

ANSI/ASHRAE/ICC/USGBC/IES Addendum aa to ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017

Standard for the Design of High-Performance Green Buildings

Except Low-Rise Residential Buildings

The Complete Technical Content of the International Green Construction Code®

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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

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FOREWORD

This addendum updates the CO₂e emission factors in Table 7.5.2, expanding the list to add values for eGRID subregions. These data will be combined with the Source Energy Conversion column of Table 7.5.3, which was added in Addendum z, and the whole table will be labeled as 7.5.2. The emission factors include both direct emissions from combustion and indirect emissions from extraction, processing, and delivery of fuels to buildings or power plants. For electricity, the emissions also account for transmission and distribution losses.

Further additions to this addendum were made during the public review process and include changes to the definition of "CO₂e" as well as clarifications to informative text and table references.

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

Addendum aa to Standard 189.1-2017

Modify the definition of "CO₂e" as it appears in Section 3.2.

carbon dioxide equivalent (CO₂e): a measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP). CO₂e approximates the time-integrated warming effect of a unit mass of a given greenhouse gas relative to that of carbon dioxide (CO₂). GWP is an index for estimating the relative global warming contribution of atmospheric emissions of 1 kg of a particular greenhouse gas compared to emissions of an equal mass 1 kg of CO₂. ~~The following GWP values are used based on a 100-year time horizon: 1 for CO₂, 25 for methane (CH₄), and 298 for nitrous oxide (N₂O).~~

Delete the following acronym from Section 3.3, as it is only used in Section 3.2 and does not appear elsewhere in the standard.

GWP ~~global warming potential~~

Modify Section 7.5 as shown.

7.5.2 Annual Carbon Dioxide Equivalent (CO₂e). *The proposed design shall have annual CO₂e emissions equal to or less than the annual CO₂e emissions of the baseline building design multiplied by the performance cost index target determined in accordance with 7.5.1. To determine the annual CO₂e for each energy source in the baseline building design and proposed design, the energy consumption shall be multiplied by the CO₂e emission factors from Table 7.5.2~~3B~~. U.S. locations shall use values for eGRID subregions from Table 7.5.2 for electricity. Locations outside the U.S. shall use the value for "All other electricity" or locally derived values. A building project served in whole or in part by a district energy plant shall follow the modeling requirements contained in Normative Appendix C, Section C1.3, in order to comply with this section.*

Table 7.5.2 CO₂e Emission Factors

Building Project Energy Source	CO₂e, lb/MWh	CO₂e, kg/MWh
Grid-delivered electricity and other fuels not specified in this table	1348	612
LPG or propane	601	273
Fuel oil (residual)	685	311
Fuel oil (distillate)	663	301
Coal	820	372
Gasoline	681	309
Natural gas	509	231
District chilled water	323	146
District steam	855	388
District hot water	807	366

The values in this table represent national averages for the United States and include both direct and indirect emissions.

Add new data to and rename Table 7.5.3 as shown. (Note: Table 7.5.3 is also used in Addendum z. The portion of the table already included in Addendum z is not underlined here.)

