



Shaping Tomorrow's
Built Environment Today

CLIMATE CHANGE AND THE BUILT ENVIRONMENT

THE ISSUE

Worldwide concern for changes in the global climate has escalated as scientific evidence has become more definitive, linking increased concentrations of atmospheric greenhouse gases (GHGs) and consequent global warming to human activities. As a response, ASHRAE is increasing our attention and consideration on standards, regulations, legislation and policies that involve GHGs.

When developing policy to combat climate change, it is important to consider that buildings and their heating, ventilating, air conditioning and refrigeration (HVAC&R) systems directly and indirectly contribute to GHG emissions. Buildings are responsible for 34% of global final energy use and 37% of energy-related emissions worldwide.¹ These emissions are associated with construction and the energy needed to operate buildings and building systems, and to a lesser extent indirectly through the release of refrigerants and other GHGs, in particular if they are not properly managed. According to the United Nations Intergovernmental Panel on Climate Change (IPCC), “buildings offer immediately available, highly cost-effective opportunities to reduce energy demand, while contributing to meeting other key sustainable development goals including poverty alleviation, energy security and improved employment.”² Improving the energy efficiency, and the ongoing efficient performance of building systems provide a significant opportunity for climate change mitigation.

ASHRAE's ROLE

ASHRAE is the leading source of information and research for HVAC&R systems and building performance making this issue a key area for our members. ASHRAE's technical resources help address buildings' contribution to climate change including through these standards:

- Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*
- Standard 90.2, *Energy Efficient Design of Low-Rise Residential Buildings*
- Standard 90.4, *Energy Standard for Data Centers*
- Standard 100, *Energy and Emissions Building Performance Standard for Existing Buildings*
- Standard 189.1, *Standard for the Design of High Performance Green Buildings* Standard 189.3 *Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities*
- Standard 105, *Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emissions*
- Standard 228, *Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance*
- Proposed Standard 240P, *Evaluating Greenhouse Gas (GHG) and Carbon Emissions in Building Design, Construction and Operation* – for full building lifecycle analysis
- Proposed Standard 242P, *Standard Method for Calculation of Building Operational Greenhouse Gas Emissions*

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¹ United Nations Environment Programme (2024), “Global Status Report for Buildings and Construction: Beyond foundations: Mainstreaming sustainable solutions to cut emissions from the buildings sector.” Nairobi. <https://doi.org/10.59117/20.500.11822/45095>.

² Lucon, Oswaldo, and Diana Ürge-Vorsatz. “AR5 Synthesis Report: Climate Change 2014.” *Chapter 9: Buildings*, United Nations Intergovernmental Panel on Climate Change, 2014, https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter9.pdf. ³ For more information, see www.ashrae.org/technical-resources/aedgs.

Other ASHRAE resources for addressing climate change include:

- ASHRAE and its partners have published several free-to-download Advanced Energy Design Guides (including Zero Energy Building Guides for K-12 Schools and Offices), which provide educational guidance to reduce energy consumption while achieving acceptable IEQ conditions.

ASHRAE's VIEW

ASHRAE is committed to a leadership role in reducing climate change contributed to by building systems and responding to climate change experienced in the built environment. ASHRAE recommends:

- States adopt the most recent version of ANSI/ASHRAE/IES Standard 100 for existing buildings and ANSI/ASHRAE/IES Standard 90.1 for new buildings.
- A full evaluation of new and existing buildings' climate impacts, carbon balance, and energy performance.
- Funding for research that improves energy efficiency/utilization in HVAC&R technology to minimize GHG emissions.
- Funding for building science research leading to improved
 - advanced equipment and systems
 - grid-interactive designs
 - ability to load-shift
 - integration of the Internet of Things (IoT)
 - net metering
 - building based energy storage systems and demand response technology
- Promotion of carbon and energy life-cycle analysis to building owners to encourage sustainable building construction, operation and renewal.