

# Public Review Draft

Proposed Addendum j to Standard 189.1-2017

# Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

First Public Review (September 2018)  
(Draft Shows Proposed Changes to Current Standard)

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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

*This addendum updates the renewable energy requirements of Standard 189.1. The proposed changes are intended to address the following issues and concerns.*

- Various options are now available to procure off-site renewable energy, including virtual power purchase agreements, direct ownership of off-site systems, and community renewable systems. However, most of these methods are inadequate in the context of building standards without requirements to assure additionality, permanence, and survival in the event of property sale.
- On-site renewable energy has many advantages to off-site procurement in terms of a long-term commitment, additionality and financing. On-site systems also have informational and inspirational value since they are visible building assets. As result, the standard should continue to require on-site renewable energy when feasible.
- The installed cost of on-site photovoltaic (PV) systems has declined significantly in the last couple of decades and costs are continuing to decline. The current requirements were drafted in about 2005 and the current requirements are very modest. A robust solar infrastructure has also emerged to provide distributed generation to building owners. As result, the on-site requirement should become more stringent.
- Virtually all on-site renewable energy systems are PV, so we should write the mandatory requirement in terms of PV capacity but allow other forms of on-site renewable energy. This proposal will make it easier to show compliance with the mandatory required amount of PV for most buildings.
- The exception low solar insolation (4 kWh/m<sup>2</sup>-day) threshold “accounting for existing buildings, permanent infrastructure that is not part of the building project, topography, or trees” is problematic. Data is available on average daily insolation, but there are no tools or procedures available to adjust insolation for local shading. Tools are available to determine the annual hours a particular spot on the site is shaded.

*To address these issues and concerns and to respond to changes in the market for renewable energy, this addendum proposes the following modifications to the standard.*

- The basic prescriptive requirement is that the sum of renewable energy produced on-site or procured off-site be greater or equal to about half of the expected building energy use.
- A mandatory on-site PV system is required based on the portion of the building roof area that is unshaded and is not being used for public access or by a vegetated roofing system. The mandatory requirement is expressed in terms of the system capacity, as opposed to annual production.
- On-site renewable energy systems other than PV may meet the mandatory requirement if they produce an equivalent amount of annual energy to the required PV system.

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- The on-site requirement is based on the unshaded building roof area. A portion of the site is considered shaded if direct sunlight is blocked for more than 1,500 hours/yr between 8 a.m. and 4 p.m. solar time.
  - The concept of qualifying off-site renewable energy is added along with associated requirements.

*[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]*

## **Addendum j to 189.1-2017**

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*Revise Section 3.2 Definitions as shown. Definitions not shown have not changed. The definitions not underlined are provided for context and are not proposed to be changed.*

### **3.2 Definitions**

**building project:** a building, or group of buildings, and site that utilize a single submittal for a construction permit or that are within the boundary of contiguous properties under single ownership or effective control. (See *owner*.)

**community renewable energy facility:** a facility that generates electricity energy with photovoltaic, solar thermal, *geothermal energy*, or wind systems and is qualified as a community energy facility under applicable state and local utility statutes and rules

***on-site renewable energy system:*** photovoltaic, solar thermal, *geothermal energy*, and wind systems used to generate energy and located on the *building project*.

***owner:*** the party in responsible control of development, construction, or operation of a project at any given time.

***site:*** a contiguous area of land that is under the ownership or control of one entity.

*Delete the existing Section 7.3.2 and replace with the following:*

**7.3.2 On-Site Renewable Energy Systems.** *Building projects* shall contain on-site photovoltaic systems with a rated capacity of not less than 2 W/ft<sup>2</sup> (22 W/m<sup>2</sup>) multiplied by the horizontal projection of the gross roof area over conditioned spaces and semiheated spaces. Documentation shall be provided to the AHJ that indicates that the RECs associated with the on-site renewable energy system(s) will be retained and retired by the owner. Where the building owner does not have ownership of the RECs associated with the on-site renewable energy system, the owner shall obtain and retire an equal or greater quantity of RECs.

The building *gross roof area* used for calculation in 7.3.2 excludes:

- a. Shaded areas which are defined as roof area where direct-beam sunlight is blocked by structures or natural objects for more than 1,500 annual hours between 8 a.m. and 4 p.m.

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- b. Areas of vegetated terrace and roofing systems compliant with Section 5.3.5.5.
  - c. Areas designated for public occupancy. Parking areas shall not qualify for this exclusion.
  - d. Areas designated for helipads.

