

Public Review Draft

Proposed Addendum z to Standard 189.1-2017

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

First Public Review (March 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).

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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 source energy conversion factors in Table 7.5.3 and expands the list for eGRID subregions. These factors represent the energy required to extract, process, and deliver the fuel to the building per unit of energy in the fuel..

Note: In this addendum, changes to the current standard as modified by previous addenda 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. Only the changes shown as Addendum z are open for review and comment at this time. Other addenda and any other additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes of this addendum.

Addendum z to 189.1-2017

Note to Reviewer: Section 7.5 of Standard 189.1 is being modified by multiple addenda. Addendum ar to 189.1-2014 and Addendum e to 189.1-2017 have received all approvals for publication, but have not yet been published and are therefore not available to reviewers of Addendum z. Addendum k has completed public review and is in the process of comment response and resolution.

This section of this addendum shows changes being made by Addendum z relative to Section 7.5 from 189.1-2017 including modifications from Addendum ar, Addendum e and Addendum k, i.e., material from ar, e and k are shown as the base document. The changes in this first section are what are open for public review. Because Addenda ar, e and k have not yet been published, those addenda are shown in subsequent sections for information only. Changes made to Appendix C by Addendum k are not shown, as this addendum does not affect them.

It should be noted that Addendum aa makes further changes to Sections 7.5.2 and 7.5.3. If all five of these addenda are approved for publication, the resulting Section 7.5 is shown at the end of this document. Addendum z adds Table 7.5.3 with source energy factors and Addendum aa adds Table 7.5.3 with CO_{2e} emission factors. Both versions of Table 7.5.3 have identical rows

and if both addenda are approved, the different columns in Table 7.5.3 from the two addenda will be combined editorially, as shown in the last section of this addendum.

7.5 Performance Option

7.5.1 Annual Energy Cost. The *proposed building performance* cost index with consideration of renewables shall be calculated in accordance with ANSI/ASHRAE/IES Standard 90.1, Normative Appendix G, and be equal to or less than the Performance Cost Index (PCI) Target, as determined from the following equation:

$$PCI_{Target} = \frac{[BBUEC + (BBREC \times BPF)] \times (1 - RF)}{BBUEC + BBREC}$$

where

PCI_{Target} = target PCI required for achieving compliance with the standard, unitless.

BBUEC = the component of *baseline building performance* that is due to *unregulated energy use*, \$

BBREC = the component of *baseline building performance* that is due to *regulated energy use*, or *baseline building performance* minus BBUEC, \$

BPF = building performance factor taken from Table 7.5.1, unitless

RF = renewable energy production fraction from Table 7.5.1, unitless

The proposed building PCI, without consideration of renewables, shall comply with the requirements of ANSI/ASHRAE/IES Standard 90.1, Section 4.2.1.1.

7.5.2 Annual Carbon Dioxide Equivalent (CO_{2e}). The *proposed design* shall have annual CO_{2e} emissions equal to or less than the annual CO_{2e} emissions of the *baseline building design* multiplied by the performance cost index target determined in accordance with 7.5.1. To determine the annual CO_{2e} for each energy source in the *baseline building design* and *proposed design*, the energy consumption shall be multiplied by the CO_{2e} emission factors from Table 7.5.2B.

Table 7.5.1 Building Performance Factors (BPF) and Renewable Fractions (RF)

Building Type	Building Performance Factor (BPF)	Renewable Fraction (RF)
Multifamily	0.71	0.50
Healthcare/hospital	0.56	0.35
Hotel/motel	0.58	0.50
Office	0.54	0.50
Restaurant	0.59	0.10
Retail	0.50	0.50
School	0.37	0.50
Semiheated warehouse ^a	0.44	0.50
All Others	0.54	0.50

a. Conditioned warehouses shall use the “All others” category.

