Section C405.15 Renewable Energy Systems

BACKGROUND INFORMATION

- **Primary code section:**
  - C405.15 Renewable Energy Systems
- **Other section(s) where amendments are needed to implement the primary code section:**
  - C401.2.1: International Energy Conservation Code (only amend if making renewable energy requirements optional)
- **Related code section(s)/dependencies:**
  - ??

CODE SUMMARY

This section requires new b*uildings* to be provided with on-site renewable electricity generation systems with a direct current (DC) nameplate power rating of not less than 0.75 watts per square foot (8.1 W/m^2) multiplied by the sum of the gross *conditioned floor area* of all floors, not to exceed the combined gross *conditioned floor area* of the three largest floors. Buildings that can't meet these requirements due to shading, and buildings under 5,000 sq ft., are required to obtain renewable energy that is 15 times the requirements for on-site renewable energy through one or more of the following means:

1. Physical renewable energy power purchase agreement.
2. Financial renewable energy power purchase agreement.
3. Community renewable energy facility.

   Off-site renewable energy system owned by the building property owner.
4. Renewable energy investment fund.
5. Green retail tariff.

PROPOSED AMENDMENTS

Five potential adoption options are proposed.

1. **Adopt the code as-is** (no amendments)
2. Adopt the code to **keep requirements for on-site solar but delete requirements for off-site renewable energy.** Buildings would be required to meet the on-site renewable energy requirements as much as possible but would not be required to purchase off-site renewable energy if they can't meet the minimum on-site requirements.
3. Adopt the code but **make all (on- and off-site) renewable energy requirements only apply to buildings over 10,000 sq ft (or some other size).** This would greatly reduce the number of buildings required to provide renewable energy (for example, there were approximately 23 new non-residential buildings constructed in Flagstaff since 2018 that were more than 10,000 sq. ft.).
4. Adopt the code but **make on-site renewable energy requirements only apply to buildings over 10,000 sq ft (or some other size) and delete all requirements for off-site renewable energy.** This would greatly reduce the number of buildings required to provide on-site renewable energy

(for example, there were approximately 23 new non-residential buildings constructed in Flagstaff since 2018 that were more than 10,000 sq. ft.).

5. **Adopt the code as-is but make all renewable energy requirements optional.**

Option 1: No amendments (adopt as-is)

Option 2: Adopt the code to keep requirements for on-site solar but delete requirements for off-site renewable energy.

C405.15 Renewable energy systems. No change

C405.15.1 On-site renewable energy systems. No change

~~**C405.15.2 Off-site renewable energy.**~~

~~*Buildings* that qualify for one or more of the exceptions to Section C405.15.1 or do not meet the requirements of Section C405.15.1 with an on-site renewable energy system shall procure off-site renewable electrical energy, in accordance with Sections C405.15.2.1 and C405.15.2.2, that shall be not less than the total off-site renewable electrical energy determined in accordance with Equation 4-11.~~

~~**Equation 4-11**~~

~~TREoff=(RENoff×0.75W/ft2×FLRA-IREon)×15~~

~~where:~~

~~TRE_{off} =Total off-site renewable electrical energy in kilowatt-hours (kWh) to be procured in accordance with Table C405.15.2.~~

~~REN_{off} =Annual off-site renewable electrical energy from Table C405.15.2, in units of kilowatt-hours per watt of array capacity.~~

~~*FLRA* =The sum of the gross conditioned floor area of all floors not to exceed the combined floor area of the three largest floors.~~

~~IRE_{on} =Annual on-site renewable electrical energy generation of a new on-site renewable energy system, to be installed as part of the building project, whose rated capacity is less than the rated capacity required in Section C405.15.1.~~

~~TABLE **C405.15.2 ANNUAL OFF-SITE RENEWABLE ENERGY REQUIREMENTS**~~

~~**CLIMATE ZONE**~~	~~**ANNUAL OFF-SITE RENEWABLE ELECTRICAL ENERGY (**~~
~~1A, 2B, 3B, 3C, 4B and 5B~~	~~1.75~~
~~0A, 0B, 1B, 2A, 3A and 6B~~	~~1.55~~
~~4A, 4C, 5A, 5C, 6A and 7~~	~~1.35~~

