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ANSI/ASHRAE Standard 228-2023
Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

ASHRAE Standard 228 can be used to determine whether a site has achieved zero net energy or zero net carbon, meaning that the source energy or carbon flows coming into a site are less than or equal to those flowing outward during building/site operation and any allowed offsets.

This standard deals with energy and carbon flows across a site boundary and their measurement and balance. In that regard, the committee has drawn from publications such as ASHRAE Standard 105. Allowances are made for sites without the opportunity to produce adequate renewable energy, but the standard places additional requirements on the use of external carbon and renewable energy in the calculation.

For energy, the committee has chosen to define the calculation in terms of source. This is a multiplier on the actual energy crossing the site boundary to include energy used or lost getting the measured energy type to the site. While the main energy calculation is in terms of annual average factors, allowance is made for a qualified professional to sum the results of individual hours where those data are available.

Carbon was an addition to the standard's original scope. The actual calculation is being made in terms of carbon dioxide equivalents, valuing related greenhouse causing gases over 100 years after their release. In some cases, in-use refrigerant leakage can be a substantial contributor to the operational carbon footprint. For this reason, the committee has decided to include leakage of refrigerants in these calculations even though it can also be thought of in terms of repair of the embodied carbon.

This standard is updated on a regular basis using ASHRAE's continuous maintenance procedures. Addenda are publicly reviewed, approved by ASHRAE and ANSI, and posted on the ASHRAE website. Change proposals can be submitted online at www.ashrae.org/continuous-maintenance. The project committee for Standard 228 takes formal action on all change proposals received.

Future development of this standard may expand beyond operational energy and carbon. For instance, in addition to energy used for operations, the committee weighed whether to include embodied energy and carbon, the sum of the energy used to create the building or site. While valuable work is being done on this subject, it is not included in the current edition of the standard.

1. PURPOSE

This standard sets requirements for evaluating whether a building or group of buildings meets a definition of "zero net energy" or whether those buildings meet a definition of "zero net carbon." It provides a consistent method of expressing qualifications for zero net energy and zero net carbon buildings associated with the design of new buildings and the operation of existing buildings.

2. SCOPE

2.1 This standard covers

a. existing buildings, new buildings, groups of buildings, or portions of buildings;
b. determination, including calculation methodology, and expression of the building(s) zero net energy status;
c. determination, including calculation methodology, and expression of the building(s) zero net carbon status; and
d. energy and carbon emissions associated with flows across the site boundary and off-site credited flows.

2.2 The provisions of this standard do not apply to

a. establishment of building gross energy performance goals or limits;
b. design guidance or design requirements; or
c. embodied energy or carbon of building materials and systems.

3. DEFINITIONS AND SYMBOLS

3.1 Definitions

adopting authority: the agency or agent that adopts this standard.

authority having jurisdiction (AHJ): the agency or agent responsible for enforcing this standard.

biomass: nonfossilized and biodegradable organic material originating from plants, animals, and/or microorganisms, including products, byproducts, residues, and waste from agriculture, forestry, and related