

**ORDINANCE NO. 8
SERIES OF 2011**

**AN ORDINANCE OF THE BOARD OF TRUSTEES OF THE TOWN OF
CARBONDALE, COLORADO, AMENDING CHAPTER 15.30 OF THE
MUNICIPAL CODE REGARDING THE CARBONDALE EFFICIENT
BUILDING PROGRAM**

WHEREAS, by Ordinance No. 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, after approximately three years of operation, 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, that the following amendments to the Town of Carbondale Municipal Code are hereby approved and adopted.

Chapter 15.30 of the Carbondale Municipal Code, entitled Efficient Building Program Residential” is renamed “Residential Efficient Building Program” and is amended to read as follows:

Chapter 15.30

Residential Efficient Building Program

- 15.30.010 Purpose
- 15.30.020 Applicability
- 15.30.030 Exemptions
- 15.30.040 Point Requirements
- 15.30.050 Renewable and Efficiency Fund
- 15.30.060 Inspection and Compliance
- 15.30.070 Definitions
- 15.30.080 Section 1: Site/Water Conservation
- 15.30.090 Section 2: Recycling and Reuse
- 15.30.100 Section 3: Framing and Materials
- 15.30.110 Section 4: Indoor Air Quality
- 15.30.120 Section 5: Energy Compliance
- 15.30.025 Section 6: Manufactured Housing
- 15.30.130 Section 7: Solar Energy

- 15.30.140 Section 8: Innovation Points
- 15.30.150 Section 9: Alternative Points
- 15.30.160 Section 10: On-site Renewable Energy and Exterior Use
- 15.30.170 Carbondale Residential Efficient Building Checklist

15.30.010 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 on-site renewable energy mitigation in order to promote a local self-sufficient energy economy as per the Carbondale Energy Plan.

15.30.020 APPLICABILITY

Carbondale’s Residential Efficient Building Program (REBP) applies to all new residential (single-family, duplex, townhouse, accessory dwelling unit) construction per the currently adopted building codes, as well as multifamily and residential sections of multi-use projects, and additions/reconstruction (remodel) projects as defined by the International Building Code or as specified in definitions.

The Carbondale Residential Efficient Building Program Checklist (REBP Checklist) and this code document are used for code enforcement. A resource guide will be provided for additional guidance and background references.

15.30.025 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.

15.30.030 EXEMPTIONS

Houses or mixed use structures applying for historical designation may request the Community Development Department to exempt the structure from any requirements set forth in this chapter. The Community Development 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.

Mobile home units that are approved by Colorado Department of Housing are exempt.

In the event of any conflict between this Chapter 15.30 and any provision set forth in Title 18 of this Code (Zoning), Title 18 shall govern.

Additions less than 500 square feet are exempt from the Carbondale Residential Efficient Building Program, but shall abide by the requirements of the currently adopted version of the International Energy Conservation Code (IECC).

15.30.040 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 multifamily and residential portions of multi-use projects. See definitions for appropriate total square footage calculations. In multi-use and 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 & ADDITIONS 2000 Square Feet and Over

CATEGORY	Tier 1	Tier 2	Tier 3	Tier 4
House Size	<3000 SF	3000-4999	5000-7999	>8000
Points	110	110-180	230-330	430-550

ADDITIONS 2000 Square Feet and Under

ADDITIONS				
Size (sf)	500	1000	1500	2000
Points	40	60	80	110

If the construction permit is only for a detached garage, the point requirements shall follow the Additions point schedule above.

Residential units in the multifamily and multi-use categories calculate total square footage as an “average” unit size as per the definitions. The points required are based on this “average” size. Multifamily and multi-use projects receive credit against the points required for the “average” size for building efficiency as follows:

1. Credit of 10 points for efficiency of common walls.
2. Credit of 10 points if heating and hot water system is common to all units.

C. Alternative Points - Cash In Lieu. Permit applicants may pay a cash fee in lieu of meeting some of the points required (see Section 15.30.150). Cash in lieu points are limited to 25% of the points required.

D. On-Site Requirements. Houses over five thousand square feet must supply part of the energy use in the home on-site or elect to provide off-site mitigation through a fee payment option (see Section 15.30.160). Also the code considers exterior energy uses over a nominal amount in Section 15.30.160.9.2. 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.