7.5.3 Zero Energy Performance Index. The zero energy performance index ($zEPI_{2004}$) of the proposed design, including on-site renewable energy systems, shall be less than the target ($zEPI_{2004,Target}$). $zEPI_{2004}$ and $zEPI_{2004,Target}$ shall be calculated as described below.

$$zEPI_{2004} = \frac{\sum_i PDSE_i \times r_i - \sum_k RE_k \times REPF_k \times r_e}{\sum_i BBSE_i \times r_i}$$

where

$zEPI_{2004}$ = Zero energy performance index relative to the Standard 90.1 baseline as defined in the performance rating method of Appendix G.

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

$BBSE_i$ = Baseline building site energy use for energy type i. The baseline building is created following the rules in Standard 90.1, Appendix G.

r_i = Source energy conversion factor for energy type i, value taken from Table 7.5.2.1 7.5.3.

RE_k = Annual renewable energy electricity production for renewable energy procurement method k (see Table 7.4.1.2)

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

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

***Informative Note:** On-site thermal energy and renewable energy contributions to district energy plants are accounted for in the PDE_i term through reductions in electricity and/or gas use. The RE_k term will always be electricity.*

$$zEPI_{2004 Target} = \frac{[BBUSE + (BBRSE \times BPF)] \times (1 - RF)}{BBUSE + BBRSE}$$

where

$zEPI_{2004 Target}$ = Zero energy performance index target required for achieving compliance with the standard, unitless.

$BBUSE$ = Baseline building *unregulated energy use* expressed in source units.

$BBRSE$ = Baseline building *regulated energy use* expressed in source units.

BPF = Building performance factor taken from Table 7.5.1, unitless.

RF = Renewable fraction from Table 7.5.1, unitless.

***Informative Note:** Informative Appendix I details a methodology for converting $zEPI_{2004}$ to $zEPI$. $zEPI_{2004}$ uses Standard 90.1 Appendix G to define the baseline building. The traditional definition of $zEPI$ uses the median energy of the existing building stock in the year 2000 as the baseline. The traditional $zEPI$ definition is used by the Architecture 2030 program and for other programs.*

TABLE 7.5.3 National Average Source Energy Conversion Factors

<u>Energy Type</u>	<u>Conversion Factor (r_i)</u>
<u>Imported Electricity</u>	<u>3.15</u>
<u>Exported Renewable Electricity</u>	<u>3.15</u>
<u>Natural Gas</u>	<u>1.09</u>
<u>Fuel Oil (1,2,4,5,6,Diesel, Kerosene)</u>	<u>1.19</u>
<u>Propane & Liquid Propane</u>	<u>1.15</u>
<u>Steam</u>	<u>1.45</u>
<u>Hot Water</u>	<u>1.35</u>
<u>Chilled Water</u>	<u>1.04</u>
<u>Coal or Other</u>	<u>1.05</u>

Informative Note: The values in this table represent national averages for the United States..

TABLE 7.5.3 Source Energy Conversion Factors

<u>Energy Form</u>	<u>Source Energy Conversion Factor</u>
<u>Fossil Fuels Used Directly in Building</u>	
Natural gas	1.09
LPG or propane	1.15
Fuel oil (residual)	1.19
Fuel oil (distillate)	1.19
Coal	1.05
Gasoline	1.19
<u>Electricity</u>	
AKGD - ASCC Alaska Grid	2.52
AKMS - ASCC Miscellaneous	1.21
AZNM - WECC Southwest	2.75
CAMX - WECC California	1.94
ERCT - ERCOT All	2.58
FRCC - FRCC All	2.97
HIMS - HICC Miscellaneous	2.86
HIOA - HICC Oahu	3.83
MROE - MRO East	3.08
MROW - MRO West	2.50
NEWE - NPCC New England	2.87
NWPP - WECC Northwest	1.39
NYCW - NPCC NYC/Westchester	2.92
NYLI - NPCC Long Island	2.90
NYUP - NPCC Upstate NY	1.97
RFCE - RFC East	3.05
RFCM - RFC Michigan	3.06
RFCW - RFC West	3.14
RMPA - WECC Rockies	2.33
SPNO - SPP North	2.67
SPSO - SPP South	2.46
SRMV - SERC Mississippi Valley	2.95
SRMW - SERC Midwest	3.20
SRSO - SERC South	3.04
SRTV - SERC Tennessee Valley	3.02
SRVC - SERC Virginia/Carolina	3.11
All other electricity and other fuels not specified in this table	2.64
<u>District Thermal Energy</u>	
Chilled water	0.63
Steam	1.83
Hot water	1.73

Informative Note: Values in this table represent averages for the United States and include both direct and indirect emissions.

