

Public Review Draft

Proposed Addendum k to Standard 189.1-2017

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

Second Public Review Draft (August 2019)
(Draft Shows Proposed Independent Substantive
Changes to Previous Public Review Draft)

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Foreword

Addendum k adds renewable energy requirements to the performance path of Section 7 to be consistent with requirements being added to the prescriptive path. The addendum includes requirements for treatment of off-site renewable energy sources. Based on public review comments on the 1st public review, this 2nd public review ISC revises the language used to describe various off-site renewable energy supplies to be consistent with industry practice.

[Note to Reviewers: This public review draft makes proposed independent substantive changes to the previous public review draft. 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 k to 189.1-2017

NORMATIVE APPENDIX C

PERFORMANCE OPTION FOR ENERGY EFFICIENCY

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Table C1.1 Modifications and Additions to ANSI/ASHRAE/IES Standard 90.1, Appendix G, Table G3.1

Proposed Building Performance	Baseline Building Performance
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15. Renewable Energy Systems

The reduction in the proposed *building* annual energy cost, CO_2e emissions, and source energy due to renewable energy systems shall be calculated as follows:

- a. **Annual Energy Cost.** The annual energy cost of the proposed design shall be adjusted to account for renewable energy systems as follows.
 1. **On-Site Thermal Energy.** The hourly thermal loads of the *proposed design* shall be reduced by the hourly thermal energy production of the *on-site renewable energy system* (but thermal

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loads shall not be reduced to less than zero). When the on-site renewable thermal energy production exceeds the applicable thermal demands of the building for any hour, the excess generated energy may be used to displace thermal loads at other times, provided the system has the storage capability and storage losses are included in the calculation. The approved energy rate structure shall be applied to the reduced energy consumption.

2. On-Site Electric Renewable Energy Systems – Net Metering.

The total electrical energy production of the *on-site renewable electricity systems* shall be calculated on an hourly basis, and the energy cost of the *proposed building performance* shall be calculated by applying the approved electrical rate structure to each hour's electrical usage, including any reduction from hourly electrical energy production of the *on-site renewable energy system*.

Exception to a.2: For *building projects* with no net metering agreement, feed-in tariff, or other electrical rate structure for net generated electricity, the cost of imported electricity from the grid is calculated by applying the approved electrical rate structure to each hour's electrical loads minus the hourly electrical energy production of the *on-site renewable energy system*, but the cost of imported electricity shall not be less than zero on a monthly basis.

Electricity production of the *on-site renewable energy system* that has a retail value in excess of the retail cost of electricity consumption on a monthly basis shall be credited as a reduction in energy costs to the *building performance* at the wholesale rate as follows:

$$\text{Credit} = \frac{\text{ExRR} - \text{ImRR}}{\text{ExRR}} \times \text{ExkWh} \times \text{WR}$$

where

Credit = cost reduction credit for month where retail value of exported electricity is greater than retail value of imported electricity

ExRR = month's value of exported electricity at retail rate

ImRR = month's value of imported electricity at retail rate

ExkWh = total kilowatt-hours exported in month

WR = average monthly wholesale rate for the region where the building located

Informative Note: *Thermal renewable energy is accounted for in a.1 above so the renewable energy addressed in a.2 will always be on-site electricity. There is no need to apply the renewable energy procurement factors from Table 7.4.1.2 since the multiplier will always be one.*

3. Electricity Generation from Off-Site Community Renewable Energy Systems – Virtual-, Aggregated-, or Community-Net Metering Tariff.

~~Community Renewable energy systems that credit the *building project* electricity account on an hourly basis shall be calculated according to a.2, except that the renewable energy procurement factor from Table 7.4.2+1.2 shall be applied to each hour of electricity production from the community~~

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renewable energy system. The energy cost credit for other ~~off-site~~~~community~~ renewable energy systems shall be calculated according to a.4.

4. Electricity Generation from Other, Self-Owned Off-Site Renewable Energy Systems or ~~Virtual Power Purchase Agreements~~. The adjusted renewable energy is the actual renewable energy for each procurement source of renewable energy delivered to or credited to the building project multiplied by the appropriate renewable energy procurement factors in Table 7.4.1.2. The annual energy cost reduction ~~credited to~~ of the proposed design shall be the total adjusted renewable energy times the from self-owned off-site systems or virtual power purchase agreements credited to the project at the virtual electric rate paid by the building. The virtual electric rate is the total retail cost for electricity for the year divided by the net consumption for the year, in dollars per kWh (\$/kWh).

b. Annual CO₂e. The annual CO₂e emissions of the proposed *building* shall be equal to the annual CO₂e associated with all building energy use minus the adjusted renewable energy multiplied by the electrical CO₂e emission factor from Table 7.5.2. Each procurement source of renewable energy delivered to or credited to the building project shall be multiplied by the renewable energy procurement factors in Table 7.4.1.2.

$$PD-CO_2e = \sum PDE_i \times e_i - \sum RE_k \times REPF_k \times e_k$$

where

PD-CO₂e = CO₂e emissions for the proposed design.

PDSE_i = Proposed design site energy use for energy type i.

e_i = CO₂e emission factor for energy type i, taken from Table 7.5.2.

RE_k = Annual renewable energy production for renewable energy type k

REPF_k = Renewable procurement factor from Table 7.4.1.2 for renewable energy type k

e_k = CO₂e emission factor for electricity taken from Table 7.5.2.

c. Zero Energy Performance Index. The adjusted renewable energy of the proposed *building* shall be credited using the source-site multiplier for electricity from Table 7.5.3. On-site thermal energy from solar shall be directly modeled according to Table C1.1, 15a.1 and accounted for through the displacement of on-site fossil fuel or electricity.

Documentation: The documentation required in ANSI/ASHRAE/IES Standard 90.1, Section G2.5 (a), (b), and (e), shall be made available to the *AHJ*, upon request, for all *on-site renewable energy systems* in the *proposed design*.