

**DIVISION 4-8 EAGLE COUNTY EFFICIENT BUILDING CODE (ECObuild): SINGLE-FAMILY, DUPLEX, TOWNHOUSE** (org. 5/30/06)

**SECTION 4-800 PURPOSE**

The intent of the ECObuild program is to encourage cost-effective 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.

**SECTION 4-810 APPLICABILITY**

ECObuild applies to all new residential R3 (single family, duplex, townhouse) construction per the currently adopted building code, as well as additions/reconstruction over 50% of the existing floor area, and exterior energy uses such as snowmelt, spas, and pools over sizes listed in Section 4-825. The completed ECObuild checklist must be submitted along with the subject building permit application. Mobile Home units that are approved by Colorado Department of Housing are exempt.

**SECTION 4-820 POINT REQUIREMENTS**

Required points are applicable as below. Items filled out by the applicant will be checked as part of the plan check review, as well as in field inspections accordingly.

Dwelling units:

<b>0-2000</b>	square feet of floor area would need to meet	<b>40 points or more</b>
<b>2001-3000</b>	square feet of floor area would need to meet	<b>45 points or more</b>
<b>3001-4000</b>	square feet of floor area would need to meet	<b>50 points or more</b>
<b>4001-5000</b>	square feet of floor area would need to meet	<b>60 points or more</b>
<b>5001-6000</b>	square feet of floor area would need to meet	<b>70 points or more</b>
<b>6001-7000</b>	square feet of floor area would need to meet	<b>80 points or more</b>
<b>7001-8000</b>	square feet of floor area would need to meet	<b>90 points or more</b>
<b>8001+</b>	square feet of floor area would need to meet	<b>100 points or more</b>

**OR**, projects may pay a fee in lieu of meeting point requirements as calculated below:

$$\frac{\text{Square footage} \times \text{number of points short} \times \$10}{\text{Number of required points}} = \text{cash in lieu fee.}$$

For example, a 2000 ft<sup>2</sup> house meeting 35 points where 40 are required:

$$\frac{2000 \times 5 \times \$10}{40} = \$2500 \text{ cash-in-lieu fee}$$

Any funds collected will be placed into a separate Renewables and Efficiency Fund which will offer financial incentives for energy efficiency and renewable power installation in Eagle County. See Section 4-840 for details regarding use of this fund.

Homes achieving a Home Energy Rating System (HERS) index of 50 or lower, or LEED Gold will receive a **rebate** after certificate of occupancy for 25% of their building permit fee, not to exceed \$5000:

**For measures where a graduated point scale is possible, the following shall apply:**

**Quantity Level 1: 10-25%**  
**Quantity Level 3: 51-75%**

**Quantity Level 2: 26-50%**  
**Quantity Level 4: 76-100%**

## **SECTION 4-825 EXTERIOR ENERGY USES**

Eco-Build also considers exterior energy uses over a nominal amount as identified below. 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 prior to completion of the amenity which generate the equivalent of 50% of the energy needed for the use. Also, any rebates earned above may be credited accordingly. System design and calculations required.

**Exterior energy fees apply as follows:**

**Snowmelt over 200 square feet: \$16 per square foot**  
**Spa/hot tub over 64 square feet: \$176 per square foot**  
**Exterior pool: \$136 per square foot**

For example, if 500 square feet of snowmelt was proposed on a residential property, where 200 is exempt, then 300 x \$16 per square foot = \$4800

## **SECTION 4-830 POINT DETAILS**

### **SECTION 4-830.1 SITE/WATER CONSERVATION**

**1.1 Reduction of irrigated turf areas, all other landscaping drip irrigation only**  
3 points

Irrigated turf area must be equal or less than 25% of lot area, or 1000 square feet, whichever is smaller. Show turf areas and drip irrigation lines/beds on landscaping plan.

**Use of low-water-demand or xeriscape-rated plants ONLY**  
2 additional points

Landscaping plan must show xeriscape plants listed by Colorado State University Extension Horticulture office, listed on [www.xratedgardening.com](http://www.xratedgardening.com), or other recognized source.

