**CED1-204-22**

**APPENDIX CC
ZERO ENERGY COMMERCIAL BUILDING PROVISIONS**

**Note: The changes in red are those proposed by Greg Johnson in CED1-204-22. The text in blue are modifications recommended by Charles Eley. Reasons for the Eley modifications are documented in comments in the right margin.**

**SECTION CC101
GENERAL**

**CC101.1 Purpose.** The purpose of this appendix is to supplement the *International Energy Conservation Code* and require renewable energy systems of adequate capacity to achieve net zero operational energy.

**CC101.2 Scope.** This appendix applies to new buildings that are addressed by the *International Energy Conservation Code*.

**Exceptions:**

1. Detached one- and two-family dwellings and townhouses as well as Group R-2 buildings three stories or less in height above grade plane, manufactured homes (mobile dwellings), and manufactured houses (modular dwellings).

2. Buildings that use neither electricity nor fossil fuel.

**SECTION CC102
DEFINITIONS**

**CC102.1 Definitions**. The definitions contained in this section supplement or modify the definitions in the International Energy Conservation Code.

ADJUSTED OFF-SITE RENEWABLE ENERGY. The amount of energy production from off-site renewable energy systems that may be used to offset building energy.

BUILDING ENERGY. All energy consumed at the building site as measured at the site boundary. Contributions from on- site or off-site renewable energy systems shall not be considered when determining the building energy.

COMMUNITY RENEWABLE ENERGY FACILITY. A facility that produces energy from renewable energy systems and is qualified as a community energy facility under applicable jurisdictional statutes and rules.

DIRECT ACCESS TO WHOLESALE MARKET. An agreement by the owner and a renewable energy developer to purchase renewable energy from the wholesale market.

DIRECT OWNERSHIP. an *off-site renewable energy system* under the ownership or control of the building project owner.

FINANCIAL RENEWABLE ENERGY POWER PURCHASE AGREEMENT (FPPA). A financial arrangement between a renewable electricity generator and a purchaser wherein the purchaser pays or guarantees a price to the generator for the project’s renewable generation. Also known as a “financial power purchase agreement” and “virtual power purchase agreement.”

GREEN RETAIL PRICING. A program by the retail electricity provider to provide 100-percent renewable energy to the building project owner.

MINIMUM RENEWABLE ENERGY REQUIREMENT: the minimum amount of on-site or adjusted off-site renewable energy needed to comply with this appendix.

OFF-SITE RENEWABLE ENERGY SYSTEM. Renewable energy system which serves the building project and is not an *on-site renewable energy system,* including contracted purchases of renewable energy and renewable energy certificates.

ON-SITE RENEWABLE ENERGY SYSTEM. Renewable energy systems located on any of the following:

1. the building,
2. the property upon which the building is located,
3. a property that shares a boundary with and is under the same ownership or control as the property on which the building is located, or
4. a property that is under the same ownership or control as the property on which the building is located and is separated only by a public right-of-way from the building served by the renewable energy system.

PHYSICAL RENEWABLE ENERGY POWER PURCHASE AGREEMENT (PPPA). A contract for the purchase of renewable electricity from a specific renewable electricity generator to a purchaser of renewable electricity.

RENEWABLE ENERGY CERTIFICATE (REC). A market-based instrument that represents and conveys the environmental, social, and other non-power attributes of one megawatt hour of renewable electricity generation and could be sold separately from the underlying physical electricity associated with renewable energy systems; also known as an energy attribute and energy attribute certificate (EAC).

RENEWABLE ENERGY INVESTMENT FUND (REIF). A fund established by the local government or other entity to accept payment from building owners to construct or acquire qualifying renewable energy (along with RECs) on their behalf.

RENEWABLE ENERGY SYSTEM. Photovoltaic, solar thermal, geothermal energy extracted from hot fluid or steam, wind, or other approved systems used to generate renewable energy.

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.

**SECTION CC103
MINIMUM RENEWABLE ENERGY**

**CC103.1 Renewable energy**. On-site renewable energy systems shall be installed, or adjusted off-site renewable energy shall be procured to meet the *minimum renewable energy requirement*.