~~**C405.15.2.1 Off-site procurement.**~~

The *building owner*, as defined in the *International Building Code*, shall procure and be credited for the total amount of off-site renewable electrical energy, not less than required in accordance with Equation 4-11, with one or more of the following:

1. *Physical renewable energy power purchase agreement*.
2. *Financial renewable energy power purchase agreement*.
3. *Community renewable energy facility*.
4. Off-site renewable energy system owned by the *building property owner*.
5. *Renewable energy investment fund*.
6. *Green retail tariff*.

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

1. Direct connection to the off-site renewable energy facility.
2. The local utility or distribution entity.
3. An interconnected electrical network where energy delivery capacity between the generator and the *building site* is available.

C405.15.2.2 Off-site contract.

The renewable energy shall be delivered or credited to the *building site* under an energy contract with a duration of not less than 10 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property.

C405.15.3 Renewable energy certificate (REC) documentation.

The *property owner* or owner's authorized agent shall demonstrate that where *renewable energy certificates (RECs)* or *energy attribute certificates (EACs)* are associated with on-site and off-site renewable energy production required by Sections C405.15.1 and C405.15.2, all of the following criteria for RECs and EACs shall be met:

1. The RECs and EACs are retained and retired by or on behalf of the *property owner* or tenant for a period of not less than 15 years or the duration of the contract in Section C405.15.2.2, whichever is less.
2. The RECs and EACs are created within a 12-month period of the use of the REC.
3. The RECs and EACs are from a generating asset placed in service not more than 5 years before the issuance of the certificate of occupancy.

C405.15.4 Renewable energy certificate purchase.

A *building* that qualifies for one or more of the exceptions to Section C405.15.1, and where it can be demonstrated to the *code official* that the requirements of Section C405.15.2 cannot be met, the *building owner* shall contract the purchase of renewable electricity products before the certificate of

~~occupancy is issued. The purchase of renewable electricity products shall comply with the Green-e Energy National Standard for renewable electricity products equivalent to five times the amount of total off-site renewable energy calculated in accordance with Equation 4-11.~~

C405.16 Inverters. No change

Option 3: Adopt the code but make all (on- and off-site) renewable energy requirements only apply to buildings over 10,000 sq ft (or some other size)

Key:
- ~~Deletion~~
- **Addition**
- Explanatory text (not a proposed amendment)

C405.15 Renewable energy systems.

Buildings in Climate Zones 0 through 7 shall comply with Sections C405.15.1 through C405.15.4.

Exception: buildings 10,000 square feet or less are not required to comply with these sections.

C405.15.1 On-site renewable energy systems.

Buildings **greater than 10,000 square feet** shall be provided with on-site renewable electricity generation systems with a direct current (DC) nameplate power rating of not less than 0.75 watts per square foot (8.1 W/m^2) multiplied by the sum of the gross *conditioned floor area* of all floors, not to exceed the combined gross *conditioned floor area* of the three largest floors.

Exceptions: The following *buildings* or building sites shall comply with Section C405.15.2:

1. A *building site* located where an unshaded flat plate collector oriented toward the equator and tilted at an angle from horizontal equal to the latitude receives an annual daily average incident solar radiation less than 1.1 kBtu/ft^2per day (3.5 kWh/m^2/day).
2. A *building* where more than 80 percent of the roof area is covered by any combination of permanent obstructions such as, but not limited to, mechanical equipment, vegetated space, access pathways or occupied roof terrace.
3. Any *building* where more than 50 percent of the roof area is shaded from direct-beam sunlight by natural objects or by structures that are not part of the *building* for more than 2,500 annual hours between 8:00 a.m. and 4:00 p.m.
4. ~~A *building* with gross *conditioned floor area* less than 5,000 square feet (465 m^2).~~

C405.15.2 Off-site renewable energy. No change.

C405.15.2.1 Off-site procurement. No change.

C405.15.2.2 Off-site contract. No change.

C405.15.3 Renewable energy certificate (REC) documentation. No change.