**1.2 Low-flow or dual-flush toilets**  
2 points

A toilet that has 1.4 gallons per flush (GPF) or less qualifies as a low-flow toilet. To achieve the point, all toilets must be low-flow or dual flush. Inspected on-site.

**1.3 Low-flow showerheads**  
1 point

Showerheads 2.0 gallons per minute or less must be installed on all showers. Provide any documentation for on-site inspection.

**1.4 Water efficient clothes washer and/or dishwasher**

1 to 2 points

Clothes washer/dishwasher must be listed on [www.aceee.org](http://www.aceee.org) or [www.energystar.gov](http://www.energystar.gov), or must be shown to have similar water usage. One point for water efficient clothes washer(s), one point for efficient dishwasher(s).

## **SECTION 4-830.2 RECYCLING AND REUSE**

### **2.1 Use of pine beetle salvage wood** 3 points per material used, up to 9 points

Pine beetle affected lumber harvested in Colorado can be utilized as dimensional framing material, as well as siding, flooring, trim, etc. Material must be used for over 50% of structure.

### **2.2 Surplus/deconstructed materials donated to building materials exchange** 1 point per 10 cubic yards donated material, up to 6 points

Extra onsite materials, either new or deconstructed, can be donated to a local materials exchange yard. Keep receipt of donated materials with field plan set on job site.

### **2.3 Wood, cardboard recycled on site** 2 points per material type recycled

Labeled containers must be on site with evidence of use and service.

### **2.4 Reclaimed and/or recycle-content materials** 2 points per material used

Use of construction materials that are either reclaimed from another structure, and/or any materials with recycle-content in them qualify. Material information/documentation must be on job site with field set of plans for inspection.

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 qualify as reclaimed materials.

Provide material info with building permit; field inspected. Material must be used for over 50% of structure.

## **SECTION 4-830.3 FRAMING AND MATERIALS**

### **3.1 Optimum value engineering techniques used** 2-6 points

Use of 24-inch on center studs for over 50% of the structure	2 points
Use of 2-stud corners for over 50% of framing	2 points
Efficient headers in over 50% of framing	2 points

Efficient headers refers to insulated headers on exterior walls (minimum R-10). Inspected at framing inspection.

### **3.2 FSC or SFI certified materials used**

2 points per material used, up to 8 points

Sustainably-harvested wood products certified by either the Forest Stewardship Council (FSC) or Sustainable Forestry Initiative (SFI). Material must be used in over 50% of building.

**3.3 Materials manufactured within Colorado and/or rapidly renewable materials**

1 point per material used, up to 8 points

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 15 years or less of growth for their harvest. Concrete or stone not included.

**3.4 Straw Bales or Structural Insulated Panels (SIPs) used for exterior walls**

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 >75% of exterior walls. Show in structural plans and inspected in field.

**3.5 Insulated Concrete Forms (ICFs) for foundation/basement**

5 points

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 drawings for plans and inspected in field.

**Insulated Concrete Forms (ICFs) for basement/foundation walls plus above grade walls.**

10 points

ICFs must be used for >75% of exterior walls. ICFs shown on structural drawings for plans and inspected in field.

**SECTION 4.830.4 ENERGY**

**4.1 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.

**4.2 Efficient Boiler or Furnace**

1 to 7 points

For each number of efficiency above 92%, a point is given. For example, if a boiler has an AFUE rating of 95%, then 3 points would be given. Field inspected.

**4.3 Tankless on-demand water heater(s) or efficient gas water heater**

3 points

Gas or electric models qualify, must meet over 50% of total domestic hot water needs. Units must have an intermittent ignition device (IID) instead of a standing pilot light to qualify.

Efficient gas conventional water heaters also help save energy. Gas waters 88% efficiency or above receive 2 points. Side arm boilers qualify as part of a modulating condensing boiler 90% efficiency or above. Field inspected.

**4.4 Efficient lighting**  
2 points

Installation of lighting that uses 20% or less wattage as incandescent lighting for equivalent lumens. Compact Fluorescent Lamps (CFLs), T8s, T5s, LEDs or equivalent comply. Efficient lighting must be installed in over 50% of the structure. Field inspected.

