



COCHISE COUNTY RESIDENTIAL GREEN BUILDING PROGRAM

COCHISE COUNTY PLANNING DEPARTMENT
1415 MELODY LANE
BISBEE, AZ 85603

COCHISE COUNTY REGIONAL RESIDENTIAL GREEN BUILDING PROGRAM
TABLE OF CONTENTS

Context.....	3
Intent.....	3
Acknowledgements.....	4
Sizing Adjustment.....	5

SECTION 1: LOCATION, LOT DESIGN, PREPARATION & DEVELOPMENT

Individual Site Development & Amenities.....	7
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SECTION 2: RESOURCE EFFICIENCY

Building Assembly.....	8
Environmentally Preferable Products.....	9
Regionally Extracted and Manufactured Products.....	10
Construction Waste Management.....	10

SECTION 3: ENERGY EFFICIENCY

Building Design & Orientation.....	11
Performance Path.....	14
Prescriptive Path Individual Measures.....	14

SECTION 4: WATER EFFICIENCY

Rainwater Harvesting.....	17
Greywater Reuse.....	18
Plumbing, Appliances & Fixtures.....	18
Impervious Surfaces.....	19
Irrigation Systems.....	19

SECTION 5: INDOOR ENVIRONMENTAL QUALITY.....21

SECTION 6: OPERATION, MAINTENANCE, & OWNER EDUCATION

Homeowner Education & Maintenance.....	23
Innovation Points.....	23

"The best thing about the future is that it comes one day at a time."

- Abraham Lincoln

INTENT

Cochise County intends to offer builders, developers, and purchasers a hospitable and flexible environment for innovation in methods to achieve design and construction while creating minimal negative impacts on the environment maximizing efficient use of energy and material resources.

The Cochise County Residential Green Building Program creates voluntary standards against which both sellers and buyers may measure the validity of "green building" assertions as they apply in Cochise County. While not all projects will necessarily achieve full certification under these voluntary standards, the standards nevertheless offer a way for sellers to effectively describe those features of new construction which are done in keeping with the goal of minimizing environmental impact. Consumers can take advantage of these certification standards as they make decisions regarding features desired and negotiate a purchase

The program is intended to encourage continuous revision to these voluntary standards as developers and builders submit new best practices for inclusion, and new technologies evolve towards mainstream building practices.

BACKGROUND

Prior to the middle of the last century, the pace and pattern of development in Cochise County, as well as much of the Western United States, was determined by three elements: the abundance of natural resources, availability of water, and proximity to a safe, traversable transportation route to the settlement area. Some areas of the County with an abundance of valuable resources could prosper by exporting surplus commodities to other regions, but areas that needed to import scarce but necessary resources were faced with significant obstacles to community development. A delicate balance of growth was maintained by climate, and the availability of water, food, housing, and employment.

In the last seventy years, the abundance of cheap fossil fuels, imported materials, and the completion of cross-continental transportation networks completely reshaped the way we site and build our structures. These shifts also made it possible for human beings to inhabit regions—such as the Arizona Desert—year round in relative comfort. These advances were not without negative effects. Most modern houses require large inputs of fossil fuels for heating and cooling interior spaces and for providing lighting, refrigeration, cooking, water heating, and maintaining remote power for electronic equipment. Over 39% of the total energy used in the United States is used for the operation of buildings, and much more is used in ways indirectly related to building location and design—especially traveling to and from the buildings we construct.

Building impacts are not just limited to energy use. Significant water consumption occurs in our homes through bathing, clothes washing, dishwashing, cooking, private swimming pools, and irrigation of private yards and gardens. Much of our water resources are wasted from unattended leaks, inefficient appliances, poor design in hot water delivery systems, and wasteful practices by users. Outdoor water use for landscaping in our region is estimated to account for 60-70% of overall water use in homes. By harvesting rainwater and incorporating native, drought-tolerant plantings outside residences, lush vegetation can be supported using only the rain that falls naturally on most sites.

Cochise County Residential Green Building Program

In addition to increases in energy and water use, modern residences are often constructed from materials with a high embodied or transport energy. Materials extracted from distant regions require high energy inputs as they move from the harvest site to manufacturing facility to sales location to final construction destination. The large scale extraction of these materials often results in the degradation of habitat, while unregulated manufacturing practices introduce toxins into the environment. Transporting these materials across the globe consumes limited fossil energy resources and produces polluting emissions and greenhouse gases.

Of all human activities, the decisions we make in the design and construction of the built environment have perhaps the most significant impact on our natural surroundings, our social structure, and the long term economic viability of a community. The siting and design of a community can dictate whether its inhabitants will walk, drive, or use public transportation to get to work and to needed services; and even whether those sources of employment and services will flourish or struggle. Our building choices also reflect the value the community places on open space and preservation of the natural environment, and whether construction development will damage, coexist with, or enhance those attributes. Most importantly, the built environment is also the location of much of our energy, water and material consumption. “Green” building is the term used to describe the movement towards designing, building and operating structures that provide comfortable, durable, healthful living spaces, while minimizing resultant consumption of non-renewable resources, community disconnectedness and environmental degradation. Green Building has moved from a theory to a widespread practice in the last several years. This progress has been accompanied by strides in energy efficiency, cost control, and perhaps most importantly, a recognition that buildings—places within which we spend 90% of our life—have a dramatic impact on health of the natural environment, economy, public health and social fabric of our region.