C405.15.4 Renewable energy certificate purchase. No change.

C405.16 Inverters. No change.

Option 4: Adopt the code but make on-site renewable energy requirements only apply to buildings over 10,000 sq ft (or some other size) and delete all requirements for off-site renewable energy.

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Buildings in Climate Zones 0 through 7 shall comply with Sections C405.15.1 through C405.15.4.

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~~4. A *building* with gross *conditioned floor area* less than 5,000 square feet (465 m^2).~~

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~~**Equation 4-11**~~

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~~where:~~

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IRE$_{on}$ = Annual on-site renewable electrical energy generation of a new on-site renewable energy system, to be installed as part of the building project, whose rated capacity is less than the rated capacity required in Section C405.15.1.

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1. *Physical renewable energy power purchase agreement.*
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6. *Green retail tariff.*

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

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2. The local utility or distribution entity.
3. An interconnected electrical network where energy delivery capacity between the generator and the *building site* is available.

C405.15.2.2 Off-site contract.

The renewable energy shall be delivered or credited to the *building site* under an energy contract with a duration of not less than 10 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property.

C405.15.3 Renewable energy certificate (REC) documentation.

The *property owner* or owner's authorized agent shall demonstrate that where *renewable energy certificates (RECs)* or *energy attribute certificates (EACs)* are associated with on-site and off-site

~~renewable energy production required by Sections C405.15.1 and C405.15.2, all of the following criteria for RECs and EACs shall be met:~~

~~1. The RECs and EACs are retained and retired by or on behalf of the *property owner* or tenant for a period of not less than 15 years or the duration of the contract in Section C405.15.2.2, whichever is less.~~

~~2. The RECs and EACs are created within a 12-month period of the use of the REC.~~

~~3. The RECs and EACs are from a generating asset placed in service not more than 5 years before the issuance of the certificate of occupancy.~~

~~**C405.15.4 Renewable energy certificate purchase.**~~

~~A *building* that qualifies for one or more of the exceptions to Section C405.15.1, and where it can be demonstrated to the *code official* that the requirements of Section C405.15.2 cannot be met, the *building owner* shall contract the purchase of renewable electricity products before the certificate of occupancy is issued. The purchase of renewable electricity products shall comply with the Green-e Energy National Standard for renewable electricity products equivalent to five times the amount of total off-site renewable energy calculated in accordance with Equation 4-11.~~

C405.16 Inverters. No change

Option 5: make this section optional

C401.2.1 International Energy Conservation Code.

Commercial buildings shall comply with one of the following:

1. Prescriptive Compliance. The Prescriptive Compliance option requires compliance with Sections C402 through C406 and Section C408. *Dwelling units* and *sleeping units* in Group R-2 buildings shall be deemed to be in compliance with this chapter, provided that they comply with Section R406.
2. *Simulated Building Performance*. The *Simulated Building Performance* option requires compliance with Section C407.

Exceptions:

1. *Additions*, *alterations*, *repairs* and changes of occupancy to existing buildings complying with Chapter 5.

2. Compliance with the provisions of Section C405.15 is optional.

C405.15 Renewable energy systems.

Buildings in Climate Zones 0 through 7 shall **optionally** comply with Sections C405.15.1 through C405.15.4.

C405.15.1 On-site renewable energy systems. No change.

C405.15.2 Off-site renewable energy. No change.

C405.15.2.1 Off-site procurement. No change.

C405.15.2.2 Off-site contract. No change.

C405.15.3 Renewable energy certificate (REC) documentation. No change.

C405.15.4 Renewable energy certificate purchase. No change.

C405.16 Inverters. No change.

CODE BENEFITS

The 2024 Commercial IECC is estimated to improve energy efficiency over Flagstaff's current code by approximately 29%. This estimate includes improvements to the building envelope in addition to renewable energy production. On- and off-site renewable energy systems support energy independence, help with grid management, and can reduce electricity bills by offsetting electricity use with solar energy production.

