

ZERO CODE™

A national and international building energy standard for new commercial, institutional, and mid- to high-rise residential buildings.



ZERO CODE™

Architecture 2030 Building Energy Standard

Energy Efficiency Requirements Based on ASHRAE Standard 90.1-2016

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Architecture 2030 does not guarantee, certify, or assure the safety or performance of any buildings, products, components, or systems installed in accordance with the ZERO Code or referenced standards.

In referring to the ZERO Code and in the design of any building or use of any product, no claim shall be made, either stated or implied, that the building or product has been approved by Architecture 2030.

The ZERO Code standard is presented solely as a guide, which may be modified and consequently adopted as such by appropriate legal jurisdictions. In utilizing the ZERO Code standard or Energy Calculator, practitioners must research and ensure compliance with ordinances and codes applicable in their jurisdictions.

INTRODUCTION

The ZERO Code is a national and international building energy standard developed by Architecture 2030 that applies to new commercial, institutional, and mid- to high-rise residential buildings, the prevalent building types being constructed in cities today. The ZERO Code, which can be adopted immediately, integrates cost-effective energy efficiency standards with on-site and/or off-site renewable energy resulting in [Zero-Net-Carbon \(ZNC\)](#) buildings. The ZERO Code can either be incentivized or required by implementing jurisdictions. Adoption of the ZERO Code is an important component of addressing climate change and reducing CO₂ emissions in these building types.

ENERGY EFFICIENCY

The ZERO Code includes prescriptive and performance paths for building energy efficiency compliance (based on current standards that are widely used by municipalities and building professionals worldwide) and is supported by compliance tools and simulation software.

While the ZERO Code incorporates the latest ASHRAE Standard 90.1-2016 requirements for minimum building efficiency, other existing or new prescriptive and performance standards can also be accommodated, such as the International Green Construction Code (IgCC), ASHRAE Standard 189.1-2017, or any building energy efficiency standards that are more stringent than ASHRAE Standard 90.1-2016.

RENEWABLE ENERGY

The ZERO Code offers code adaptable language and a flexible approach for incorporating renewable energy, both through on-site generation and/or off-site procurement. By establishing a flexible approach, the ZERO Code is applicable to all new commercial and institutional buildings, and mid- to high-rise housing, including those buildings with limited on-site renewable energy generating capacity (e.g. buildings in dense urban environments).

A technical support document is available that describes several potential options for off-site procurement of renewable energy within the context of codes and presents a process for evaluating and assigning a weight to each procurement method. The feasibility/desirability of each option will vary with how the electric system is structured and the laws and regulations applicable to each city, state, province, country or local jurisdiction that adopts the ZERO Code. It is anticipated that qualifying off-site renewable energy systems and their weightings will vary with each adoption of the ZERO Code. The purpose of the technical support document is to provide information to enable these adaptations.

ZERO CODE ENERGY CALCULATOR

The ZERO Code is supported by an Energy Calculator that eases the implementation process and reduces errors when applying the prescriptive compliance path of ASHRAE 90.1-2016. An Application Program Interface (API) for the ZERO Code Energy Calculator has been developed so that users can interact in a programmatic way with the software, enabling its implementation as a website or application for smart phones and tablets. Ultimately this approach will save years and valuable resources that would otherwise be spent on developing new compliance tools and mechanisms. The ZERO Code Energy Calculator API is free and open source.

For access to the ZERO Code Energy Calculator API documentation, or for information about incorporating the International Green Construction Code (IgCC), ASHRAE Standard 189.1-2017 or other building energy standard, please contact Architecture 2030 at info@architecture2030.org.

THE ZERO CODE

1. PURPOSE

The purpose of the ZERO Code is to provide a national *and* international building energy standard that establishes the minimum energy efficiency requirements of buildings other than low-rise residential buildings and requires renewable energy systems of adequate capacity to achieve zero-net-carbon.

2. SCOPE

This standard applies to new buildings that are addressed by Standard 90.1-2016. The provisions of this standard do not apply to

- a. single-family houses, multifamily structures of three stories or fewer above grade, manufactured homes (mobile homes), and manufactured houses (modular) or
- b. buildings that use neither electricity nor fossil fuel.

3. DEFINITIONS

The definitions from Standard 90.1-2016 apply to this standard and are supplemented or modified by the definitions below. Throughout this standard, defined terms from either Standard 90.1-2016 or this standard are shown in italics.