ACKNOWLEDGEMENTS

The development of this program is the result of cooperation and input from many dedicated individuals and entities. The format is similar to many local and national green building systems currently in existence. The content is based substantially on the Pima County Regional Residential Green Building Standard, which contains many elements that are applicable to Cochise County. The Cochise County Planning Department would also like to acknowledge the assistance and input provided by Carl Robie, Cochise County Water Conservation Coordinator, Cado Daily and Mark Apel of the University of AZ Cooperative Extension Service, and the builders, designers, and suppliers active in green building in Cochise County for their valuable comments and input on the program.



COCHISE COUNTY RESIDENTIAL GREEN BUILDING PROGRAM

Introduction

The Cochise County Residential Green Building Program is a voluntary system provided to guide builders, developers and owners in the design and construction of energy efficient, water-conserving, healthful homes. The rating system requires measurement and verification that the residence meets the minimum levels in each category. Single family and duplex homes no more than two stories in height may apply for certification. Renovations and remodeling can be rated under the program if the renovation will involve replacement or overhaul of all major building systems, or alteration of at least 75% of the existing building.

The rating system provides four levels of certification:

- Bronze Certification: minimum 100 points
- Silver Certification: 101-130 points
- Gold Certification: 131-160 points
- Platinum Certification: Over 160 points

Home builders desiring to certify a new home should read the Green Building Program credit criteria and checklist to assess the design of their project. An initial orientation meeting with building division staff to review a proposed application is strongly suggested to identify any special conditions or issues associated with the project. Once the residence is entered into the Green Building Program, it will be tracked through the permitting and inspection process for credits.

Builders must satisfy any mandatory requirements listed in each category and submit appropriate documentation as noted to achieve certification. Final certification will be awarded upon issuance of the Certificate of Occupancy for the residence. Certification confers the right for the builder/owner to advertise the home as a Green Building Program Certified home at the level of certification attained.

Sizing adjustment:

For every 200 square feet *less than* 2300 square feet of floor area, add one point; for every 200 square feet *over* 2500 square feet of floor area, deduct (1 point). Homes that are 2300 -2500 square feet in size fall in the "neutral zone", and do not add or subtract points. Square footage shall be based on only *conditioned space*, and therefore does not include porches or unconditioned garages.

Building size, materials use, and energy consumption are interdependent. Research indicates that for every doubling of house size there is a corresponding 15-50% increase in energy use and a 40-90% increase in materials use. The Cochise County Regional Residential Green Building Program pegs neutral sizing to the national average of 2300 square feet. House designs that significantly deviate from the average, gain or lose points accordingly. Larger than average homes may need to include additional energy efficiency measures or innovation strategies to achieve certification.



SECTION 1: LOCATION, LOT DESIGN, PREPARATION & DEVELOPMENT

Community Criteria

Individual Site Development & Amenities

Mandatory: Control and direct runoff with straw bales, silt fencing, silt sacks, rock filters or other approved devices. Stabilize soils on slopes over 10% with erosion control blankets or other approved method.

Credit 1.10: Minimize disturbed/compacted area of site to 15 feet around the perimeter of the building footprint, and one driveway access area no wider than 15 feet. The limits of clearing and grading shall be clearly demarcated on the Site Plan, and the “No Disturbance” boundary shall be flagged or fenced on site. (2 points);

Credit 1.11: Provide a grading plan showing balanced cut and fill, maintaining original topography. (1 point);

Credit 1.12: Protect and maintain on-site native vegetation for a minimum of 75% of the “No Disturbance” area (see Credit 1.10). Protection and maintenance may include watering, mulching, and protection of root system from compaction or trenching. (1 point);

Credit 1.13: Appropriate landscape plantings for Cochise County:

1.13. a: Use only drought-tolerant, low-water use plants for landscaping plantings *OR* if a rainwater harvesting system meeting the sizing requirements of Credit 4.1, 4.2 or 4.3 is installed, a combination of drought-tolerant plantings *and* food producing vegetation may be used. (2 points for either option);

1.13. b: Use only native plants for landscape use (1 additional point);

Note: A list of low-water use plants appropriate for Cochise County is available at:
http://www.ag.arizona.edu/cochise/mg/sierra_vista_plant_list.pdf

Credit 1.14: Collect, conserve and protect (cover) topsoil on site for reuse. (1 point);

Credit 1.15: Install light colored, high albedo materials (minimum reflectance of 0.3) for:

1.15. a: at least 50% of the site’s hardscape (does not include roof) (2 points);

1.15. b: 100% of the site’s hardscape (does not include roof) (2 additional points);

Credit 1.16: Provide low water use vegetative shading for 25% or more of paved area/hardscapes. Vegetation must mature to provide this percentage of shading within 5 years. (2 points);

Credit 1.17: Eliminate the use of potable water for all landscaping needs (2 points);

Credit 1.18: Prepare and implement a pest management plan that minimizes chemical pesticides. (1 point);

Cochise County Residential Green Building Program

Credit 1.19: Provide a stormwater diversion/recharge plan using gabions, rain gardens, grading contours and other acceptable measures to enhance recharge and utilize rainwater for landscaping. (1 point).