Table 7.5.32 Source Energy Conversion Factors and CO₂e Emissions Factors

Energy Form	Source Energy Conversion Factor	CO ₂ e Emissions Factor	
		lb/MWh	kg/MWh
Fuels Used Directly in Building			
Natural gas	1.09	<u>681</u>	<u>309</u>
LPG or propane	1.15	<u>651</u>	<u>295</u>
Fuel oil (residual)	1.19	<u>738</u>	<u>335</u>
Fuel oil (distillate)	1.19	<u>715</u>	<u>324</u>
Coal	1.05	<u>892</u>	<u>405</u>
Gasoline	1.19	<u>744</u>	<u>337</u>
Other fuels not specified in this table	1.05	<u>892</u>	<u>405</u>
Imported Electricity and Exported Renewable Electricity			
AKGD—ASCC Alaska Grid	2.52	<u>1580</u>	<u>717</u>
AKMS—ASCC Miscellaneous	1.21	<u>738</u>	<u>335</u>
AZNM—WECC Southwest	2.75	<u>1496</u>	<u>679</u>
CAMX—WECC California	1.94	<u>957</u>	<u>434</u>
ERCT—ERCOT All	2.58	<u>1529</u>	<u>694</u>
FRCC—FRCC All	2.97	<u>1601</u>	<u>726</u>
HIMS—HICC Miscellaneous	2.86	<u>1717</u>	<u>779</u>
HIOA—HICC Oahu	3.83	<u>2460</u>	<u>1116</u>
MROE—MRO East	3.08	<u>2337</u>	<u>1060</u>
MROW—MRO West	2.50	<u>1686</u>	<u>765</u>
NEWE—NPCC New England	2.87	<u>1024</u>	<u>464</u>
NWPP—WECC Northwest	1.39	<u>936</u>	<u>425</u>
NYCW—NPCC NYC/Westchester	2.92	<u>1034</u>	<u>469</u>
NYLI—NPCC Long Island	2.90	<u>1600</u>	<u>726</u>
NYUP—NPCC Upstate NY	1.97	<u>540</u>	<u>245</u>
RFCE—RFC East	3.05	<u>1156</u>	<u>524</u>
RFCM—RFC Michigan	3.06	<u>1806</u>	<u>819</u>
RFCW—RFC West	3.14	<u>1757</u>	<u>797</u>
RMPA—WECC Rockies	2.33	<u>1829</u>	<u>830</u>
SPNO—SPP North	2.67	<u>1851</u>	<u>840</u>
SPSO—SPP South	2.46	<u>1737</u>	<u>788</u>
SRMV—SERC Mississippi Valley	2.95	<u>1421</u>	<u>645</u>
SRMW—SERC Midwest	3.20	<u>2234</u>	<u>1014</u>
SRSO—SERC South	3.04	<u>1651</u>	<u>749</u>
SRTV—SERC Tennessee Valley	3.02	<u>1677</u>	<u>761</u>
SRVC—SERC Virginia/Carolina	3.11	<u>1255</u>	<u>569</u>
All other electricity	2.64	<u>1418</u>	<u>643</u>
District Thermal Energy			
Chilled water	0.63	<u>339</u>	<u>154</u>
Steam	1.83	<u>1145</u>	<u>519</u>
Hot water	1.73	<u>1081</u>	<u>491</u>

Informative Note: Values in this table represent averages for the United States and include both direct and indirect emissions. The source energy conversion factors are based on noncombustible renewable energy having a zero heat rate. The carbon dioxide equivalent emissions of methane (CH₄) and nitrous oxide (N₂O) are based on their GWP for a 20 year time horizon. Other assumptions are documented in Informative Appendix K.

Remove text added to Section 7.5.3 by proposed Addendum z, as shown.

r_e = source energy conversion factor taken from Table 7.5.3 for electricity. ~~eGRID values shall be used for electricity where applicable.~~

Modify the description of the term r_e in Section 7.5.3 (added in Addendum k).

r_e = source energy conversion factor taken from Table 7.5.32 for electricity. U.S. Locations shall use values for eGRID subregions from Table 7.5.2 for electricity. Locations outside the U.S. shall use the value for “All other electricity” or locally derived values.

Renumber Figure 7.5.3, added by Addendum z, as shown.

Figure 7.5.32 Map of eGRID subregions.

Crosshatching indicates that an area falls within overlapping eGRID subregions due to the presence of multiple electric service providers. Power Profiler can be used to definitively determine the eGRID subregion associated with a specific location and electric service provider (www.epa.gov/energy/power-profiler).

Modify Section 9.5.1 as shown.

9.5.1 Life-Cycle Assessment (LCA). An LCA shall be performed in accordance with ASTM E2921 and ISO Standard 14044, as modified by this section, for a minimum of two building alternatives, both of which shall conform to the *owner's project requirements (OPR)*. For the purposes of Section 9.5, values for global warming potential relative to CO₂ shall be based on a 100 year time horizon when used for calculations, results, and comparisons.

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FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES**

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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Standard 189.1 and the International Green Construction Code

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