**4.5 No mechanical air conditioning**  
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. Field inspected.

**4.6 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. Show system detail on construction plans, field inspected.

**4.7 Air to air heat exchanger**  
2 points

An air-to-air heat exchange captures potentially lost warm or cool air while ventilating interior space. Heat exchange must be in place for all mechanical ventilation in place. Field inspected.

**4.8 Roof/ceiling insulation**  
1 to 10 points

One point given for each R value over 49, up to 10 points maximum. Field inspected.

**4.9 Wall insulation**  
1 to 8 points

Show wall insulation in construction plans. One point given for each R value over 20, up to 8 points maximum. For example, if an R-30 wall is installed, 8 points would be given. Field inspected.

**4.10 Blown or sprayed insulation**  
1 point per Quantity Level

Blown or sprayed insulation reduces air infiltration and offers higher effective R values than batt insulation. Blown insulation installed in attics/ceilings, walls, and basements/crawlspaces qualifies. One point given for each quantity level of blown or sprayed insulation installed. For example, if 80% of the insulation in a structure is blown-in, then quantity level 4 (76-100%) or 4 points would be given. Field inspected.

**4.11 Windows with low-e glazing**

1 point for each U-.01 below U-.30

Window decals field inspected. Where U-rating variations occur, a weighted average will be utilized. For example, U-.25 rating would yield 5 points.

**4.12 Insulating window coverings installed**

3 points

Window coverings must be properly installed and have a minimum R-3 to qualify. Over 75% of exterior windows must have insulated window coverings for points to apply.

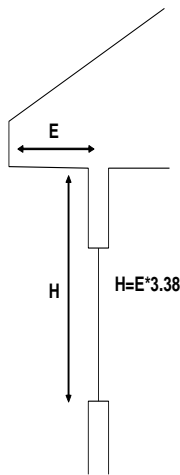
**SECTION 4.830.5 RENEWABLE ENERGY**

**5.1 Passive solar design**

5 to 10 points

**Prerequisite:** Site and south facing glazed area must have unobstructed solar access from 10am to 2pm. Deciduous trees to south are allowable for summer shading.

**Glazing:** Install south-facing (at least within 20 degrees of due south) glass equivalent to 7% or more of total heated floor area. Inspected at plan review. **5 points**



Install south-facing glass equivalent to 12% or more of total 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,  $E=H/3.38$ .

**5 additional points**

**5.2 Solar hot water system**

8 points

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 due south, and between 30 and 50 degrees from horizontal. 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

**5.3 On-site solar photovoltaic, wind energy, micro-hydroelectric**

3 points for every .5 kW installed

**Solar photovoltaic system**

Photovoltaic panels should be mounted within 20 degrees of due south and between 30 and 50 degrees from horizontal. System must have reasonably unobstructed solar access. Applicant must submit plans from a qualified architect, engineer, or designer certifying the kW capacity, and

proper system design. Proper protection to prevent electric islanding must be in place in the event on a power outage. Field inspected. Maximum 50 points possible.

### **Wind Power**

An on-site wind energy generation system must be constructed in accordance to the Eagle County Land Use Regulations. System must be installed in a minimum class 3 wind site, either as mapped by the National Renewable Energy Laboratory [www.nrel.gov](http://www.nrel.gov), or from on-site anemometer measurements for at least 3 months. Proper protection to prevent electric islanding must be in place in the event on a power outage. Maximum 50 points possible.

### **On-site micro-hydroelectric generation**

An on-site micro-hydroelectric generation system must be constructed with proper permitting from the U.S. Army Corps of Engineers and approvals from any applicable water-governing authority. Show system plan, any grading/abutments, penstock/weir design, and grid tie-in or storage as applicable. For more information, go to [www.microhydropower.net](http://www.microhydropower.net). Proper protection to prevent electric islanding must be in place in the event on a power outage. Maximum 50 points possible.