Credit 1.20: Fertilize landscaping with slow-release 100% organic fertilizer. (1 point);

Innovation Credits

Innovation Credits are awarded in this category for measures that provide exemplary protection of the natural features and resources found on the site, implement creative solutions to mitigate detrimental effects of development on the natural environment, including those that promote open space, mixed-use development, clustered buildings, and preservation of significant site features, transportation alternatives, and community amenities. Requests for innovation credits may be submitted to the Green Building Program Manager for consideration.

Note: See: the Water Efficiency Section for related criteria.



SECTION 2: RESOURCE EFFICIENCY

Building Assembly

Credit 2.1: Advanced framing techniques:

2.1.a: Use wood sheathing for shear walls only at locations required in the prescriptive portion of the currently adopted International Residential Code. (0.5 point); *OR* use an alternative to wood sheathing for shear walls (entire building). (1 point);

2.1. b: Space joists at greater than 16" o.c. (0.5 point);

2.1. c: Use stack-framing at joists and single top plates. (0.5 point);

2.1. d: Space studs at greater than 16" o.c. (0.5 point);

2.1. e: Construct 2-stud corners. (0.5 point);

2.1. f: Construct insulated headers or box headers. (0.5 point);

Advanced framing techniques can save up to 20% of the lumber used in a residential project with no reduction in structural integrity. In order to claim these credits, applicants should submit a complete set of framing plans with all header sizes. For more information, see:

<http://www.nahbr.org/greenguidelines/advancedframing.pdf>

<http://www.toolbase.org/PDF/DesignGuides/advancedwallframing1.pdf>

Credit 2.2: Structurally Insulated Panels & Insulated Concrete Forms

Credit 2.2.a: SIPs: Use Structurally Insulated Panels for all wall and roof components wherever appropriate. (4 points); *OR*

Credit 2.2.b: Use an Insulated Concrete Form (ICF) or block system (i.e., Rastra, Mikey Block) for all appropriate wall components. (2 points); *OR*

Credit 2.2.c: use a combination of ICF walls and SIP roof for all appropriate roof and wall components. (4 points);

Credit 2.3: Alternative material assemblies: Use rammed earth, compressed earth block, adobe, strawbale, or natural building material for all *appropriate* wall components of the building. Non-load bearing interior partition walls are not included in this credit; (4 points);

Environmentally Preferable Products

Credit 2.4: Provide documentation of all products certified as EPPs (Environmentally Preferable Products) *OR* as Indoor Advantage Gold

<http://www.scscertified.com/ecoproducts/indoorairquality/indooradvgold.html>

(0.5 point per component; maximum 8 points);

Credit 2.5: The following material certifications may be substituted for EPP certification (see above);

Cochise County Residential Green Building Program

2.5.a: Carpet & Rug Institutes Green Label Plus certification *OR* SCS Sustainable Choice Certification for all carpets, adhesives and padding used in the residence; 0.5 point *OR* no carpeting used in the residence. (1 point);

See <http://www.carpet-rug.org/residential-customers/selecting-the-right-carpet-or-rug/green-label.cfm> for additional information on Green Label Plus certification.

2.5. b: Green Seal Certification for all interior paints, coatings, and enamels used in the residence. (1 point) *OR* Green Seal Certification for all interior *and* exterior paints, coatings and enamels used in the residence. (1 additional point);

2.5. c: All adhesives and sealants used in the home are Green Seal Certified. (1 point);

2.5. d: Use structural or base materials as finish with no added paint or coatings. (1 point);

Green Seal works with manufacturers, industry sectors, purchasing groups, and governments at all levels to "green" the production and purchasing chain. We utilize a life-cycle approach, which means we evaluate a product or service beginning with material extraction, continuing with manufacturing and use, and ending with recycling. www.greenseal.org

Credit 2.6: All wall and ceiling cavity/continuous insulation is: (choose one)

Credit 2.6. a: A bio-based foam product (i.e. soy). (1.5 points);

Credit 2.6. b.: Recycled material (i.e. cotton, denim, cellulose). (1.5 points);

Credit 2.6. c: Formaldehyde-free fiberglass batts. (0.5 point);

Credit 2.7: All wood beams, joists and rafters are made from engineered wood products. (1 point);

Credit 2.8: All trusses are engineered and use 2 x 4 or lesser diameter lumber for all truss members (0.5 point);

Unlike sawn lumber, engineered wood products utilize smaller trees, lower quality wood, and wood waste to produce structurally stable, strong building components. See www.apawood.org for more information

Credit 2.9: Use sustainably grown and harvested wood:

*Credit 2.9.a: All structural wood used in residence is FSC (Forest Stewardship Council) Certified Wood. (1 point); *OR**

Credit 2.9.b: all wood (interior and exterior, including trim) is FSC Certified Wood. (1 additional point);

The Forest Stewardship Council monitors and certifies lumber to standards for forest sustainability and stewardship. FSC certified wood is available from major retail building supply outlets. For more information see www.fscus.org