[**Informative Note:** Definitions from Standard 90.1-2016 are *shown in grey* for convenience to the reader. References from Standard 90.1-2016 definitions are to sections in that standard.]

adjusted off-site renewable energy: the amount of energy production from *off-site renewable energy systems* that may be used to offset *building energy*.

authority having jurisdiction: the agency or agent responsible for enforcing this standard.

baseline building design: a computer representation of a hypothetical design based on the proposed design. This representation is used as the basis for calculating the *baseline building performance* for rating above-standard design or when using the *performance rating method* as an alternative path for minimum standard compliance in accordance with Section 4.2.1.1.

baseline building EUI: the energy utilization intensity of the *baseline building design*. See also the definition of energy utilization intensity.

building: any structure used or intended for supporting or sheltering any use or occupancy.

building energy: Energy consumed at the building site as measured at the site boundary. At minimum, this includes heating, cooling, ventilation, domestic hot water, indoor and outdoor lighting, plug loads, process energy, elevators and conveying systems, and intra-building transportation systems. Contributions from *on-site* or *off-site renewable energy systems* shall not be considered when determining the *building energy*.

building project: a building, or group of buildings, and site that utilize a single submittal for a construction permit or that are within the boundary of contiguous properties under single ownership or effective control.

conditioned floor area, gross: see *floor area, gross*.

conditioned space: see *space*.

energy utilization intensity (EUI): the site energy for either the *baseline building* or the *proposed building* divided by the *gross conditioned floor area* and the *semiheated floor area* of the building. For the *baseline building*, the EUI can be divided between *regulated energy use* and *unregulated energy use*.

floor area, gross: the sum of the floor areas of the spaces within the building, including basements, mezzanine and intermediate-floored tiers, and penthouses with a headroom height of 7.5 ft or greater. It is measured from the exterior faces of walls or from the centerline of walls separating buildings, but excluding covered walkways, open roofed-over areas, porches and similar spaces, pipe trenches, exterior terraces or steps, chimneys, roof overhangs, and similar features.

gross building envelope floor area: the *gross floor area* of the *building envelope*, but excluding *slab-on-grade floors*.

gross conditioned floor area: the *gross floor area* of *conditioned spaces*.

gross lighted floor area: the *gross floor area* of *lighted spaces*.

gross semiheated floor area: the *gross floor area* of *semi-heated spaces*.

performance rating method: a calculation procedure that generates an index of merit for the performance of building designs that substantially exceeds the *energy efficiency* levels required by this standard or when using the *performance rating method* as an alternative path for minimum standard compliance in accordance with Section 4.2.1.1.

proposed building EUI: the EUI calculated for a proposed design.

proposed building EUI without renewables (EUI_{PB,EE}): the proposed building EUI without consideration of *on-site renewable energy* or *off-site renewable energy*.

proposed building EUI with on-site renewables (EUI_{PB,EE+RE}): the proposed building EUI with consideration of *on-site renewable energy*, but not *off-site renewable energy*.

proposed building EUI with on-site and off-site renewables ($EUI_{PB,EE+RE+pRE}$): the proposed building EUI with consideration of both *on-site renewable energy* or *off-site renewable energy*.

regulated energy use: energy used by *building systems* and components with requirements prescribed in Sections 5 through 10. This includes *energy* used for HVAC, lighting, *service water heating*, motors, *transformers*, vertical transportation, refrigeration equipment, computer-room cooling equipment, and other *building systems*, components, and processes with requirements prescribed in Sections 5 through 10.

renewable energy: energy generated by photovoltaic systems, solar thermal power plants, geothermal power plants, and wind turbines.

on-site renewable energy: renewable energy generated by systems on the building project.

off-site renewable energy: renewable energy generated by systems not located on the building project.

site: a contiguous area of land that is under the ownership or control of one entity.

site energy: energy consumed at the *building site* as measured at the site boundary. At minimum, this includes heating, cooling, ventilation, domestic hot water, indoor and outdoor lighting, plug loads, process energy, elevators and conveying systems, and intra-building transportation systems.

space: an *enclosed space* within a *building*. The classifications of *spaces* are as follows for the purpose of determining *building envelope* requirements:

conditioned space: a *cooled space*, *heated space*, or *indirectly conditioned space* defined as follows:

- a. **cooled space:** an *enclosed space* within a *building* that is cooled by a cooling system whose sensible output capacity is ≥ 3.4 Btu/h-ft² of *floor area*.
- b. **heated space:** an *enclosed space* within a *building* that is heated by a heating system whose output capacity relative to the *floor area* is greater than or equal to the criteria in Table 3.2.
- c. **indirectly conditioned space:** an *enclosed space* within a *building* that is not a *heated space* or a *cooled space*, which is heated or cooled indirectly by being connected to adjacent spaces, provided:
 - i. the product of the *U-factors* and surface areas of the *space* adjacent to connected spaces exceeds the combined sum of the product of the *U-factors* and surface areas of the *space* adjoining the outdoors, *unconditioned spaces*, and to or from

semiheated spaces (e.g., corridors) or

- ii. that air from heated or *cooled spaces* is intentionally transferred (naturally or mechanically) into the space at a rate exceeding 3 ach (e.g., atria).

semiheated space: an *enclosed space* within a *building* that is heated by a heating system whose output capacity is greater than or equal to 3.4 Btu/h·ft² of floor area but is not a *conditioned space*.

unconditioned space: an *enclosed space* within a *building* that is not a *conditioned space* or a *semiheated space*. Crawlspace, attics, and parking garages with natural or mechanical ventilation are not considered *enclosed spaces*.

unregulated energy use: energy used by *building systems* and components that is not *regulated energy use*. (See *regulated energy use*.)

zero-net-carbon (ZNC) building: a highly energy efficient building that produces on-site, or procures, enough carbon-free energy to meet building operations energy consumption annually.

ZERO Code Energy Calculator: calculator available from Architecture 2030 that may be used to estimate the building EUI without renewables for the prescriptive path.

zero energy performance index (zEPI_{PB,EE}): the ratio of the *proposed building EUI without renewables* to the *baseline building EUI*, expressed as a percentage.

4. ADMINISTRATION AND ENFORCEMENT

4.1 Compliance

New buildings shall comply with Section 5 (Minimum Energy Efficiency) and Section 6 (Renewable Energy).

4.2 Compliance Documentation

4.2.1 Construction Details

Compliance documents shall show all the pertinent data and features of the building, equipment, and systems in sufficient detail to permit a determination of compliance by the *authority having jurisdiction* and to indicate compliance with the requirements of this standard.

4.2.2 Supplemental Information

Supplemental information necessary to verify compliance with this standard, such as calculations, worksheets, compliance forms, vendor literature, contracts for *off-site*

renewable energy procurement, or other data, shall be made available when required by the *authority having jurisdiction*.

4.2.3 Manuals

Operating and maintenance information shall be provided to the building owner. This information shall include, but not be limited to, the information specified in Sections 6.7.2.2, 8.7.2, and 9.7.2.2 of Standard 90.1-2016.

4.3 Labeling of Material and Equipment

Materials and equipment shall be labeled in a manner that will allow for a determination of their compliance with the applicable provisions of this standard.

4.4 Inspections

All building construction subject to the provisions of this standard shall remain accessible and exposed for inspection purposes until approved in accordance with the procedures specified by the *authority having jurisdiction*.

4.5 Verification and Commissioning Reporting

Where reporting is required, the *authority having jurisdiction* or other approved agencies shall report to the contractor their findings of conformance and nonconformance for correction.

If the nonconforming work is found not to be corrected within a predetermined time as agreed upon by the contractor, the nonconforming work shall be reported in writing to the *authority having jurisdiction* and *design professional*. At a time agreed on by the *authority having jurisdiction* or other approved agencies, a final report shall be submitted to the building official and the contractor that outlines the inspection findings and documents the correction of nonconforming work.

4.6 ZERO Code Energy Calculator

The ZERO Code Energy Calculator, available from Architecture 2030, may be used to estimate *building energy use* when the prescriptive path is used, and to estimate the potential for *on-site renewable energy* production and/or off-site procurement.

5. MINIMUM ENERGY EFFICIENCY

Buildings shall comply with either 5.1 or 5.2.

5.1 Prescriptive Requirement

Buildings shall comply with Standard 90.1-2016 including:

- 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".

5.2 Performance Requirement

The *proposed building zero energy performance index* without consideration of *renewable energy* ($zEPI_{PB,EE}$) shall be less than or equal to the *zero energy performance index target* ($zEPI_{Target,EE}$) when calculated in accordance with the performance rating method of Standard 90.1-2016 (Appendix G).

$$zEPI_{PB,EE} \leq zEPI_{Target,EE}$$

where

$$zEPI_{PB,EE} = \left[\frac{EUI_{PB,EE}}{EUI_{BB,EE}} \right] \times 100$$

$$zEPI_{Target,EE} = \left[\frac{EUI_{BB,UEU} + (BPF \times EUI_{BB,REU})}{EUI_{BB,EE}} \right] \times 100$$

and

$zEPI_{PB,EE}$ = the *zero energy performance index* of the *proposed building* without consideration of *renewable energy*, unitless (see equation)