15.30.050 RENEWABLE AND EFFICIENCY FUND

A. General Description. The town will establish the renewable and efficiency fund separate from the general fund to support the installation of renewable energy and energy efficient technologies in the town of Carbondale or in locations as approved by the trustees.

B. Fees. Fees collected from items as per 15.30.150: Alternative cash in lieu of points and Section 15.30.160: On-site renewable energy and exterior use will be deposited to the Renewable and Efficiency Fund (REF).

Fees from Section 15.30.150: Alternative Cash in Lieu of points may be collected at time of permit or paid prior to Final Inspection and Certificate of Occupancy (C.O.). Fees from 15.30.160: On-site Renewable Energy and Exterior Use are paid at time of permit. All fees may be reviewed prior to Certificate of Occupancy for applicability and accuracy. Refunds or additional fees may be assessed prior to Certificate of Occupancy.

C. Budget Requests. The Environmental Board will meet periodically with the Community Office for Resource Efficiency (CORE) to recommend funding requests at least 2 times per year for review and approval by the Town 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 Town of Carbondale or for locations on a case-by-case basis as approved by the 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 fund which is to encourage and promote energy efficiency and renewable energy in the Town of Carbondale. 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 Carbondale community.

4. Affordable Housing: Special consideration is given to projects that positively affect occupants of local affordable housing in the Town of Carbondale. 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 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.
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 as per the Town of Carbondale's Energy Plan.

15.30.060 INSPECTION AND COMPLIANCE

A. General Description. These regulations identify the specific requirements for complying with the Carbondale Residential Efficient Building Program (REBP) code. The sections and numbers in these regulations correspond to the sections and numbers on the REBP checklist. The REBP checklist is most easily handled 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

B. Permit Application. Two copies of a completed REBP checklist, scoring the required points, must be submitted with the building permit application.

In addition, permit applications must contain two copies of Energy Compliance Documents (REScheck, HERS rating or letter advising on use of prescriptive requirements of the latest adopted version of the Energy Codes—see 15.30.120 – Section 5: Energy Compliance for details). The permit application will not be processed without the completed REBP checklists and the Energy Compliance Documents.

C. Inspections. Items selected on the Carbondale Residential Efficient Building Program Checklist will be scored and submitted for plan review and in field inspections accordingly. Field inspections are noted on the right column of the REBP checklist.

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, 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 time of inspection. If documentation is required for an item, this documentation should be kept in the inspection container at the site. The Town of Carbondale reserves the right to conduct a documentation and inspection review after the 4th inspection to determine if “Cash in Lieu of Points” are needed to meet point requirements.

E. Failed Inspections or Compliance Audits. In addition, 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 final certificate of occupancy.

Prior to final inspection, fees and checklist may be reviewed to revise the fee schedule if necessary.

15.30.070 DEFINITIONS

A. General. Definitions included herein are for interpretation of this chapter 15.30 of code only.

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

C. ACCA. Air Conditioning Contractors of America. This organization produces manual J which is referenced by this code.

D. AFUE. Annual Fuel Utilization Efficiency. The AFUE is the most widely used measure of a furnace's heating efficiency. It measures the amount of heat actually delivered to your house compared to the amount of fuel that you must supply to the furnace. Thus, a furnace that has an 80% AFUE rating converts 80% of the fuel that you supply to heat -- the other 20% is lost.

E. AHRI. Air Condition 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.

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

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

- H. Community Office for Resource Efficiency (CORE). Local nonprofit 501c(3) energy office that is working with the Town of Carbondale to implement a clean energy future in the Roaring Fork Valley.
- I. 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.
- J. EPA. Environmental Protection Agency. This agency's standards are referenced in this code for indoor air quality points.
- K. 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.
- L. 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.
- M. 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
- N. Multifamily. Multifamily projects are as per the International Residential Code or International Building Code: buildings or portion 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.
- O. Multi-Use. Multi-use projects may include different occupancies including residential type, commercial and industrial. This code applies only to the residential portions of these projects.
- P. REScheck. A tool developed by the Department of Energy that compares a residential structure to a number of energy code standards.
- Q. Resnet. Residential Energy Services Network. The company that certifies energy raters and audits for the HERS program as well as other energy audit programs.
- R. SEER. Seasonal energy efficiency ratio. A ratio used to rate the efficiency of air conditioners.
- S. Sone. A unit of perceived loudness.
- T. 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 home, exclusive of basements and garages, without deduction for corridors, stairways, closets, the thickness of interior walls, columns or other features.