Credit 2.10: 100% of flooring in the residence is any combination of the following materials: cork, bamboo, compressed earth, reclaimed/recycled wood, reclaimed/recycled brick, sealed integral color concrete, or tile/flooring with a minimum 50% recycled content. (3 points);

Cochise County Residential Green Building Program

Credit 2.11: All installed cabinetry and built-ins are made from materials that contain no urea-formaldehyde resins. (1 point);

Credit 2.12: Use an HVAC system that does not use refrigerants or uses non-HCFC refrigerants. (1 point);

Credit 2.13: Provide an area for recycling with bins inside the house. (1 point);

Credit 2.14: A minimum of 20% of the concrete content of the building is replaced with fly ash or slag. (1 point);

Regionally Extracted and Manufactured Products

Credit 2.15: Regionally extracted and harvested materials:

Credit 2.15.a: At least 20% of construction materials used, by weight or volume, are extracted and manufactured from within a 500 mile radius of the building site. (2 points); *OR*

Credit 2.15.b: 50% of construction materials, by weight or volume, are extracted and manufactured from within a 500 mile radius of the building site. (2 additional points); *OR*

Credit 2.15.c: One of the following components of the building is constructed with material(s) extracted and manufactured from within a 100 mile radius of the building site: exterior walls, flooring, wall covering (interior and exterior), or roofing. (Other components are allowed at the discretion of the program manager) (1 point per component);

Credit 2.15.d: For projects involving new pathways, driveways or sidewalks, use exterior paving materials from within a 100-mile radius of the building site. (1 point);

Regionally extracted and manufactured materials use less fossil fuel for transport and support the local economy. Builder shall document that the material was harvested and processed within a 500 mile radius of the building site.

Construction Waste Management

Credit 2.16: Reduce construction waste based on industry average:

Credit 2.16.a: Reduce construction waste to 25% less than industry average. (3 points);

Credit 2.16.b: Reduce construction waste to 50% less than industry average. (3 additional points);

Credit 2.16.c: Reduce construction waste to 75% less than industry average. (3 additional points).

Data from the National Association of Home Builders Research Center indicates the industry averages 4.2 lbs (0.265 cubic yards) of waste per square foot of conditioned space. To achieve this credit, multiply the conditioned space square footage by 4.2 to get the average pounds per square foot of waste for the size of the residence. A Construction Waste Management calculator is available on our web site. Demonstrate a minimum 25% reduction through submittal of a waste management plan documenting the amount of waste diverted through reduction, recycling, reuse, salvage or donation of excess materials to a non-profit organization. Land clearing waste and demolition waste from removal of pre-existing structures do not count towards the totals.



SECTION 3: ENERGY EFFICIENCY

BUILDING DESIGN & ORIENTATION

Passive Solar Design can help reduce heating loads and minimize interior temperature swings. Credits 1-3 below address passive solar building form and orientation.

*Basic design principles: the building's south face should receive sunlight between the hours of 8:00 A.M. and 12:00 P.M. (sun time) during the heating season. During the cooling season, these same areas need to be shaded during at least the hours of 9am to 3 pm. Overhangs, deciduous vegetation, retractable awnings, or other shading devices should be provided to prevent overheating. It is important to note that improper passive solar design may result in overheating that can actually **increase** energy consumption. During the heating season, sunlight entering the building should strike floor and/or wall materials with a high thermal mass, such as masonry, adobe, rammed earth or tile. Strongly consider consulting a designer with experience in passive solar buildings to do an analysis of the residence prior to construction. See: <http://www.azsolarcenter.com/design/pas-1.html> for additional information. www.susdesign.com has a number of software tools to size overhangs, compute sun angles and calculate heat gain through windows.*

Credit 3.1: Provide shading devices or overhangs for all south-facing fenestration such that the fenestration is fully shaded at noon during the months of June, July and August. (2 points);

For proper overhang sizing information see: <http://www.azsolarcenter.com/design/pas-3.html>

Credit 3.2: Use proper amount and type of glazing to maximize appropriate solar gain:

Credit 3.2.a: Orient the building so the longest side faces within 30 degrees of true south and locate less than 20% of total glazing on the east and west faces of the building. (4 points);

Credit 3.2.b: Install appropriate glazing type for each orientation. Glazing materials have properties that reduce heat gain (Solar Heat Gain Coefficient, or SHGC). Using glazing materials with a low SHCG on the southern elevation may reduce the effectiveness of any passive solar design. (Additional 2 points);

For information on appropriate glazing types for passive solar heating see: <http://www.nrel.gov/docs/fy01osti/27954.pdf>

Credit 3.3: Plant two native drought-tolerant trees minimum 10' height, on the west side of the residence as close to the residence as possible without causing future root damage to structure. Trees must cast shade on the west walls to provide measurable benefits during the cooling season. (1 point per tree; max. 3 points);

Remember to integrate your landscaping design with future plans for active solar, such as PV panels, so as not to shade areas designated for future solar collection.

See: <http://www.epa.gov/heatisland/strategies/vegetation.html> for additional information on shade trees and their associated energy saving benefits.