### **5.4 Ground source heat pump (geothermal) system**

5 to 20 points

Ground source heat pumps utilize glycol loop systems drilled into the ground to heat or cool a structure. Five points are given for each quantity level of the structure's heating/cooling needs met by the system. If utilized for a snowmelt system, total energy calculations must include exterior energy use(s) as well. 5 points per quantity level. For example, if the system met 60% of the structure's heating/cooling needs, quantity level 3 (51-75%), 5 points per quantity level, 15 points would be given.

### **5.5 Pellet Stove**

2 points

Pellet stoves utilize a salvage/recycled renewable fuel source, are clean burning, cost effective, energy efficient, and are considered a carbon-neutral energy source. Pellet stove must generate 2.0 grams/hour of particulate or less. Plan check and field inspected.

## **SECTION 4.830.6 INDOOR AIR QUALITY**

### **6.1 High efficiency particulate air (HEPA) filter on HVAC system, or no HVAC**

2 points

Install a high efficiency filter on a forced-air furnace system. Any High Efficiency Particulate Air (HEPA) filter must be rated at MERV 13 (0.1 micron) or higher. Field inspected.

### **6.2 Low-or non-toxic floor coverings**

1 point per Quantity Level, up to 4 points

Materials either listed on [www.greenguard.org](http://www.greenguard.org) or show that coverings are below EPA thresholds for low/non-toxicity. Quantity Level is determined by the percentage of total floor area meeting the above criteria. For example, if 80% of the total flooring was non-toxic, then quantity level 4 (76-100%) would apply, 1 point per Quantity Level, so 4 points would be given.

### **6.3 No attached garage or automatic exhaust fan in garage**

2 points

Exhaust fumes from vehicles in the garage enter living space attached to it. Show on site plan if there is no attached garage. If attached garage exists, or there is habitable space above a garage, submit specifications on properly sized mechanical exhaust ventilation either running on a sensor, or timer that automatically turns on when garage door closes.

#### **6.4 Radon Mitigation**

3 points

Design and install radon mitigation system that removes radon or other soil gas from under the slab/crawlspace and vent per EPA guidelines. More information at [www.radon.org](http://www.radon.org) and [www.buildingscience.com](http://www.buildingscience.com).

### **SECTION 4-830.7.0 INNOVATION POINTS**

Innovative product use and/or design points will be given points on a case by case basis. The item must specifically meet the intent of the EcoBuild guidelines as stated at the beginning of this guidelines document, and points will be scaled as the item would apply to similar comparable items in the guidelines.

Some options eligible for Innovation Points may include but are not limited to:

Energy 10 Analysis, American Lung Association-certified home, modulating or sequentially staged boilers, net-zero energy home, pervious materials in hardscape areas, frost-protected shallow foundation, trombe wall/interior thermal massing systems, evapo-transpiration watering system, etc.

### **SECTION 4-840. RENEWABLES AND EFFICIENCY FUND**

Fees collected would go into a separate Renewables and Efficiency Fund (REF) which would create financial assistance, rebates, and incentives that would promote energy and resource efficient projects elsewhere in Eagle County. An advisory board would meet periodically to appropriate funding accordingly based upon guidelines and criteria to be approved by the Eagle County Commissioners.

#### **The Renewables and Efficiency Fund will be utilized as follows:**

1. 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, etc.
2. Proposed 25% rebates for building permit applications exceeding compliance as outlined in the Eco-Build Guidelines point requirements.
3. Any additional funds generated will be used to assist existing structures or current projects to achieve improved energy efficiency or renewable power generation in Eagle County. An advisory board consisting of appointed Eagle County residents will meet quarterly to make recommendations on appropriations of any funds. It is suggested that such recommendations be based upon the following criteria:
  - a. **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 power generation in Eagle County. 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.



- b. **Cost/Benefit.** The extent to which the proposed project provides an economic return on appropriations invested. Expected performance in our climate and return on investment calculations must be provided.
- c. **Public benefit.** The extent to which the proposed project offers a public benefit to the Eagle County community.
- d. **Consistency with Comprehensive Plan.** The extent to which the proposed project is in compliance with the Eagle County Comprehensive Plan.
- e. **Affordable Housing.** Special consideration is given to projects that positively affect occupants of local affordable housing in Eagle County. Funding may assist in the incremental upgrade of a project, and shall not be utilized for construction costs required for code compliance.