### **Exceptions to 7.3.2:**

1. Building projects that have an annual daily average incident solar radiation available to a flat plate collector oriented due south at an angle from horizontal equal to the latitude of the collector location less than 1.2 kBtu/ft<sup>2</sup>-day (4.0 kWh/m<sup>2</sup>-day).
2. Renewable energy systems other than photovoltaic systems that result in an equal or greater annual energy production.
3. Capacity shall be permitted to be reduced to that required to provide at least 50% of the simulated annual site energy consumption of the proposed building project in accordance with Normative Appendix C.

Delete the existing Section 7.4.1.1 and replace with the following Sections 7.4.1.1 through 7.4.1.3:

**7.4.1.1 Renewable Energy Systems.** The adjusted renewable energy provided to the project shall be equal to or greater than the gross conditioned and semi-heated floor areas of the building project in feet squared (meters squared) multiplied by the renewable energy requirement from Table 7.4.1.1.

Building projects complying with the Alternate Renewables Approach shall comply with the applicable equipment efficiency requirements in Normative Appendix B, the water-heating efficiency requirements in Section 7.4.4.1, equipment efficiency requirements in Section 7.4.7.1, and the applicable ENERGY STAR® requirements in Section 7.4.7.3.2. For equipment listed in Section 7.4.7.3.2 that are also contained in Normative Appendix B, the installed equipment shall comply by meeting or exceeding both requirements.

**Exception to 7.4.1.1:** Building projects that demonstrate to the AHJ that they cannot comply with Section 7.4.1.1 shall contract for renewable electricity products complying with the Green-e Energy National Standard for Renewable Electricity products of not less than 1.2 MWh/ft<sup>2</sup> (12.6 MWh/m<sup>2</sup>) of gross floor area of conditioned spaces and semiheated spaces, or an amount equal to 100% of the modeled annual energy usage multiplied by 20 years, whichever is less. A combination of renewable electricity products and renewable energy systems shall be permitted to demonstrate compliance.

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**Table 7.4.1.1 Renewable Energy Requirement**

<b>Building Type</b>	<b>Standard Renewables Approach</b>		<b>Alternate Renewables Approach</b>	
	<b>kBtu/ft<sup>2</sup>-y</b>	<b>kWh/m<sup>2</sup>-y</b>	<b>kBtu/ft<sup>2</sup>-y</b>	<b>kWh/m<sup>2</sup>-y</b>
Office	14	44	13	40
Retail	24	74	21	67
School	19	61	17	55
Healthcare	40	126	36	113
Restaurant	40	126	36	113
Hotel	34	108	31	98
Apartment	22	68	20	62
Warehouse	8	26	7	23
All Others	25	80	23	72

**7.4.1.2 Adjusted Renewable Energy.** Each source of renewable energy delivered to or credited to the *building project* shall be multiplied by the factors in Table 7.4.1.2 when determining compliance with Section 7.4.1.1.

Where multiple buildings in a *building project* are served by the same *on-site renewable energy system*, the *owner* shall allocate for not less than 20 years the energy production of the system to the buildings served by the system. On-site renewable energy production that is not allocated, but that is reserved for future use, shall be documented as part of the *building project*. Documentation of allocation shall be retained by the building owner and made available for inspection by the AHJ upon request.

Qualifying renewable energy sources are as follows:

- a. *On Site Renewable Energy System*
- b. *Directly Owned Off-Site Renewable Energy System* – an offsite renewable energy system compliant with Section 7.4.1.3, owned by the *building project owner*.
- c. *Community Renewable Energy Facility* – The system shall comply with Section 7.4.1.3.
- d. *Virtual PPA* – a power purchase agreement for offsite renewable energy compliant with Section 7.4.1.3, where the *owner* agrees to purchase renewable energy output at a fixed price schedule.

**Table 7.4.1.2 Multipliers for Renewable Energy Procurement Methods**

<b>Location</b>	<b>Renewable Energy Source</b>	<b>Renewable Energy Factor</b>
On-Site	<i>On Site Renewable Energy System</i>	1.00
Off-Site	<i>Directly Owned Off-Site Renewable Energy System</i>	0.75
	<i>Community Renewable Energy System</i>	0.75
	<i>Virtual PPA</i>	0.75

**7.4.1.3 Off-Site Renewable Energy Requirements.**

Off-site renewable energy delivered or credited to the *building project* to comply with 7.4.1.1 shall be subject to a legally binding contract to procure qualifying off-site renewable energy. Where the renewable

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energy producer ceases operation, the building *owner* shall procure alternative qualifying renewable energy. Qualifying off-site renewable energy shall meet the following requirements:

1. Documentation of off-site renewable energy procurement shall be submitted to the AHJ.
2. The procurement contract shall have a duration of not less than 20 years. The contract shall be structured to survive a partial or full transfer of ownership of the property.
3. RECs and other environmental attributes associated with the procured off-site renewable energy shall be assigned to the *building project* for a period of not less than 20 years.
4. The energy source shall produce electricity from solar, wind, or *geothermal energy*.

