



**BSR/ASHRAE/IES Addendum by
to ANSI/ASHRAE/IES Standard 90.1-2016**

Public Review Draft

Proposed Addendum by to Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings

**First Public Review (February 2019)
(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 proposal considers a minimum prescriptive requirement for onsite renewable energy. The renewable energy resources are defined within the proposal; however, the specific resource to be used is left up to the designer or building owner. The listed capacity requirement, as well as the scalar evaluation, is based on photovoltaic generation as that is the most ubiquitous and cost effective renewable energy resource and equipment/system currently available across the industry. The renewable energy capacity component was determined thru a comparative analysis exercise considering economics, (roof) space competition, annual energy production/contribution to the building energy budget and equivalencies against other energy efficiency measures. The annual purchased energy reduction budget for this renewable energy proposal, based on the PI prototype models considered, is 4.5%. The building prototypes and solar zones evaluated passed the ASHRAE scalar assessment for cost effectiveness.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (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 by to 90.1-2016

Modify the standard as follows (IP and SI Units)

3.2 Definitions

on-site renewable energy: ~~energy generated~~ from renewable energy resources produced/harvested at the building site.

renewable energy resources: energy from solar, wind, biomass or hydro, or extracted from hot fluid or steam heated within the earth.

~~**site-solar energy:** thermal, chemical, or electrical energy derived from direct conversion of incident solar radiation at the building site and used to offset consumption of purchased fuel or electrical energy supplies. For the purposes of applying this standard, site-solar energy shall not include passive heat gain through fenestration systems.~~

Note to reviewers: {Eliminating *site-solar energy* requires the follow sections to replace *site-solar energy* with *on-site renewable energy*}

6.5.2.1 exception 4; Zones where at least 75% of the energy for *reheating* or for providing warm air in mixing systems is provided from *site-recovered energy* (including condenser heat) or ~~*site-solar energy*~~ *on-site renewable energy*.

6.5.2.3 exception 4; *Systems* serving *spaces* where specific humidity levels are required to satisfy process needs, such as a vivarium; museum; surgical suite; pharmacy; and *buildings* with refrigerating *systems*, such as supermarkets, refrigerated warehouses, and ice arenas, and where the *building* includes *site-recovered energy* or ~~*site-solar energy*~~ *on-site renewable energy* that provide *energy* equal to at least 75% of the annual *energy* for *reheating* or for providing warm air in mixing *systems*. This exception does not apply to *computer rooms*.

6.5.2.3 exception 5: At least 90% of the annual *energy* for *reheating* or for providing warm air in mixing *systems* is provided from *site-recovered energy* (including condenser heat) or ~~*site-solar energy*~~ *on-site renewable energy*.

6.5.3.5 exception 3; *Systems* in which at least 75% of the *energy* for *reheating* (on an annual basis) is from *site recovered energy* or ~~*site-solar energy*~~ *on-site renewable energy*.

6.5.6.1 exception 3; Where more than 60% of the *outdoor air heating energy* is provided from *site-recovered energy* or ~~*site-solar energy*~~ *on-site renewable energy*.

6.5.6.2.2 exception 2; Facilities that provide 60% of their *service water heating* from ~~*site-solar energy*~~ *on-site renewable energy* or *site-recovered energy* or from other sources

7.4.5.2 exception; *Pools* deriving over 60% of the *energy* for heating from *site-recovered energy* or ~~*site-solar energy*~~ *on-site renewable energy*.

7.5.3 exception 1; Where 25% of the annual *service water-heating* requirement is provided by ~~*site-solar energy*~~ *on-site renewable energy* or *site-recovered energy*.

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10 Other Equipment

10.1 General

10.1.1 Scope

This section applies only to the *equipment* described below.

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10.2 Compliance Paths

10.2.1 Compliance

Compliance with Section 10 shall be achieved by meeting all requirements of Section 10.1, "General"; Section 10.4, "Mandatory Provisions"; Section 10.5 "Prescriptive Path" and Section 10.8, "Product Information."

10.2.2

Projects using the Energy Cost Budget Method (Section 11 of this standard) must comply with Section 10.4, the mandatory provisions of this section, as a portion of that compliance path.

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10.5 Prescriptive Compliance Path (Not Used)

10.5.1 Renewable Energy Resources.

Buildings shall be served by *renewable energy resources* complying with Section 10.5.1.1.

10.5.1.1 On-site renewable energy.

The *building* site shall have *equipment* for *on-site renewable energy* with a rated capacity of not less than 0.25 W/ft² (2.7W/m²) multiplied by the sum of the *gross conditioned floor area* for all floors up to the three (3) largest floors.