Cochise County Residential Green Building Program

Credit 3.4: Construct a passive evaporative cooling tower with a fan mounted high in the tower to boost the output, and a damper/door at the base to controls flows. (2 points);

For more information on passive cooling tower design, see:

<http://cala.arizona.edu/research/hed/publications/ASES97/Ases97.html>

Credit 3.5: Design and construct an exhaust (convection) tower, solar chimney, or below grade cooling tube system. (3 points);

The following link provides additional resources on the design and construction of exhaust towers and other passive solar structures: <http://www.azsolarcenter.com/design/passive-3.html>

Credit 3.6: Design and construct a vestibule or foyer at the main entrance of the residence that provides an enclosed transitional space between the outdoors and the interior of the building. This area must be able to be completely sealed from the outside and the adjoining interior space(s). (1 point);

Credit 3.7: Install window treatments such as “solar shades” or similar products:

Credit 3.7.a: with an openness factor of 8% or less on 50% of all east, west and south facing windows. (1 point); OR

Credit 3.7.b: Installed on 100% of all east, west and south facing windows. (1 additional point);

Openness Factor" - (O.F.) Refers to the ratio of open area to the total flat surface area of a drapery fabric or perforated material. This quantity relates well to the amount of solar heat admitted through a fabric or perforated material to the extent to which discomfort results to individuals near the glazing system.

Credit 3.8: Install only ENERGY STAR rated appliances. (1 point/appliance; max. 4 points);

Credit 3.8.a: Refrigerator

Credit 3.8.b: Dishwasher

Credit 3.8.c: Clothes Washer

Credit 3.8.d: Freezer

Credit 3.9: Install a whole house ventilation system/economizer to ventilate residence with outside air. (1 point);

Credit 3.10: Install lighting and ceiling fans in accordance with the ENERGY STAR Advanced Lighting Package (ALP) criteria. (2 points); http://www.energystar.gov/index.cfm?c=fixtures.alp_consumers

Credit 3.11: Install tubular skylights for illumination of interior spaces. (0.5 point per skylight, max. 2 points.);

Credit 3.12: Provide an outdoor clothesline or drying rack for each residence. (1 point);

Credit 3.13: Install a Heat Recovery Ventilation (HRV) or an Energy Recovery Ventilation (ERV) system to condition incoming outside air. (2 points);

Credit 3.14: Install a passive solar ventilation air preheating system. (1 point);

For additional information on passive solar air preheating systems:

<http://www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=773>

Cochise County Residential Green Building Program

Credit 3.15: Insulate all hot water lines to a minimum of R-4 throughout entire residence. (1 point);

Credit 3.16: Provide a plumbing line stub out to a south facing roof for future solar thermal installation. (1 point);

Credit 3.17: Install a solar thermal hot water system:

(2 *Credit 3.17.a:* to provide a minimum of 60% of the estimated annual load (the “Solar Fraction”). points); *OR*

Credit 3.17.b: to provide 90% of the estimated annual load. (3 points);

Credit 3.18: Provide electrical conduit from service panel to flat or south-sloping roof surface area for future solar PV system. (1 point);

Credit 3.19: Install a solar PV system (grid tied or off grid) to generate on-site electricity. (1 point for each 10% of annual electrical load);

Information on state and federal rebates and tax credits for renewable energy systems is available at:
www.dsireusa.org.

Sulphur Springs Valley Electrical Cooperative (SSVEC) customers can find rebate and low interest loan information on the company's "Sun Watts" program at:
<http://www.ssvec.org/programs/energySunWatts.php>

Arizona Public Service (APS) customers can find information on the Company's Green Choice Program at: http://www.aps.com/main/green/choice/choice_2.html?s=h

ENERGY PATH

NOTE: For the section below, applicants should choose only one Energy Efficiency method for obtaining points: Performance Path or Prescriptive Path. If taking Performance Path credits cannot be taken for Prescriptive measures and vice versa.

Performance vs. Prescriptive Path: Remember that only one path can be used for scoring a residence. For the Performance path the builder submits Home Energy Rating System (HERS) rating documentation demonstrating the energy performance of the residence. The Prescriptive Path may be used if the builder chooses only to use individual measures, exceeding the prescriptive guidelines found in the adopted International Energy Conservation Code (IECC). In order to obtain maximum points, the prescriptive path is not recommended if the residence can obtain points through the Performance path.

The prescriptive path may be a better choice for those builders using conventional building assemblies that utilize components such as air barriers and typical HVAC units to achieve energy performance. The Performance path may be appropriate for innovative technologies and alternative materials that are not addressed adequately in the Prescriptive path of the rating system.

For more information on the HERS rating system follow this link:

http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_HERS

PERFORMANCE Path:

Mandatory: Meet the requirements of the currently adopted International Energy Conservation Code.