**Exception to 7.4.1.3 Part 4:** Captured methane from feed-lots and landfills are permitted to be used to generate electricity for the purposes of this section.

5. The generation source shall be located where the energy can be delivered to the building *site* by any of the following:
  - a. By direct connection to the off-site renewable energy facility
  - b. By the local utility or distribution entity
  - c. By an interconnected electrical network where energy delivery capacity between the generator and the building *site* is available (***Informative Note:*** Examples of interconnected electrical networks include regional power pools and regions served by Independent System Operators or Regional Transmission Organizations.)
6. Records on power sent to or purchased by the *building project* from the off-site renewable energy producer that specifically assign power production to the *building project* shall be retained by the building *owner* and made available for inspection by the AHJ upon request.
7. Where multiple buildings in a *building project* are allocated energy procured by a contract subject to this Section, the owner shall allocate for not less than 20 years the energy procured by the contract to the buildings in the *building project*. Procured energy not allocated before issuance of the certificate of occupancy is permitted to be reserved for allocation to new or existing buildings included in the *building project*. This documentation shall be retained by the building *owner* and made available for inspection by the AHJ upon request.

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**Note to reviewers:**

*Section 7.4.1.1 is also modified by addendum b, as follows, which is not yet published.*

**7.4.1.1 On-Site Renewable Energy Systems.** *Building projects* shall comply with either the Standard Renewables Approach in Section 7.4.1.1.1 or the Alternate Renewables Approach in Section 7.4.1.1.2. Section 7.4.1.1.2 shall apply only to *building projects* that meet one of the following requirements:

- a. The *building project* shall comply with ANSI/ASHRAE/IES Standard 90.1 Section 6.3 Simplified Approach Option for HVAC Systems.
- b. The sum of the *gross conditioned and semi-heated floor areas* of the *building project*

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shall be less than 10,000 ft<sup>2</sup> (930 m<sup>2</sup>).

(the remainder of Section 7.4.1.1 is unchanged by Addendum b)

*Modifications that reflect the combined impact of addendum b and this addendum, but which do not appear explicitly in either, is shown below in strikethrough/underline.*

**7.4.1.1 Renewable Energy Systems.** The adjusted renewable energy provided to the project shall be equal to or greater than the gross conditioned and semi-heated floor areas of the *building project* in feet squared (meters squared) multiplied by the renewable energy requirement from Table 7.4.1.1.

*Building projects* complying with the Alternate Renewables Approach shall comply with the applicable equipment efficiency requirements in Normative Appendix B, the water-heating efficiency requirements in Section 7.4.4.1, equipment efficiency requirements in Section 7.4.7.1, and the applicable ENERGY STAR® requirements in Section 7.4.7.3.2. For equipment listed in Section 7.4.7.3.2 that are also contained in Normative Appendix B, the installed equipment shall comply by meeting or exceeding both requirements. ~~Section 7.4.1.1.2~~ The Alternate Renewables Approach shall apply only to *building projects* that meet one of the following requirements:

- a. The *building project* shall comply with ANSI/ASHRAE/IES Standard 90.1 Section 6.3 Simplified Approach Option for HVAC Systems.
- b. The sum of the *gross conditioned* and *semi-heated floor areas* of the *building project* shall be less than 10,000 ft<sup>2</sup> (930 m<sup>2</sup>).

**Exception to 7.4.1.1:** *Building projects* that demonstrate to the AHJ that they cannot comply with Section 7.4.1.1 shall contract for renewable electricity products complying with the Green-e Energy National Standard for Renewable Electricity products of not less than 1.2 MWh/ft<sup>2</sup> (12.6 MWh/m<sup>2</sup>) of gross area of *conditioned spaces and semiheated spaces*, or an amount equal to **100%** of the modeled annual energy usage multiplied by 20 years, whichever is less. A combination of renewable electricity products and renewable energy systems shall be permitted to demonstrate compliance.

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**Table 7.4.1.1 Renewable Energy Requirement**

Building Type	Standard Renewables Approach		Alternate Renewables Approach	
	kBtu/ft <sup>2</sup> -y	kWh/m <sup>2</sup> -y	kBtu/ft <sup>2</sup> -y	kWh/m <sup>2</sup> -y
Office	14	44	13	40
Retail	24	74	21	67
School	19	61	17	55
Healthcare	40	126	36	113
Restaurant	40	126	36	113
Hotel	34	108	31	98
Apartment	22	68	20	62
Warehouse	8	26	7	23
All Others	25	80	23	72

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