Exceptions to 10.5.1.1:

1. Any building located where an unshaded flat plate collector oriented towards the equator and tilted at an angle from horizontal equal to the latitude receives an annual daily average incident solar radiation less than 3.5 kWh/m²-day (1.1 kBtu/ft²-day).
2. Any building where more than 80% of the roof area is covered by any combination of equipment other than for on-site renewable energy systems, planters, vegetated space, skylights or occupied roof deck.
3. Any building where more than 50% of roof area is shaded from direct-beam sunlight by natural objects or by structures that are not part of the building for more than 2,500 annual hours between 8:00 AM and 4:00 PM.

NOTE TO REVIEWER: Addenda W, AD, AJ, AP, and DN(2013) also affect portions of sections changed by this proposal. The following shows how this section will appear combined with addenda W, AD, AJ, AP, and DN(2013). Additional changes needed to combine this addendum with prior addenda are shown in ~~strikeout~~ and underline. Such changes do not change the substantive nature of prior approved addenda and are not available for comment. (No additional changes needed in this case.)

3.2 Definitions

on-site renewable energy: energy from renewable resources harvested at the *building* site.

Renewable energy resources: energy harvested from solar, wind, biomass or hydro, or extracted from hot fluid or steam heated within the earth.

6.5.2.1 exception 4; Zones where at least 75% of the *energy* for *reheating* or for providing warm air in *mixing systems* is provided from *site-recovered energy* (including condenser heat) or *on-site renewable energy*.

6.5.2.3 exception 4; *Systems* serving *spaces* where specific humidity levels are required to satisfy *process application* needs, such as a vivarium; museum; surgical suite; pharmacy; and *buildings* with refrigerating *systems*, such as supermarkets, refrigerated warehouses, and ice arenas, and where the *building* includes *site-recovered energy* or *on-site renewable energy* that provide *energy* equal to at least 75% of the annual *energy* for *reheating* or for providing warm air in *mixing systems*. This exception does not apply to *computer rooms*. [Note: modified by addendum AJ]

6.5.2.3 exception 5: At least 90% of the annual *energy* for *reheating* or for providing warm air in *mixing systems* is provided from *site-recovered energy* (including condenser heat) or *on-site renewable energy*.

6.5.3.5 exception 5; *Systems* in which at least 75% of the *energy* for *reheating* (on an annual basis) is from *site recovered energy* or *on-site renewable energy*. [Note: renumbered by addendum AP]

6.5.6.1.2 exception 3; Heating energy recovery where more than 60% of the *outdoor air heating energy* is provided from *site-recovered energy* or *on-site renewable energy*. [Note: modified by addendum DN(2013)]

6.5.6.2.2 exception 2; Facilities that provide 60% of their *service water heating* from *on-site renewable energy* or *site-recovered energy* or from other sources

7.4.6.2 exception; *Pools* deriving over 60% of the *energy* for heating from *site-recovered energy* or *on-site renewable energy*. [Note: renumbered by addendum W]

7.5.3 exception 1; Where 25% of the annual *service water-heating* requirement is provided by *on-site renewable energy* or *site-recovered energy*.

10 Other Equipment

10.1 General

10.1.1 Scope

This section applies only to the *equipment* described below.

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10.2 Compliance Paths *[Note: Sections 10.2, 10.2.1, and 10.2.2 modified by addendum AD]*

Other equipment shall comply with Section 10.2.1 and Section 10.2.2.

10.2.1 Requirements for All Compliance Paths

Other equipment shall comply with Section [10.1](#), "General"; Section [10.4](#), "Mandatory Provisions"; Section 10.5 "Prescriptive Path" and Section [10.8](#), "Product Information."

10.2.2 Additional Requirements to Comply with Section 10 (Not Used)

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10.5 Prescriptive Compliance Path

10.5.1 Renewable Energy Resources.

Buildings shall be served by *renewable energy resources* complying with Section 10.5.1.1.

10.5.1.1 On-site renewable energy.

The *building* site shall have *equipment* for *on-site renewable energy* with a rated capacity of not less than 0.25 W/ft² (2.7W/m²) multiplied by the *gross conditioned floor area* for all floors up to the three (3) largest floors.

Exceptions to 10.5.1.1:

4. Any *building* located where an unshaded flat plate collector oriented towards the equator and tilted at an angle from horizontal equal to the latitude receives an annual daily average incident solar radiation less than 3.5 kWh/m²·day (1.1 kBtu/ft²·day)
5. Any *building* where more than 80% of the *roof* area is covered by any combination of *equipment*, planters, vegetated space, *skylights* or occupied *roof* deck.
6. Any *building* where more than 50% of *roof* area is shaded from direct-beam sunlight by natural objects or by structures that are not part of the *building* for more than 2,500 annual hours between 8:00 AM and 4:00 PM.