U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

National Definition of a Zero Emissions Building

Part 1: Operational Emissions from Energy Use, Version 1

June 2024

Purpose

Transitioning the building sector to zero greenhouse gas (GHG) emissions requires a broadly accepted definition of a "zero emissions building" with minimum criteria that a building must meet to qualify as "zero emissions," as well as a pathway for documenting whether a building satisfies that definition. The National Definition of a Zero Emissions Building sets forth standardized, consistent, and measurable minimum criteria for a zero-emissions building that users can achieve through multiple pathways. The Definition is intended to provide guidance to help support the building sector moving toward zero emissions and thereby advance public- and private-sector climate goals.[1]

The Definition sets forth minimum criteria that public and private entities can adopt, and these entities can demonstrate additional climate leadership by exceeding the minimum criteria.

Scope

Part 1 of the Definition sets criteria for a building with zero operational emissions from energy use. Reducing a building's total life cycle emissions to zero also requires minimizing its embodied carbon, minimizing the impacts of refrigerants, and attending to other considerations that fall outside of the scope of operational emissions. Future parts of the Definition may address these matters.

Furthermore, numerous factors[2] apart from building emissions have the potential to enhance human health, minimize environmental impacts, improve resiliency to climate disaster, reduce climate change impact, cut utility costs, and advance environmental justice.[3] Accordingly, the Definition is not a substitute for the green building and energy efficiency standards and certifications that public and private parties have developed.

---

[1] DOE is issuing this guidance under its general statutory authority to conduct programs of energy efficiency research, development, demonstration, and commercial application of various activities, including increasing the energy efficiency of buildings. 42 U.S.C. § 16191.

[2] For example, embodied carbon, refrigerant use, grid interactivity, electric vehicle support equipment, water efficiency, indoor air quality, waste management, walkability and proximity to transit, landscape and stormwater management, healthy materials, building codes, building site selection.

[3] Program implementors and building owners should strive to incorporate best practices for climate-smart material and other infrastructure recommendations from M-24-03, https://www.whitehouse.gov/wp-content/uploads/2023/11/M-24-03-Advancing-Climate-Resilience-through-Climate-Smart-Infrastructure-Investments.pdf, as well as pursue additional opportunities for climate leadership.

Criteria

At a minimum, a building that achieves zero operational emissions from energy use meets the following criteria:

1. **Energy efficient:** The building is among the most efficient.
2. **Free of on-site emissions from energy use:** The building's direct GHG emissions from energy use equal zero.
3. **Powered solely from clean energy:** All the energy used by the building, both on-site and off-site, is from clean energy sources.

Implementation Guidance

This implementation guidance can be adopted by public and private entities to provide the minimum criteria that a building in their jurisdiction or under their control should meet in order for the building to qualify as a zero-emissions building for operational energy use.

This Definition is not a regulatory standard. This Definition is guidance that can be adopted by public and private entities. This Definition applies to existing buildings and new construction and covers both commercial and residential buildings. It applies to operational emissions from the whole building's energy use, including emissions from tenants. Carbon offsets are not permitted under this Definition.

Electric vehicle supply equipment (EVSE) is not considered part of the building load under this Definition.[4]

Other definitions and policies apply to GHG emissions from Federally owned buildings, pursuant to statute and Executive Orders. This Definition does not supersede those authorities and requirements.

1. Energy Efficient

At a minimum, an existing building must satisfy one of the following criteria:

- The building obtains an ENERGY STAR score of 75 or higher;

[4] While electric vehicle supply equipment (EVSE) is not considered part of the building load under this Definition and is not part of the energy balance of the building, it should be considered a key component to support reduced transportation-related emissions.

- If the building is ineligible for an ENERGY STAR score, the whole building's site energy use intensity (EUI) is at least 35% better than the median EUI for buildings of that category;[5] or
- The whole building's EUI is less than the EUI specified in the latest version of ANSI/ASHRAE/IES Standard 100, "Energy and Emissions Building Performance Standard for Existing Buildings," for buildings of that type and location.[6]

At a minimum, a new building must satisfy one of the following criteria:

- Estimated whole building energy use, reflecting as-built condition, is at least 10% lower than the model code;[7]
- Designed to achieve an ENERGY STAR score of 90 or higher (for buildings eligible for the ENERGY STAR score); or
- Certified to the most recent effective version of the ENERGY STAR Residential New Construction program or Zero Energy Ready Homes program.

