

**ORDINANCE NO. 1  
SERIES OF 2020**

**AN ORDINANCE OF THE BOARD OF TRUSTEES OF THE TOWN OF  
CARBONDALE, COLORADO, AMENDING CHAPTER 18 ARTICLE 11 OF THE  
MUNICIPAL CODE (THE RESIDENTIAL EFFICIENT BUILDING PROGRAM)**

WHEREAS, by Ordinance No. 8, Series of 2011 (amended from the original Ordinance 12, Series of 2007) , the Town of Carbondale adopted a residential efficient building program that provides for education of the community, promotes the use of environmentally friendly construction methods and renewable energy technologies, and fosters economic development of “green” businesses; and

WHEREAS, by Ordinance No. 8, Series of 2011, the Board of Trustees adopted certain amendments to the residential efficient building program; and

WHEREAS, after approximately eight years of operation since the last amendment, the Board of Trustees finds and determines that certain amendments to the residential efficient building program are in the interest of public health, safety and welfare;

NOW THEREFORE, BE IT ORDAINED BY THE BOARD OF TRUSTEES OF THE TOWN OF CARBONDALE, COLORADO:

**Section 1.** The Board of Trustees hereby finds, determines and declares that this Ordinance is necessary and proper to provide for the safety, preserve the health, promote the prosperity and improve the order, comfort and convenience of the Town of Carbondale and the inhabitants thereof.

**Section 2.** Chapter 18, Article 11 of the Municipal Code is hereby amended by deleting the language stricken and adding the language underlined as set forth on the revised Code text attached to this Ordinance as Exhibit A.

**Section 3.** This Ordinance shall be published pursuant to Section 3-3 of the Carbondale Home Rule Charter but shall not become effective until July 1, 2020.

**INTRODUCED, READ, APPROVED AND ORDERED PUBLISHED** this 28th day  
of February, 2020.

**TOWN OF CARBONDALE**

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Dan Richardson, Mayor

ATTEST:

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Cathy Derby, Town Clerk

## EXHIBIT A

### ARTICLE 11 - Residential Efficient Building Program

#### Sec. 18-11-10. - Purpose.

The intent of the Carbondale Residential Efficient Building Program (REBP) is to encourage cost-effective and sustainable building methods to create durable, energy-efficient structures that conserve natural resources, promote the efficient use of building materials and improve indoor air quality. Depending on the house size and use of exterior energy, there are requirements for onsite renewable energy mitigation in order to promote a local self-sufficient energy economy as per the Carbondale Climate Action Plan.

(Ord. No. 8, 2011; prior code 15.30.010; Ord. No. 8, 2015 §1, 8-11-2015)

#### Sec. 18-11-20. - Applicability.

- (a) The REBP applies to all new residential (single-family, duplex, townhouse, accessory dwelling unit) construction per the currently adopted building codes, as well as multi-family and residential sections of mixed-use projects, and additions or reconstruction (remodel) projects as defined by the International Building Code or as specified in definitions.
- (b) The REBP Checklist and this Article are used for code enforcement. A resource guide will be provided for additional guidance and background references.

(Ord. No. 8, 2011; prior code 15.30.020; Ord. No. 8, 2015 §1, 8-11-2015)

#### Sec. 18-11-30. - Manufactured housing.

All manufactured homes must come from plants certified to produce ENERGY STAR-qualified manufactured homes on an ongoing basis. This process includes utilizing home designs that meet ENERGY STAR design guidelines.

(Ord. No. 8, 2011; prior code 15.30.025; Ord. No. 8, 2015 §1, 8-11-2015)

#### Sec. 18-11-40. - Exemptions.

- (a) Houses or mixed-use structures applying for historical designation may request the Planning Department to exempt the structure from any requirements set forth in this Article. The Planning Department shall refer any such request to the Community Office for Resources Efficiency (CORE) and/or the Building Department for comments before processing any such exemption request.
- (b) HUD home units that are approved by the Colorado Department of Housing are exempt.
- (c) In the event of any conflict between this Article and any provision set forth in the Unified Development Code of the Town, the provisions of the Unified Development Code shall govern.
- (d) Additions less than 500 square feet are exempt from the REBP, but shall abide by the requirements of the currently adopted version of the currently adopted energy code.

(Ord. No. 8, 2011; prior code 15.30.030; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-50. - Innovation points.**

- (a) *General description.* The points to be scored or minimum required points are based on total square footage or total square footage per unit (or an "average") for multi-family and residential portions of multi-use projects. See the definitions for appropriate total square footage calculations. In mixed-use residential projects, points that are common to all units are gained for each unit and can be scored in each REBP Checklist; i.e., recycled content siding, roof insulation.
- (b) *Examples - point requirements.* The number of points required is on a graduated scale and can be calculated directly in the REBP Checklist. Examples of points required for various new residential housing or other residential type construction are included below:

**New Construction and Additions  
2,000 Square Feet and Over**

<b>Category</b>	<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3</b>	<b>Tier 4</b>
House Size (SF)	<2,000	2,000- 3,999	4,000— 6,999	>= 7,000
Points	110	110—180	230—330	430—550

**Additions  
2,000 Square Feet and Under**

<b>Category</b>	<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3</b>	<b>Tier 4</b>
Size (SF)	500	1,000	1,500	2,000
Points	40	60	80	110

- (c) If the construction permit is only for a detached garage, the point requirements shall follow the Additions point schedule above.
- (d) Residential units in the multi-family categories calculate total square footage as an "average" unit size as per the definitions. The points required are based on this "average" size. Multi-family projects receive credit against the points required for the "average" size for building efficiency as follows:
  - (1) Credit of ten points for efficiency of common walls.
  - (2) Credit of ten points if heating and hot water system is common to all units.
- (e) *Alternative points - cash in lieu.* Permit applicants may pay a cash fee in lieu of meeting some of the points required (see Section 18-11-160 of this Article). Cash-in-lieu points are limited to 25 percent of the points required.

(f) *Renewable energy requirements.* All new residential construction of 2000 sf or greater and all additions of 2000 sf or greater must supply part of the energy use in the home on site or elect to provide offsite renewables as calculated per Town standards or provide mitigation through a fee payment option (see Section 18-11-160 of this Article). Also, the code considers exterior energy uses over a nominal amount in Paragraph 18-11-170(9.2) of this Article. In order to offset the exterior use of energy, the use must be mitigated with renewable energy onsite or the applicant has an option to pay a fee as determined by the Chief Building Official.

(Ord. No. 8, 2011; prior code 15.30.040; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-60. - Renewable and Efficiency Fund.**

- (a) *General description.* The Town has established the Renewable and Efficiency Fund (REF) separate from the General Fund to support the installation of renewable energy and energy efficient technologies in the Town or in locations as approved by the Board of Trustees.
- (b) *Fees.*
- (1) Fees collected from items as per Section 18-11-160, Alternative cash in lieu of points; and Section 18-11-170, Onsite renewable energy and exterior use, of this Article, will be deposited to the REF.
  - (2) Fees from Section 18-11-160 may be collected at the time of issuance of the permit or paid prior to final inspection and issuance of the certificate of occupancy (C.O.). Fees from Section 18-11-170 are paid at the time of issuance of the permit. All fees may be reviewed prior to issuance of the C.O. for applicability and accuracy. Refunds or additional fees may be assessed prior to issuance of the C.O.
- (c) *Budget requests.* The Environmental Board will meet periodically with CORE to recommend funding requests at least two times per year for review and approval by the Board of Trustees.
- (d) *Criteria for authorizations.* Funds generated will be used to assist existing structures or new projects to achieve improved energy efficiency or renewable power generation in the Town or for locations on a case-by-case basis as approved by the Board of Trustees. It is suggested that such recommendations be based upon the following criteria:
- (1) Meets intent. The extent to which the proposed project meets the intent of the REF, which is to encourage and promote energy efficiency and renewable energy in the Town. This intent should be met by assisting in the incremental upgrade of a project and shall not be utilized for construction costs required for Code compliance.
  - (2) Cost benefit. The extent to which the proposed project provides an economic return on appropriations invested.
  - (3) Public benefit. The extent to which the proposed project offers a public benefit to the community.
  - (4) Affordable housing. Special consideration is given to projects that positively affect occupants of local affordable housing in the Town. Funding may assist in the incremental upgrade of a project and shall not be utilized for construction costs required for Code compliance.

Other items that may be considered for funding:

- (1) Focused education for the Carbondale Residential Efficient Building Program. Educational materials and events, including but not necessarily limited to, printed process guides, resource

reference guides, efficient building educational events to assist participants in Code compliance, a webpage with available resources, links and information, shall be available.

- (2) Residences applying for historical preservation may apply for design assistance for mechanical and electrical renovations.
- (3) Activities related to implementing recommendations and conservation efforts shall be available as per the Carbondale Climate and Energy Action Plan.

