

**Carbondale Commercial Green Code Update  
International Green Construction Code 2018 (IGCC)  
Master List of Recommendations and Comments**

**Biospaces Energy Consulting, Inc. 6/16/2021**

*Recommendations in Purple*

**Yellow highlights are for major changes in sections between 2012 and 2018**

*Items in black are background info, to remain, or proposed modifications*

*This is the recommendation for the IGCC adoption. Additional areas to be included in adoption ordinance include: Incentives for Beneficial Electrification & Net Zero Buildings, and EV Charging station requirements.*

**Chapter 3 - Definitions, Abbreviations, and Acronyms**

301.1 General

301.2 Definitions

*2012 was amended to add Adaptive Plant Species definition.*

*No need to amend for 2018, noted in 2018 section.501.3.3.2*

301.3 Abbreviations and Acronyms

**Chapter 5 - Site Sustainability**

Recommend to retain most of it - see exceptions and questions below

501.1 Scope

501.2 Compliance

501.3 Mandatory Provisions -

501.3.1 Site Selection

501.3.1.1 Allowable sites

*Recommend to amend out. This is covered in UDC and Comprehensive Plan, Urban Growth Boundary.*

501.3.1.2 Prohibited Development Activity (402.2.3)

*(402 was amended out of 2012, was to be addressed in land use code rewrite)*

*(402.6 402.7 amended out of 2012)*

*Recommend to amend out. (Per Janet Buck Urban growth boundary, UDC 5.2, 5.4, Comprehensive Plan covers this)*

501.3.2 (401.2) Predesign Site Inventory and Assessment

501.3.3 Plants

501.3.3.1 (405.2.2) Invasive Plants

**2018 More strict regarding mandatory removal of existing invasive plants (2012 allowed for a plan for containment, removal and replacement)**

*Recommend to adopt*

501.3.3.2 (b.2) (402.7.1) Greenfield Sites

*Recommend to amend out, as greenfield sites do not exist*

501.3.4 Stormwater Management (was 403.1, amended out of 2012)

*Recommend to amend out. (Per Janet Buck as addressed in Public Works Manual*

501.3.5 Mitigation of Heat Island Effect (was 408.1, amended out of 2012 with exception of Vegetated Terrace and Roofing Systems, see below)

*Recommend to adopt (Based on best practices and increasing summer temperatures).*

501.3.5.5 Vegetated Terrace and Roofing Systems (was 408.3.2)

*2018 Changed to say within 2 years not less than 50% foliage coverage (was 80%) of designed area of vegetation. Items e and f added (regarding irrigation compliance and installation according to roofing manufacturer instructions).*

*Recommend to adopt .*

501.3.6 Reduction of Light Pollution (was 409, amended out in 2012 as Town lighting code is more comprehensive)

*Recommend to amend out (covered in Carbondale lighting code).*

501.3.7 Mitigation of Transportation Impacts

501.3.7.1 Pedestrian and Bicycle Connectivity (was 407.1, amended out in 2012)

*Recommend to amend out (addressed in UDC 5.5)*

501.3.7.2 Bicycle Parking (was 407.3, amended out in 2012)

*Recommend to amend out (addressed in UDC 5.5)*

501.3.7.3b Site Vehicle Provisions-(was 407.4) --

*Recommendation to amend out and to include this language in Unified Development Code (UDC):*

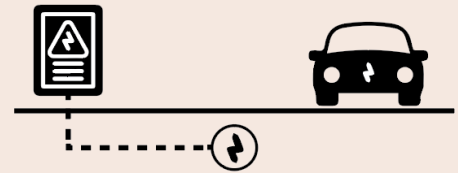
- 1) If required parking is 1-9 spots, they need to provide 1 EVSE Ready Outlet spot,*
- 2) if it is 10-19, they need to have 1 Level 2 Charging station installed, and 1 EVSE Ready Outlet spots,*
- 3) if it is 20 or over, they need to have 1 level 2 EV charging stations for every 20 spots and 1 EVSE Ready Outlet per 20 spots.*
- 4) All the required EV parking spots are in addition to the standard parking requirements in the UDC.*

## 1. EV-Capable

Install electrical panel capacity with a dedicated branch circuit and a continuous raceway from the panel to the future EV parking spot.