Basement and garage floor areas shall be added to the above totals by adding fifty percent of the total basement and garage floor areas.

Each unit of a duplex or row of townhouses shall calculate the total square footage of each unit.

Multifamily projects will calculate the total square footage and the points required by dividing the total square footage as per 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.

Mixed residential/commercial multi-use projects will calculate the floor area as per above for each unit by dividing the square footage of all the residential sections (including halls and common areas) of the buildings and dividing by the number of units to obtain the “average” floor area per unit. Points required for each unit are based on this “average” square footage

Areas not included in the total square footage: (1) covered walkways, open roofed--over areas, porches and similar spaces; (2) pipe trenches, exterior terraces or steps, chimneys, roof overhangs and similar features.

15.30.080 SECTION 1: SITE/WATER CONSERVATION

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

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

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

1.2: 100% 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: 100% of excavated fill reused on-site or within a 3-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 3-mile radius, provide a signed receipt with details on the location.

Compliance: Inspected with documentation (1: Foundation)
Documentation required for off-site 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	800 sf
2 bedrooms	1,375 sf
3 bedrooms	1,900 sf
4 bedrooms plus	2,650 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/large shrubs provide summer shade to west of structure 1 point

Mature landscaping must shade over 50% of subject glazing area. Show plantings on landscaping plan to provide shade from solar gain on west elevation from 2-6 PM in summer.

Compliance: Plan check (PC)

XERISCAPE LANDSCAPING

1.7: Addition of organic material to soil or use 2" 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 2” deep. (Except desert plantings.)

Compliance: Inspected with documentation (5: Final)

1.8 and 1.9: Reduction of turf areas

1.8 Area limited 3 points

1.9 Xeriscape 5 points

Irrigated turf area of high water demand turf must be less than 25% of landscaped area, or 2000 square feet, whichever is smaller for 3 points. Or use low-water-demand or xeriscape-rated plants only in at least 50% of landscaped area or 2000 square feet whichever is smaller for a total of 5 points.

Documentation includes landscaping plan or alternate, and must show xeriscape plants listed by Colorado State University Extension Horticulture office, listed on www.xratedgardening.com, or other 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, listed on www.xratedgardening.com, 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 2 points

Use water sources other than potable city water for irrigation if appropriate access to water right is available from the Town or other source. Indicate sources on plan.

Compliance: Inspected with documentation (5: Final)
Documentation with landscape plan or signed letter by the architect or owner ensuring project is compliant.

1.12: Drip irrigation 2 points

At least 50% 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 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 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 night time activation with city water supplied systems. Night time 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 project is compliant.

1.15: Rain sensor installed with 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 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: 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 www.cuwcc.org. MaP test to be 18th version or most recent).

A dual flush toilet has a minimum of 2 flushing option 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

Showerheads 2.0 gallons per minute or less must be installed on all showers. Only 1 shower head in each shower to obtain points. Maximum of 2 points.

Compliance: Inspection with documentation (5: Final).
Provide product documentation on-site

1.20: 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.

1.21: Water efficient clothes washer 3 points

Select an ENERGY STAR front loading washer to save both water and energy.

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

15.30.090 SECTION 2: RECYCLING AND REUSE

2.1: Wood, scrap metal, cardboard recycled on site 2 to 6 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% of the use in the structure. For example: for flooring, 50% 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: 20% or more of fly ash content in over 50% 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 locally available from LaFarge, Pitkin County Solid Waste Facility and other yards. 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/applicant from another structure, or that are 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/documentation must be on 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, recycle-content carpets, counter tops, recycled-content tile. Material must be used for over 50% of the use of this type 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

3 points

Install at least 2 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).

15.30.100 SECTION 3: 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%. 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.

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

Framing on 24" 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 3 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 2x4 headers, simply frame the rough opening with a 2x4 laid flat.

Compliance: Inspected (2: Framing)

- 3.4: Structural/framing dimensions in 2' increments 2 points

Most building products come in 2' increments; building to this dimension minimizes waste. Even dimensions reduce material waste and labor. Exterior dimensions in 2' increments must be incorporated in 75% or more of the building footprint.