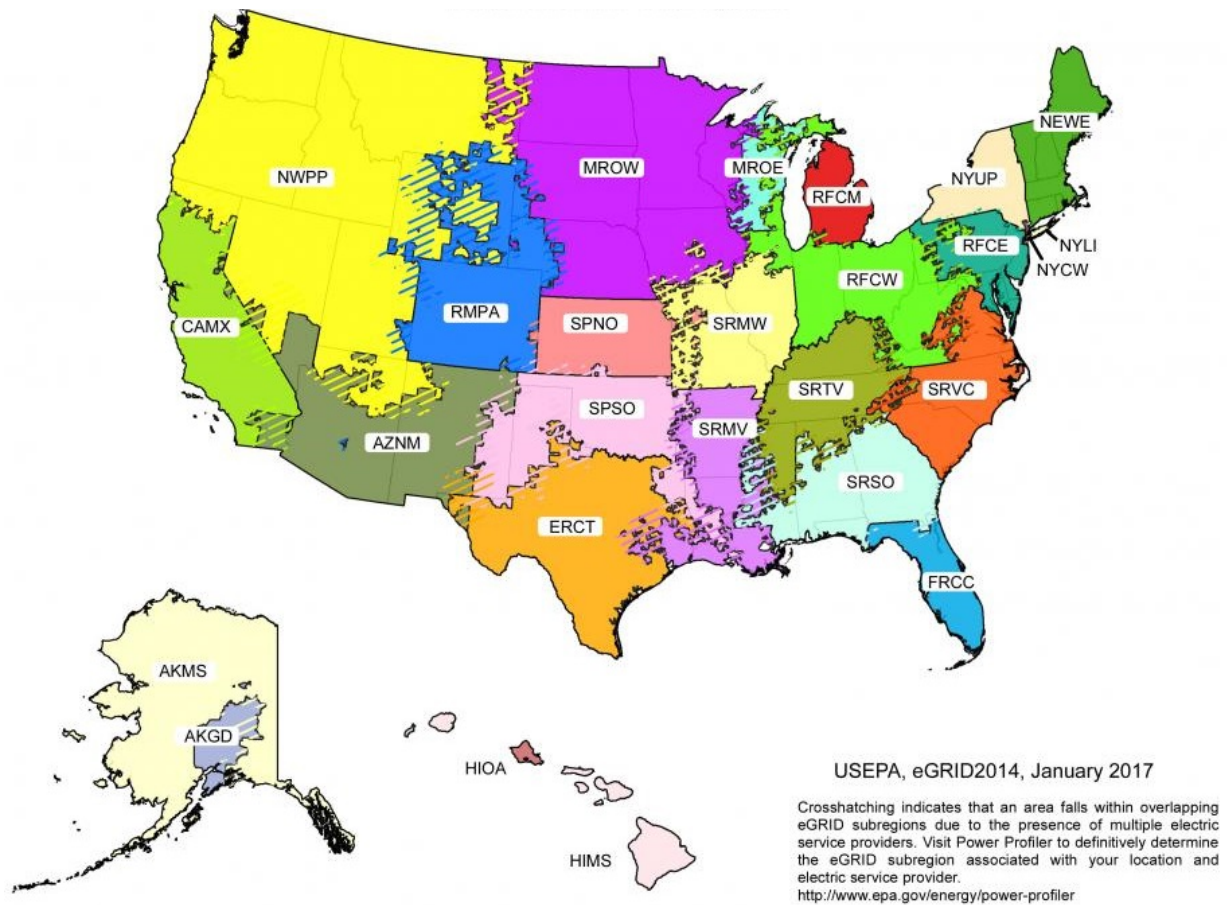


Figure 7.5.3 Map of eGRID Subregions

Crosshatching indicates that an area falls within overlapping eGRID subregions due to the presence of multiple electric service providers. Visit Power Profiler to definitively determine the eGRID subregion associated with your location and electric service provider. See <http://www.epa.gov/energy/power-profiler>.

