their global warming potential. To phase down HFCs, alternative low-GWP refrigerants need to be available and safely used. For refrigerants used in buildings, building codes need to incorporate safety standards that address these low-GWP refrigerants. ANSI/ASHRAE Standards 15-2019 and 34-2019 guide refrigerant identification and usage, including procedures for operating equipment and systems to address the safe use of these refrigerants. As sectors transition from HFCs, it will also be important that HFCs are properly managed, including through their safe recovery for reuse, recycling, reclamation or destruction, and through efforts to support proper handling to avoid leaks and other accidents. ASHRAE offers its technical expertise in refrigerants and refrigeration technology as EPA continues to implement the American Innovation and Manufacture Act and phase down HFCs. In addition, ASHRAE’s expertise in refrigeration technology is also important for maintaining the efficacy of vaccines and reducing food spoilage and their emissions. ASHRAE would be available to share its expertise for these applications domestically as well as internationally.

International Engagement to Address Climate Change

As EPA works with the international community on the HFC phasedown and the use of alternative refrigerants, ASHRAE would like the EPA to be aware of its partnership with the United Nations Environment Programme (UNEP). Through a Cooperation Agreement, ASHRAE and UNEP are working on a variety of projects with the aim of reducing refrigerants emissions, maximizing climate benefits in selecting alternative refrigerants, building the capacities of different HVAC&R stakeholders and facilitating the transfer and adoption of

² ASHRAE has established a Task Force for Building Decarbonization to address the multiple facets of reducing greenhouse gas emissions from the buildings sector. For more information, visit www.ashrae.org/decarb.

suitable technologies in developing countries.³

As EPA collaborates with international partners to reduce greenhouse gas emissions, ASHRAE wants to emphasize the importance of buildings to climate change. With buildings generating nearly 40% of greenhouse gas emissions globally, and with the building stock expected to double by 2050,⁴ this sector is critical to address if climate change is to be tackled. While building energy codes and standards are essential for conserving energy (and related climate emissions), mandatory building codes are lacking in many countries, and Sub-Saharan Africa, and South and Central America have very few mandatory codes. ASHRAE's well established energy standards and related training and other resources could be leveraged by the EPA in its efforts to advance international climate efforts (Strategic Objective 1.3). ASHRAE is a global technical society, and with our grassroots network of chapters around the world, ASHRAE would serve as a valuable partner in these efforts to reduce greenhouse gas emissions from buildings.

Promote the Health and Well-Building of Building Occupants: Indoor Air Quality

EPA's Goal 4, "Ensure Clean and Healthy Air for All Communities," is congruent with ASHRAE's vision of a healthy and sustainable built environment for all. ASHRAE is pleased that EPA's plan has a focus on indoor air quality (IAQ); with Americans spending on average 90 percent of their time indoors, this focus is needed. We are also pleased that EPA recognizes how climate change, wildfires and the COVID-19 pandemic have underscored the importance of a healthy indoor environment.

The Strategic Plan does not set a "Long Term Performance Goal" for non-radiation indoor air quality (Objective 4.1), and ASHRAE encourages EPA to set a quantitative and specific goal. While EPA does not have statutory authority to regulate indoor air quality, EPA's non-regulatory efforts can emphasize the importance of meeting established indoor air quality standards for the health of building occupants⁵. For example, many school buildings do not meet minimum ventilation rates, weakening students' ability to learn and harming their health.⁶

³ For more information about this partnership, including resources and training courses available, please visit <https://www.ashrae.org/professional-development/ashrae-unep-portal>

⁴ International Energy Agency: <https://www.iea.org/reports/the-critical-role-of-buildings>

⁵ The ASHRAE *Position Document on Infectious Aerosols*, Approved by ASHRAE Board of Directors April 14, 2020, states: "[F]acilities of all types should follow, as a minimum, the latest published standards and guidelines and good engineering practice. ANSI/ASHRAE Standards 62.1 and 62.2 (ASHRAE 2019a, 2019b) include requirements for outdoor air ventilation in most residential and nonresidential spaces, and ANSI/ASHRAE/ASHE Standard 170 (ASHRAE 2017a) covers both outdoor and total air ventilation in healthcare facilities. Based on risk assessments or owner project requirements, designers of new and existing facilities could go beyond the minimum requirements of these standards, using techniques covered in various ASHRAE publications, including the ASHRAE Handbook volumes, Research Project final reports, papers and articles, and design guides, to be even better prepared to control the dissemination of infectious aerosols."

⁶ A 2016 study found that only 22% of recently constructed classrooms met minimum ventilation rates. (Batterman S, Su F-C, Wald A, Watkins F, Godwin C, Thun G. Ventilation rates in recently constructed U.S. school classrooms. *Indoor Air*. 2017;27: 880–890. <https://doi.org/10.1111/ina.12384>)

The COVID-19 pandemic has exposed shortcomings in our built environment, particularly poor ventilation⁷, and highlights the immense opportunities for improved health from ensuring that indoor air quality standards are continuously improved and then implemented in the buildings where we live, work, and learn. ASHRAE's technical resources can support these efforts; below, we highlight some of the relevant technical resources related to IAQ and ventilation, some of which have benefited from previous collaborative work between EPA and ASHRAE.