Compliance: Plan check and inspected. (PC and 2: Framing).
Show exterior dimensions on site/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% 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 seventy-five percent of structural material.

Compliance: Inspected. (2: Framing).

3.8: Structural Insulated panels or Strawbale 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 2x6 wall construction. Must be used for over 75% 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% of the structure.

Compliance: Inspected. (2: Framing).

3.10: Panelized pre-fabricated walls, and/or sections 1 to 2 points

Use of panelized or pre-fabricated walls: 1 point. Use of prefabricated sections or modular construction for over 75% or more of home: 1 additional point.

Compliance: Inspected. (2: Framing).

3.11: Finger jointed studs or engineered studs for over 50% 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% 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 10 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 $\geq 75\%$ recycle content 2 points

Install roofing with minimum 30 year life or roofing with greater than 75% recycle content. Roofs that typically will qualify for 75% recycled content include metal and faux shake/slate roofing. Provide cutsheet for roofing 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% of exterior wall surfaces for 1 point.

Compliance: Inspected with documentation. (4: Rough-in).
Cutsheet for recycled material with receipt.

FSC MATERIAL

Sustainably-harvested wood products are certified by the Forest Stewardship Council (FSC). Material must be used in over 50% of the application in the building.

3.17 FSC harvested lumber for at least 50% of framing material 8 points

8.18 Install FSC certified trim and/or flooring 2 points available for each material used up to 6 points

3.19 FSC sustainable certified cabinets 4 points

3.20 Install FSC 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 3.173.20: 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

3.21: Non-solvent based foundation water proofing 3 points

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

Compliance: Inspected with documentation. (1: Foundation).

- 3.22: : Insulated Concrete Forms (ICFs) 4 points
Use grid type or post and beam ICFs that use less concrete, with over 50% recycled content for basement/foundation walls.
Compliance: Inspected. (1: Foundation).
- 3.23: : 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.
Compliance: Inspected. (1: Foundation).
- 3.24: 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).
- 3.25: Frost protected shallow foundation 3 points
Use this design technology for more than 50% of the perimeter foundation. Provide details as per the International Residential Code.
Compliance: Plan check and inspected. (PC, 1: Foundation).
- 3.26: Unventilated 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. Floor must be covered with vapor diffusion plastic retarder sealed to walls.
Compliance: Inspected. (3: Insulation).
- 3.27: Controlled ventilated crawl 3 points
Construct all crawlspaces according to guidelines in ASHRAE Book of Fundamentals, Section 23.11. Provide automatic dampers on crawlspace vents. Provide details demonstrating an approved design. Floor above crawl must be insulated at R-21 or above.
Compliance: Plan check and inspected. (PC, 3: Insulation).

15.30.110 SECTION 4: INDOOR AIR QUALITY

CHEMICAL REDUCTION

For sections 4.1-4.8 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.greenguard.org.

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,” GREENGUARD™ certified www.greenguard.org, 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.greenguard.org.

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

4.4: Solvent-free and/or low-toxic construction adhesives 2 points

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% 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.greenguard.org or show that coverings are below EPA thresholds for low/non-toxicity. One 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 3 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 or polyethylene and tape down.
Compliance: Inspected with documentation. (3-5: Insulation - Final).

MECHANICAL SYSTEMS

For sections 4.9-4.17 it is required that at least one category be performed.

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 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 1-2 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.

Compliance: Inspected with documentation. (5: Final).
Provide fan documentation.

4.12: Carbon monoxide detectors 3 points

Install an electric (hard-wired) or AC/DC carbon monoxide detector, located near sleeping areas. Note this is required by the Town of Carbondale code. Points given for meeting code in this category.

Compliance: Inspected. (5: Final).

4.13: High efficiency particulate air (HEPA) filter on HVAC system 2 points

Install a high efficiency filter on a forced-air furnace system. Any High Efficiency Particulate Air (HEPA) filter must be rated at 99% efficiency or higher. MERV 11 minimum. HEPA - Carbon filter systems also count for these points.

Compliance: Inspected (5: Final)

4.14: Rough-in passive radon mitigation system 3 points

Design and install radon mitigation system that removes radon or other soil gas from under the slab/crawlspace/basement and vent passively per EPA guidelines. More information at <http://www.epa.gov/radon/> and www.buildingscience.com . Passive system will allow for addition of fan to exhaust radon if needed. A completed system may include an operating fan on the exhaust side to exhaust radon or work passively.