Mandatory: Provide documentation of third-party testing for residential energy performance by a certified HERS rater (Home Energy Rating System) OR provide an energy model using an accepted software program demonstrating the performance of the proposed building assembly. Acceptable software is continually being developed. Acceptable software must be on the National registry of Accredited IECC Performance Verification Software list found at:

http://www.resnet.us/programs/iecc_software/directory.aspx

PERFORMANCE 1: Exceed the Performance requirements of the currently adopted International Energy Conservation Code (IECC) by 15% (25 points); *OR*

PERFORMANCE 2: Exceed the performance requirements of the currently adopted Energy Conservation Code (IECC) by 30% (35 points); *OR*

PERFORMANCE 3: Exceed the performance requirements of the currently adopted Energy Conservation Code (IECC) by 50% (45 points); *OR*

PERFORMANCE 4: Exceed the performance requirements of the currently adopted Energy Conservation Code (IECC) by 75% (65 points); *OR*

PERFORMANCE 5: Design and construct a zero-net energy home. (75 points)

The HERS (Home Energy Rating System) is a relative energy use rating that compares the energy use of a residence on a numeric scale. HERS ratings are done by certified raters and have been used in the ENERGY STAR program, Energy Efficient Home Mortgage Program, and local utility company guarantee programs. For more information, see www.natresnet.org.

Prescriptive Path Individual Measures

Mandatory: Size the HVAC system properly according to heating and cooling loads calculated using ACCA 556 (Manual J) or equivalent.

Mandatory: Size and install the duct system properly according to ACCA 29-D (Manual D) or equivalent.

Mandatory: Install an ENERGY STAR rated programmable thermostat.

Mandatory: Install only ENERGY STAR rated bathroom exhaust fans.

Mandatory: Install only ENERGY STAR or equivalent rated windows and skylights throughout the residence.

ENERGY STAR rated windows are dual-pane, Low E coated glass with thermally broken panes, and have a maximum SHGC (Solar Heat Gain Coefficient) of 0.4 and, a maximum U-factor of .40. Skylights have a maximum SHGC of .40 and a maximum U-factor of .60. These features save energy by reducing heat flow and glare. See www.Energystar.gov

Cochise County Residential Green Building Program

Mandatory: Seal off entire duct system during construction or clean all ducts and HVAC equipment following construction completion.

Mandatory: If radiant or hydronic space heating systems are utilized, the system shall be designed using Gas Appliance Manufacturer's Association GAMA-H-22 guidelines, See <http://www.gamanet.org> , Radiant Panel Association (RPA) *Guidelines*, www.radiantpanelassociation.org or by an accredited design professional in accordance with manufacturer's recommendations.

PRESCRIPTIVE 1: Insulation shall be installed to achieve "Grade 1" certification; regardless of the insulation material or installation process. (1 point); See <http://www.getenergysmart.org/Files/InsulationAssessment.doc>

PRESCRIPTIVE 2: Air leakage rate from the envelope no more than 0.5 ACH (air changes per hour) or .35 cfm/ft² of building enclosure area @ 50 Pa. (2 points); *OR*

PRESCRIPTIVE 3: Air leakage rate from the envelope no more than 0.35 ACH (air changes per hour) or .25 cfm/ft² of building enclosure area @ 50 Pa. (4 points); *OR*

PRESCRIPTIVE 4: Air leakage rate from the envelope shall be less than or equal to 0.25 ACH (air changes per hour) or .15 cfm/ft² of building enclosure area @ 50 Pa. (6 points);

PRESCRIPTIVE 5: Locate all ducts within conditioned building space. (1 point);

PRESCRIPTIVE 6: Install air handling systems, furnaces, and water heaters in conditioned space. (1 point);

PRESCRIPTIVE 7: Install an ENERGY STAR or Cool Roof Rating Council certified roofing system. (2 points)

See http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products or <http://www.coolroofs.org/>

PRESCRIPTIVE 8: Provide 1" (R-4) continuous rigid insulation on exterior of structural wall assembly. (1 point); *OR* Provide 2" (R-8) continuous rigid insulation on exterior of structural wall assembly. (2 additional points);

Continuous insulation on the exterior of stud or masonry walls greatly reduces air infiltration and thermal bridging through wall assemblies.

PRESCRIPTIVE 9: Use blown-in or foam insulation at: Walls (2 points); Ceilings (2 additional points);

PRESCRIPTIVE 10: Install "energy" trusses. (1.5 points);

Raised heel and oversized cantilevered trusses do not compress insulation at building eaves, allowing full effective depth of insulation. For examples see:

http://www.1800arkansas.com/business_development/energy/files/Clearinghouse/ACF789F.pdf

PRESCRIPTIVE 11: Install a water recirculating, high efficiency evaporative cooler, with timer ejector system. Released water shall be plumbed for landscape irrigation. (1 point); *OR*

PRESCRIPTIVE 12: Cooling system is an electric heat pump with multi-speed compressor and variable speed air handling units. (2 points);

Cochise County Residential Green Building Program

PRESCRIPTIVE 13: Cooling system is a hydronic radiant system or a ground-source heat pump. (3 points);

For information on hydronic radiant heat systems see:

For information on ground-source heat pumps see:

<http://www.toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=754&BucketID=6&CategoryID=6>

PRESCRIPTIVE 14: Insulate the attic access opening to the same value as the ceiling insulation; OR design for no internal attic access. (0.5 point);

PRESCRIPTIVE 15: Install a furnace with an efficiency rating of at least 90%; (1 point).

PRESCRIPTIVE 14: Seal entire duct system with water-based mastic, tape or a non-toxic aerosol spray-applied duct sealant. (1 point).