Addendum k to 189.1-2017

Note to reviewers: The first section of this addendum shows changes being made by this addendum relative to Section 7.5 from 189.1-2017 including modifications from Addendum ar, Addendum e and Addendum k, i.e., material from ar, e and k are shown as the base document. The changes open for public review are those in the first section.

This section of the addendum shows Addendum k for informational purposes. These changes are shown with Standard 189.1-2017 plus Addendum ar and Addendum e as the base document. The changes shown in this section are not open for public review.

7.5 Performance Option

7.5.1 Annual Energy Cost. The proposed building performance cost index with consideration of renewables shall be calculated in accordance with ANSI/ASHRAE/IES Standard 90.1, Normative Appendix G, and be equal to or less than the Performance Cost Index (PCI) Target, as determined from the following equation:

$$PCI_{Target} = \frac{[BBUEC + (BBREC \times BPF)] \times (1 - RF)}{BBUEC + BBREC}$$

$$PCI_{Target} = \frac{BBUEC + (BBREC \times BPF) - REC}{BBUEC + BBREC}$$

where

PCI_{Target} = target PCI required for achieving compliance with the standard, unitless.

BBUEC = the component of *baseline building performance* that is due to *unregulated energy use*, \$

BBREC = the component of *baseline building performance* that is due to *regulated energy use*, or *baseline building performance* minus BBUEC, \$

BPF = building performance factor taken from Table 7.5.17-5.2A, unitless.

REC_{RF} = renewable energy production fraction from Table 7.5.1, unitless~~determined from Section 7.4.1.1.1 and converted to cost, \$~~

The proposed building PCI, without consideration of renewables, shall comply with the requirements of ANSI/ASHRAE/IES Standard 90.1, Section 4.2.1.1.

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 7.5.2B.

Table 7.5.1 Energy Cost and CO₂e-Building Performance Factors (BPF) and Renewable Fractions (RF)

Building Type	Building Performance Factor (BPF)	Renewable Fraction (RF)
Multifamily	0.71	<u>0.50</u>
Healthcare/hospital	0.56	<u>0.35</u>
Hotel/motel	0.58	<u>0.50</u>
Office	0.54	<u>0.50</u>
Restaurant	0.59	<u>0.10</u>
Retail	0.50	<u>0.50</u>
School	0.37	<u>0.50</u>
Semiheated warehouse ^a	0.44	<u>0.50</u>
All Others	0.54	<u>0.50</u>

b. Conditioned warehouses shall use the “All others” category.

Table 7.5.2B 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.

7.5.3 Zero Energy Performance Index. The zero energy performance index (zEPI₂₀₀₄) of the proposed design, including on-site renewable energy systems, shall be less than the target (zEPI_{2004,Target}). zEPI₂₀₀₄ and zEPI_{2004,Target} shall be calculated as described below.

$$zEPI_{2004} = \frac{\sum_i PDSE_i \times r_i - \sum_k RE_k \times REPF_k \times r_e}{\sum_i BBSE_i \times r_i}$$

$$zEPI_{2004} = \frac{\sum_t PDE_t \times r_t}{\sum_t BBE_t \times r_t}$$

where

$zEPI_{2004}$ = Zero energy performance index relative to the Standard 90.1 baseline as defined in the performance rating method of Appendix G.

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

$BBSE_i$ = Baseline building site energy use for energy type i. The baseline building is created following the rules in Standard 90.1, Appendix G.

r_i = Source energy conversion factor for energy type i, value taken from Table 7.5.2.1 7.5.3.