(Ord. No. 8, 2011; prior code 15.30.050; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-70. - Inspection and compliance.**

- (a) *General description.* The regulations contained in this Section identify the specific requirements for complying with the REBP. The sections and numbers in these regulations correspond to the sections and numbers on the REBP Checklist. The REBP Checklist is most easily completed via an electronic spreadsheet, but can be filled in by hand. The REBP Checklist and other related documents are available at the Building Department or at [www.carbondalegov.org](http://www.carbondalegov.org).
- (b) *Permit application.*
  - (1) Two copies of a completed REBP Checklist, scoring the required points, must be submitted with the building permit application.
  - (2) In addition, the permit application must contain two copies of Energy Compliance Documents (REScheck, or HERS rating). See Section 18-11-130 for details. The permit application will not be processed without the completed REBP Checklists and the Energy Compliance Documents.
- (c) *Inspections.*
  - (1) Items selected on the REBP Checklist will be scored and submitted for plan review and field inspections accordingly. Field inspections are noted on the right column of the REBP Checklist.
  - (2) Compliance methods for each REBP Checklist item described herein will be demonstrated by "Inspection" and/or "Documented." If compliance is "Inspected," Town staff will inspect these measures during their typical inspections. Inspections are listed as PC: Plan Check, 1: Foundation, 2: Framing, 3: Insulation, 4: Rough-in and 5: Final. (Please read the "Compliance" section of the specific measure to see which type of inspection is required.)
- (d) *Documented items.* Items selected that are "Documented" shall require the submission of appropriate documentation to establish compliance at the time of inspection. If documentation is required for an item, this documentation should be kept in the inspection container at the site. The Town reserves the right to conduct a documentation and inspection review after the fourth inspection to determine if "Cash in Lieu of Points" are needed to meet point requirements.
- (e) *Failed inspections or compliance audits.*
  - (1) The Town may conduct follow-up inspections or compliance audits of "Documented" measures prior to issuing a C.O. If a compliance audit is conducted, the contractor must provide documentation for these items. If, for any reason, an inspection fails and the checklist has to be revised for compliance, then a revised REBP Checklist must be resubmitted to the Building Department within 30 days of the failed inspection and/or prior to issuance of the final C.O.
  - (2) Prior to final inspection, fees and the REBP Checklist may be reviewed to revise the fee schedule if necessary.

(Ord. No. 8, 2011; prior code 15.30.060; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-80. - Definitions.**

Definitions included herein are for interpretation of this Article only:

*ACCA.* Air Conditioning Contractors of America. ACCA produces Manual J, which is referenced by this Article.

*AFUE.* Annual Fuel Utilization Efficiency. AFUE, is the most widely used measure of a furnace's heating efficiency. It measures the amount of heat actually delivered to an occupant's premises compared to the amount of fuel that the occupant must supply to the furnace. Thus, a furnace that has an 80 percent AFUE rating converts 80 percent of the fuel that the occupant supplies to heat - the other 20 percent is lost.

*AHRI.* Air Conditioning, Heating and Refrigeration Institute. AHRI administers the heating, ventilation, air-conditioning and commercial refrigeration industry's performance certification programs for heating and cooling equipment and components.

*ASHRAE.* The American Society of Heating, Refrigerating and Air-Conditioning. ASHRAE is a technical society organized to advance sciences of heating, ventilation, air-conditioning and refrigeration. Some ASHRAE standards are referenced or required in the REBP.

*Basement.* A basement is that portion of a building that is partly or completely below grade per the International Residential Code.

*Community Office for Resource Efficiency (CORE).* A local nonprofit 501c(3) energy office that is working with the Town to implement a clean energy future in the Roaring Fork Valley.

*COP.* Coefficient of performance (sometimes CP). The ratio of the change in heat of the output of a heat pump to the supplied work.

*ERV* Energy Recovery Ventilator is the [energy recovery](#) process of exchanging the energy contained in normally exhausted building or space air and using it to treat (precondition) the incoming outdoor [ventilation](#) air in residential and commercial [HVAC](#) systems. During the warmer seasons, the system pre-cools and dehumidifies while humidifying and pre-heating in the cooler seasons.

*ENERGY STAR.* ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that manages and promotes energy efficient products and practices.

*EPA.* Environmental Protection Agency. This agency's standards are referenced in this Article for indoor air quality points.

*Floor area.* The floor area gross is defined as the sum of the horizontal areas of floors of a building measured from the exterior face of exterior walls or, if appropriate, from the center line of dividing walls.

*GREENGUARD.* An environmental institute with the mission of improving human health and quality of life by enhancing indoor air quality and reducing people's exposure to chemicals and other pollutants. GREENGUARD certifies products and materials for low chemical emissions.

*HERS.* Home Energy Rating System. A HERS rating is a performance audit of a home. It consists of the evaluation, diagnostic testing, cost-effective recommendations and a computerized simulation analysis utilizing Resnet Accredited Rating Software to calculate a rating score on the HERS Index.

*HRV.* Heat Recovery Ventilator. A heat-recovery ventilator (HRV) uses the heat in the outgoing stale air to warm up the fresh air. A typical **unit** features two fans—one to take out household air and the other to bring in fresh air.

*Multi-family.* Multi-family projects are as per the International Residential Code or International Building Code: buildings or portions thereof designed for occupancy by three or more families living independently, including apartment houses, in which they may or may not share common entrances and/or other spaces. Individual dwelling units may be owned as condominiums or offered for rent.

*Mixed-use.* Multi-use projects may include different occupancies, including residential type, commercial and industrial. This Article applies only to the residential portions of these projects.

*REScheck*. A tool developed by the Department of Energy that compares a residential structure to a number of energy code standards.

*Resnet*. Residential Energy Services Network. The company that certifies energy raters and audits for the HERS program, as well as other energy audit programs.

*SEER*. Seasonal energy efficiency ratio. A ratio used to rate the efficiency of air conditioners.

*Sone*. A unit of perceived loudness.

*Total square footage*. For the purposes of this program, the total square footage is calculated as follows: The floor area within the inside perimeter of the exterior walls of a home, inclusive of basements and exclusive of garages, without deduction for unfinished areas, corridors, stairways, closets, the thickness of interior walls, columns or other features.

- (1) Each unit of a duplex or row of townhouses shall calculate the total square footage of each unit.
- (2) Multi-family projects will calculate the total square footage and the points required by dividing the total square footage as described above (including halls and common areas) by the number of units, to obtain the "average" square footage per unit. Points required for each unit are based on this "average" square footage. For the purpose of calculating square footage of multi-family projects for renewable requirements, total square footage is the aggregate Conditioned Floor Area (CFA).
- (3) Mixed-use (residential and commercial) projects will calculate the floor area as described above for each unit by dividing the square footage of all the residential sections (including halls and common areas) of the buildings by the number of units, to obtain the "average" floor area
- (4) Areas not included in the total square footage: (1) covered walkways, open roofed-over areas, porches and similar spaces; and (2) pipe trenches, exterior terraces or steps, chimneys, roof overhangs and similar features.

(Ord. No. 8, 2011; prior code 15.30.070; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-90. - Section 1, Site and water conservation.**

The following paragraphs contain points allowed for conservation:

1.1: Construction does not impact site 15 feet outside of building footprint: 2 points.

Vegetation shall not be impacted by construction area. Show detailed construction management plan with fence and limits of construction no more than 15 feet around the proposed building footprint. Driveways, utility lines and material storage are exempted.

Compliance: Plan check and inspected (PC, 1: Foundation).

1.2: One hundred percent of topsoil saved and reused on site: 2 points.

Topsoil must remain on site during construction. Storage area for topsoil must be indicated on the site plan. Care should be exercised to conform with the Carbondale Weed Management Plan.

Compliance: Inspected (1: Foundation).

1.3 One hundred percent of excavated fill reused on site or within a three-mile radius:



On site: 2 points.

Within 3-mile radius: 1 point.

Reuse of excavation material locally reduces transport of material and impacts. For points within a three-mile radius, provide a signed receipt with details on the location.

Compliance: Inspected with documentation (1: Foundation).

Documentation required for offsite point.

1.4: House size less than the national standard: 8 points.

Average house size has increased dramatically over the past 20 years, requiring additional heating energy, electricity and materials used in construction. Houses designed with total square footage below these sizes achieve these points.

Average house sizes:

For a studio: 650 sf.

1 bedroom: 1000 sf.

2 bedrooms: 1,600 sf.

3 bedrooms: 2,200 sf.

4 bedrooms plus: 2,800 sf.

Compliance: Show calculation of house size on site plan. Plan check (PC).

1.5: Erosion controls during construction: 1 point.

Reduce runoff from construction sites by providing silt fencing or straw bales in runoff areas. Protect stockpiled soil and disturbed areas from erosion.

Compliance: Inspected (1: Foundation).

1.6: Deciduous trees and large shrubs provide summer shade to west of structure: 1 point.

Mature landscaping must shade over 50 percent of subject glazing area. Show plantings on landscaping plan to provide shade from solar gain on west elevation from 2:00 p.m. to 6:00 p.m. in summer.

Compliance: Plan check (PC).

## XERISCAPE LANDSCAPING

1.7: Addition of organic material to soil or use two inches of mulch or bark on all planting beds: 1 point.