$zEPI_{Target,EE}$ = the *zero energy performance index target* without consideration of *on-site* or *off-site renewable energy*, unitless (see equation)

$EUI_{PB,EE}$ = the *proposed building EUI* without *renewable energy*, kWh/m²-y, MJ/m²-y, or kBtu/ft²-y

$EUI_{BB,EE}$ = the *baseline building EUI*, including both *regulated energy use* and

unregulated energy use, kWh/m²-y, MJ/m²-y, or kBtu/ft²-y. The *baseline building* has no *renewable energy* systems and is defined in Standard 90.1-2016, Appendix G.

EUI_{BB,UEU} = baseline building unregulated EUI, the portion of the baseline building EUI that is due to unregulated energy use, kWh/m²-y, MJ/m²-y, or kBtu/ft²-y

EUI_{BB,REU} = baseline building regulated EUI, the portion of the annual energy use of the baseline building design that is due to regulated energy use, kWh/m²-y, MJ/m²-y, or kBtu/ft²-y

BPF = building Performance Factor from Table 5.2, unitless
 [For building area types not listed in Table 5.2 use “All others.” Where a building has multiple building area types, the BPF shall be the area-weighted average of the building area types.]

[**Informative Note:** Zero Energy Performance Index (zEPI) as defined here uses a baseline building definition from Standard 90.1-2016 Appendix G, as opposed to the traditional zEPI baseline which represents a turn-of-the-millennium building.]

Table 5.2 Building Performance Factor (BPF)

<i>Building Area Type</i> ^a	<i>0A/ 1A</i>	<i>0B/ 1B</i>	<i>2A</i>	<i>2B</i>	<i>3A</i>	<i>3B</i>	<i>3C</i>	<i>4A</i>	<i>4B</i>	<i>4C</i>	<i>5A</i>	<i>5B</i>	<i>5C</i>	<i>6A</i>	<i>6B</i>	<i>7</i>	<i>8</i>
Multifamily	0.73	0.73	0.71	0.69	0.74	0.73	0.68	0.78	0.81	0.81	0.76	0.80	0.81	0.76	0.79	0.74	0.80
Healthcare/ hospital	0.64	0.56	0.60	0.56	0.60	0.56	0.54	0.57	0.53	0.55	0.59	0.52	0.55	0.57	0.52	0.56	0.56
Hotel/motel	0.64	0.65	0.62	0.60	0.63	0.65	0.64	0.62	0.64	0.62	0.60	0.61	0.60	0.59	0.61	0.57	0.58
Office	0.58	0.62	0.57	0.62	0.60	0.64	0.54	0.58	0.60	0.58	0.60	0.61	0.58	0.61	0.61	0.57	0.61
Restaurant	0.62	0.62	0.58	0.61	0.60	0.60	0.61	0.58	0.55	0.60	0.62	0.58	0.60	0.63	0.60	0.65	0.68
Retail	0.52	0.58	0.53	0.58	0.54	0.62	0.60	0.55	0.60	0.60	0.55	0.59	0.61	0.55	0.58	0.53	0.53
School	0.46	0.53	0.47	0.53	0.49	0.52	0.50	0.49	0.50	0.49	0.50	0.50	0.50	0.49	0.50	0.47	0.51
Warehouse	0.51	0.52	0.56	0.58	0.57	0.59	0.63	0.58	0.60	0.63	0.60	0.61	0.65	0.66	0.66	0.67	0.67
All others	0.62	0.61	0.55	0.57	0.56	0.61	0.59	0.58	0.57	0.61	0.57	0.57	0.61	0.56	0.56	0.53	0.52

a. In cases where both a general *building* area type and a specific *building* area type are listed, the specific *building* area type shall apply

6. RENEWABLE ENERGY

6.1 Minimum Renewable Energy

On-site renewable energy systems shall be installed or *off-site renewable energy* shall be procured to offset *the building energy*.

$$RE_{\text{onsite}} + RE_{\text{offsite}} \geq E_{\text{building}}$$

where

RE_{onsite} = annual site energy production from *on-site renewable energy* systems (see 6.2)

RE_{offsite} = adjusted annual site energy production from *off-site renewable energy* systems that may be credited against building energy use (see 6.3)

E_{building} = *building energy* use without consideration of *renewable energy* systems.