[Aspen, CO: 3% of parking is EV-Capable \(IBC\)](#)

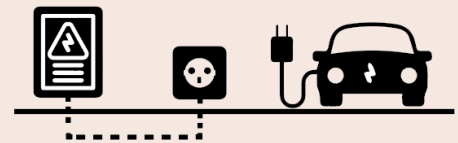
[Atlanta, GA: 20% is EV-Capable \(Ordinance\)](#)



## 2. EVSE-Ready Outlet

Install electrical panel capacity and raceway with conduit to terminate in a junction box or 240-volt charging outlet (typical clothing dryer outlet).

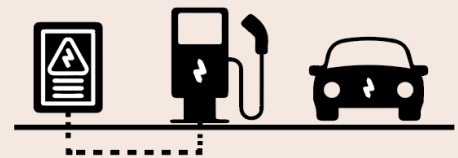
[Boulder, CO: 10% of parking is EV-Ready Outlet](#)



## 3. EVSE-Installed

Install a minimum number of Level 2 EV charging stations.

[Palo Alto, CA: 5-10% of parking is EV-Installed](#)



501.3.8 (was 406.1) Building Site Waste Mgmt

**2018 Increases the amount from 75% in 2012 to not less than 90% of land clearing debris must be diverted from landfills.**

The 90% number is attainable according to Cathy Hall at the Pitkin County Landfill,, most items ie: rocks trees and soil get reused.

*Recommend to adopt*

## Chapter 6 - Water Use Efficiency

Recommend to retain most of it - see exceptions and questions below

601.1 Scope

601.2 Compliance

601.3 Mandatory Provisions

601.3.1 Site Water Use Reduction

601.3.1.1 Landscape Design

*Recommendation: Amend to include provision that any turfgrass installed must be low %ET or Drought Tolerant. Suitable for Carbondale's climate.*

601.3.1.2 (404.1.1.2) Irrigation

601.3.1.2.1 Irrigation System Design

*Amended in 2012 to add design professional language for potable water for lots over 2500 sf.*

*2018 requires design professionals for all irrigation system design.*

*Recommend amendment for 2018 Includes language that requires irrigation professionals only for landscaping over 2500 sf. (do not distinguish potable water)*

*Paragraph G of 5.4.4 UDC says use non-potable water if available for turf*

#### 601.3.2 Building Water Use Reduction

*2018 adds section 601.3.2.1(j) to require water bottle filling stations as a part of or adjacent to not less than 50% of indoor drinking fountains 2012 this was not a requirement*

*Recommend to adopt*

#### 601.3.3 Special Water Features

#### 601.3.4 Water Consumption Measurement (was 705.1)

*2012 was amended to say ditch water required to be metered at the discretion of the Utility Director*

*Recommend to retain amendment from 2012 .*

*Table 601.3.4.1a. Sets measuring thresholds.*

#### 601.3.4.1 Consumption Management

*2018 - submetering of tenant spaces in excess of 50k sf. 2012 this was not a requirement*

*Recommend an amendment that drops submetering requirement from 50,000 to 25,000 sf.*

#### 601.3.5 Water Softeners

#### 601.3.6 Reverse Osmosis Water Treatment Systems (was 704.2)

#### 601.3.7 On-site Reclaimed Water Treatment Systems

*Recommend to amend out as reclaimed water or alternate onsite sources are not likely to exist in Carbondale.*

#### 601.3.8 Dual Water Supply Plumbing

*2018 adds this section that says if sufficient supply of reclaimed water or alternate on-site sources of water is available or planned to be available within 5 years, must plumb water supply to allow for this to all urinals and water closets.*

*Recommend that this only applies to buildings over 5000 sf*

## Chapter 7 Energy Efficiency

### 701.1 Scope

### 701.2 Compliance

### 701.3 Mandatory Provisions

#### 701.3.1 General

##### 701.3.1.1 Continuous Air Barrier

#### 701.3.2 On-site Renewable Energy Systems (**PV Ready**).

Requires allocated space of 6 KBtu/sf per year for single story and 10 KBtu/sf per year for multi-story (2012 had no PV ready requirements)

*Recommend to adopt with the deletion of exception 2 (i.e., the space for future PV is in addition to required PV)*

#### 701.3.3 Energy Consumption Management

##### 701.3.3.1 Consumption Management

Measurement devices and Data acquisition system required. Energy Source Thresholds listed. Data must be displayed.

##### 701.3.3.2 Energy Consumption Data Collection and Display

2018 New requirement to mandate tracking of energy consumption for a minimum of 36 months and have the ability to show hourly, daily, monthly, and annual energy consumption.