Organic material can include but is not limited to manure and compost. Add organic material or mulch all planting beds with wood chips or bark at least two inches deep. (Exception: desert plantings.)

Compliance: Inspected with documentation (5: Final).

1.8 and 1.9: Reduction of turf areas.

1.8 Area limited: 3 points.

Irrigated turf area of high-water demand turf must be less than 25 percent of landscaped area, or 2,000 square feet, whichever is smaller, for 3 points.

1.9 Xeriscape: 3 points.

Use low-water-demand or Xeriscape-rated plants only in at least 50 percent of landscaped area or 2,000 square feet, whichever is smaller, for 3 points.

Documentation includes landscaping plan or alternate and must show Xeriscape plants listed by the Colorado State University Extension Horticulture Office, or another recognized source.

Compliance: Inspected with documentation (5: Final).

Document with landscape plan.

1.10: Provide education on low-water plants and list of Xeriscape plants: 1 point.

Provide list of appropriate low-water plants to homeowner as listed by Colorado State University Extension Horticulture Office, or other recognized source.

Compliance: Inspected with documentation (5: Final).

Copy of list in the inspection container.

## IRRIGATION SYSTEMS

1.11: Non-potable water used for irrigation, including ditches and/or storm water (as allowed by law): 2 points.

Use water sources other than potable Town water for irrigation if appropriate access to water right is available from the Town or other source. Indicate sources on plan. Storm water used for irrigation cannot exceed the amount allowed by law.

Compliance: Inspected with documentation (5: Final).

Documentation with landscape plan or signed letter by the architect or owner ensuring that project is compliant.

1.12: Drip irrigation: 2 points.

At least 50 percent of landscaped area should include low- to moderate-water demanding plants, and should be irrigated with drip irrigation, bubbler or micro-spray systems.

Compliance: Inspected with documentation (5: Final).

Documentation with landscape plan or signed letter by the architect or owner ensuring that project is compliant.

1.13: Zoned irrigation system: 2 points.

Irrigation system must be zoned to deliver different amounts of water appropriate to the different plant zones. High-water zones should NOT be immediately adjacent to large hardscapes such as driveways or streets. Turf and planting beds must be zoned separately.

Compliance: Inspected with documentation (5: Final).

Documentation with landscape plan or signed letter by the architect or owner ensuring that project is compliant.

1.14: Timer controls installed: REQUIRED.

REQUIRED if irrigation is to be installed; high-water zones should have irrigation controls that include timed devices; timer shall have nighttime activation with Town water-supplied systems. Nighttime activation for ditch water systems is required, if possible.

Compliance: Inspected with documentation (5: Final).

Documentation with landscape plan or signed letter by the architect or owner ensuring that project is compliant.

1.15: Rain sensor installed on irrigation system: 2 points.

Sensors installed as part of an irrigation system turn-off system when adequate rainfall has occurred.

Compliance: Inspected with documentation (5: Final).

Documentation with landscape plan or signed letter by the architect or owner ensuring that project is compliant.

## FOOD PRODUCTION

1.16: On-site greenhouse of 30 square feet or larger: 4 points.

Solar greenhouses can add heat to the home on sunny winter days and also provide fresh local vegetables year-round. Greenhouse must be isolatable from living space. Any heating must be provided by a separately controllable system or zone with a maximum temperature set point of 50 degrees F. Proper sizing of glazing area, thermal mass and insulation must be followed.

Compliance: Plan check and inspected (PC, 5: Final).

1.17: Edible landscaping: 1 point.

Edible landscaping takes advantage of planted areas by turning them into food producers. A minimum of 50 square feet must be prepared and dedicated for edible landscaping. In-ground, raised bed and container planting areas qualify.

Compliance: Inspected (5: Final).

## WATER CONSERVATION

1.18: High efficiency low-flow or dual-flush toilets: 1—4 points.

A low-flow toilet uses 1.4 gallons per flush (GPF) or less AND is equal to or greater than 400 grams per flush as per Maximum Performance testing (MaP). (MaP data is found on the California Urban Water Conservation Council web site). Alternate compliance path is installing toilet with WaterSense label.

A dual-flush toilet has a minimum of two flushing options and provides at least one flush choice less than 1.4 GPF.

Receive 1 point each low-flow toilet and 2 points for each dual-flush toilet installed. Note: a toilet can be both low-flow and dual-flush. In this case, the toilet will receive 2 points. Maximum of 4 points.

Compliance: Inspection with documentation (5: Final).

Provide documentation on site. Toilet must be on the MaP list to qualify for low flow.

1.19: Low-flow showerheads: 1 point per showerhead: 1-2 points

Showerheads using two gallons per minute or less must be installed on all showers. Only one shower head in each shower to obtain points. Alternate compliance path is installing showerhead with WaterSense label. Maximum of 2 points total.

Compliance: Inspection with documentation (5: Final).

Provide product documentation on-site.

1.20: Low-flow faucets: 1 point per faucet: 1-2 points

Faucets using one and a half gallons per minute or less must be installed. Alternate compliance path is installing faucet with WaterSense label. Maximum of 2 points total.

Compliance: Inspection with documentation (5: Final).

Provide product documentation on-site.

1.21: Hot water recirculation system: 1 point.

Saves water by maintaining hot water at faucets. Sensors or switches turn circulation pumps on and off to save energy.

Compliance: Inspection with documentation (4: Rough-in).

Provide product documentation at inspection.

(Ord. No. 8, 2011; prior code 15.30.080; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-100. - Section 2, Recycling and reuse.**

The following paragraphs contain points allowed for recycling and reuse:

2.1: Wood, scrap metal, cardboard, concrete recycled on site: 2 to 8 points; 2 points per material type recycled.

There shall be labeled containers or areas on site designated for recycling with evidence of use and service. The Pitkin County Landfill offers a reduced tipping fee for separated wood waste, and cardboard can be recycled free. For example, if cardboard and wood scraps are being recycled in containers on site, 4 points would be given.

Compliance: Inspected (1 thru 5).

2.2: Use of spruce-pine beetle salvage wood: 4 points for structural; 1 point for other uses: 2 total.

Spruce-pine beetle-affected lumber harvested in Colorado can be utilized as dimensional framing material, as well as siding, flooring and trim. Material must be used for over 50 percent

of the use in the structure. For example: for flooring, 50 percent of the flooring installed must be pine- or spruce-beetle affected for 1 point.

Compliance: Inspected with documentation (2: Framing or 5: Final).

Provide documentation of source.

2.3: Use of compost from local landfills for landscaping: 2 points.

Provide delivery or purchase slip confirmation in the permit sleeve.

Compliance: Inspected with documentation (5: Final).

2.4: Twenty percent or more of fly ash content in over 50 percent of concrete used: 3 points.

Provide receipt from batch plant. Follow guidelines of American Concrete Institute for cure time.

Compliance: Inspected with documentation (1: Foundation).

2.5: Recycled Class 5-6 concrete or asphalt material: 2 points.

This material is available locally... Use this material for road base or driveways.

Compliance: Inspected with documentation (5: Final).

2.6: Reclaimed materials: 8 points total; 2 points per material.

Use of construction materials that have been reclaimed from another structure qualify. Materials that are purchased from a reclaimed materials distributor, deconstructed by the owner or applicant from another structure or purchased from a used building materials exchange (RECON in Wolcott, Habitat Store in Gypsum, Resource Yard in Boulder and others) all qualify as reclaimed materials.

Compliance: Inspected with documentation (4: Rough-in).

Material information and documentation must be on the job site for inspection.

2.7: Recycled Content: materials: 8 points total; 2 points per material used.

Some common recycled-content materials include steel studs-I-beams, composite decking, cellulose or shredded cotton batt insulation, recycled-content carpets, counter tops, recycled-content tile. Material must be used for over 50 percent of the use of this type of material in the structure. (Recycled-content roofing and siding not included in these points - See 3.14 and 3.16.)

Compliance: Inspected with documentation (PC and 1-5).

Provide material info with building permit.

2.8: Built-in recycling center: 1 point.

Install at least two bins in built-in kitchen recycling center to receive these points. Design recycling center to handle glass, cans, paper and other common recycling items.

Compliance: Inspected (5: Final).

(Ord. No. 8, 2011; prior code 15.30.090; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-110. - Section 3, Framing and materials.**

The following paragraphs contain points allowed for framing and materials:

**OPTIMAL VALUE ENGINEERING**

Optimal Value Engineering (OVE) is a technique for minimizing the amount of wood used for framing a structure by only using the amount of wood required for structural integrity and nail backing for wall sheathings and drywall. OVE framing can reduce the amount of time and lumber used in house construction by 25 percent. OVE framing also reduces heat loss by allowing more insulation and reduces drywall cracking by minimizing opportunities for differential movement between the wood and the drywall. Different types of OVE points are outlined below. See [www.apawood.org/advanced-framing](http://www.apawood.org/advanced-framing)

3.1: Use of 24-inch on center studs for over 50 percent of the structure: 3 points.

Framing on 24-inch centers reduces wood use and saves money. Be sure to verify structural requirements.