When 5.1 is used to comply with the minimum energy efficiency requirement, *building energy* shall be determined by multiplying the *gross conditioned floor area* plus the *gross semiheated floor area* of the *proposed building* by an *EUI* selected from Table 6.1. Use a weighted average for mixed-use buildings.

When 5.2 is used to comply with the minimum energy efficiency requirement, *building energy* shall be determined from energy simulations following the guidelines of the performance rating method of Standard 90.1-2016 Appendix G.

[**Informative Note:** The Architecture 2030 *ZERO Code Energy Calculator* can be used to estimate *building energy* use and *renewable energy* requirements.]

Table 6.1 Energy Utilization Intensity for Building Types and Climates
(kWh/m²-y; MJ m²-y; kBtu/ft²-y)

Building Area Type	Climate Zone																
	0A/ 1A	0B/ 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
kWh/m²-y																	
Multifamily	136	142	129	129	136	132	114	142	136	129	148	145	129	167	151	167	186
Healthcare/hospital	375	379	375	356	366	344	334	366	344	334	372	347	331	397	366	413	448
Hotel/motel	230	240	230	215	221	211	205	218	208	205	224	215	205	243	227	256	281
Office	98	101	95	91	91	88	79	88	85	79	91	88	79	104	95	101	114
Restaurant	1227	1344	1297	1287	1401	1325	1246	1524	1379	1442	1675	1527	1527	1858	1697	2032	2366
Retail	145	158	142	145	139	139	117	151	139	139	164	158	145	189	164	202	243
School	132	145	132	126	126	123	114	123	126	126	123	136	117	139	126	142	170
Warehouse	28	38	28	35	38	35	32	54	41	44	73	54	47	101	73	101	101
All others	161	167	158	151	155	148	136	155	148	145	161	155	142	177	161	183	205
MJ/m²-y																	
Multifamily	488	511	466	466	488	477	409	511	488	466	534	522	466	602	545	602	670
Healthcare/hospital	1351	1363	1351	1283	1317	1238	1204	1317	1238	1204	1340	1249	1192	1431	1317	1488	1613
Hotel/motel	829	863	829	772	795	761	738	784	750	738	806	772	738	874	818	920	1011
Office	352	363	341	329	329	318	284	318	307	284	329	318	284	375	341	363	409
Restaurant	4418	4838	4668	4633	5042	4770	4486	5485	4963	5190	6030	5497	5497	6689	6110	7314	8517
Retail	522	568	511	522	500	500	420	545	500	500	591	568	522	681	591	727	874
School	477	522	477	454	454	443	409	443	454	454	443	488	420	500	454	511	613
Warehouse	102	136	102	125	136	125	114	193	148	159	261	193	170	363	261	363	363
All others	579	602	568	545	556	534	488	556	534	522	579	556	511	636	579	659	738
kBtu/ft²-y																	
Multifamily	43	45	41	41	43	42	36	45	43	41	47	46	41	53	48	53	59
Healthcare/hospital	119	120	119	113	116	109	106	116	109	106	118	110	105	126	116	131	142
Hotel/motel	73	76	73	68	70	67	65	69	66	65	71	68	65	77	72	81	89
Office	31	32	30	29	29	28	25	28	27	25	29	28	25	33	30	32	36
Restaurant	389	426	411	408	444	420	395	483	437	457	531	484	484	589	538	644	750
Retail	46	50	45	46	44	44	37	48	44	44	52	50	46	60	52	64	77
School	42	46	42	40	40	39	36	39	40	40	39	43	37	44	40	45	54
Warehouse	9	12	9	11	12	11	10	17	13	14	23	17	15	32	23	32	32
All others	51	53	50	48	49	47	43	49	47	46	51	49	45	56	51	58	65

Source: These data were derived from EnergyPlus simulations of prototype buildings in minimum compliance with Standard 90.1-2016. The work was performed by the Pacific Northwest National Laboratory as part of their progress indicator support to the ASHRAE Standard 90.1 committee.

[**Informative Note:** Energy Utilization Intensities provided in this table are provided as a default and used to establish the *renewable energy* requirement per Section 6.1. They are based on typical building operating conditions and fuel mixes for the United States. The performance approach is recommended for buildings with when these conditions are significantly different. Also, these default tables may be modified when the ZERO Code is adapted for other countries, especially when an alternative energy efficiency standard is substituted for Standard 90.1-2016.]

6.2 Calculation of On-Site Renewable Energy

The annual energy production from *on-site renewable energy* systems shall be determined using the PVWatts software or other software approved by the *authority having jurisdiction*.

