



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

Public Review Draft

Proposed Addendum cp 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)**

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

This standard is under continuous maintenance. To propose a change to the current standard, use the change submittal form available on the ASHRAE website, www.ashrae.org.

The appearance of any technical data or editorial material in this public review document does not constitute endorsement, warranty, or guaranty by ASHARE of any product, service, process, procedure, or design, and ASHRAE expressly disclaims such.

© 2019 ASHRAE. This draft is covered under ASHRAE copyright. Permission to reproduce or redistribute all or any part of this document must be obtained from the ASHRAE Manager of Standards, 1791 Tullie Circle, NE, Atlanta, GA 30329. Phone: 404-636-8400, Ext. 1125. Fax: 404-321-5478. E-mail: standards.section@ashrae.org.

ASHRAE, 1791 Tullie Circle, NE, Atlanta GA 30329-2305

This draft is covered under ASHRAE copyright. The appearance of any technical data or editorial material in this publication document does not constitute endorsement, warranty, or guaranty by ASHRAE of any product, service, process, procedure, design or the like and ASHRAE expressly disclaims such. Permission to republish or redistribute must be obtained from the MOS.

(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 adds language for Appendix G to address the new proposed renewable energy requirements in addendum BY. The proposed approach allows a proposed design that does not include renewable energy required by Section 10.5.1 a method of trade off against other prescriptive requirements in the Standard. In that case the renewable energy allowance included in the budget building design will be based on a horizontal photovoltaic array with a rated capacity equal but not to exceed the requirement in Section 10.5.1.1. For proposed designs that include an on-site renewable energy system the budget building design allowance will be based on the proposed renewable energy system design with a rated capacity equal but not to exceed the requirement in 10.5.1.1.

This addendum impacts an optional performance path in the standard designed to provide increased flexibility and therefore was not subjected to cost effectiveness analysis.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes. Only these changes 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 substantive changes.

Addendum cp to 90.1-2016

Revise the Standard as follows (IP Units)

4.2.1.1 New Buildings

New *buildings* shall comply with either the provisions of

- a. Section 5, “*Building Envelope*”; Section 6, “*Heating, Ventilating, and Air Conditioning*”; Section 7, “*Service Water Heating*”; Section 8, “*Power*”; Section 9, “*Lighting*”; and Section 10, “*Other Equipment*,” or
- b. Section 11, “*Energy Cost Budget Method*,” or
- c. Appendix G, “*Performance Rating Method*.”

When using [Appendix G](#), the Performance Cost Index (PCI) shall be less than or equal to the Performance Cost Index Target (PCI_t) when calculated in accordance with the following:

When using Appendix G, the Performance Cost Index (PCI) shall be less than or equal to the Performance Cost Index Target (PCI_t) when calculated in accordance with the following:

$$PCI_t = [BBUEC + (BPF \times BBREC) - PNA - PRE] / BBP$$

where

PCI = Performance Cost Index calculated in accordance with Section G1.2.

BBUEC = Baseline *Building Unregulated Energy Cost*, the portion of the annual *energy cost* of a *baseline building design* that is due to *unregulated energy use*.

BBREC = Baseline *Building Regulated Energy Cost*, the portion of the annual *energy cost* of a *baseline building design* that is due to *regulated energy use*.

BPF = *Building Performance Factor* from Table 4.2.1.1. For *building area types* not listed in Table 4.2.1.1 use “All others.” Where a *building* has multiple *building area types*, the required BPF shall be equal to the area-weighted average of the *building area types*.

BBP = *Baseline Building Performance*.

PBP = Proposed Building Performance including the reduced, annual purchased energy cost associated with all on-site renewable energy generation systems

PBP_{nre} = Proposed Building Performance without any credit for reduced annual energy costs from on-site renewable energy generation systems.

PBP_{pre} = Proposed Building Performance excluding any renewable energy system in the proposed design and including an on-site renewable energy system that meets but not exceeds the requirements of Section 10.5.1.1 modeled following the requirements for a budget building design in Table 11.5.1 using option b.