Compliance: Inspected (2: Framing).

3.2: Insulate corners prior to framing inspection: 2 points.

Insulating corners during construction prevents insulation "voids" often found with box corners. Better yet, use three-stud, turned corners, drywall clips or ladder blocking to facilitate insulation.

Compliance: Inspected with documentation (2: Framing).

Provide photos of insulation if not easily visible.

3.3: All closet headers flat-framed to minimize over-framing: 1 point.

Closets do not require upright 2 x 4 headers; simply frame the rough opening with a 2 x 4 laid flat.

Compliance: Inspected (2: Framing).

3.4: Structural-framing dimensions in two-foot increments: 2 points.

Most building products come in two-foot increments; building to this dimension minimizes waste. Even dimensions reduce material waste and labor. Exterior dimensions in two-foot increments must be incorporated in 75 percent or more of the building footprint.

Compliance: Plan check and inspected (PC and 2: Framing).

Show exterior dimensions on site and floor plans.

3.5: Single trim windows - no trimmer or jack studs: 1 point.

Use of metal hangers for window headers in lieu of jack studs allows room for more insulation and minimizes thermal bridging.

Compliance: Inspected (2: Framing).

**STRUCTURAL ELEMENTS**

3.6: Engineered I-Joist used in floors: 2 points; and roofs: 2 points.

Use of engineered wood I-joists, I-studs in place of solid dimensional lumber improves material efficiency. Engineered system must be in place for over 50 percent of the structure. Floors only: 2 points; roof only: 2 points; floors and roofs: 4 points.

Compliance: Inspected (2: Framing).

3.7: Engineered lumber used in structural applications: 2 points.

Use of glue-laminated beams and other engineered alternatives in structural applications must amount to over 75 percent of structural material.

Compliance: Inspected (2: Framing).

3.8: Structural insulated panels or straw bale: 10 points.

SIP panels, a foam core laminated to oriented strand board, or straw bale construction both provide superior R-values and reduced air infiltration than conventional 2 x 6 wall construction. Must be used for over 75 percent of exterior walls.

Compliance: Plan check and inspected (PC, 2: Framing). Show details on plans.

3.9: Pre-cut studs, pre-fabricated roof trusses: 2 to 4 points.

Pre-cut or off-site construction of structures reduces material waste. Use of pre-cut studs (2 points) or roof trusses (2 points). Must be used for over 75 percent of the structure.

Compliance: Inspected (2: Framing).

3.10: Panelized pre-fabricated walls and/or sections: 2 to 5 points.

Use of panelized or pre-fabricated walls: 3 points. Use of prefabricated sections or modular construction for 75 percent or more of home: 2 additional points.

Compliance: Inspected (2: Framing).

3.11: Finger-jointed studs or engineered studs for over 50 percent of framing: 3 points.

Use these studs for improved framing efficiency and improved structural integrity.

Compliance: Inspected (2: Framing).

## EFFICIENT MATERIALS

3.12: Oriented Strand Board (OSB) in subfloors and/or sheathing: 2 points.

Use OSB for over 50 percent of specified material used in these applications. (See low-toxic OSB Section 4.5 for additional points.)

Compliance: Inspected (2: Framing).

3.13: Materials manufactured within Colorado and/or rapidly renewable: 8 points total; 1 point per material used.

Provide documentation on site for any materials used that are manufactured in-state and/or are considered rapidly renewable. Rapidly renewable materials are building materials needing ten years or less of growth for their harvest. (Bamboo, cellulose, aspen). Concrete not included.

Compliance: Inspected with documentation (4: Rough-in).

3.14: Roofing: 30-year roofing or roofing with more than or equal to 75 percent recycle content: 2 points.

Install roofing with minimum 30-year life or roofing with greater than 75 percent recycle content. Roofs that typically will qualify for 75 percent recycled content include metal and faux shake/slate roofing. Provide cutsheet for roofing with 30-year or recycle content.

Compliance: Inspected with documentation (5: Final).

3.15: Aerated concrete block: 3 points.

This material is light and easy to work with. It is an interlocking block and reduces the use of energy-intensive concrete compared to conventional concrete blocks.

Compliance: Inspected with documentation (2: Framing).

3.16 Fiber-cement, stucco or recycled siding: 1 point.

Install fiber-cement, stucco or recycled content siding for over 50 percent of exterior wall surfaces for 1 point.

Compliance: Inspected with documentation (4: Rough-in).

Cutsheet for recycled material with receipt.

3.17 Insulated Concrete Forms (ICFs) for exterior (above-grade) walls: 5 points

Use grid type or post and beam ICFs that use less concrete, with over 50% recycled content for exterior above grade walls.

Compliance: Inspected. (PC and 5: Final).

3.18 Premanufactured Insulated Studs: 2 points

Studs in buildings can be a significant source of heat loss through thermal bridging. Premanufactured studs have built-in insulation to minimize thermal bridging and heat loss.

Compliance: Inspected. (2: Framing).

#### FSC and/or SFI MATERIAL

Sustainably harvested wood products are certified by the Forest Stewardship Council (FSC and/or the Sustainable Forestry Initiative (SFI)). Material must be used in over 50 percent of the application in the building.

3.19 FSC or SFI harvested lumber for at least 75 percent of framing material: 8 points.

3.20 Install FSC or SFI certified trim and/or flooring: 2 points available for each material used, up to 6 points.

3.21 FSC or SFI sustainable certified cabinets: 4 points.

3.22 Install FSC or SFI certified windows/doors or outdoor structures: Total 6 points; 2 points for each application.

Each application is 2 points with a total available of 6 points. For example: windows made with certified wood: 2 points.

Compliance for 3.19-.22: Inspected with documentation (2 and 5).



Documentation is required showing certification for each material specified. Make documentation available at framing inspection or final as appropriate.

## FOUNDATION ELEMENTS

3.23: Non-solvent-based foundation waterproofing: 3 points.

Use non-solvent-based waterproofing on all walls receiving waterproofing.

Compliance: Inspected with documentation (1: Foundation).

3.24: Insulated Concrete Forms (ICFs): 4 points.

Use grid-type or post and beam ICFs that use less concrete, with over 50 percent recycled content for basement and foundation walls.

Compliance: Inspected (1: Foundation).

3.25: Precast concrete wall foundation system: 2 points.

Precast wall systems reduce the amount of time and energy needed for foundation systems. One type to use is Superior Wall Systems. [www.superiorwalls.com](http://www.superiorwalls.com).

Compliance: Inspected (1: Foundation).

3.26: Recycled Content Insulated Concrete Forms (ICFs): 2 points.

Recycled Content Insulated Concrete Forms (ICFs) are expanded polystyrene form blocks which are stacked with concrete poured into the internal void. ICFs provide improved insulation and reduced moisture transport over conventional foundation walls. ICFs shown on structural plans.

Compliance: Plan check and inspected (PC, 1: Foundation).

3.27: Frost-protected shallow foundation: 3 points.

Use this design technology for more than 50 percent of the perimeter foundation. Provide details as per the International Residential Code.

Compliance: Plan check and inspected (PC, 1: Foundation).

3.28: Conditioned crawlspace: 3 points.

Construct all crawlspaces according to guidelines in ASHRAE Book of Fundamentals, Section 23.11, or the IRC. Insulate walls to code and ventilate with indoor air. Provide details demonstrating an approved design. Earth must be covered with vapor diffusion plastic retarder sealed to walls.

Compliance: Inspected (3: Insulation).

3.29: Controlled ventilated crawlspace: 3 points.

Construct all crawlspaces according to guidelines in ASHRAE Book of Fundamentals guidelines. Provide automatic dampers on crawlspace vents. Provide details demonstrating an approved design. Floor above crawlspace must be insulated at R-21 or above.

Compliance: Plan check and inspected (PC, 3: Insulation).

(Ord. No. 8, 2011; prior code 15.30.100; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-120. - Section 4, Indoor air quality chemical reduction.**

- (a) The paragraphs contained in this Section contain points allowed for indoor air quality.
- (b) For Sections 4.1 through 4.8, it is required that at least one category be performed.

4.1: Formaldehyde-free and/or low-toxic insulation: 4 points.

Insulation must be labeled as formaldehyde-free or GREENGUARD™ certified at [www.spot.ul.com](http://www.spot.ul.com).

Compliance: Inspected (3: Insulation).

4.2: Low- or zero-VOC and/or low-toxic interior paint: 2 points.

EPA regulations call for no more than 250 gm-L of Volatile Organic Compounds (VOCs) in Low-VOC latex paints and no more than 380 gm-L for Low-VOC oil-based paints/stains. Products must be either labeled "Low VOC" or GREENGUARD™ certified [www.spot.ul.com](http://www.spot.ul.com), or show that VOC levels are below EPA thresholds.

Compliance: Inspected with documentation (5: Final).

4.3: Water-based lacquers and water-based finishes on woodwork: 2 points.

Lacquers and wood finishes can contain toxic compounds. Use water-based products to reduce off-gassing of toxic substances in your home. Check for GREENGUARD™ recommended water-based products [www.spot.ul.com](http://www.spot.ul.com).