*Recommended amendment for 2018*

*Exception for buildings under 2500 or 5000Sf?*

701.3.4 Automated Demand response- Amendment in 2012 requiring to rough in only for Auto-DR as utilities could not provide at that time. Utility can provide now. We should require this for the 2018.

*Recommended amendment for 2018 Mandatory if available by utility company at time of building permit. If not then required to rough-in AUTO-DR, including thermostat wire to all appliances and conduit from meter to electrical room.*

*Exception for buildings under 2500 sf.*

### 701.4 Prescriptive Options

#### **ASHRAE 90.1 or IECC (adopt appendix H if IECC)**

##### 701.4.1.1 On-Site Renewables

##### 701.4.1.1.1 Renewable Energy Systems (**PV Required**)

2012 - 610.1.2 Amended to require 10 percent of total calculated annual energy use of building or buildings, with a production rate of not less than 1.75 Btu/hr or not less than .5 watts per square foot of conditioned floor area, using any single or combination of renewable energy generation systems meeting requirements of 610.2, 610.3 or 610.4.

2018 requires 6KBtu/sf per year for single story and 10KBtu/sf per year for multi-story

*Recommendation to amend with the following intent (exact amendment language and placement needs review):*

*Buildings under 5,000 sf*

- 1. Requires 3 watts of PV/sf or equivalent for prescriptive method.*
- 2. If on-site renewable energy is not feasible due to physical constraints of the building (as verified by a third party, approved by the Chief Building Official) and off-site is available in area for purchase (if project is within the territory of Xcel, off site renewable energy shall be located within Garfield County If project is within the Holy Cross territory, off-site renewable energy purchased shall be located within the Holy Cross Energy Territory), renewable energy credits with a 10 year commitment must be purchased and renewable requirements will be increased by 50% (4.5 watts/sf).*
- 3. If on-site renewable energy is not feasible due to physical constraints of the building (as verified by a third party, approved by the Chief Building Official) and off-site is not available in area for purchase, a fee-in-lieu option is allowed. The fee shall be \$5/watt. If fee in lieu is off-setting the entire renewable amount of energy, the fee in lieu amount of energy shall be equal to 4.5 watts/per sf. If the site cannot accommodate the required renewables but some renewables are installed on-site, then the difference can be paid as a fee in lieu with no penalty.*
- 4. If Natural gas is used for space or water heating, an additional 25% renewables are required in addition to any other requirements above.*

*Buildings 5,000 sf or over*

- 1. Requires 25% of the regulated non-process loads to be off-set by renewables.*
- 2. If on-site renewable energy is not feasible due to physical constraints of the building (as verified by a third party, approved by the Chief Building Official) and off-site is available in area (if project is within the territory of Xcel, off site renewable energy shall be located within Garfield County If project is within the Holy Cross territory, off-site renewable energy purchased shall be located within the Holy Cross Energy Territory) for purchase, renewable energy credits with a 10 year commitment must be purchased and renewable requirements will be increased by 50% (37.5% renewables).*
- 3. If on-site renewable energy is not feasible due to physical constraints of the building (as verified by a third party, approved by the Chief Building Official) and off-site is not available in area for purchase, a fee-in-lieu option is allowed. The fee shall be \$5/watt. If fee in lieu is off-setting the entire renewable amount of energy, the fee in lieu amount of energy shall be equal to 37.5% renewables. If the site cannot accommodate the required renewables but some renewables are installed on-site, then the difference can be paid as a fee in lieu with no penalty.*

4. *If Natural gas is used for space or water heating, an additional 25% renewables are required in addition to any other requirements above.*

*Also recommend an exemption for Low Energy Buildings as defined in the IECC C401.1.1, buildings with less than 3.4 Btu/hr per sf peak design rate.*

701.4.1.1.2 Alternate Renewables Approach, reduction for high efficiency equipment.

*Recommendation - If high efficiency equipment is installed per this section the required solar may be reduced by 20%.-prescriptive method.*

701.4.2 Building Envelope- Shall comply with ASHRAE 90.1 and be 5% better.

*Recommend to allow a weighted average (Exact wording to be determined)*

2018 mandates 5% reduction in U C and F factors (2012 was 10%)

701.4.3 HVAC- (was 606.1)

Shall comply with ASHRAE 90.1, and appendix B. Increased efficiencies.