ASHRAE's Technical Resources to Improve Indoor Air Quality

ASHRAE has long focused on indoor air quality, including through the development and continuous improvement of ANSI/ASHRAE Standards for Ventilation and Indoor Air Quality. First published in 1973 as Standard 62, ANSI/ASHRAE Standards 62.1 and 62.2, *Ventilation for Acceptable Indoor Air Quality*, and accompanying User's Manuals set minimum design requirements for ventilation and guide the improvement of IAQ in new and existing buildings, including residential buildings (62.2). ASHRAE resources for improving IAQ beyond minimum requirements include the upcoming *Guideline 42P, Enhanced Indoor Air Quality in Commercial and Institutional Buildings*, and the 2020 *Damp Buildings, Human Health, and HVAC Design* report. Past collaboration between EPA and ASHRAE, along with other key private-sector stakeholders, resulted in the 2009 *Indoor Air Quality Guide* (for commercial buildings) and ASHRAE's 2018 *Residential Indoor Air Quality Guide*. These Guides provide examples of best practices in design, construction, operation, and maintenance of buildings to maintain and improve IAQ.

With respect to residential buildings, as EPA updates its Indoor airPLUS new home construction specifications and expands the program to address indoor air quality (IAQ) protections during home renovations and upgrades, we encourage EPA to contact ASHRAE for its technical expertise that could inform the IAQ protective practices EPA would be recommending in its guidance documents and tools.⁸

Addressing the COVID-19 Pandemic

Through its Epidemic Task Force, ASHRAE has published hundreds of pages of guidance to reduce the risk of exposure to harmful pathogens such as SARS-CoV-2.⁹ This guidance has been referenced by governments around the world, including the U.S. EPA. We ask that EPA continue to share these resources and to engage with us in further research¹⁰, development of additional guidance, and distribution of these references.

⁷ Li, Y, Nazaroff, WW, Bahnfleth, W, Wargoeki, P, Zhang, Y. The COVID-19 pandemic is a global indoor air crisis that should lead to change: A message commemorating 30 years of Indoor Air. *Indoor Air*. 2021; 31: 1683– 1686. <https://doi.org/10.1111/ina.12928>

⁸As discussed in the EPA Strategic Plan on page 44.

⁹ www.ashrae.org/covid19

¹⁰ Page 80 of the Strategic Plan noted that EPA has engaged in new research to reduce the risk of exposure to SARS-CoV-2; ASHRAE welcomes the opportunity to collaborate in additional research and/or provide technical assistance from our HVACR and buildings experts.

Improving Air Quality in Schools

ASHRAE is delighted that EPA is partnering with the U.S. Department of Energy on the Efficient and Healthy Schools Campaign to reduce energy costs and improve energy performance and indoor quality. ASHRAE wants you to be aware that it is an organizational supporter, and that ASHRAE would be pleased to work with EPA to share ASHRAE resources across the country. With 119 U.S. chapters, ASHRAE's extensive grassroots network of members can connect with local school districts and facility managers to help distribute this important technical information. ASHRAE would also welcome the opportunity to share its technical expertise through EPA's Indoor Air Quality Tools for Schools program.¹¹ The Strategic Plan states the focus will be on technical assistance, training, assessments, and implementation support for in-need communities, and ASHRAE's technical expertise should be useful for these efforts.

Keeping Safe from Wildfires

ASHRAE also recognizes the built environment can be a place of refuge when outdoor air quality is poor, including during wildfire events, which have been increasing in frequency. ASHRAE recently published "Guidance for Commercial Building Occupants from Smoke During Wildfire Events"¹², a technical brief for residential buildings¹³, and a podcast entitled, "What You Don't Know Can Kill You."¹⁴ ASHRAE appreciates the contributions of EPA scientists to the upcoming Guideline 44, *Protecting Building Occupants from Smoke During Wildfire and Prescribed Burn Events*, and is excited about finalizing this document and making it available for use.

Future Work In IAQ

As EPA works to address high-risk indoor air quality pollution in homes, schools and workplaces¹⁵, ASHRAE would like to highlight the following critical areas for future research, public outreach, and collaboration:

- Unvented combustion appliances in homes: This topic is important in light of increased knowledge of usage patterns and evolving air quality standards related to combustion by-products.¹⁶

¹¹ EPA Strategic Plan, page 44.