Compliance: Inspected with documentation (5: Final).

4.4: Solvent-free and/or low-toxic construction adhesives: 1 point.

Use construction adhesives free of aromatic hydrocarbons or solvents throughout the house. GREENGUARD™ certified adhesives comply with this requirement.

Compliance: Inspected with documentation (2: Framing and 5: Final).

4.5: Low-toxic-oriented strand board: 2 points.

Use low-toxic OSB for 50 percent or more of OSB wherever OSB is specified. GREENGUARD™ certified OSB complies with this requirement.

Compliance: Inspected with documentation (2: Framing).

Documentation from supplier.

4.6: Low- or non-toxic floor coverings: 2 points.

Materials either listed on [www.spot.ul.com](http://www.spot.ul.com) (or other nationally recognized agency's website) or show that coverings are below EPA thresholds for low non-toxicity. 1 point per specified material; maximum 2 points.

Compliance: Inspected with documentation (5: Final).

Provide cutsheet with material specification.

4.7: Elimination or sealing of all particleboard inside building shell: 1—2 points.

Provide material specifications for alternatives used; if particle board has been eliminated, for 2 points (i.e., strawboard). If all exposed particleboard is sealed, must be with three coats of low-VOC sealer for 1 point.

Compliance: Inspected with documentation (5: Final).

4.8: All ducts sealed during construction: 1 point.

As the ducts are installed, the duct openings into the interior spaces shall be sealed with plastic or other material to eliminate contamination and dust entering the ducts. Dirt, sawdust and other construction waste can fall into open ductwork during construction. This can be difficult to clean out and lead to dust and mold problems. Cover ducts with cardboard, polyethylene or other durable material and tape down.

Compliance: Inspected with documentation (3-5: Insulation - Final).

(c) For Sections 4.9 through 4.15, it is required that at least one category be performed.

## MECHANICAL SYSTEMS

4.9: Automatic exhaust fan in attached garage, no attached garage or detached garage: 2 points.

Exhaust fumes from vehicles in an attached garage can enter a living space. If an attached garage exists or there is habitable space above a garage, submit specifications on properly sized mechanical exhaust ventilation, running on a timer that automatically turns on when garage door closes. Points also for no attached garage.

Compliance: Inspected (2: Framing).

4.10: Reduce point source pollution: 2 points.

Install exhaust fans at stove and in all bathrooms, including bathrooms with exterior windows.

Compliance: Inspected (2: Framing).

4.11 ENERGY STAR low sone bathroom fans / bath fan timer: 1—3 points.

Install quiet, low sone (less than 1.0) bathroom fans for these points. One point per fan with maximum of 2 points. Reference the ENERGY STAR web site: [www.energystar.org](http://www.energystar.org). If all bath fans have timers, add an additional point.

Compliance: Inspected with documentation (5: Final).

Provide fan documentation.

4.12: High-efficiency filter on HVAC system: 2 points.

Install a high-efficiency filter on a forced-air furnace system. MERV 11 minimum. Compliance: Inspected (5: Final).

4.13: Mechanical room sealed: 1 point.

Mechanical equipment, such as the furnace, boiler and water heater, must be located in a separate room from living spaces. The room should be sealed off with a continuous-air barrier, to minimize air infiltration from the mechanical area to the rest of the house. Room must be fitted with an exterior solid-core door weather-stripped to exterior specifications. (Consider this strategy if not selecting 4.16).

Compliance: Inspected (3: Insulation).

4.14: Furnaces, boilers, gas hot-water heaters sealed combustion/direct vented: 4 to 8 points.

Sealed combustion and directed vented gas appliances reduce the risk of exhaust entering interior habitable areas. 4 points for each gas appliance; limit 8 points total.

Compliance: Inspected (5: Final).

4.15: Mechanical ventilation for fresh air supply (see also Section 5.25): (Mandatory) 2 points.

Design and install a ventilation system that complies with ASHRAE 62.2-2004 or most currently adopted version, "Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings." Total ventilation air (cubic feet per minute or CFM) shall be calculated by the following equation:  $CFM = (\text{total number of bedrooms} + 1) \times (7.5 \text{ CFM}) + (0.01 \times \text{total conditioned square feet})$ . See also Section 5.27 for alternative method for indoor air quality improvement with air-to-air heat exchanger. If using air-to-air heat exchanger points (Section 5.25), count these points for mechanical ventilation too.

Compliance: Inspected with documentation (PC, 5: Final).

Show calculation on plans at permit submittal.

(Ord. No. 8, 2011; prior code 15.30.110; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-130. - Section 5, Energy compliance.**

Compliance with the following minimum efficiencies is mandatory, depending on house size. Energy compliance may be determined by either REScheck or HERS rating in homes less than 2000 sf. Homes less than 2,000 sf have the option of either meeting the HERS requirement or providing REScheck and solar per the chart below. Houses 2000 sf and above must provide solar and HERS rating. All homes must meet the UA requirements of the currently adopted energy code. A written report must be provided to show compliance. The following minimums are required along with the compliance paths. Code refers to currently adopted version of the energy code. Carbondale is in Climate Zone 6.

**Table 5.0 New Construction and Additions  
2,000 Square Feet and Over**

<b>Category</b>	<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3</b>	<b>Tier 4</b>
House Size (SF)	<2,000	2,000— 3,999	4,000— 6,999	>=7,000
Points (min)	110	110—180	230—330	430—550

HERS (max)	50 (option)	40	35	30
PV Requirement (min) (a)(b)(c)(d)	1.5 watts per sf (option)	1.5 watts per sf	1.5 watts per sf	2.0 watts per sf
Boiler/furnace (min). AFUE	87%/88%	90%/92%	92%/94%	94%/95%
Air conditioning (min). SEER	14	15	16	17
Heat Pump (min) HSPF	10	10	10	11

- (a) Shading: Houses that do not have access to solar energy, as verified by a third party, approved by the Chief Building Official, can provide the renewables offsite by purchasing renewable energy via a method approved by the town.
- (b) High Performance Houses that provide calculations showing that their overall energy use is less than 3 watts per sf can reduce the size of the renewable systems to meet 25% of their overall electrical needs.
- (c) Fee in lieu of required renewables to be calculated per Section 18.11.170
- (d) For multi-family, the PV requirement is 1.0 watt per sf (min) for all Tiers.

**REQUIRED ENERGY COMPLIANCE DOCUMENTS**

Choose one method from Sections 5.1 (for homes 2000 sf and larger) or 5.2 (for homes under 2000 sf):

5.1: (For homes 2000 s.f. and larger) Compliance with HERS rating per Tier Table:

Submit a projected "From Plans" rating certificate with the building permit application and obtain a "Confirmed" rating certificate at completion. Blower door test as part of HERS rating is required.

A certified Home Energy Rater must complete energy inspections and reports. Complete information, including a list of local rating professionals, is available at [www.resnet.us/trade/home-energy-raters-hers-raters](http://www.resnet.us/trade/home-energy-raters-hers-raters) or on CORE website.

Compliance: Plan check and inspection (PC, 5: Final inspection).

Submit a projected "From Plans" review by HERS rating at plan check and "confirmed" HERS rating certificate in permit sleeve prior to final inspection.

HERS is not required for homes less than 2,000 s.f. if the structure meets the Prescriptive Requirements of the currently adopted energy code and the energy compliance table in section 5 of the REBP including the Photovoltaic requirement.

5.2: (For homes less than 2000 s.f. only) Compliance via prescriptive path and PV with REScheck REPORT: REQUIRED.

For Tier 1 only, a completed REScheck software report and a copy must be submitted with permit application to demonstrate building compliance with the Town's Energy Code. The current version of the IECC must be selected in the code selection portion of the REScheck software and appropriate climate zone as amended. See IECC adoption. US Department of Energy has the REScheck compliance tool on its web site: [www. energycodes. gov/rescheck/](http://www.energycodes.gov/rescheck/).

Compliance: Plan check and inspection (PC, 5: final).

Include information on plans that shows compliance with prescriptive requirements REScheck report submitted with plan and in inspection container on site.

## PERFORMANCE BETTER THAN CODE

5.3: HERS-rated house less than tier requirements. One point per point below tier requirements, maximum of 40 points: 1 to 40 points.

As per Section 5.1, submit HERS "Confirmed" rating certificate showing score less than tier requirements. Complete information, including local rating professionals, is available at [www.resnet.us/trade/home-energy-raters-hers-raters](http://www.resnet.us/trade/home-energy-raters-hers-raters).

Receive 1 point for each HERS rating point below tier requirements.

Blower door test as part of HERS rating is required:

Compliance: Inspected (5: Final).

HERS "Confirmed" rating certificate placed in permit sleeve.

5.4: REScheck report better than code: 1 to 40 points.

Depending on the building envelope and mechanical system efficiencies, REScheck may report performance better than code. Obtain 1 point for every one percent better than code, to a maximum of 40 points. This option is only available to Tier 1.

Compliance: Inspected (5: Final).

5.5: Blower door and duct blasting test: 1-6 points. REQUIRED

This requirement is mandatory for all residences.