6.3 Off-Site Renewable Energy

6.3.1 Qualifying Off-Site Renewable Energy Procurement Methods

1. **Community Renewables:** an *offsite renewable energy* system for which the owner has purchased or leased *renewable energy* capacity along with other subscribers.
2. **Renewable Energy Investment Fund:** an entity that installs *renewable energy* capacity on behalf of the owner to offset *building energy*.
3. **Virtual Power Purchase Agreement:** a power purchase agreement for *offsite renewable energy* where the owner agrees to purchase *renewable energy* output at a fixed price schedule.
4. **Direct Ownership:** an *offsite renewable energy* system owned by the *building project owner*.
5. **Direct Access to Wholesale Market:** an agreement between the owner and a *renewable energy* developer to purchase *renewable energy*.
6. **Green Retail Tariffs:** a program by the retail electricity provider to provide 100% *renewable energy* to the owner.
7. **Unbundled Renewable Energy Certificates (RECs):** certificates purchased by the owner representing the environmental benefits of *renewable energy* generation that are sold separately from the electric power.

[**Informative Note:** The qualifying *off-site renewable energy* procurement methods listed above are provided as a default. They are based on methods available in the United States and the judgment of the standards development team at Architecture 2030. When the ZERO Code is adapted for other countries or jurisdictions, the qualifying procurement options should be customized for that region. A technical support document is available from Architecture 2030 to assist in this process.]

6.3.2 General Requirements

The following requirements apply to all *off-site renewable energy* procurement methods.

1. The building owner shall sign a legally binding contract to procure qualifying *off-site renewable energy*.
2. The procurement contract shall have duration of not less than 15 years and shall be structured to survive a partial or full transfer of ownership of the property.
3. RECs and other environmental attributes associated with the procured *off-site renewable energy* shall be assigned to the building project for the duration of the contract.
4. The *renewable energy* generating source(s) shall be photovoltaic systems, solar thermal power plants, geothermal power plants, and/or wind turbines.
5. The generation source shall be located where the energy can be delivered to the building site by the same utility or distribution entity; the same ISO or RTO; or within integrated ISOs (electric coordination council).
6. The *off-site renewable energy* producer shall maintain transparent accounting that clearly assigns production to the ZNC building. Records on power sent to or purchased by the building shall be retained by the building owner and made available for inspection by the *authority having jurisdiction* upon request.

6.3.2 Adjusted Off-Site Renewable Energy

The process for calculating the adjusted *off-site renewable energy* is shown in the following equation:

$$RE_{\text{offsite}} = \sum_{i=1}^n C_i \cdot RE_i = C_1 \cdot RE_1 + C_2 \cdot RE_2 + \dots + C_n \cdot RE_n$$

where

RE_{offsite} = Adjusted *off-site renewable energy*

C_i = Coefficient or multiplier for the i^{th} *renewable energy* procurement method or class taken from Table 6.3.

RE_i = Annual energy production for the i^{th} *renewable energy* procurement method or class

n = The number of *renewable energy* procurement options or classes considered

Table 6.3 Default Off-Site Renewable Energy Procurement Methods, Classes, and Coefficients

Class	Coefficient	Procurement Options	Additional Requirements
1	0.75	Community Solar	
		REIFs	Entity must be managed to prevent fraud or misuse of funds.
		Virtual PPA	
2	0.55	Self-Owned Off-Site	Provisions shall prevent the generation from being sold separately from the building.
		Green Retail Tariffs	The offering shall not include the purchase of unbundled RECs.
		Direct Access	The offering shall not include the purchase of unbundled RECs.
3	0.20	Unbundled RECs	The vintage of the RECs shall align with building energy use.

[Informative Note: The procurement options and coefficients in this table are provided as a default. They are based on conditions in the United States and the judgment of the standards development team at Architecture 2030. When the ZERO Code is adapted for other countries or jurisdictions, the qualifying procurement options and the coefficients should be customized for that region. A technical support document is available from Architecture 2030 to assist in this process.]

7. REFERENCES

ANSI/ASHRAE/IES Standard 90.1-2016, ASHRAE, 1791 Tullie Circle NE, Atlanta, GA 30329, United States,

Center for Resource Solutions, Green-e Energy National Standard for Renewable Electricity Products.

National Renewable Energy Laboratory, PVWatts Version 5 Manual, Technical Report NREL/TP-6A20-62641, September 2014. See also <https://developer.nrel.gov/docs/solar/pvwatts-v5/>.