¹² ASHRAE, "Planning Framework for Protecting Commercial Building Occupants from Smoke During Wildfire Events," downloadable here: <https://www.ashrae.org/file%20library/technical%20resources/covid-19/planning-framework-for-protecting-commercial-building-occupants-from-smoke-during-wildfire-events.pdf>

¹³ ASHRAE Residential Buildings Committee Residential Issue Brief, "Wildfire Smoke Hazards for Dwelling Occupants," June 21, 2021. Downloadable here: [https://www.ashrae.org/file%20library/communities/committees/standing%20committees/residential%20building%20committee%20\(rbc\)/rib_06-07-2021_wildfire-smoke-hazards_final.pdf](https://www.ashrae.org/file%20library/communities/committees/standing%20committees/residential%20building%20committee%20(rbc)/rib_06-07-2021_wildfire-smoke-hazards_final.pdf)

¹⁴ *ASHRAE Journal* Podcast, Greg Nilsson and Mike Gallagher, P.E., Fellow ASHRAE, "What You Don't Know Can Kill You," Available here: <https://www.ashrae.org/news/ashraejournal/ashrae-journal-podcast-episode-2>

¹⁵ EPA Strategic Plan, page 38.

¹⁶ The *ASHRAE Position Document on Unvented Combustion Devices and Indoor Air Quality*, Approved by ASHRAE Board of Directors January 25, 2012, Reaffirmed by ASHRAE Technology Council June 29, 2020,

- Various air cleaning technologies¹⁷: EPA has developed excellent technical resources, such as the 2018 *Residential Air Cleaners: A Technical Summary, 3rd Ed.* and the companion publication intended for a general audience, *Guide to Air Cleaners in the Home*. Staying current on various air cleaning technologies, incorporating new research findings and updating guidance is needed.
- Role of HVAC systems in risk mitigation of pathogen transmission and occupant exposure.

Promote the Health and Well-Being of Building Occupants: Water System Safety

In line with EPA Strategic Plan Goal 5: Ensure Clean and Safe Water for All Communities, and Objective 5.1: Ensure Safe Drinking Water and Reliable Water Infrastructure, ASHRAE wants EPA to be aware of its technical resources that can help protect people from contaminants in water systems. While not specifically named in the EPA Strategic Plan, *Legionella pneumophila* is the most common and dangerous drinking water pathogen in the U.S. ASHRAE is pleased that EPA has extensive information on its website about this pathogen, including the recent June 24, 2021 *Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings*, prepared by the Centers for Disease Control and Prevention. We are pleased this guide references ANSI/ASHRAE Standard 188-2018, *Legionellosis: Risk Management for Building Water Systems*, which establishes minimum legionellosis risk management requirements for building water systems.

ASHRAE also has a training module on *Legionellosis*, many Journal articles and conference proceedings, and Guideline 12-2020 *Managing the Risk of Legionellosis Associated with Building Water Systems*, which provides additional information and guidance for building owners and operators. In addition to these standards and guides, ASHRAE continues to develop new standards as the need for them grows, such as the upcoming Standard 514P *Risk Management for Building Water Systems: Physical, Chemical, and Microbial Hazards*, which will establish minimum requirements to address a broader spectrum of water system hazards. We hope that EPA will continue to engage with ASHRAE for any additional technical expertise related to water systems in buildings (i.e., “premise plumbing”), including the interplay between building systems and the public water distribution system.

recommends development of a public information program that improves the knowledge of owners of these appliances with regard to usage and the importance of professional installation and maintenance; and research should be performed on these appliances to answer remaining questions about their impact on indoor air quality. Specific research questions relate to particle emissions, nitrogen dioxide emission, the relative impact of cooking versus heating, and denatured alcohol kerosene appliances.

¹⁷ The ASHRAE *Position Document on Filtration and Air Cleaning*, Approved by the ASHRAE Board of Directors January 29, 2015 and Reaffirmed by Technology Council February 2, 2021, states, “[A]t present, there is only significant evidence of health benefits for porous media particle filtration systems. For a few other technologies, there is evidence to suggest health benefits, but this evidence is not sufficient to formulate firm conclusions. A key position is that filtration and air-cleaning technologies are not recommended for use if they produce significant amounts of contaminants that are known or expected to be harmful for health. Finally, it is stated that there are limited data documenting the effectiveness of gas-phase air cleaning as an alternative to ventilation. ASHRAE should continue supporting research and standardization of contemporary filtration and air-cleaning technologies and should focus on performance testing, maintenance procedures, and development of new innovative technologies.”

Thank you for your consideration of our comments to the EPA Strategic Plan. We welcome EPA to utilize ASHRAE's technical resources, and please be sure to contact us when specific subject matter expertise is needed or for other collaborative work, including research, modeling for specific indoor environments, training and education, and outreach efforts including to underserved communities. EPA rightly states in its Strategic Plan that public-private partnerships have proven effective and we welcome additional partnership opportunities with EPA to bolster the health of our communities. If you have any questions or need additional information, please feel free to contact me directly or have your staff contact ASHRAE's government affairs staff at GovAffairs@ASHRAE.org. Thank you again for your consideration of our comments.

Sincerely,

A handwritten signature in black ink, reading "Michael CA Schwedler". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Michael CA (Mick) Schwedler, P.E., Fellow ASHRAE, LEED AP
2021-2022 ASHRAE President