Complete a blower door test by a certified professional that accurately shows air changes per hour (ACH) @ 50 Pascals. Test results must show ACH of currently adopted IECC Code maximum; 1 point for each increment of 0.5 below the currently adopted IECC Code maximum, ACH50, up to 6 points. .Compliance: Inspection with documentation (5: Final).

Documentation from blower door professional in permit packet prior to final inspection.

## EFFICIENT ENVELOPE - INSULATION MEASURES

5.6: Insulated headers on all exterior walls: 2 points.

All headers on exterior walls shall be insulated to a minimum R-7.

Compliance: Inspected (2: Framing).

5.7: Raised heel trusses: 4 points.

Raised heel trusses provide roof space at the exterior wall for insulation at a critical place at the exterior wall-roof interface. Minimum raised heel size to receive points is 12 inches. Provide greater raised heel heights as required for insulation per currently adopted energy code. Points in Section 5.9 reflect for raised heel only; see Section 5.10 for points for insulation.

Compliance: Inspected (2: Framing).

5.8: Roof-ceiling insulation: 1 to 11 points.

For conventional framing, 1 point given for each R value over currently adopted energy code, up to 6 points maximum. For example, if code requires R49, and R52 is installed = 3 points.

For raised heel trusses, 1 point given for each R value over currently adopted energy code, add insulation for maximum 11 points.

Compliance: Plan check and inspected (PC, 3: Insulation).

Show roof-ceiling insulation on plans.

5.9: Wall cavity insulation: 1 to 8 points.

1 point is given for each R value over currently adopted energy code, up to 8 points maximum. For example, if code requires R-21 and an R-28 wall is installed, 7 points will be given.

Compliance: Plan check and inspected (PC, 3: Insulation).

Show wall insulation in construction plans.

5.10: Continuous exterior insulation: 2-10 points.

Two points given for each R value over currently adopted energy code minimum, up to 10 points maximum.

Compliance: Plan check and inspected (PC, 3: Insulation).

Show wall insulation in construction plans.

5.11: Crawlspace/basement wall insulation: 2 to 4 points.

For crawlspace and/or basement walls, provide exterior perimeter insulation. Insulation must be continuous for entire wall area below main floor. Provide detail to account for thermal bridging at transition from basement to upper wall. 2 points for each R5 above currently adopted energy code for a maximum of 4 points

Compliance: Plan check and inspected (PC, 3: Insulation).

Show insulation of wall in construction plans.

5.12: Insulation under heated slab: 2 to 3 points.

For heated slabs-on-grade, provide location of insulation of slab in construction drawings: Provide detail to account for thermal bridging at perimeter. For continuous R-10 minimum insulation, 2 points; for continuous R-15 minimum insulation, 3 points.

Compliance: Plan check and inspected (PC, 1: Foundation).

5.13: Insulate all hot water pipes at all locations R-3 or higher: 2 points.

Insulating hot water pipes reduces heat loss through the plumbing system. Closed cell foam or fiberglass pipe insulation must be installed on all hot water pipes at a minimum R-3 value. Leave clearance space for gas heater exhaust.

Compliance: Inspected (3: Insulation).

5.14: Blown or sprayed insulation: 8 points.

Blown or sprayed insulation reduces air infiltration and offers higher effective R values than batt insulation. Blown insulation must be installed in more than 50 percent of exterior surfaces - attics, ceilings, walls, basements and crawlspaces - to receive points.

Compliance: Inspected (3: Insulation).

5.15: Water heater wrapped with R-5 or above: 1 point.

Insulating water heaters reduces heat loss of hot water storage, is simple and inexpensive and offers a rapid return on investment for energy savings. Tankless water heaters are not applicable. All water heaters must be wrapped in order to qualify. Note: some gas water heater manufacturers do not recommend insulating wraps for their water heaters. follow manufacturers recommendations.

Compliance: Inspected (5: Final).

5.16: R-5 Exterior doors: 1 point.

Insulated and sealed exterior doors reduce heat loss.

Compliance: Inspected (4: Rough-in).

5.17: No recessed lights in cathedral ceilings: 2 points.

Recessed lighting in exterior ceilings, exposed to outside air, can allow for thermal leakage, both from reduced insulation and air leakage.

Compliance: Inspected (3: Insulation).

#### MECHANICAL EQUIPMENT - EFFICIENCY MEASURES

5.18: Mechanical equipment centrally located: 2 points.

Locate mechanical equipment within the middle one-third of the distance of the longest horizontal diagonal.

Compliance: Plan check and inspected (PC).

5.19: Manual J calculations used for sizing mechanical equipment: 3 points. REQUIRED for all homes .

This point is mandatory for all homes.

Oversizing mechanical equipment wastes energy as equipment cycles on and off. ACCA Manual J, 8th edition, or most current (or equivalent), shall be used to determine correct size of mechanical equipment.



Compliance: Final Inspection

Submit calculations with Checklist.

5.20: Thermostats for each room: 2 points.

To qualify for the 2 points, each enclosed room must have a separate thermostat, not including storage areas, closets, bathrooms, mechanical rooms or nonhabitable space.

Compliance: Inspected (5: Final).

5.21: Programmable thermostats: 1 to 2 points.

Thermostats that automatically change programmed temperature settings to provide night set-back or reduced temperature settings for unoccupied periods must be installed and be functional. Not to be used for radiant in-floor systems. One point for each programmable thermostat installed, maximum 2 points.

Compliance: Inspected (5: Final).

5.22: Efficient Boiler or Furnace: 1 to 7 points.

Install a boiler and/or furnace with an AFUE rating at or above value given in Sec 18-11-130, Table 5 (Energy Efficiency Table) and receive 1 point per 1% increase in efficiency starting 8% above currently adopted energy code with a maximum of 7 points.

Compliance: Inspected (4: Rough-in).

5.23: Radiant floor-hydronic baseboard heating system: 5 points.

Either in-floor radiant heat or baseboard hydronic heat qualifies as long as over 75 percent of the heating needs of the structure are met by hydronic means.

Compliance: Plan check and inspected (PC, 4: Rough-in).

Show system detail on construction plans.

5.24: Side arm hot water heater, indirect coil from a boiler or tankless on-demand water heater for domestic hot water use: 3 points.

Units must have an intermittent ignition device (IID) instead of a standing pilot light to qualify. Tankless hot water heaters may use natural gas or electricity as heating source.

Compliance: Inspected (5: Final).

5.25 Air-to-air heat exchanger: 1-6 points.

An air-to-air heat exchange captures potentially lost warm or cool air while ventilating interior space. 1 point for each single room HRV or ERV (4 max) or 6 for whole house. The heat exchanger may be used as mechanical ventilation. See Section 4.15, count points for both Sections (5.25 and 4.15).

Compliance: Inspected (5: Final).

## DUCTING - AIR CONDITIONING - HVAC

5.26: All ductwork sealed with mastic: **REQUIRED.**

Delivery of heated or cooled air to where it is needed in a home requires proper sealing of ductwork, use mastic for superior performance. Forced air systems only.

Compliance: Inspected (4: Rough-in).

5.27: All ductwork sealed with low VOC mastic: 2 points.

Compliance: Inspected with documentation (4: Rough-in).

Documentation of Low VOC mastic required.

5.28: No ductwork in unconditioned spaces or ductwork insulated to R-8 in unconditioned spaces.

Ductwork insulated to R-8 minimum in unconditioned space: 1 point.

No ductwork in unconditioned spaces: 3 points.

Whenever possible, running ductwork through unconditioned space, especially attics, should be avoided. It creates a potential for heat loss and moisture problems. However, if it is not avoidable, all ductwork should be properly sealed at all joints with mastic and insulated to a minimum R-8.

Compliance: Inspected (4: Rough-in).

5.29: Fully ducted system: REQUIRED.

If a ducted system is installed, all supply-and-return ducts must be fully ducted. No panned spaces or building spaces can be used or modified to be used as ducts. Install all ducts.

Compliance: Inspected (4: Rough-in).

5.30: No mechanical air conditioning (A/C) or use evaporative cooling: 5 points.

Due to dry weather patterns and low number of Cooling Degree Days, most houses do not use mechanical air conditioners. Evaporative cooling is an acceptable cooling alternative to mechanical air conditioning and uses ten percent of the electricity used in air conditioning systems.

Compliance: Inspected (4: Rough-in).

5.31: Mechanical air conditioning installed: Minus 4 points.

Through proper design of building aspect, window sizing and placement, overhang shading and insulation, air conditioning systems are unnecessary in this climate. Eliminating the need for air conditioning offers an immediate initial cost savings, as well as reduced operational costs for the life of the structure. Projects installing mechanical air conditioning will receive minus 4 points. Section 5.19 (Manual J Analysis) required.

Compliance: Inspected (5: Final).

5.32: Mechanical A/C with rating 2 points higher than required in Table 5 Energy Compliance. Table: 2 points.

Since January 2006, minimum SEER is 13 for all A/C systems manufactured in the U.S. Choose a more efficient, higher SEER system for operational savings over the system lifetime. SEER must be 15 minimum to be applicable for points. Sections 5.19 and 5.31 required.