In lieu of earning PRESCRIPTIVE points from the list above, a builder who meets the requirements of the ENERGY STAR[™] for Homes Program shall be awarded 25 points. *For more information, follow this link:* <http://www.energystarhomes.com/> (25 points);

Also, builders who meet the requirements and earn the "Builders Challenge" label from the DOE (currently under development) or the New Home Construction Builder's Option Package Requirements from the EPA shall be awarded 35 points in lieu of PRESCRIPTIVE points.



SECTION 4: WATER EFFICIENCY

Water Adequacy

Cochise County has implemented some of the most innovative water conservation measures in Arizona. In April, 2008 Cochise County became the first County in the state to voluntarily implement water adequacy requirements for subdividers. These water adequacy determinations were previously only enforced for areas inside AMAs (Active Management Areas). If you are planning a subdivision in Cochise County, please contact the AZ Department of Water Resources to obtain an application for determining water adequacy for your project.

Sierra Vista Sub-Watershed Water Conservation Overlay Zone

The County also adopted the Sierra Vista Sub-Watershed Water Conservation Overlay Zone in 2007 to protect the Sierra Vista Sub-watershed. All single and multi-family residences constructed after January 5, 2007 in the Overlay Zone must include certain water conservation features and site development standards. These requirements are listed at:

http://cochise.az.gov/uploadedFiles/Planning_and_Zoning/Building%20Division%20Bulletin%20SV%20Sub-Watershed%20Requirements.pdf

Residences outside the Sierra Vista Sub-Watershed Overlay Zone may achieve points for adhering to the Overlay District packaged requirements voluntarily as a part of the Cochise County Green Building Program. If credit is taken for the Overlay Zone package, credit should not be taken for the individual measures. These credits are marked "SVSWOZ" Credit may be taken, however, for the additional measures not already included in the Overlay Zone.

SVSWOZ Package Credit: If located outside the Sierra Vista Sub-Watershed Overlay Zone, design and construct the residence to include the same requirements of the Overlay Zone. (4 points);

Rainwater Harvesting

Credit 4.1: Install a rainwater harvesting system capable of retaining and storing 50% or more of the average annual available rainfall on the catchment surface (minimum catchment area = 500 sq. ft.). (6 points);

Credit 4.2: Install a rainwater harvesting system capable of retaining and storing 25% of the average annual available rainfall on the catchments surface (minimum catchment area = 500 sq. ft.). (4 points);

Credit 4.3: Install a rainwater harvesting system capable of retaining and storing 10% of the average annual available rainfall on the catchments surface (minimum catchment area = 500 sq. ft.). (2 points);

Most rainwater harvesting systems include a catchment surface, gutters w/ filtered downspouts, underground or above ground storage tank, and drip irrigation system for disbursing the harvested water on the landscape as needed. Cisterns should be covered or screened to avoid breeding mosquitoes or contamination. Annual rainfall for Cochise County varies from under 12 to over 15". For the purposes of estimation, an annual rainfall of 12.3" may be used. You may use the [rainwater harvesting calculator](#) to compute the size of the storage tank needed.

For more information on the design of rainwater harvesting systems:

<http://ag.arizona.edu/pubs/water/az1052/>

Cochise County Residential Green Building Program

<http://www.harvestingrainwater.com>

The Arizona Department of Environmental Quality brochure on appropriate uses of greywater can be found at: <http://www.azdeq.gov/environ/water/permits/download/graybro.pdf>

Credit 4.4: Install a gutter and downspout system or canals that tie to stormwater infiltration trenches, bioswales, or rain gardens. (0.5 point per downspout; max 2 points);

Grey water Reuse

Credit 4.5*: Install separate greywater and sanitary sewer distribution lines on residences with greywater lines stubbed out to exterior and clearly marked. (1 point);

Credit 4.6: Install greywater lines as above, *and also* connect the greywater lines to an appropriate distribution system serving landscaping. (2 additional points);

For more information on the legal uses of greywater and best management practices in Arizona follow this link:

<http://www.azdeq.gov/environ/water/permits/download/graybro.pdf>

Greywater and Rainwater Harvesting Tax Credits in Arizona Effective January 1, 2007: Arizona taxpayers who install a “water conservation system” (defined as a system to collect rainwater or residential greywater) in their residence may take a one-time tax credit of 25% of the cost of the system (up to a maximum of \$1,000). Builders are eligible for an income tax credit of up to \$200 per residence unit constructed with a water conservation system installed. At the moment only greywater-harvesting systems qualify for the credit, but State legislators are planning to remedy this in the near future so rainwater-harvesting systems will also qualify. For application forms and further information go to: www.azdor.gov click on “credit pre-certification” on the left hand side of the home page click on “gray water conservation tax credit.” There is general information and applications for corporations and for individuals.