Compliance: Inspected (2: Framing)

4.15: 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).

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

Sealed combustion/directed vented gas appliances reduce the risk of exhaust entering interior habitable areas. Four points for each gas appliance, limit 8 points total.

Compliance: Inspected. (5: Final).

4.17: Mechanical ventilation for fresh air supply (see also 5.28) 2 points

Design and install a ventilation system that complies with ASHRAE 62.2-2004, "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 5.28 for alternative method for indoor air quality improvement with air-to-air heat exchanger. If using air-to-air heat exchanger points (5.28) count these points for mechanical ventilation too.

Compliance: Inspected with documentation. (PC, 5: Final).
Show calculation on plans at permit submittal.

15.30.120 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. The following minimums are required along with the compliance paths.

CATEGORY	Tier 1	Tier 2	Tier 3	Tier 4
House Size	<3000 SF	3000-4999	5000-8000	>8000
Points	110	110-180	230-330	430-550
Percent Better than Code	Code Minimum	20%	30%	40%
HERS Maximum	75	70	65	60
PV Requirement	None	None	1.5 watts per sf	2.0 watts per sf

Boiler/Furnace Minimum AFUE	87%/88%	94%/90%	94%/92%	94%/95%
Air Conditioning Minimum SEER	14	15	16	17

REQUIRED ENERGY COMPLIANCE DOCUMENTS

Choose one method 5.1-5.3

5.1: Compliance with REScheck REPORT

REQUIRED

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. Percent better than code required depends on Tier as outlined in the Energy Compliance Table above. Homes smaller than Tier 1 need only meet code and not be any % better than code. US Department of Energy has the REScheck compliance tool on its web site: <http://www.energycodes.gov/rescheck/>

Compliance: Plan check and inspection (PC, 5: final)
REScheck report submitted with plan and in inspection container on site

OR

5.2: Compliance with HERS rating per Tier Table

REQUIRED

REScheck is not required if home obtains a HERS rating that is equal to or less than amounts required by Tier as outlined in Energy Compliance Table above.- Homes smaller than Tier 1 must have a HERS rating of 100 or less. Submit a projected “From-Plans” rating certificate with 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 <http://www.resnet.us/trade/home-energy-raters-hers-raters>.

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.

OR

5.3: Compliance via prescriptive method REQUIRED

REScheck or HERS is not required for homes less than 3000 sf if the structure meets the Prescriptive Requirements of the current International Residential Code (IRC).

Compliance: Plan check (PC).

Include information on plans that shows compliance with prescriptive requirements.

PERFORMANCE BETTER THAN CODE

5.4: REScheck Report Better than Tier Requirement 1 to 40 points

Depending on the building envelope and mechanical system efficiencies, REScheck may report performance better than the tier requirements. Obtain 1 point for every 1% better than tier requirements to a maximum of 40 points.

5.5: NOT USED

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

As per 5.2, submit HERS “Confirmed” rating certificate showing score less than tier requirements. Complete information, including local rating professionals is available <http://www.resnet.us/trade/home-energy-raters-hers-raters>.

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

Blower door test as part of HERS rating is required - No points

Compliance: Inspected (5: Final).

HERS “Confirmed” rating certificate placed in permit sleeve.

5.7: Blower Door and Duct Blasting Test 3 points and mandatory for all residences

This requirement is Mandatory for all residences.

Complete a blower door test by a certified professional that accurately shows air changes per hour (ACH) and pinpoints areas of air infiltration. Test results must show ACH of 0.35 or less. Homes with this result should have fresh air make-up, (see mechanical ventilation Section 4.17 and air to air heat exchangers Section 5.28). Blower door test shows where the air can enter and exit through holes in your house where more attention is needed.

Compliance: Inspection with documentation (5: Final)
Documentation from blower door professional in permit packet prior to final inspection.

EFFICIENT ENVELOPE - INSULATION MEASURES

5.8: Insulated headers on all exterior walls 2 points

All headers on exterior walls shall be insulated to a minimum R-10.

Compliance: Inspected. (2: Framing).

5.9: 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" (minimum depth needed for code required R-38 roof insulation). Provide greater raised heel heights as required for insulations above R-38. Points in 5.9 reflect for raised heel only, see 5.10 for points for insulation.