(Equation CC-1)

REonsite + REoffsite ≥ REmin

where:

REonsite = Annual site energy production from *on-site* *renewable energy systems*, including installed *on-site renewable energy systems* for compliance with C405.13.1 and C406.5.

REoffsite = Adjusted annual energy production from *off-site* *renewable energy systems* that may be credited against the *minimum renewable energy requirement*This includes off-site renewable energypurchased for compliance with C405.15.1 and C405.15.2.

REmin = *Minimum renewable energy requirement.*

When Section C401.2.1(1) is used for compliance with the *International Energy Conservation Code*, the *minimum renewable energy requirement* shall be determined by multiplying the gross *conditioned floor area* plus the gross semiheated floor area of the proposed building by the prescriptive renewable energy requirement from Table CC103.1. An area weighted average shall be used for mixed-use buildings.

When Section C401.2.1, Item 2 or Section C401.2.2 is used for compliance with the International Energy Conservation Code, the *minimum renewable energy requirement* shall be equal to the *building energy* as determined from energy simulations.

**CC103.2 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~~ *approved* software.

**CC103.2.1 Renewable energy certificates**. Renewable energy certificates (RECs) associated with the *on-site renewable energy system* shall be assigned to the initial and subsequent building owner(s) for a cumulative period of not less than 15 years. The building owner(s) are permitted to transfer RECs to building tenants occupying the building.

**CC103.3 Off-site renewable energy**. Off-site energy shall comply with Sections CC103.3.1 and CC103.3.2.

**CC103.3.1 ~~off~~Off-site procurement methods**. Off-site renewable energy procurement methods used to comply with Section CC103.1 shall be one or more of the following:

1. *Community renewables energy facility*

2. *Renewable energy investment fund*

3. *Financial renewable energy power purchase agreement*

4. *Direct ownership*

5. *Direct access to wholesale market*

6. *Green retail pricing*

7. Unbundled *Renewable Energy Certificates (RECs)*

8. *Physical renewable energy power purchase agreement*

**TABLE CC103.1
PRESCRIPTIVE RENEWABLE ENERGY REQUIREMENT FOR BUILDING TYPES AND CLIMATES (kWh/ft²-yr)**

|  |  |
| --- | --- |
|  | Building Area Type |
| Climate Zone | Multifamily (R-2) | Healthcare/hospital (I-2) | Hotel/Motel (R-2) | Office (B) | Restaurant (A-2) | Retail (M) | School (E) | Warehouse (S) | Grocery Store (M) | Laboratory (B) | Assembly (A)  | All others |
| 0A | 13 | 35 | 23 | 10 | 129 | 17 | 16 | 3 | 27 | 41 | 5 | 17 |
| 0B | 12 | 34 | 22 | 10 | 123 | 17 | 15 | 3 | 26 | 40 | 5 | 16 |
| 1A | 11 | 32 | 20 | 9 | 113 | 14 | 13 | 3 | 24 | 36 | 4 | 15 |
| 1B | 11 | 32 | 20 | 9 | 118 | 15 | 14 | 3 | 24 | 37 | 5 | 15 |
| 2A | 11 | 32 | 20 | 8 | 114 | 13 | 12 | 3 | 22 | 34 | 4 | 14 |
| 2B | 11 | 30 | 18 | 8 | 108 | 12 | 11 | 3 | 22 | 33 | 4 | 13 |
| 3A | 11 | 30 | 18 | 8 | 117 | 13 | 11 | 3 | 21 | 31 | 4 | 13 |
| 3B | 10 | 29 | 18 | 8 | 110 | 12 | 10 | 3 | 20 | 31 | 4 | 13 |
| 3C | 9 | 28 | 18 | 7 | 100 | 10 | 9 | 2 | 18 | 27 | 3 | 12 |
| 4A | 12 | 31 | 18 | 8 | 123 | 15 | 11 | 6 | 21 | 32 | 4 | 14 |
| 4B | 11 | 29 | 18 | 7 | 113 | 12 | 10 | 4 | 20 | 30 | 4 | 13 |
| 4C | 10 | 28 | 17 | 7 | 111 | 13 | 10 | 4 | 18 | 28 | 3 | 13 |
| 5A | 12 | 31 | 19 | 8 | 133 | 17 | 11 | 8 | 22 | 34 | 4 | 15 |
| 5B | 11 | 29 | 18 | 8 | 125 | 14 | 11 | 5 | 21 | 31 | 4 | 14 |
| 5C | 10 | 29 | 17 | 7 | 116 | 13 | 10 | 4 | 18 | 27 | 3 | 13 |
| 6A | 14 | 33 | 20 | 10 | 151 | 20 | 13 | 11 | 26 | 39 | 5 | 17 |
| 6B | 13 | 33 | 19 | 8 | 137 | 17 | 11 | 7 | 22 | 34 | 4 | 16 |
| 7 | 14 | 37 | 21 | 9 | 164 | 20 | 13 | 10 | 25 | 37 | 5 | 18 |
| 8 | 15 | 40 | 22 | 11 | 190 | 23 | 16 | 10 | 28 | 43 | 5 | 20 |

