



Shaping Tomorrow's  
Built Environment Today

## **BUILDING DECARBONIZATION**

### **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) with global warming. The standard metric used to quantify different types of GHGs having different global warming potentials is the “carbon dioxide equivalent,” the term for the common metric used both to evaluate performance and to document global agreements. As jurisdictions across the planet confront climate change, a useful way to describe methods that reduce GHGs is to refer to them as “decarbonization” practices or policies.

With buildings responsible for about 40% of global energy-related CO<sub>2</sub> emissions, policies are being developed that focus on the decarbonization of buildings. Many jurisdictions are requiring new buildings to be low carbon or net-zero energy in the near-term and other policies are requiring retrofits of existing building stock in the medium to long term to decarbonize. Some policies also advance building electrification when coupled with a renewable electricity source or other low-carbon technologies, which are possible tools to help decarbonize buildings. These decarbonization efforts will require large public sector and private sector investments while at the same time creating jobs and business opportunities in the HVAC&R, construction materials, and design sectors.

ASHRAE has been involved with the promotion and measurement of energy efficiency in buildings for decades. Recognizing that operational carbon emissions are a function of energy conversion and consumption, and that energy conservation alone cannot adequately address the emissions reductions necessary to slow climate change, ASHRAE is advancing strategies toward direct reduction of carbon emissions in the built environment. The targeted carbon emissions include not only those directly resulting from the operation of buildings, but also those embodied in the materials incorporated into buildings and those generated by the building construction process itself.

Building decarbonization addresses the following involving design, construction and operation of buildings:

- Reducing the carbon balance of the building in its operations;
- Reducing energy demand while maintaining indoor environmental quality and functionality;
- Integrating building energy demands with the power grid as well as output of on-site and grid renewable energy assets;
- Reducing carbon emissions during the construction of a building; and
- Reducing the embodied and end-of-life carbon of the structural, envelope and system materials incorporated into the buildings.

ASHRAE Government Affairs Office 1255 23<sup>rd</sup> Street NW, Suite 825, Washington, DC 20037  
Tel: 202.833.1830 | E: [GovAffairs@ashrae.org](mailto:GovAffairs@ashrae.org)

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### **ASHRAE's ROLE**

ASHRAE is the leading source of information -- including standards (many of which are the basis of building codes around the world), guidelines, training/education, and research -- for HVAC&R systems and building performance, that serve as resources for building decarbonization, including:

- Energy standards for new buildings: Standard 90.1-2019 *Energy Standard for Buildings Except Low-Rise Residential Buildings*, and Standard 90.2-2018 *Energy-Efficient Design of Low-Rise Residential Buildings*
- Building performance standards to reduce energy consumption for existing buildings: ASHRAE Standard 100-2018 *Energy Efficiency in Existing Buildings*
- High-performance buildings standard providing comprehensive sustainable green building strategies: 2018 International Green Construction Code Powered by ASHRAE Standard 189.1-2017
- Providing a consistent method of measuring, expressing and comparing the energy performance of buildings: Standard 105-2014 *Standard Methods of Determining, Expressing and Comparing Building Energy Performance and Greenhouse Gas Emissions*
- Advanced Energy Design Guides (including Zero Energy Building Guides for K-12 Schools and Offices), which are available for free download and provide educational guidance to reduce energy consumption and drive carbon reductions while maintaining healthy and comfortable indoor conditions.
- Requirements for evaluating whether a building or group of buildings meets a definition of "zero energy": BSR/ASHRAE Standard 228P *Proposed Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance*
- Refrigerant classification and safety standards which address low-global warming potential refrigerants, an important component for building decarbonization: Standard 15-2019 *Safety Standard for Refrigeration Systems* and Standard 34-2019 *Designation and Safety Classification of Refrigerants*.

### **ASHRAE's VIEW**

Building decarbonization is essential to combat climate change, one of the most formidable environmental challenges ever faced by society. ASHRAE has a leadership role in improving the built environment. We are evolving our focus to better address building decarbonization, both to improve building performance and to inform public policy. In pursuit of these goals, ASHRAE will continue to develop tools and resources to advance innovation in the decarbonization of buildings through research, technology transfer, standards writing, publishing, certification, and continuing education.

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