Compliance: Inspected with documentation (5: Final).

Supply AHRI certificate with SEER in the inspection container.

## COOLING STRATEGIES

5.33: Overhangs: 2 points.

Provide properly sized overhangs for blocking solar gain in the summer on south windows. See Section 6.4.

Compliance: Plan check and inspected (PC, 5: Final).

5.34: Reduce heat gain in summer: 2 points.

On east- and west-facing windows, either use windows with a SHGC, Solar Heat Gain Coefficient of .40 or less or install reflective films to reduce heat gain in summer. Reduce the amount of west-facing glass to avoid overheating.

Compliance: Inspected with documentation (4: Rough-in).

Check the NFRC window stickers or see film specs in the inspection container.

5.35: Ceiling fans/air destratification system in common rooms: 1 point.

Installation of a ceiling fan or air handling system helps to cool spaces in summer and reduces the accumulation and escape of warm air through the ceiling during the winter.

Compliance: Plan check and inspected (5: Final).

Show units/systems in construction plans.

5.36: Installation of whole-house fan natural cooling/ventilation system: 2 points.

Whole-house fan natural cooling and ventilation systems are installed in ceilings and attics to help cool a structure by flushing warm air from inside living space as well as the attic. Such ventilation systems can help reduce or eliminate air conditioning cooling loads. Systems must be installed and operable manually and by automated thermostat. Fans should be sized to produce between four and five air changes per hour (ACH) at maximum speed. For design purposes, use the following formula:

Minimum fan CFMs = Volume of house x 4.5 ACH / 60; where Volume = square footage of house interior times average ceiling height.

Provide an insulated R-19 cover for winter protection.

Compliance: Inspected (5: Final).

5.37: Reflective Radiant Barrier: 1 point.

Show and specify a reflective radiant barrier on roof/ceiling insulation plan. Install a reflective radiant barrier on the ceiling or floor of the attic, or under the roof sheathing of a vaulted ceiling.

Compliance: Inspected. (2: Framing, 3: Insulation).

## WINDOWS/OTHER

5.38: Insulating window coverings installed: 4 points.

Windows, even high performance models, are still typically the largest point of heat loss in walls. By utilizing insulating window coverings, a window's thermal performance can be doubled or tripled. Window coverings must be properly installed and have a minimum R-3 to qualify. Some common options are duet/cellular shades or quilted shades. Install on 75 percent of windows.

Compliance: Inspected (5: Final). Must be installed.

5.39: Unheated air lock entry: 4 points.

A significant amount of heat loss can occur when an exterior door is opened into a heated space. By incorporating an airlock space with an interior door, creating a space that acts as a vestibule, this heat loss can be minimized.

Compliance: Inspected (5: Final).

5.40: High Performance Windows: 1-10 points

Provide window manufacturer specifications with window schedule as part of construction plans. Leave window labels in place until inspected.

1 point for each 0.01 that the U-Value of the window is below currently adopted energy code.

Compliance: Inspected. (3: Insulation).

## ELECTRICAL

5.41: ENERGY STAR appliances: 2 to 10 points.

Use any appliances with the EPA's ENERGY STAR logo on them and/or appliances listed on [www.energystar.gov](http://www.energystar.gov) website qualify. Units must be installed and operable. Two points per appliance.

Compliance: Inspected (5: Final).

Check for ENERGY STAR labels in appliances.

5.42: Dimmers installed: 1 point.

Install dimmers on four fixtures for 1 point and save energy using the dimmers.

Compliance: Inspected (5: Final).

5.43: House dimming system: 2 points.

Systems for automatic control of lighting can be used for dimming and contain time clock and programming capability for vacation mode. Use the system to save energy and help reduce light pollution in neighborhoods.

Compliance: Inspected (5: Final).

5.44: Occupancy/motion-sensing light switches: 1 to 4 points.

Lighting that operates by occupancy or motion detection saves energy and increases safety. Motion-detection lighting is ideal for exterior uses and interior spaces such as bathrooms, closets and basements. These switches come either as an integrated unit or by a remote motion sensor. 1 point is given for each motion detection switch installed, up to 4 points.

Compliance: Inspected (5: Final).

5.45: LED Efficient lighting: 2-4 points.

Minimum of 75% of lighting fixtures are REQUIRED to be high efficacy (LED).

2 pts for > 75% LED, 4 pts for 100% LED

Compliance: Inspected (5: Final).

5.46: Airtight J boxes: 2 points.

Reduce air infiltration through electrical boxes; use air-tight boxes on all exterior walls for improved energy efficiency.

Compliance: Inspected (4: Rough-in).

5.47: Interior lighting light pollution reduction: 5 points.

All openings in the envelope (translucent or transparent) with a direct line of sight to any nonemergency luminaires must have shielding between 9:00 p.m. and 6:00 a.m.

Consider ways to reduce bright light spilling from inside the home into the outside environment to be a good neighbor. Curtains, shades, proper placement of fixtures, light shades and low light levels at night can help reduce light pollution.

Compliance: Inspection (5: Final).

5.48: Electrical Installed in garage: 5 points.

Install 240V electrical in garage for future charging station.

Compliance: Inspection (4: Rough-in))

(Ord. No. 8, 2011; prior code 15.30.120; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-140. - Section 6, Solar energy.**

The paragraphs contained in this Section contain points allowed for solar energy.

6.0 General Description:

Section 6 should be reviewed with Section 9.1, Size requirement, for renewable energy installation.

6.1 Prerequisite for items 6.3-6.7:

Site should have reasonably unobstructed solar access from the south from 10:00 a.m. to 2:00 p.m. Site plan must show accurate North Arrow.

6.2: Rough-in for future solar electric: REQUIRED

Tier 1 has option of whether to install PV but is required to rough-in for future solar electric. Install minimum three-quarter-inch metal conduit from future site for solar electric to service panel or room for utilities.

Compliance: Inspected (4: Rough-in).

6.3: Garage cannot be heated unless offset by solar (see 9.2) REQUIRED

See 9.2

Compliance: Inspected (4: Rough-in).

6.4: Sun-tempered design: 5 points.

In this climate, ten percent to 15 percent of a home's heating energy can be obtained by moving some of the home's windows to the south side of the house. Install south-facing (at least within 30 degrees of true south) glass, equivalent to six percent to seven percent of total above-grade heated floor area. On plans, show calculation of area of south glass divided by total heated floor area.

Compliance: Plan Check (PC).

6.5: Passive solar design: 5 to 10 points.

Effective passive solar design allows for south-facing solar heat gain and heat storage in thermal mass of the interior during the winter, while properly shading south-facing windows to prevent unwanted heat gain during the summer.

Passive solar design for enhanced performance:

Install south-facing glass equivalent to seven percent to 12 percent or more of total above-grade heated floor area, and provide proper shading according to the figure above, where E = eave width, H = height of bottom of window from the eave, and  $H = E * 3.38$ , or conversely,  $E = H / 3.38$ . Show calculations on the plan. 5 points.

For each square foot of south-facing glass, provide at least thermal mass in interior walls and/or floor reached by the solar gain. Types of thermal mass which qualify include concrete floors, double-layered sheetrock, gypcrete, tile, masonry, CMUs, adobe and stone. 5 points.

Compliance: Plan Check and Inspection (PC, 5: Final).

6.6: Solar hot water system for domestic hot water: 8 points.

Solar hot water system also serves for heating: 8 additional points.

Domestic solar hot water:

Install a solar hot water system, which includes rooftop or ground-mounted panel collectors connected to a heat exchanger and/or insulated storage tank for domestic hot water supply. System must have unobstructed solar access. Systems may be active, using solar or electric

pumps, or they may utilize a thermal siphon. Collectors must be facing within 20 degrees of true south, and between 30 and 60 degrees from horizontal. See Section 18-11-170 for on-site requirements. System size is dependent on number of bedrooms:

One bedroom - 40 square feet of collectors: 50 gallons storage.

Two bedrooms - 48 square feet of collectors: 60 gallons storage.

Three bedrooms - 64 square feet of collectors: 80 gallons storage.

Four and more bedrooms - 96 square feet of collectors: 120 gallons storage.

Compliance: Inspected (5: Final).

Integrated solar hot water:

Integrated solar hot water system that supplements both radiant floor heat and domestic hot water is worth a total of 12 points.

Install a solar hot water system sized as previous that provides heat for radiant floor heating, as well as domestic hot water. Show system in construction plans and schematics. Distribute solar heat to a heat exchanger and/or insulated storage tank in order to meet part of the winter heating load. Area of solar collectors shall be five percent to seven percent of total heated floor area. No more than 320 square feet of collector shall be installed on a house. The collectors for the solar system must be mounted with a minimum slope from the horizontal of 40 degrees.

Compliance: Inspected (5: Final).

6.7: On-site solar electric or photovoltaic system: 5 to unlimited points.

