

2021 Providing for Michigan's Safety  
in the Built Environment

# MICHIGAN COMMERCIAL ENERGY CODE

Incorporating the 2021 edition of the  
International Energy Conservation Code®



Michigan Department of Licensing and  
Regulatory Affairs Bureau of Construction Codes



## APPENDIX CC

# ZERO ENERGY COMMERCIAL BUILDING PROVISIONS

The provisions contained in this appendix are specifically adopted and authorized as permissive guidelines and shall not be mandated by an enforcing agency.

### User note:

**About this chapter:** Appendix CC provides a model for applying new renewable energy generation when new buildings add electric load to the grid. This renewable energy will avoid the additional emissions that would otherwise occur from conventional power generation.

### 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 carbon.

**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.

**ENERGY UTILIZATION INTENSITY (EUI).** The site energy for either the baseline building or the proposed building divided by the gross *conditioned floor area* plus any semiheated floor area of the building. For the baseline building, the EUI can be divided between regulated energy use and unregulated energy use.

**OFF-SITE RENEWABLE ENERGY SYSTEM.** Renewable energy system not located on the building project.

**ON-SITE RENEWABLE ENERGY SYSTEM.** Renewable energy systems on the building project.

**RENEWABLE ENERGY SYSTEM.** Photovoltaic, solar thermal, geothermal energy and wind systems used to generate 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 × ft<sup>2</sup> of floor area but is not a conditioned space.

**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.

### SECTION CC103 MINIMUM RENEWABLE ENERGY

**CC103.1 Renewable energy.** On-site renewable energy systems shall be installed, or off-site renewable energy shall be procured to offset the building energy as calculated in Equation CC-1.

$$RE_{onsite} + RE_{offsite} \geq E_{building} \quad (\text{Equation CC-1})$$

where:

$RE_{onsite}$  = Annual site energy production from on-site renewable energy systems (see Section CC103.2).

$RE_{offsite}$  = Adjusted annual site energy production from off-site renewable energy systems that may be credited against building energy use (see Section CC103.3).

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

When Section C401.2.1(1) is used for compliance with the *International Energy Conservation Code*, 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 CC103.1. Use a weighted average 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*, building energy shall be determined from energy simulations.

**TABLE CC103.1**  
**ENERGY UTILIZATION INTENSITY FOR BUILDING TYPES AND CLIMATES (kBtu/ft<sup>2</sup> - yr)**

| BUILDING AREA TYPE        | CLIMATE ZONE              |       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------------------------|---------------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                           | 0A/1A                     | 0B/1B | 2A  | 2B  | 3A  | 3B  | 3C  | 4A  | 4B  | 4C  | 5A  | 5B  | 5C  | 6A  | 6B  | 7   | 8   |
|                           | kBtu/ft <sup>2</sup> - yr |       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Healthcare/hospital (I-2) | 119                       | 120   | 119 | 113 | 116 | 109 | 106 | 116 | 109 | 106 | 118 | 110 | 105 | 126 | 116 | 131 | 142 |
| Hotel/motel (R-1)         | 73                        | 76    | 73  | 68  | 70  | 67  | 65  | 69  | 66  | 65  | 71  | 68  | 65  | 77  | 72  | 81  | 89  |
| Multiple-family (R-2)     | 43                        | 45    | 41  | 41  | 43  | 42  | 36  | 45  | 43  | 41  | 47  | 46  | 41  | 53  | 48  | 53  | 59  |
| Office (B)                | 31                        | 32    | 30  | 29  | 29  | 28  | 25  | 28  | 27  | 25  | 29  | 28  | 25  | 33  | 30  | 32  | 36  |
| Restaurant (A-2)          | 389                       | 426   | 411 | 408 | 444 | 420 | 395 | 483 | 437 | 457 | 531 | 484 | 484 | 589 | 538 | 644 | 750 |
| Retail (M)                | 46                        | 50    | 45  | 46  | 44  | 44  | 37  | 48  | 44  | 44  | 52  | 50  | 46  | 60  | 52  | 64  | 77  |
| School (E)                | 42                        | 46    | 42  | 40  | 40  | 39  | 36  | 39  | 40  | 40  | 39  | 43  | 37  | 44  | 40  | 45  | 54  |
| Warehouse (S)             | 9                         | 12    | 9   | 11  | 12  | 11  | 10  | 17  | 13  | 14  | 23  | 17  | 15  | 32  | 23  | 32  | 32  |
| All others                | 55                        | 58    | 54  | 53  | 53  | 51  | 48  | 54  | 52  | 51  | 57  | 54  | 50  | 63  | 57  | 65  | 73  |

**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 software approved by the code official.

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

**CC103.3.1 Qualifying off-site procurement methods.** The following are considered qualifying off-site renewable energy procurement methods:

1. Community renewables: an off-site 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.
3. Virtual power purchase agreement: a power purchase agreement for off-site renewable energy where the owner agrees to purchase renewable energy output at a fixed price schedule.
4. Direct ownership: an off-site 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-percent 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.

**CC103.3.2 Requirements for all procurement methods.** The following requirements shall 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 shall include one or more of the following: photovoltaic systems, solar thermal power plants, geothermal power plants and 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 independent system operator (ISO) or regional transmission organization (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 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 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.

$$RE_{\text{offsite}} = \sum_{i=1}^n PF_i \times RE_i = PF_1 \times RE_1 + PF_2 \times RE_2 + \dots + PF_n \times RE_n$$

(Equation CC-2)

where:

- $RE_{\text{offsite}}$  = Adjusted off-site renewable energy.
- $PF_i$  = Procurement factor for the  $i^{\text{th}}$  renewable energy procurement method or class taken from Table CC103.3.3.
- $RE_i$  = Annual energy production for the  $i^{\text{th}}$  renewable energy procurement method or class.
- $n$  = The number of renewable energy procurement options or classes considered.

TABLE CC103.3.3  
 DEFAULT OFF-SITE RENEWABLE ENERGY PROCUREMENT METHODS, CLASSES AND COEFFICIENTS

| CLASS | PROCUREMENT FACTOR (PF) | PROCUREMENT OPTIONS  | ADDITIONAL REQUIREMENTS (see also Section CC103.3.2)                                  |
|-------|-------------------------|----------------------|---|
| 1     | 0.75                    | Community solar      | —   |
|       |                         | REIFs                | Entity must be managed to prevent fraud or misuse of funds.                           |
|       |                         | Virtual PPA          | —   |
|       |                         | Self-owned off-site  | Provisions shall prevent the generation from being sold separately from the building. |
| 2     | 0.55                    | 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.                         |