Compliance: Inspected (2: Framing).

5.10: Roof/ceiling insulation 1 to 11 points

For conventional framing, 1 point given for each R value over R-49, up to 6 points maximum. For example: R-52 = 3 points.

For raised heel trusses, 1 point given for each R value over R-38, add insulation up to R-49 for maximum 11 points.

Compliance: Plan check and inspected (PC, 3: Insulation).
Show roof/ceiling insulation on plans.

5.11: Wall insulation 1 to 10 points

1 point is given for each R value over 21, up to 8 points maximum. For example, if 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.

- 5.12: Continuous insulation on the exterior 3 points
- Exterior insulated sheathing of R-3.5 minimum is installed on 75% of the exterior to reduce air infiltration and provide added insulation at framing. Seal sheathing with appropriate tape at seams, this sheathing also provides a water barrier if installed properly under exterior siding.
- Compliance: Plan check and inspected (PC, 3: Insulation)
Show wall insulation in construction plans.
- 5.13: Crawl space/basement wall insulation 2 to 6 points
- For crawl space and/or basement walls provide exterior perimeter insulation. Insulation must be continuous for entire wall area below main floor. For R-15 insulation, 2 points; for R-19 or higher insulation, 4 points.
- Compliance: Plan check and inspected (PC, 3: Insulation)
Show insulation of wall in construction plans.
- 5.14: Insulation under heated slab 2 to 3 points
- For heated slabs-on-grade, provide location of insulation of slab in construction drawings. : For continuous R-10 minimum insulation, 2 points; for continuous R-15 minimum insulation, 3 points.
- Compliance: Plan check and inspected (PC, 1: Foundation).
- 5.15: Insulate all hot water pipes at all locations R-2 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-2 value. Leave clearance space for gas heater exhaust.
- Compliance: Inspected. (3: Insulation).
- 5.16: Insulate hot water pipes with R-6 in all unconditioned spaces 2 points
- Significant heat loss can occur from hot water pipes in crawlspaces or attics. Pipe insulation is a cost effective way to save energy. These points are in addition to points in 5.15.
- Compliance: Plan check and inspected (PC, 1: Foundation)
- 5.17: 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% of exterior surfaces-attics/ceilings, walls and basements/crawlspaces to receive points.

Compliance: Inspected. (3: Insulation).

5.18: Water heater(s) 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.

Compliance: Inspected. (5: Final).

5.19: R-5 Exterior doors 1 point

Insulated and sealed exterior doors reduce heat loss.

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

5.20: 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

5.21: Mechanical equipment centrally located 1 point

Locate mechanical equipment within the middle third (1/3) of the distance of the longest horizontal diagonal.

Compliance: Plan check and inspected (PC)

5.22: Manual J calculations used for sizing mechanical equipment 3 points
REQUIRED for homes with AC

This point is mandatory for homes with air-conditioning

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: Plan Check (PC).

Submit calculations with checklist.

5.23: 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 non-habitable space.

Compliance: Inspected. (5: Final).

5.24: 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 ~~two~~ 2 points.

Compliance: Inspected. (5: Final).

5.25: Efficient Boiler or Furnace 5 to 10 points

Install a boiler and/or furnace with a (combined) AFUE rating of 88% for 5 points or for systems reaching 92% efficiency, 10 points is given.

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

5.26: Radiant floor/hydronic baseboard heating system 2 points

Either in-floor radiant heat or baseboard hydronic heat qualifies as long as over 50% 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.

5.27: Side arm hot water heater, indirect coil from a boiler or tankless on-demand water heater(s) 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).

5.28 Air to air heat exchanger 4 points

An air-to-air heat exchange captures potentially lost warm or cool air while ventilating interior space. Heat exchanger may be used as mechanical ventilation see Section 4.17, count points for both Sections (5.28 and 4.17).

Compliance: Inspected. (5: Final).

DUCTING/AIR CONDITIONING/HVAC

5.29: 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)

5.30: All ductwork sealed with low VOC mastic 2 points

Compliance: Inspected with documentation. (4: Rough-in).
Documentation of Low VOC mastic required.

5.31: No ductwork in unheated 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).

5.32: 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).

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

Due to our 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 10% of the electricity used in air conditioning systems.