RE_k = Annual renewable energy electricity production for renewable energy procurement method k (see Table 7.4.1.2)

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

r_e = Source energy conversion factor taken from Table 7.5.3 for electricity.

Informative Note: On-site thermal energy and renewable energy contributions to district energy plants are accounted for in the PDE_i term through reductions in electricity and/or gas use. The RE_k term will always be electricity.

$$zEPI_{2004 Target} = \frac{[BBUSE + (BBRSE \times BPF)] \times (1 - RF)}{BBUSE + BBRSE}$$

$$zEPI_{2004 Target} = \frac{BBUSE + (BBRSE \times BPF) - RECSE}{BBUSE + BBRSE}$$

where

$zEPI_{2004 Target}$ = Zero energy performance index target required for achieving compliance with the standard, unitless.

$BBUSE$ = Baseline building *unregulated energy use* expressed in source units.

$BBRSE$ = Baseline building *regulated energy use* expressed in source units.

BPF = Building performance factor taken from Table 7.5.1, unitless.

$RECSE$ = Renewable fraction from Table 7.5.1, unitless. energy production determined from section 7.4.1.1.1 and converted to source energy

Informative Note: *Informative Appendix I details a methodology for converting $zEPI_{2004}$ to $zEPI$. $zEPI_{2004}$ uses Standard 90.1 Appendix G to define the baseline building. The traditional definition of $zEPI$ uses the median energy of the existing building stock in the year 2000 as the baseline. The traditional $zEPI$ definition is used by the Architecture 2030 program and for other programs.*

TABLE 7.5.3 National Average Source Energy Conversion Factors

Energy Type	Conversion Factor (r)
Imported Electricity	3.15
Exported Renewable Electricity	3.15
Natural Gas	1.09
Fuel Oil (1,2,4,5,6,Diesel, Kerosene)	1.19
Propane & Liquid Propane	1.15
Steam	1.45
Hot Water	1.35
Chilled Water	1.04
Coal or Other	1.05

Informative Note: The values in this table represent national averages for the United States..

Addendum e to 189.1-2017

Note to reviewers: The first section of this addendum shows changes being made by this addendum relative to Section 7.5 from 189.1-2017 including modifications from Addendum ar, Addendum e and Addendum k, i.e., material from ar, e and k are shown as the base document. The changes open for public review are those in the first section.

The second section of the addendum showed Addendum k for informational purposes

This section of the addendum shows Addendum e for informational purposes. These changes are shown with Standard 189.1-2017 plus Addendum ar as the base document. The changes shown in this section are not open for public review.

7.5.2 Annual Carbon Dioxide Equivalent (CO₂e). The *proposed design* shall have annual CO₂e equal to or less than the annual CO₂e of the *baseline building design* multiplied by the performance cost index target determined in accordance with 7.5.1~~building performance factor (BPF) target determined from Table 7.5.2A using the performance rating method in ANSI/ASHRAE/IES Standard 90.1, Normative Appendix G.~~ 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 7.5.2B.

Addendum ar to 189.1-2014

Note to reviewers: The first section of this addendum shows changes being made by this addendum relative to Section 7.5 from 189.1-2017 including modifications from Addendum ar, Addendum e and Addendum k, i.e., material from ar, e and k are shown as the base document. The changes open for public review are those in the first section.

The second section of the addendum showed Addendum k for informational purposes and the third section showed Addendum e for informational purposes.

This section of the addendum shows Addendum ar for informational purposes. These changes are shown with Standard 189.1-2017 as the base document. Some editorial changes are included because Addendum ar was originated as an addendum to 189.1-2014 and because of editorial errors in the original addendum. The changes shown in this section are not open for public review.

7.5.3 Zero Energy Performance Index. The zero energy performance index ($zEPI_{2004}$) of the proposed design, including on-site renewable energy systems, shall be less than the target ($zEPI_{2004,Target}$). $zEPI_{2004}$ and $zEPI_{2004,Target}$ shall be calculated as described below.

$$zEPI_{2004} = \frac{\sum_i PDE_i \times r_i}{\sum_i BBE_i \times r_i}$$

where

$zEPI_{2004}$ = Zero energy performance index relative to the Standard 90.1 baseline as defined in the performance rating method of Appendix G.