701.4.3.3 Duct Leakage Tests

2018 Lowered threshold for duct leakage testing - Jeff says it is acceptable.

701.4.3.7 Exhaust Air Energy Recovery-

2018 Increases effectiveness to 60% from ASHRAE'S 50%, was not included in 2012.

*Recommend adopting with the following amendment*

*Buildings using gas or propane as a fuel source for space heating shall install one or more (dependent upon number of units) dedicated 208/240 volt, 30 amp of greater electrical circuit connected to the electric panel, terminating within 3 feet from the designated future location of the compressor units. 208-230 volt 30 amp electrical receptacle that is connected to the electrical panel with a 120/240 volt 3 conductor 10 AWG copper branch circuit within 3 feet of the water heater and accessible to the heater with no obstructions.*

701.4.4 Service Water Heating,

Shall comply with ASHRAE 90.1, Section 7, and refers to Appendix B. Increased efficiencies, when 701.4.1.1.2 selected.

*Recommend amendment to add that buildings using gas or propane as a fuel source for water heating shall install a dedicated 208-230 volt 30 amp electrical receptacle that is connected to the electrical panel with a 120/240 volt 3 conductor 10 AWG copper branch circuit within 3 feet of the water heater and accessible to the water heater with no obstructions.*

701.4.5 Power

Shall comply with ASHRAE 90.1 Section 8. 701.4.6 Lighting. Replaces tables for lighting power density etc. Reduced allowances compared to IECC.

701.4.6 Lighting

2018 Tables revised to target a high level of performance

*Recommend adopting as written for interior lighting. (after review from JP and Aaron Humphries of AlpenGlow Lighting).*

*Recommend amending out all sections referring to exterior lighting as covered in TOC lighting ordinance (sections 701.4.6.1.2, Exterior LPDs, 701.4.6.4 Controls for Exterior Sign Lighting, 701.4.6.5 Parking and Outdoor Sales Lighting)*

701.4.7 Other Equipment.

2018 -New section relating to efficiencies required for all other equipment not mentioned above shall comply with ASHRAE 90.1. If applying for 701.4.1.1.2 (Alternative Renewables Section) then must comply with Normative Appendix B and applicable Energy Star requirements in this section. Note: Supermarkets over 25,000 sf must install heat recovery systems on permanently installed refrigeration equipment.

## 701.5 Performance Options

701.5.1 Annual Energy Cost

2018 uses ASHRAE 90.1 PCI target methodology.

*Recommend to adopt as written*

## Chapter 8 - Indoor Environmental Quality

### 801.3 Mandatory Provisions

801.3.1 Indoor Air Quality (IAQ) (ASHRAE 62.1)

801.3.1.1 Minimum Ventilation Rates (ASHRAE 62.2)

801.3.1.2.2 Monitoring of minimum outdoor air flow required

801.3.1.2 Outdoor air delivery monitoring -

*Recommend to amend out (too onerous)*

\*801.3.1.3 Filtration and air cleaner requirements

801.3.1.4 Building Pressure

801.3.1.5 Venting of Combustion Appliances-Venting to exterior required.

*Recommend to adopt with amendment that excludes commercial kitchen makeup air units for direct fired units.*

801.3.1.6 Humidity Control-Supersedes ASHRAE 62.1

801.3.1.7 Environmental Tobacco Smoke- No smoking allowed in or near bldgs.

801.3.1.8 Building Entrances-Scraper, Absorption, & Finishing surfaces -

***Now requires shoe scraper. New in 2018***

*Recommend to adopt*

801.3.1.9 Guest Room Preoccupancy-Outdoor air purge cycle required

801.3.1.10 Pre occupancy Ventilation Control - details controls

801.3.2 Thermal Environmental Conditions for Human Occupancy

801.3.3 Acoustical Control-Transmission and space noise levels.

*Recommend to amend out, too onerous and not enforced in 2012, per JP*

801.3.4 Soil Gas Control (radon)

801.3.5 Lighting Quality-Multi Level or Bi Level



801.3.6 Moisture Control in Building Envelope-analysis for dewpoint in materials.  
*2018 this is new and requires moisture analysis in building materials to prevent moisture or mold problems. ASHRAE 160 defines procedures for moisture analysis in building materials to prevent moisture or mold problems. This is standard best building practices.*

*Recommend to adopt*

801.3.7 Glare Control -

New in 2018. Requires curtains, shades or other glare control devices to be installed. Must have specular visible transmittance of 3%.