#### **SECTION 4-850. SEVERABILITY PROVISION**

Should any provision of this Eagle County Efficient Building Code (Eco-Build) be declared by a court of competent jurisdiction in any final judgment to be invalid, unlawful or unenforceable for any reason, such offending provision shall be deemed deleted and the remaining provisions of such Code shall remain in full force and effect.

### **DIVISION 4-9: EAGLE COUNTY EFFICIENT BUILDING CODE: COMMERCIAL/MULTI-FAMILY**

#### **SECTION 4-900 PURPOSE** *(orig. 5/8/2008)*

The intent of the ECO-BUILD COMMERCIAL/MULTI-FAMILY program is to encourage cost-effective 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 for occupants.

#### **SECTION 4-910: APPLICABILITY**

Eco-Build applies to all new non-residential, mixed use, and/or multi-family construction per the currently adopted building code, as well as additions/reconstruction over 50% of the existing floor area, and exterior energy uses such as snowmelt, spas, and pools over sizes listed in Section 4-925. The completed Eco-Build checklist must be submitted along with the subject building permit application.

#### **SECTION 4-920 POINT REQUIREMENTS**

**The minimum points required for applicable construction projects are 70. Projects achieving LEED Gold or better will receive a 25% building permit rebate, not to exceed \$5000. Projects not meeting the minimum 70 points shall pay a mitigation fee as follows:**

**Fee = Square footage of project x number of points short x \$.15.**

For example, a 4000 square foot project that is 5 points short would be assessed a fee as follows:

$$4000 \times 5 \times \$ .15 = \$3000$$

**SECTION 4-925: EXTERIOR ENERGY USES**

Eco-Build also considers exterior energy uses over a nominal amount as identified below. 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. Also, any rebates earned above may be credited accordingly. System design and calculations required.

**Exterior energy fees apply as follows:**

<b>Snowmelt over 200 square feet:</b>	<b>\$16 per square foot</b>
<b>Spa/hot tub over 64 square feet:</b>	<b>\$176 per square foot</b>
<b>Exterior pool:</b>	<b>\$136 per square foot</b>

**SECTION 4-930: POINT DETAILS****SECTION 4-930.1 SITE/WATER CONSERVATION****1.1 Construction Activity Pollution Prevention  
REQUIRED**

Provide proper erosion control measures to prevent off-site sedimentation. Limits of disturbance to have sediment fencing, staked hay bales in swales/drainage ditches, revegetation matting in any areas outside fencing disturbed by construction.

**1.2 Site is either a redevelopment location or brownfield redevelopment.  
Redevelopment 5 points. Brownfield redevelopment 10 points**

Show on site plan location of existing or pre-existing structures. Deconstruction is required for existing structures for any reusable/recyclable items. For brownfield redevelopment, show documentation demonstrating previous or existing site contamination and clean-up.

**1.3 Walkability/bikability: The site/design provides connection to a recreation path network.  
2 points**

Show connection to path network on site/vicinity plan.

**1.4 Covered bicycle storage and employee changing/storage rooms  
2 points**

Bicycle storage for at least 10% of occupants; show in plans, field verified. Employee changing rooms are not applicable to projects with no onsite employees.

**1.5 On-site affordable housing unit, live-work mixed use.  
10 points per unit**

Show on-site dwelling unit(s) that meet the Eagle County Housing Guidelines for either a deed restricted for sale unit or rental unit.

**1.6 Reduced parking area  
3 points**

Provide at least 15% less parking than what is currently required in the Eagle County Land Use Regulations onsite. A parking demand analysis must be completed and submitted by an accredited professional that demonstrated the amount of parking on site is adequate.

### **1.7 Maximize Open Space**

2 points

Total lot coverage is less than 75% of maximum allowable for lot. Total surface parking and hardscape area is less than building footprint(s).