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

BBE_i = Baseline building site energy use for energy type i. The baseline building is created following the rules in Standard 90.1, Appendix G.

r_i = Source energy conversion factor for energy type i, value taken from Table 7.5.3.

$$zEPI_{2004,Target} = \frac{BBUSE + (BBRSE \times BPF) - RECSE}{BBUSE + BBRSE}$$

where

$zEPI_{2004,Target}$ = Zero energy performance index target required for achieving compliance with the standard, unitless.

$BBUSE$ = Baseline building unregulated energy use expressed in source units.

$BBRSE$ = Baseline building regulated energy use expressed in source units.

BPF = Building performance factor taken from Table 7.5.1, unitless.

$RECSE$ = Renewable energy production determined from section 7.4.1.1.1 and converted to source energy

Informative Note: Informative Appendix I details a methodology for converting $zEPI_{2004}$ to $zEPI$. $zEPI_{2004}$ uses Standard 90.1 Appendix G to define the baseline building. The traditional definition of $zEPI$ uses the median energy of the existing building stock in the year 2000 as the baseline. The traditional $zEPI$ definition is used by the Architecture 2030 program and for other programs.

TABLE 7.5.3 National Average Source Energy Conversion Factors

<u>Energy Type</u>	<u>Conversion Factor (r)</u>
<u>Imported Electricity</u>	<u>3.15</u>
<u>Exported Renewable Electricity</u>	<u>3.15</u>
<u>Natural Gas</u>	<u>1.09</u>
<u>Fuel Oil (1,2,4,5,6,Diesel, Kerosene)</u>	<u>1.19</u>
<u>Propane & Liquid Propane</u>	<u>1.15</u>
<u>Steam</u>	<u>1.45</u>
<u>Hot Water</u>	<u>1.35</u>
<u>Chilled Water</u>	<u>1.04</u>
<u>Coal or Other</u>	<u>1.05</u>

Informative Note: The values in this table represent national averages for the United States..

Intended Section 7.5

Note to reviewers: Section 7.5 is being modified by Addendum ar, Addendum e, Addendum k, Addendum z and Addendum aa. If all five of these addenda are approved for publication, the resulting Section 7.5 is shown below.

7.5 Performance Option

7.5.1 Annual Energy Cost. The *proposed building performance* cost index with consideration of renewables shall be calculated in accordance with ANSI/ASHRAE/IES Standard 90.1, Normative Appendix G, and be equal to or less than the Performance Cost Index (PCI) Target, as determined from the following equation:

$$PCI_{Target} = \frac{[BBUEC + (BBREC \times BPF)] \times (1 - RF)}{BBUEC + BBREC}$$

where

PCI_{Target} = target PCI required for achieving compliance with the standard, unitless.

BBUEC = the component of *baseline building performance* that is due to *unregulated energy use*, \$

BBREC = the component of *baseline building performance* that is due to *regulated energy use*, or *baseline building performance* minus BBUEC, \$

BPF = building performance factor taken from Table 7.5.1, unitless.

RF = renewable energy production fraction from Table 7.5.1.

The proposed building PCI, without consideration of renewables, shall comply with the requirements of ANSI/ASHRAE/IES Standard 90.1, Section 4.2.1.1.

Table 7.5.1 E energy Cost and CO₂e Building Performance Factors (BPF)

Building Type	Building Performance Factor (BPF)	Renewable Fraction (RF)
Multifamily	0.71	0.50
Healthcare/hospital	0.56	0.35
Hotel/motel	0.58	0.50
Office	0.54	0.50
Restaurant	0.59	0.10
Retail	0.50	0.50
School	0.37	0.50
Semiheated warehouse ^a	0.44	0.50
All Others	0.54	0.50

a. Conditioned warehouses shall use the “All others” category.

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 CO_2e emission factors from Table 7.5.2B. eGRID values shall be used for electricity when applicable.