2. Free of On-Site Emissions from Energy Use

Direct GHG emissions from energy use must equal zero. There is an exception for use of emergency backup generators when grid power is unavailable.[8]

3. Powered Solely from Clean Energy

All energy used by the building must be clean energy, obtained through any combination of on- and off-site sources, as long as the GHG emissions from that clean energy equals zero. If the building obtains heating or cooling from a district energy system, the district energy must be generated from clean sources. On-site clean energy is encouraged to be maximized before procuring off-site clean energy.

To qualify as clean energy, each source of off-site power generation for the building must meet at least one of the following requirements:

---

[5] Determined by reference to the EUI values in ENERGY STAR, Portfolio Manager Technical Reference: U.S. National Energy Use Intensity (August 28, 2018), https://www.energystar.gov/buildings/tools-and-resources/portfolio-manager-technical-reference-us-national-energy-use, or any successor values published by ENERGY STAR.

6 See ASHRAE, ANSI/ASHRAE/IES Standard 100, https://www.ashrae.org/technical-resources/bookstore/standard-100.

[7] Model code is specified here as the latest edition of the International Energy Conservation Code (IECC) for residential buildings and the latest edition of ANSI/ASHRAE/IES Standard 90.1 for commercial buildings for which DOE has issued an affirmative determination. For more information and the latest determinations visit https://www.energycodes.gov/determinations.

[8] Required testing of backup generators is also exempt from this requirement. Many codes require backup generation that often leads to fossil fuels as the energy source. While clean energy alternatives are encouraged, the current availability of code-compliant alternatives may be limited.

- ANSI/ASHRAE Standard 228, “Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance,” Sections 8.3 to 8.5;
- Partnership Requirements for the U.S. Environmental Protection Agency’s (EPA) Green Power Partnership;
- “Green-e Renewable Energy Standard for Canada and the United States” (surplus to regulation if applicable); or
- Sections 4.2.4 to 4.2.7 of “Implementing Instructions for Executive Order 14057.”[9]

Documentation and Verification

The purpose of the Definition is to set forth criteria that public and private entities can use to determine whether a building is a zero emissions building.

Accordingly, The Department of Energy (DOE) will not certify whether a particular building satisfies the Definition. Rather, each entity that uses (or requires others to use) the Definition should determine how to document and verify that a particular building meets the Definition, including:

- Whether to accept data directly from a building’s owner or operator or to require that a third-party certifier or licensed professional verify data;
- Whether, and how often, to review a building’s compliance with the Definition; and
- The documentation format.

Building owners are encouraged to use EPA’s ENERGY STAR Portfolio Manager® tool to document criteria.[10] Other approaches may be used to document that a building has met the Definition if such methods:

[9] E.O. 14057 Implementing Instructions, https://www.sustainability.gov/pdfs/EO_14057_Implementing_Instructions.pdf.

[10] The ENERGY STAR Portfolio Manager tool, available at https://ww.energystar.gov/benchmark, is a free, online tool that building owners, managers, and occupants can use to assess the energy and emissions performance of their buildings. Depending on data entered by the user, it will provide much or all of the information required to verify that a building meets this Definition.

- Demonstrate that the building meets or exceeds criteria 1, 2, and 3. May use annual emissions factors or alignment of production/consumption methodologies (e.g. 24/7 methodologies);
- Are based on 12 months of whole-building energy use (measured for existing buildings; estimated for new construction); and
- Document that the building has met each of the criteria independently, with no trade-offs between criteria.

Definition Updates

DOE, in coordination with other Federal agencies, as appropriate, intends to periodically reevaluate the requirements for each Part of the National Definition of a Zero Emissions Building and potentially revise the criteria based on the market's response and the advancement of energy efficiency, clean energy, and low carbon activity in the building sector.

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

For more information, visit: energy.gov/eere

DOE/EE-2871 • June 2024