### **1.8 Stormwater Design**

3 points

100% of surface water runoff travels through bioswales, landscaped detention areas, or combination thereof that provides a portion of irrigation needs from natural precipitation, eliminates direct discharge of potential pollutants or sediment, and promotes groundwater recharge.

### **1.9 Diverse native landscaping**

1 point

Landscaping plan includes 10 or more native species. Show on landscaping plan, plantings must be in at CO for credit.

### **1.10 Water Efficient Landscaping**

2 to 4 points

Irrigated turf area must be equal or less than 40% of landscaped area, or 1000 square feet, whichever is smaller. Show turf areas and drip irrigation lines/beds on landscaping plan. Landscape must be in place at time at CO for points.

#### **Use of low-water-demand or xeriscape-rated plants ONLY**

1 additional point

Landscaping plan must show xeriscape plants listed by Colorado State University Extension Horticulture office, listed on [www.xratedgardening.com](http://www.xratedgardening.com), or other recognized source. Any turf area (must meet above standard) shall use species that utilizes at least 25% less water than Kentucky blue grass.

#### **Landscape design requires no permanent irrigation**

4 total points

Landscape plan must meet landscaping minimum standards. Temporary irrigation is permissible during plant establishment period. Landscaping must be planted prior to CO.

### **1.11 Interior Water Use Reduction**

2 to 3 points

Demonstrate total water use reductions on interior fixtures, including toilets, showers, sinks, faucets, and urinals. 2 and 3 points are credited for projects demonstrating 20% and 30% or more reduction in use, respectively. Estimates are based on average occupant usage pursuant to the 1992 Energy Policy Act for

fixture flow rates.

## **SECTION 4-930.2: RECYCLING, REUSE, MATERIALS**

### **2.1 Storage and Collection of Recyclables in Design REQUIRED**

Show on construction plans areas for storage of recycling containers next to trash container(s). Adequate space for a cardboard 2-yard minimum container, and totes for co-mingled and newspaper/mixed paper required. Field verified.

### **2.2 Construction Waste Recycling** 2 points per material type

Provide labeled containers during construction for recycling cardboard, wood waste, and/or co-mingled (bottles/cans). Labeled containers clean of trash with evidence of use must be in place during inspections.

### **2.3 Use of Beetle Kill Pine** 3 points per material type

Pine beetle-affected lumber harvested in Colorado can be utilized as dimensional framing material, as well as siding, flooring, trim, etc. Material must be used for over 50% of structure.

### **2.4 Reclaimed and/or recycled-content materials** 2 points per material type

Use of construction materials that are either reclaimed from another structure, and/or any materials with recycle-content in them qualify. Material information/documentation must be on job site with field set of plans for inspection.

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 all qualify as reclaimed materials (must provide documentation).  
Some common recycle-content materials include composite decking, recycle-content faux shake/slate roofing, cellulose or shredded cotton batt insulation, recycle-content carpets, counter tops, recycle-content tile, etc. Provide material info onsite; field inspected. Material must be used for over 50% of structure.

### **2.5 Surplus or reclaimed materials donated to local building material exchange** 1 point per 10 cubic yards donated

Donate any surplus building materials or deconstructed materials to a used building materials exchange. Must provide documentation from business donated to at final ecobuild inspection for credit.

### **2.6 FSC or SFI certified materials** 2 points per material type

FSC (Forest Stewardship Council) or SFI (Sustainable Forestry Initiative) stamped certification on material(s) required. Material must be used in over 50% of the structure, no 'token' materials for points. Field inspected.

### **2.7 Materials manufactured within Colorado and/or rapidly renewable materials** 2 points per material type

Show documentation for any materials used that were manufactured within Colorado, or that consist of rapidly renewable materials (naturally reproducing within 15 years). Material type must be used in over 50% of the project. Field inspected.

### **SECTION 4-930.3: ENERGY**

#### **3.1 Combustion Analysis Report REQUIRED**

Provide detailed combustion analysis report of furnace/boiler after installation and following manufacturer's start up. Combustion analysis must demonstrate performance no less than 10% of AFUE efficiency rating.