7.5.3 Zero Energy Performance Index. The zero energy performance index ($zEPI_{2004}$) of the proposed design, including on-site renewable energy systems, shall be less than the target ($zEPI_{2004,Target}$). $zEPI_{2004}$ and $zEPI_{2004,Target}$ shall be calculated as described below.

$$zEPI_{2004} = \frac{\sum_i PDSE_i \times r_i - \sum_k RE_k \times REPF_k \times r_e}{\sum_i BBSE_i \times r_i}$$

where

$zEPI_{2004}$ = Zero energy performance index relative to the Standard 90.1 baseline as defined in the performance rating method of Appendix G.

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

$BBSE_i$ = Baseline building site energy use for energy type i. The baseline building is created following the rules in Standard 90.1, Appendix G.

r_i = Source energy conversion factor for energy type i, taken from Table 7.5.3.

RE_k = Annual renewable energy electricity production for renewable energy procurement method k (see Table 7.4.1.2)

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

r_e = Source energy conversion factor taken from Table 7.5.3 for electricity.

Informative Note: On-site thermal energy and renewable energy contributions to district energy plants are accounted for in the PDE_i term through reductions in electricity and/or gas use. The RE_k term will always be electricity.

$$zEPI_{2004 Target} = \frac{[BBUSE + (BBRSE \times BPF)] \times (1 - RF)}{BBUSE + BBRSE}$$

where

$zEPI_{2004 Target}$ = Zero energy performance index target required for achieving compliance with the standard, unitless.

$BBUSE$ = Baseline building *unregulated energy use* expressed in source units.

$BBRSE$ = Baseline building *regulated energy use* expressed in source units.

BPF = Building performance factor taken from Table 7.5.1, unitless.

RF = Renewable fraction from Table 7.5.1, unitless.

TABLE 7.5.3 Source Energy Conversion and CO₂e Emissions Factors

Energy Form	Source Energy Conversion Factor	CO ₂ e Emission Factor	
		lb/MWh	kg/MWh
Fossil Fuels Used Directly in Building			
Natural gas	1.09	681	309
LPG or propane	1.15	651	295
Fuel oil (residual)	1.19	738	335
Fuel oil (distillate)	1.19	715	324
Coal	1.05	892	405
Gasoline	1.19	744	337
Electricity			
AKGD - ASCC Alaska Grid	2.52	1,580	717
AKMS - ASCC Miscellaneous	1.21	738	335
AZNM - WECC Southwest	2.75	1,496	679
CAMX - WECC California	1.94	957	434
ERCT - ERCOT All	2.58	1,529	694
FRCC - FRCC All	2.97	1,601	726
HIMS - HICC Miscellaneous	2.86	1,717	779
HIOA - HICC Oahu	3.83	2,460	1,116
MROE - MRO East	3.08	2,337	1,060
MROW - MRO West	2.50	1,686	765
NEWE - NPCC New England	2.87	1,024	464
NWPP - WECC Northwest	1.39	936	425
NYCW - NPCC NYC/Westchester	2.92	1,034	469
NYLI - NPCC Long Island	2.90	1,600	726
NYUP - NPCC Upstate NY	1.97	540	245
RFCE - RFC East	3.05	1,156	524
RFCM - RFC Michigan	3.06	1,806	819
RFCW - RFC West	3.14	1,757	797
RMPA - WECC Rockies	2.33	1,829	830
SPNO - SPP North	2.67	1,851	840
SPSO - SPP South	2.46	1,737	788
SRMV - SERC Mississippi Valley	2.95	1,421	645
SRMW - SERC Midwest	3.20	2,234	1,014
SRSO - SERC South	3.04	1,651	749
SRTV - SERC Tennessee Valley	3.02	1,677	761
SRVC - SERC Virginia/Carolina	3.11	1,255	569
All other electricity and other fuels not specified in this table	2.64	1,418	643
District Thermal Energy			
Chilled water	0.63	339	154
Steam	1.83	1,145	519
Hot water	1.73	1,081	491

Informative Note: Values in this table represent averages for the United States and include both direct and indirect emissions.