*Recommend to adopt*

801.4 Prescriptive Options

801.4.1 Daylighting

2018 801.4.1.1.1 prescribes "not less than 50% of floor area shall be in the daylight area", 2012 was not less than 25%

*Recommend to adopt*

801.4.2 Materials (VOC) Emissions or VOC listing reqd.

2018 now requires compliance with SCAQMD requirements vs a table embedded in 2012 IGCC

*Recommend to adopt*

801.4.3 Lighting for Presentations

801.5 Performance Options

801.5.1 Daylight Simulation

801.5.2 Materials (VOC)-Modeling Option

801.5.3 Lighting for Presentations

## **Chapter 9 Materials and Resources**

### **901.3 Mandatory Provisions**

901.3.1 Construction Waste Management

901.3.1.1 Diversion

2018 and 2012 both require 50% diversion.

*Recommend to change to 25% as 50% has not been doable historically*

901.3.1.2 Total Waste

2018 new requirement "for new building projects on sites with less than 5% existing buildings, structures, or hardscape, the total amount of construction waste generated prior to the issuance of the final COO on the project shall not exceed 42 cubic yards or 12,000 lbs per 10,000 sf of new building floor area"

*Recommend to adopt, may modify to 20 lbs per square foot.*

901.3.2 Extracting, harvesting and or manufacturing

901.3.3 Refrigerants

901.3.4 Area for Storage and Collection of Recyclables and Discarded Goods

2012 (was 504.1) was amended to allow for waste post occupancy, Must have designated area for waste recycling).

2018 Now requires separate areas for recyclables, reusables, bulbs, batteries, and restricts mercury content, which was the intent of 2012 Amendment.

*Recommend to adopt*

901.4.1.4 Multi-attribute Product Declaration or Certification

2018 now requires that a minimum of 10 products install in the building project at time of issuance of COO must have EPDs (environmental product declaration)

*Recommend to adopt*

901.3.5 Mercury Content of Levels of Lamps

2018 Levels updated to reflect current practices.

*Recommend to adopt*

#### **901.4 Prescriptive Options (for construction) pick 2**

901.4.1.1 Recycled content and salvaged material content (10% min)

901.4.1.2 Regional Materials (15% min)

901.4.1.3 Biobased Products (5% min)

901.4.1.4 Multiple attribute product declaration or certification (10 different products min)

#### **901.5 Performance Options**

901.5.1 Life Cycle Assessment

### **Chapter 10 Construction and Plans for Operation**

1001.1 Scope

#### **1001.3 Mandatory Provisions**

2018 no longer contains provisions for modifications of existing buildings as did 2012 (chapters 10 and 11)

1001.3.1 Construction

1001.3.1.1 FPT Requirements-Functional and Performance Testing

1001.3.1.1.2 Acoustical Field Measurement -

*Recommend to amend out, see section 801.3.3*

1001.3.1.2 Building Project Commissioning (Cx) Process--

2018 - Commissioning of systems based upon industry standard

ANSI/ASHRAE/IES-202

*John Plano working with Angela Loughry to create commissioning standard*

1001.3.1.3 Project Cx Documents--

*John Plano to work with Angela to review and develop submittal and commissioning checklists.*

1001.3.1.4 Erosion and Sedimentation Control -

*Recommend to adopt - verify with JP and Janet, make sure not covered in UDC or elsewhere*

1001.3.1.5 IAQ Construction Management-Plan required.

2018 Now has pre-occupancy baseline IAQ monitoring.

*Recommend adopting. Postconstruction, preoccupancy baseline IAQ monitoring is an option, not required.*

1001.3.1.6 Moisture Control-for Bldg materials during construction

1001.3.1.7 Construction Activity Pollution Prevention (idling of vehicles)

1001.3.1.8 Construction Activity Pollution Prevention (protection of occupied areas)

1001.3.1.9 Soil-Gas Control-testing required

1001.3.1.10 Construction Waste Management-during construction

1001.3.2 Plans for Operation-

1001.3.2.1 High Performance Building Operation Plan

1001.3.2.2 Maintenance Plan

1001.3.2.3 Service Life Plan

2018 requires indoor environmental quality survey to be administered 18 months post issuance of COO and repeated every three years

1001.3.2.4 Transportation Management Plan

*Recommend to amend out. Covered in UDC.*