**CC103.3.2 Requirements for all procurement methods**. Offsite renewable energy systems used to comply with Section Cc103.1 shall comply with ~~all~~ of the following:

1. The building owner shall sign a legally binding contract or other approved agreement 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 associated with the procured off-site renewable energy shall comply with the following requirements:

3.1 The RECs shall be retained or retired by or on behalf of the property owner or tenant for a period of not less than 15 years.

3.2 The RECs shall be created within a 12-month period of the use of the REC; and

3.3 The RECs shall be from a generating asset constructed no more than 5 years before the issuance of the certificate of occupancy.

4. The generating source shall be a *renewable energy system*.

5. The generation source shall be located where the energy can be delivered to the building site by any of the following:

5.1. Direct connection to the off-site renewable energy facility

5.2.The local utility or distribution entity

5.3. An interconnected electrical network where energy delivery capacity between the generator and the building site is available

6. Records on power sent to or purchased by the building project shall be retained by the building owner and made available for inspection by the code official upon request.

**CC103.3.3 Adjusted off-site renewable energy**. The process for calculating the adjusted off-site renewable energy is shown in Equation CC-2.

(Equation CC-2)

$$RE\_{offsite}=PF\_{NonRecs}×RE\_{NonRecs}+0.20×RE\_{Recs}$$

where:

REoffsite = Adjusted off-site renewable energy.

PFNonRecs = The renewable energy procurement factor for off-site renewable energy other than RECs per Section CC103.3.3.1.

RENonRecs = Annual energy production for renewable energy procurement methods other than RECs.

RENonRecs = Annual energy production associated with unbundled RECs.

**CC103.3.3.1 Procurement Factors.** ~~When~~ Where installed on-site renewable energy capacity is 7.5 W/ft2 of roof area or greater, the procurement factor is 1.00, otherwise, the procurement factor is 0.75. A procurement factor of 1.0 shall also be used when the conditions of exceptions 1, 2, or 3 to C405.15.1 are satisfied. ~~In all cases, unbundled~~ Unbundled renewable energy certificates shall have a procurement factor of 0.20.

**Exception:** Other than for RECs**,** procurement factorsfor R-2 occupancies shall be 1.00. The procurement factors for R-2 occupancies using RECs to comply shall be 0.33.

**Alternative:**

**CC103.3.3.1 Procurement Factors.** The procurement factors for renewable energy system compliance alternatives shall be as specified in Table CC103.2.

**Exception:** Other than for RECs**,** procurement factorsfor R-2 occupancies shall be 1.00. The procurement factors for R-2 occupancies using RECs to comply shall be 0.33.

 **TABLE CC103.2.**

**Procurement Factors for Renewable Energy System Compliance Alternatives**

|  |  |
| --- | --- |
| On-Site Renewable Energy  | Procurement Factor |
| Unbundled RECs | Other Procurement Methods |
| 7.5 W/ft2 of roof area or more or where one or more of exceptions 1, 2 or 3 to C405.15.1 are satisfied | 0.20 | 1.0 |
| Less than 7.5 W/ft2 of roof area and no exceptions 1, 2 or 3 to C405.15.1 are satisfied | 0.20 | 0.75 |