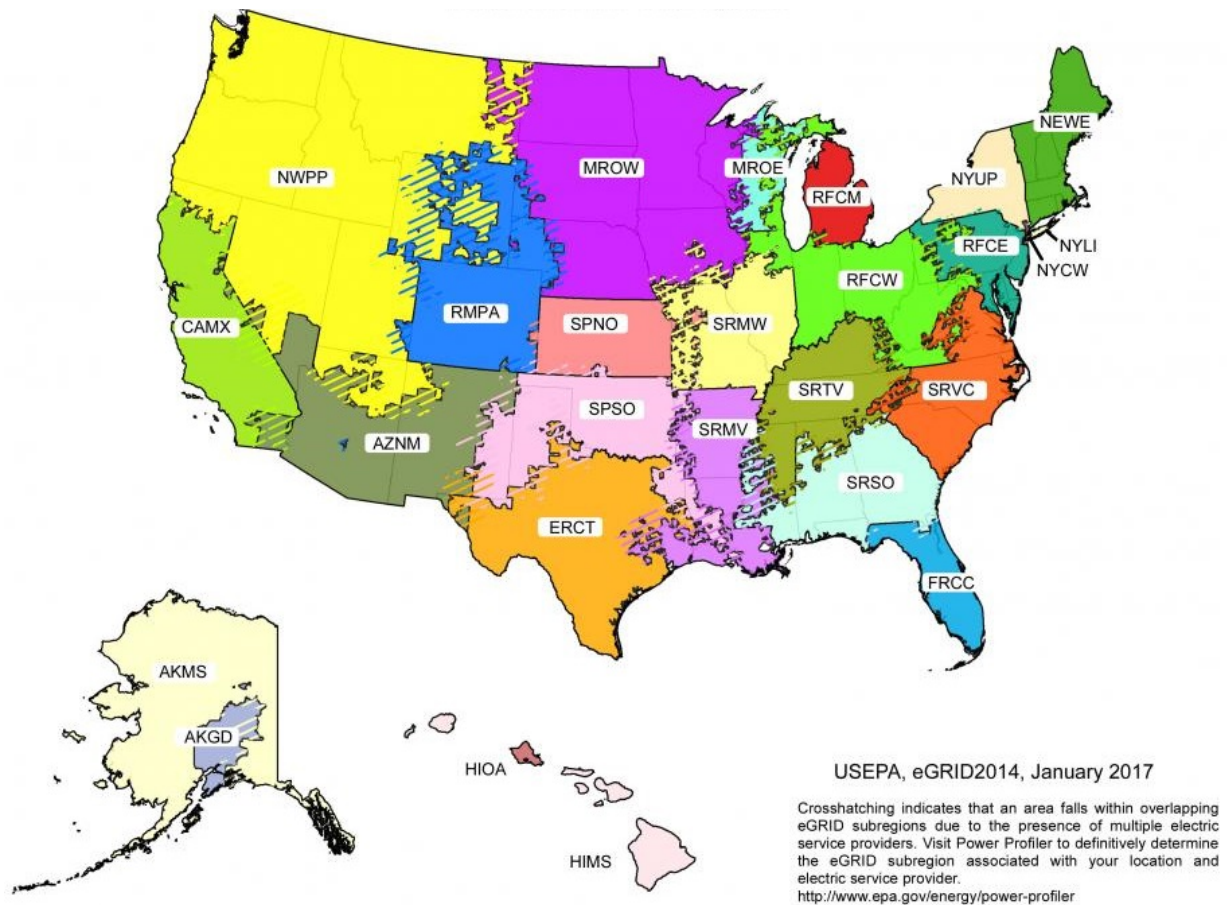


Figure 7.5.3 Map of eGRID Subregions

Crosshatching indicates that an area falls within overlapping eGRID subregions due to the presence of multiple electric service providers. Visit Power Profiler to definitively determine the eGRID subregion associated with your location and electric service provider. See <http://www.epa.gov/energy/power-profiler>.