#### **3.2 Blower Door Test Points** 2 points for each .05 ACH below 0.35 NACH

Provide blower door test documentation showing NACH (Natural Air Changes per Hour) rating. Two points awarded for each .05 rating below 0.35. For example, an ACH rating of 0.22 would yield 4 points. For any ACH ratings below 0.20, an air-to-air heat exchanger (Energy Recovery Ventilator or Heat Recovery Ventilator) is required to provide efficient mechanical fresh air.

#### **3.3 Infrared Heat Loss Analysis and Remediation** 3 points

Infrared cameras can be effective tools for pinpointing areas of heat loss (interior-exterior temperature difference must be at least 25 degrees). Provide detailed report from an accredited professional on analysis performed, areas of heat loss, and demonstrated remediation (if stated in analysis).

#### **3.4 Building Commissioning** 6 points

Provide a comprehensive third party inspection, testing, and analysis of all heating, cooling, electrical, lighting, and ventilation systems. Include report and demonstrated remediation for items delineated by the report.

#### **3.5 No recessed lights on ceiling to exterior or sealed/IC-rated** 2 points

Recessed lights and outlets act as chimneys for heat loss and moisture transfer into attic spaces and wall cavities respectively. Either eliminate any recessed light and/or outlet wall/ceiling penetrations, or all can lights and outlets on exterior walls/ceilings are sealed and IC-rated (Insulation Contact rated). The fixtures must either be manufactured with no penetrations, or installed inside an airtight assembly of gypsum board or manufactured assembly.

#### **3.6 Efficient Boiler/Furnace** 1 to 7 points

One point for each AFUE efficiency rating percentage over 87%. For multiple boilers/furnaces, ratings area averaged. Field inspected.

**3.7 Tankless water heater(s)**

1 to 3 points

Gas or electric tankless on-demand water heater models qualify, must meet over 50% of total hot water needs. Units must have an intermittent ignition device (IID) instead of a standing pilot light to qualify. Tankless systems get 3 points. Side-arm boilers qualify for one point as part of a modulating condensing boiler 90% AFUE efficiency or above. Field inspected.

**3.8 Efficient Interior Lighting**

2 points

At least 50% of interior lighting is 75% or more efficient than incandescent lighting (compact fluorescent, T5 or T8 fluorescent, LED, qualify). Field inspected.

**3.9 Motion Detecting Light Switches**

1 to 4 points

Lighting that operates by motion detection saves energy and increases safety. One point is given for each motion detection switch installed, up to 4 points. Field inspected.

**3.10 Evaporative Cooling Only or No Mechanical Air Conditioning**

2 to 4 points

Evaporative Cooling is defined as cooling which relies only on evaporation of water for its cooling needs. Evaporative cooling works efficiently in arid dry climates in Colorado. Evaporative Cooling only is awarded 2 points. No mechanical air conditioning (passive cooling, ceiling fans, whole house ventilation systems excepted) 4 points.

**3.11 Radiant in-floor heat**

2 points

Hydronic in-floor heating in over 50% of the heated area of the structure receives 2 points.

**3.12 Air-to-Air Heat Exchanger**

2 points

An air-to-air heat exchanger (also referred to as a Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV)) pre-warms or cools outside air by providing a heat exchange with exhaust air. Majority of total mechanical ventilation must go through a heat exchanger for points. Field inspected.

**3.13 Roof/Ceiling Insulation**

1 to 15 points

One point awarded for each manufacturer-rated R-value of insulation installed in the roof assembly. For structures/roof assemblies with multiple different R-values, a weighted average is used.

**3.14 Wall Insulation**

1 to 8 points

One point awarded for each manufacturer-rated R-value of insulation installed in the exterior wall assembly. For multiple wall types with different R-values, a weighted average is used.

**3.15 Slab Insulation**

R-10 2 points R-15 or above 4 pts.