Obtain 5 points for every one-half Kilowatt (Kw) installed; for example: 2 Kw = 20 points, 4 Kw = 40 points. Partial points offered for systems not reaching the .5 Kw increments. For example: 3.1 Kw = 31 points.

Photovoltaic panels should be mounted within 30 degrees of true south and between 20 and 50 degrees from horizontal to receive full credit for Kw capacity.

Systems with designs that are not within the orientation parameters must show efficiency of system more than 70 percent as per the "solar orientation chart." The solar orientation chart is in the appropriate section in the REBP Checklist. These systems can receive partial credit, but the Kw capacity must be adjusted for efficiency. For example: nameplate 4 Kw x 75% efficiency equals 3 Kw.

The system must have unobstructed solar access. The applicant must submit plans from a qualified architect, engineer or COSEIA certified designer, certifying the Kw capacity and proper system design. Proper protection as per code and prevention of electric islanding must be in place in the event of a power outage.

Compliance: Inspected with documentation (5: Final).

(Ord. No. 8, 2011; prior code 15.30.130; Ord. No. 8, 2015 §1, 8-11-2015)

### **Sec. 18-11-150. - Section 7, Innovation points.**

The paragraphs contained in this Section contain points allowed for innovation.

7.1: Innovation points: 1 to 20 points.

Innovative product use and/or design will be given points on a case-by-case basis. The item must specifically meet the intent of the REBP code as stated at the beginning of this Article, and points will be scaled as the item would apply to similar comparable sections in the Code. Criteria for points granted will be made available.

Some options eligible for innovation points may include but are not limited to:

Energy modeling, Indoor Air Plus, DOE Net Zero Energy Ready, modulating or sequential-staged boilers, sun rooms, net-zero energy home, pervious materials in hardscape areas, Trombe wall/interior thermal massing systems, evapo-transpiration watering system.

7.2: Ground source heat pump system or Cold Climate Air Source Heat Pump: 20 points.

Ground source heat pumps utilize glycol loop systems drilled into the ground to heat or cool a structure. The system also provides hot water for home. Minimum COP as per AHRI guidelines must be minimum 3.3. Air Source Heat Pump must be designed for cold climate. System design must cover the heat load of the residence. . Cannot take points for both 7.2 and 7.3.

Compliance: Inspected with documentation (4: Rough-in).

AHRI Certificate required.

7.3: No Natural Gas or propane on site: 25 points

All heating equipment to be heat pump or other high efficiency system. Cannot take points for both 7.2 and 7.3.

Compliance: Inspected with documentation (4: Rough-in)

AHRI Certificate required

7.4: Deconstruction/reuse of materials: 1 to 10 points.

In cases of scrape-offs or remodels, deconstruction of structures should be considered. Materials can be donated or sold to organizations such as Habitat for Humanity or commercial building resellers for reuse or sale. The number of points is dependent on the amount of deconstruction material donated. Donated/reused value of \$5,000.00 equals 10 points.

Compliance: Inspection with documentation (4: Rough-in). Provide value receipt from donation or sale.

7.5: Deconstruction/grinding/recycling: 5 points.

In cases of scrape-offs or remodels, deconstruction or grinding of waste should be considered. The number of trips to the landfill can be significantly reduced and wood waste can be recycled for use as compost material at either South Canyon or Pitkin County. Other materials such as metals can also be recycled.

Compliance: Inspection with documentation (4: Rough-in). Provide receipt for recycling and/or grinding operation.

7.6: High efficiency wood stove: 2 points.



Specify stove make and model number on plans. Stove may generate no more than 2.0 grams/hour of particulate and must exceed 75% efficiency as determined by EPA (New Source Performance Standard for New Residential Wood Heaters) test methods using Low-Heat Value protocol. Provide EPA "Temporary Label", manufacturer's (IRS) certification statement, or other documentation at plan review. Installation must conform to manufacturer's recommendations at final inspection.

Compliance: Plan check and inspection (PC, 5: Final)

7.7: Donate surplus materials: 1-3 points.

1 point per trailer load (maximum 3)

Compliance: Inspection with documentation (5: Final). Provide receipt for donation.

(Ord. No. 8, 2011; prior code 15.30.140; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-160. - Section 8, Alternative - cash in lieu of points.**

The paragraphs contained in this Section contain points allowed for cash in lieu of points.

8.1: Cash in lieu: Maximum of 25 percent of required points.

Projects may pay a fee instead of scoring points. The maximum amount of points per checklist is 25 percent of total required points. Fees are calculated using the Checklist. In general, the fee structure for points increases with increasing house size. The range of maximum points and cost for maximum points and cost per point are shown below. Please refer to the Checklist for actual point cost for your specific project based on checklist input.

<i><b>Tier</b></i>	<i><b>Total Sq. Ft.</b></i>	<i><b>Max Point Range Allowed for Cash in Lieu</b></i>	<i><b>Cost per Point Range</b></i>
1	<2,000	27	\$250.00
2	2000-3999	27-45	\$250.81-\$304.56
3	4000-6999	57-82	\$304.60- \$520.20
4	7000-10000	107-137	\$520.30-\$898.00

(Ord. No. 8, 2011; prior code 15.30.150; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-170. - Section 9, Onsite renewable energy and exterior use requirements, offsite solar option and fees in lieu of same.**

The paragraphs contained in this Section contain points allowed for renewable energy and fees in lieu thereof.

9.1: Requirements for renewable energy installation:

All residential construction 2000 sf and over (including additions and multi-family projects 2000 sf and over in aggregate Conditioned Floor Area (CFA)), as defined in Section 18-11-80 of this Article, are required to install a renewable energy system on site, or pay a fee. Options for compliance are as follows:

Install solar electric system for houses and additions 2,000 square feet and over; or

Pay a fee in lieu of renewable energy development to the Town of Carbondale.

Houses that do not have access to solar energy, as verified by a third party, approved by the Chief Building Official, can provide the renewables offsite by purchasing renewable energy via a method approved by the town.

The solar electric system, off-site solar energy requirement or fee-in-lieu payment is applied as per the REBP Checklist calculations. If the applicant cannot use the electronic version of the Checklist, the size of the solar electric system option or fee can be interpolated from the examples below. The fee structure and on-site renewable energy options are graduated. The Fee Option is calculated at \$5.00 per required watt of PV. Some examples of fees or solar options are as follows:

<b>Size Sq. Ft.</b>	<b>Solar Energy Requirement (on-site or off-site)</b>	<b>Fee Option</b>
2,000	3.0 Kw solar electric	\$15,000.00
3,000	4.5 Kw solar electric	\$22,500.00
5,000	7.5 Kw solar electric	\$ 37,500.00
7,500	11.5 Kw solar electric	56,250.00
10,000	20 Kw solar electric	100,000.00

Multi-family projects over 2,000 sf in aggregate Conditioned Floor Area (CFA) are required to provide 1.0 watts per square foot of Photovoltaic equivalent or pay a fee in lieu. For example, a 3000 aggregate CFA project would require 3.0 KW solar electric or pay a fee of \$15,000.

Two Panel Solar thermal systems may be substituted for 2.7 Kw of PV requirement.

The solar systems installed on-site for house size requirements will also count towards points required for REBP Checklist.

Compliance: Plan check (PC).

9.2: Exterior uses of energy.

This Code considers exterior energy uses over a nominal amount as identified below. In order to offset the exterior use of energy, the use must be mitigated with renewable energy on-site or the applicant has an option to pay a fee. Fees are based on average Btus required for such amenities over a 20-year period in this climate. Fees are exempted if renewable energy systems are installed on-site which generate the equivalent of 50 percent of the energy needed for the use. On-site system design and calculations required. Designs must be approved by the Town of Carbondale, in consultation with the Community Office for Resource Efficiency (CORE), until standards are developed and adapted to the REBP Checklist.

Exterior energy fees would apply exclusively to residential projects as follows:

<b>Energy Use</b>	<b>Btu per Sq. Ft. per Year</b>	<b>"Free Allowed Sq. Ft." per Unit</b>	<b>Fee per Sq. Ft. Above "Free Allowed"</b>
Snowmelt	81,800	None	\$ 33.00
Small Spa	430,000	64	176.00
Pool	332,000	None	136.00
Heated Garage	19,500	None	8.00

Maximum amount of allowable exterior energy used is 240,000,000 Btu or purchased is \$100,000.00.

All calculations must be submitted at time of permit. On-site renewable energy systems installed for exterior energy do not count towards required point total.

Compliance: Plan Check (PC).

(Ord. No. 8, 2011; Ord. No. 9, 2012 §1; prior code 15.30.160; Ord. No. 8, 2015 §1, 8-11-2015)

**Sec. 18-11-180. - Carbondale Residential Efficient Building Program Checklist.**

- (a) The Building Department shall maintain and periodically update a Residential Efficient Building Program (REBP) Checklist consistent with this Article.
- (b) The REBP Checklist can be downloaded from the Town's website with Summary Page to assist in compliance with Sections 8 and 9 (Sections 18-11-160 and 18-11-170 of this Article).

(Ord. No. 8, 2011; prior code 15.30.170; Ord. No. 8, 2015 §1, 8-11-2015)

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