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

5.34: 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 our 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 5.22 (Manual J Analysis) required.

Compliance: Inspected. (5: Final).

5.35: Mechanical A/C with rating 2 points higher than required than required 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 life time. SEER must be 15 minimum to be applicable for points. Section 5.22 and 5.34 required.

Compliance: Inspected with documentation (5: Final).

Supply AHRI certificate with SEER in the inspection container.

COOLING STRATEGIES

5.36: 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).

5.37: 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.

5.38: 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.

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

Whole-house fan natural cooling/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 4-5 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).

WINDOWS/OTHER

5.40: 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% of windows.

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

5.41: Unheated Air Lock Entry 2 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).

ELECTRICAL

5.42: ENERGY STAR appliances 2 to 8 points

Use any appliances with the EPA's ENERGY STAR logo on them and/or appliances listed on 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.

5.43: Dimmers installed 1 point

Install dimmers on 4 fixtures for 1 point and save energy using the dimmers.

Compliance: Inspected. (5: Final).

5.44: 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 your neighborhood.

Compliance: Inspected. (5: Final).

5.45: 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, basements. These switches come either as an integrated unit or by a remote motion sensor. One point is given for each motion detection switch installed, up to 4 points.

Compliance: Inspected. (5: Final).

5.46: Efficient lighting 2 points

Efficient lighting must be installed in 10% of fixtures. Install lighting that uses 20% or less wattage as incandescent lighting for equivalent lumens. Hard wired T8s, T5s, LEDs or equivalent comply.

Compliance: Inspected. (5: Final).

5.47: CFL - compact fluorescents 1 to 2 points

Install CFLs in lighting fixtures, 1 point for every 4 bulbs installed, maximum of 2 points.

Compliance: Inspected. (5: Final).

5.48 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).

5.49: Interior lighting light pollution reduction

3 points

All openings in the envelope (translucent or transparent) with a direct line of sight to any non-emergency luminaires must have shielding between 9 PM and 6 AM.

Consider ways to reduce bright light spilling from inside your 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)

15.30.130 SECTION 6: SOLAR ENERGY

6.0 General Description:

Section 6 should be reviewed with Section 9.1:Size Requirement for renewable energy installation-

6.1 Prerequisite:

Site should have reasonably unobstructed solar access from the south from 10 AM to 2 PM. Site plan must show accurate North Arrow.

6.2: Rough-in for future solar hot water preheat

REQUIRED

Two runs of copper plumbing pipe minimum 3/4", insulated; to minimum R-6, must be installed in an interior wall and start in the mechanical room or near the area that will house the storage tank/heat exchanger. The plumbing should terminate in an attic space under the roof that will support the solar collectors, and it shall be above the insulation for easy sighting. If there isn't an attic space, the piping shall end after penetrating the roof that will support the collectors. In the mechanical room, identify 10 square feet for future preheat tank.

Compliance: Inspected (4: Rough-in)

6.3: Rough-in for future solar electric

REQUIRED

Install minimum 3/4" metal conduit from future site for solar electric to service panel or room for utilities.

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

6.4: Sun tempered design

5 points

In our climate 10-15% 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 6-7% 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)

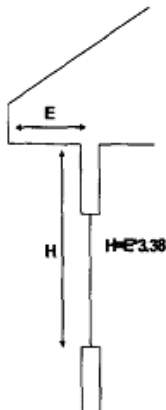
6.5: Passive solar design

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 7-12% or more of total above grade heated floor area, and provide proper shading according to the figure to the left, 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, 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

4 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 15.36.160 for on-site requirements. System size is dependent on number of bedrooms:

1 bedroom - 40 square feet of collectors	50 gallons storage
2 bedrooms - 48 square feet of collectors	60 gallons storage
3 bedrooms - 64 square feet of collectors	80 gallons storage
4+ 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 5-7% 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 0.5 Kilowatt (KW) installed for example: 2 KW= 20 points, 4 KW = 40 points. Partial points offered for systems not reaching the .5KW increments. For example: 3.1 KW equals 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% as per the “solar orientation chart.” Solar orientation chart is in the appropriate section in the Resource Guide. These systems can receive partial credit but the KW capacity must be adjusted for efficiency. For example: nameplate 4 KW times 75% percent efficiency equals 3 kilowatts.

System must have unobstructed solar access. 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 on a power outage.