Either for basement floors or slab-on-grade, a minimum continuous R-10 subfloor insulation is REQUIRED. Insulation R-15 or above, 2 points. Field inspected\*. *\*Must call in for inspection of not being looked at for infloor heat, etc.*

**3.16 Crawl Space/Basement Insulation**

R-10 REQUIRED, 2 points R-15+, 3 points R-19+

For crawl spaces or basements, provide minimum R-10 (either inside or outside wall) insulation. 2 points for R-15 or above, 4 points for R-19 or above.

**3.17 Blown or Sprayed Insulation**

1 point per Quantity Level

Blown insulation installed in attics/ceilings, walls, and basements/crawlspaces qualifies. One point given for each quantity level of blown or sprayed insulation installed. For example, if 80% of the insulation in a structure is blown-in, then quantity level 4 (76-100%) or 4 points would be given. Field inspected.

**3.18 Landscaped Roof**

1 to 2 points

A landscaped vegetated roof that occupies over 50% of the total roof area qualifies for 2 points. If 25% of the area is a landscaped vegetated roof, 1 point. Field inspected.

**3.19 Efficient Windows**

1-8 points

Double-pane windows with low-e glazing REQUIRED. 1 point for each U-.01 below U-.35. Field inspected. If windows have differing U-ratings on project, then a weighted average is taken.

**3.20 Insulating Window Shades**

2 points

75% or more of total windows have insulating window coverings rated of R-3 or higher. Field inspected at CO.

**SECTION 4-930.4 RENEWABLE ENERGY****4.1 Onsite Renewable Energy**

Provide calculations demonstrating any onsite renewable energy systems (including passive solar) as a function of total energy use offset for that energy source (total electricity or total gas). Points as follows:

Over 5% offset	5 points
Over 10% offset	10 points
Over 25% offset	15 points
Over 50% offset	20 points
Over 75% offset	25 points

**SECTION 4-930.5: INDOOR QUALITY**

**5.1 Radon mitigation system  
REQUIRED**

Install a Radon mitigation system that eliminates potential for Radon or other soil gases from entering habitable areas of the structure. Must ventilate below floor/slab vapor barrier to exterior. Mechanical ventilation of Radon system not necessary unless otherwise specified.

**5.2 HEPA filter in HVAC  
1 point**

Have a High Efficiency Particulate Air (HEPA) or MERV 13 (0.1 micron) or higher filter installed that effectively filters HVAC system.

**5.3 Low- or Non-Toxic Floor Coverings  
1 point per Quantity Level**

Materials either listed on [www.greenguard.org](http://www.greenguard.org) or show that coverings are below EPA thresholds for low-toxicity. In general, most tile, wood, and natural carpets meet low-toxic standards. For other coverings, provide documentation demonstrating compliance. Quantity Level is determined by the percentage of total floor area meeting the above criteria. For example, if 80% of the total flooring was non-toxic, then quantity level 4 (76-100%) would apply, 1 point per Quantity Level, so 4 points would be given.

**5.4 Construction IAQ Plan  
1 point**

HVAC system must be covered until occupancy.

**5.5 Indoor Chemical and Pollutant Control  
2 points**

Any onsite hazardous material storage must be air-tight and provide spill/leakage containment. Also, install a minimum 4x4' grated area with void below for all major entryways that reduces potential for dirt and other pollutants from entering the structure.

**5.6 Mechanical Ventilation Beyond Code  
2 points**

Provide mechanical ventilation at least 10% over ASHRAE Standard 62.1-2004, which operates on occupancy controls (motion activated or CO<sub>2</sub> activated). An air-to-air heat exchanger (ERV or HRV) that pre-heats or cools fresh intake air is required.

**SECTION 4-930.6 INNOVATION POINTS**

Innovative product use and/or design points will be given points on a case by case basis. The item must specifically meet the intent of the Eco-Build guidelines as stated at the beginning of this guidelines document, and points will be scaled as the item would apply to similar comparable items in the guidelines.



**SECTION 4-950. SEVERABILITY PROVISION**

Should any provision of this Eagle County Efficient Building Code (Eco-Build) be declared by a court of competent jurisdiction in any final judgment to be invalid, unlawful or unenforceable for any reason, such offending provision shall be deemed deleted and the remaining provisions of such Code shall remain in full force and effect.