PRE = PBP_{nre} - PBP_{pre}

PNA = Proposed renewable energy contribution not allowed for compliance

Informative Note

PBP_{nre} - Proposed Building Performance No Renewable Energy

PBP_{pre} - Proposed Building Performance Prescriptive Renewable Energy

PRE - Prescriptive Renewable Energy

PNA - Proposed Not Allowed

$$\text{Additional Renewable contribution} = \frac{\text{PBP}_{\text{pre}} - \text{PBP}_{\text{pre}}}{\text{PBP}_{\text{pre}} - \text{PBP}}$$

$$\text{Renewable Fraction} = \frac{(\text{PBP}_{\text{pre}} - \text{PBP}_{\text{pre}} - \text{PBP})}{\text{BBP}}$$

If Renewable Fraction \leq 0.05 then PNA = 0,
 otherwise PNA = Additional Renewable Contribution - (0.05 x BBP)

G2.2 Simulation Program

The *simulation program* shall be a computer-based program for the analysis of *energy* consumption in *buildings* (a program such as, but not limited to, DOE-2, BLAST, or EnergyPlus). The *simulation program* shall include calculation methodologies for the *building* components being modeled. For components that cannot be modeled by the *simulation program*, the exceptional calculation methods requirements in Section [G2.5](#) shall be used.

Exception

When approved by the adopting authority, a separate computer-based program shall be permitted to be used to calculate on-site renewable energy.

Table G3.1

Table G.3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance

18 On-site renewable energy

On-site renewable energy in the proposed building performance shall be determined as follows:

- a. Where a complete system providing on-site renewable energy exists, the model shall reflect the actual system type using actual component capacities and efficiencies.
- b. Where a system providing on-site renewable energy has been designed, the system model shall be consistent with design documents.
- c. Where no system exists or is specified to provide on-site renewable energy, no system shall be modeled.

On-site renewable energy shall not be included in the Baseline Building Performance.

=====

Section 4.2.1.1 has been previously modified by addendum s and addendum x both of which are approved

for publication. If this proposal is approved for publication, the section will be appear as follows. Text that did not appear in addendum s, addendum x or in the previous sections of this draft, are shown below in strikethrough/underline:

4.2.1.1 New Buildings

New *buildings* shall comply with Sections 4.2.2 through 4.2.5 and either the provisions of

- a. Section 5, “*Building Envelope*”; Section 6, “*Heating, Ventilating, and Air Conditioning*”; Section 7, “*Service Water Heating*”; Section 8, “*Power*”; Section 9, “*Lighting*”; and Section 10, “*Other Equipment*,” or
- b. Section 11, “*Energy Cost Budget Method*,” or
- c. Normative Appendix G, “*Performance Rating Method*.”

When using Appendix G, the Performance Cost Index (PCI) of new *buildings, additions to existing buildings and/or alterations to existing buildings* shall be less than or equal to the Performance Cost Index Target (PCI_t) when calculated in accordance with the following:

When using Appendix G, the Performance Cost Index (PCI) shall be less than or equal to the Performance Cost Index Target (PCI_t) when calculated in accordance with the following:

$$PCI_t = [BBUEC + (BPF \times BBREC) - PNA - PRE]/BBP$$

where

PCI = Performance Cost Index calculated in accordance with Section G1.2.

BBUEC = Baseline *Building Unregulated Energy Cost*, the portion of the annual *energy cost* of a *baseline building design* that is due to *unregulated energy use*.

BBREC = Baseline *Building Regulated Energy Cost*, the portion of the annual *energy cost* of a *baseline building design* that is due to *regulated energy use*.

BPF = *Building Performance Factor* from Table 4.2.1.1. For *building area types* not listed in Table 4.2.1.1 use “All others.” Where a *building* has multiple *building area types*, the required BPF shall be equal to the area-weighted average of the *building area types*.

BBP = *Baseline Building Performance*.

PBP = Proposed Building Performance including the reduced, annual purchased energy cost associated with *all on-site renewable energy generation systems*

PBP_{nre} = Proposed Building Performance without any credit for reduced annual energy costs from on-site renewable energy generation systems.

PBP_{pre} = Proposed Building Performance excluding any renewable energy system in the proposed design and including an *on-site renewable energy system* that meets but not exceeds the requirements of Section 10.5.1.1 modeled following the requirements for a *budget building design* in Table 11.5.1 using option b.

PRE = PBP_{nre} - PBP_{pre}

PNA = Proposed renewable energy contribution not allowed for compliance

Informative Note

PBP_{nre} - Proposed Building Performance No Renewable Energy

PBP_{pre} - Proposed Building Performance Prescriptive Renewable Energy

PRE - Prescriptive Renewable Energy

$$\text{Additional Renewable contribution} = \cancel{\text{PBP}}_{\text{pre}} \text{PBP}_{\text{pre}} - \text{PBP}$$

$$\text{Renewable Fraction} = (\cancel{\text{PBP}}_{\text{pre}} \text{PBP}_{\text{pre}} - \text{PBP})/\text{BBP}$$

If Renewable Fraction ≤ 0.05 then PNA = 0,
otherwise PNA = Additional Renewable Contribution - (0.05 x BBP)