Compliance: Inspected with documentation (5: Final).

15.30.140 SECTION 7: INNOVATION POINTS

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 document, 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 10 Analysis, American Lung Association-certified home, 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 (geothermal) system 20 points

Ground source heat pumps utilize glycol loop systems drilled into the ground to heat or cool a structure. System also provides hot water for your home. Minimum COP as per AHRI guidelines must be minimum 3.3. System design must cover the heat load of the residence.

Compliance: Inspected with documentation (4: Rough-in)
AHRI Certificate required

7.3: 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 equals 10 points.

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

7.4: 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.

7.5: Approved EPA wood stove or pellet stove

5 points

Wood and pellet stoves are considered a carbon-neutral energy source. Only 1 stove per dwelling unit is permitted and a separate permit must be requested from Building Department prior to installation (see Chapter 15.05.035 Wood Burning Stoves). Houses or units with this type heating for primary or supplemental heating require HERS rating of 80 or less. Test results must be submitted prior to permit approval for stove installation. Permissible solid fuel burning devices may emit no more than (i) 2.5 grams of exhaust per hour for catalytic stoves, or (ii) 4.0 grams of exhaust per hour for non-catalytic stoves and be on the EPA list of approved devices. All solid fuel burning devices must incorporate exterior combustion air ventilation that complies with Section 703 of the International Mechanical Code (IMC), as defined in Article 16-5 of the Town Code. Ducting for solid fuel burning devices must be fitted with back draft dampers. All applications for solid fuel burning devices shall reflect the applicant’s compliance with the foregoing requirements.

Pellet stoves utilize a salvage/recycled renewable fuel source, are clean burning, cost effective, and more energy efficient than regular wood burning stoves.

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

15.30.150 SECTION 8: ALTERNATIVE – CASH IN LIEU OF POINTS

8.1: Cash in Lieu

maximum of 25 %
of required points

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

<u>Total Square Footage</u>	<u>Maximum Points Allowed for Cash in lieu</u>	<u>Cost per point</u>
3,000	27	\$250.00
5,000	57	\$333.33
7,000	74	\$500.00
10000	116	\$869.56

15.30.160 SECTION 9: ON-SITE RENEWABLE ENERGY AND EXTERIOR USE

9.1: Size requirement for renewable energy installation

Residential construction with total square footage over 5000 square feet as defined in 15.30.070 definitions are required to install a small renewable energy system on site or pay a fee. Options for complying with minimum renewable energy system are:

- Or solar electric system for houses over 5000 square feet
- Or pay a fee
- Or other system exceeding this performance

The solar electric system or fee 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:

<u>Size square feet</u>	<u>On-site Requirement</u>	<u>Fee Option</u>
5,000	7.5 KW solar electric	\$ 37,500.00
7,500	11.25 KW solar electric	\$ 56,250.00
10,000	20 KW solar electric	\$ 100,000.00

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 REB 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 our climate. Fees are exempted if renewable energy system(s) are installed on-site which generate the equivalent of 50% of the energy needed for the use. On-site system design and calculations required. Designs must be approved by the Community Development Department, 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:

<u>Energy Use</u>	<u>BTUs per sq. ft. per year</u>	<u>“Free allowed square footage” per unit</u>	<u>Fee per square foot above “free allowed”</u>
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.

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).

15.30.170 CARBONDALE RESIDENTIAL EFFICIENT BUILDING CHECKLIST

The Building Department shall maintain and periodically update a Residential Efficient Building Program Checklist consistent with this Chapter 15.30.

The Carbondale Residential Efficient Building (REB) Checklist can be downloaded from the Town of Carbondale web site with Summary Page to assist in compliance with Sections 8 and Sections 9.

Except as set forth above, the Board of Trustees intends that all other provisions of the Municipal Code shall remain in full force and effect. If any part, section, subsection, sentence, clause or phrase of this Ordinance is for any reason held to be invalid, such decision shall not affect the validity of the remaining portions of this ordinance and the Board of Trustees hereby declares that it would have passed this Ordinance and each such part thereof regardless of the fact that any one or more provisions were declared invalid.

INTRODUCED, READ AND PASSED this ___ day of _____, 2011.

THE TOWN OF CARBONDALE

Stacey Patch Bernot, Mayor

ATTEST:

Cathy Derby, Town Clerk