COST IMPACTS

- **Costs:** This code section will increase the cost of construction to account for the installation of solar panels and the purchase of off-site renewable energy, if required. Online sources indicate the price per watt for solar panels in Arizona in early 2026 ranges from $2.04 - $2.77.
- **Savings:** APS pays residents and building owners with on-site solar for each kilowatt hour that is fed back into the electrical grid. This can provide substantial savings on electricity bills, especially during the summer when solar production is high and electricity use tends to be lower in Flagstaff.

RELEVANT ENERGY CODE UPDATE OPTION(S)

☐ Option 1 ☒ Option 2 ☐ Option 3 ☐ Option 4

IS THIS IN FLAGSTAFF'S CURRENT CODE?

☐ Yes ☐ Yes, but new requirements are stronger ☒ No

AMENDMENT JUSTIFICATION

Given the upfront costs of installing renewable energy (or purchasing off-site renewable energy), several different amendments are proposed. These options are intended to lower the costs of complying with this section and/or reduce the number of buildings to which this section would apply. These options are provided so that Flagstaff continues to benefit from renewable energy while minimizing upfront construction costs.

RELATED REQUIREMENTS IN FLAGSTAFF'S CURRENT CODE

Flagstaff's current code has solar-ready requirements for commercial buildings. There are no requirements for the installation of on-site solar or for the purchase of off-site solar.

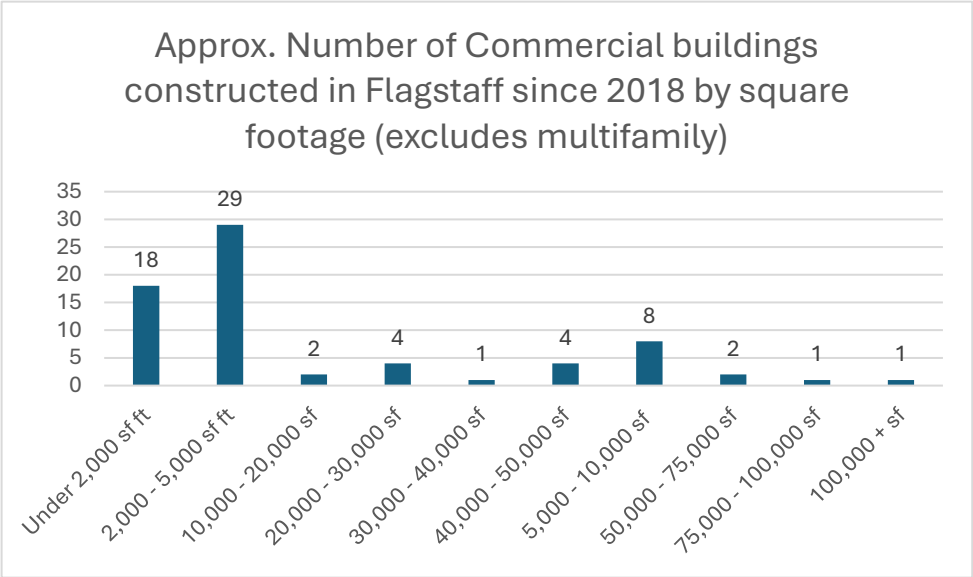
OTHER CITIES AND STATES THAT HAVE ADOPTED THIS AMENDMENT OR SIMILAR AMENDMENTS

Phoenix, Tucson, Glendale, Avondale, Mesa, and Chandler deleted this section. Outside of AZ, Southern Nevada and Northern Nevada also edited this out. The Colorado Model Energy Code doesn't require it because the doesn't require it because the Colorado Public Utilities Commission has requirements for the utilities to provide clean renewable energy, so the Colorado Energy Office opinion is if the grid is clean, then they don't need to require onsite clean energy.

Fort Collins kept this section in their code adoption.

ADDITIONAL INFORMATION

The chart below indicates that approximately 70 non-residential commercial buildings have been built in Flagstaff since 2018. Approximately 67% of these buildings are under 10,000 square feet. This information could help identify a threshold below which buildings don't have to comply with part or all of this section



COMMUNITY FEEDBACK ON THIS CODE SECTION
• **Source:** • **Date:** • **Comments:** • **Source:** • **Date:** • **Comments:** • **Source:** • **Date:** • **Comments:**