Plumbing, Appliances & Fixtures

Credit 4.7: Install a “central-core” plumbing system with all water-using fixture fittings within five feet of the hot water heater. (1 point);

Credit 4.8: Install a manifold controlled “home run” water distribution system. Fixtures shall be located within 10 feet of the circulation loop with branch lines no greater than 0.5” in diameter. (2 points);

Credit 4.9: Install a manual or motion activated on-demand hot water circulation pumping system (*note: continuous recirculation systems do not qualify*). (2 points);

Credit 4.10: Install a point-of-use tankless hot water heater that uses only cold water supply or solar-assisted preheating for any fixture greater than 20 pipe run feet from water heater. (1 point per fixture; maximum 3 points);

Credit 4.11: Install lavatory faucets that meet the proposed EPA’s WaterSense™ criteria or have a maximum flow rate or 1.5 gpm or less. (1 point each faucet, maximum 3 pts);

Credit 4.12: Install showerheads that meet the proposed EPA’s WaterSense™ criteria or have a maximum flow rate of 1.5 gpm @ 80 psi. (1 point per fixture; maximum 3 points);

Cochise County Residential Green Building Program

Credit 4.13: Install toilets that meet the EPA's WaterSense™ rating (1.28 gpf) (1 point per fixture; maximum 3 points);

Credit 4.14: Install dual flush toilets with 1.6/.8 gpf or less water use. (1.5 points per fixture; maximum 3 points);

Credit 4.15: Install a washing machine with a water factor or 6.0 or less. (2 points);

Credit 4.16: Install a composting toilet. (2 points per fixture; no maximum);

Credit 4.17: Install a refrigerator with an in-door filtered water system (0.5 point);

Credit 4.18: Install excess flow check valves or excess water shutoff connectors at fixtures. (0.5 point per fixture; maximum 3 points);

Credit 4.19: No swimming pool. (2 points);

Credit 4.20*: No decorative water features or mister systems that use potable water (harvested rainwater is acceptable). (1 point);

Credit 4.21: No under sink garbage disposal systems. (1 point);

Impervious Surfaces

Mandatory: Design for impervious driveway and walkway surfaces equivalent to <10% of the total site area (less than 5 acres) *OR* <1% of the site area (over 5 acres);

Mandatory: Wash out concrete trucks into storage containers, not on to soil;

Credit 4.22: Design for pervious driveway and walkway surfaces for 50% of site hardscape. (2 points);

Credit 4.23: Design for pervious driveway and walkway surfaces for 100% of site hardscape. (2 additional points);

Credit 4.24: Install a vegetative roof system that uses a non-potable water source over at least 50% of the total roofed area. (3 points);

Vegetative or "green roofs" can provide stormwater management, passive cooling, and additional useable outdoor space to a building. In hot, dry climates, care must be taken to ensure that plants species will not require additional water inputs beyond those that can be supplied through water harvesting (from rain or greywater) available at the site. For additional information follow this link: www.greenroofs.org

Irrigation Systems

Credit 4.25: Install landscaping designed by a licensed landscape professional using drought-tolerant plantings that require no irrigation. (3 points);

Credit 4.26: Irrigation system is designed and installed by an EPA Watersense™ certified landscaping professional. (1 point);

For more information on EPA Watersense™ certification, follow this link:
<http://www.epa.gov/watersense/pp/irrprof.htm>

Cochise County Residential Green Building Program

Credit 4.27: Install a high efficiency irrigation system that includes the following items (0.5 point for each item below):

- 4.27. a: “Smart Controllers” with moisture sensors, rain delay controllers, and high efficiency nozzles;
- 4.27. b: Check valves in heads and heads matched to the beds distinct watering needs;
- 4.27. c: Separate sprinkler zones for beds, with plants grouped based on watering needs (hydrozoning);
- 4.27. d: A timer/controller that irrigates during the hours of 10 pm to 8 am to minimize losses from evaporation;
- 4.27. e: Drip irrigation for all planting beds.

***SVSWOZ** : Credits marked with an asterisk in the Water Efficiency Section are part of the Sierra Vista Sub-Watershed Overlay Zone requirements. These credits cannot be taken for points if you are building in the Overlay Zone, where these elements are mandatory.



SECTION 5: INDOOR ENVIRONMENTAL QUALITY

Section 5.1: Garage:

5.1. a: Garage is detached from residence. (1 point); *OR*

5.1. b: No garage is constructed. (2 points);

Credit 5.2: Complete the requirements for the EPA's ENERGY STAR Indoor Air Quality Package certification. (3) points;

For additional information see: http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_iap

Credit 5.3: Garage is provided with a 100 cfm exhaust fan with operation controlled by an occupant sensor, garage door opening/closing device, or timer. Provide outside make-up air through a screened inlet. (1 point);

If credit 5.1.b is taken, no credits can be claimed for Credit 5.3.

Credit 5.4: Test for radon and if the radon level is 2 pCi/L (pico Curies per Liter) or more, install a radon ventilation system, or other recommended system, and seal cracks and holes in foundation/slab. (1 point);

See <http://www.epa.gov/radon/index.html> for more information on radon, testing, and methods of abatement.

Credit 5.5: Install only combustion sealed furnaces, fireplaces and water heaters in residence (0.5 point);

Credit 5.6: Install a whole house filtration system with a disposable filter MERV rating of at least 11 or an electrostatic filter rating of 95% arrestance at .1 micron. (1 point);

A MERV (Minimum Efficiency Reporting Value) rating is a furnace filter rating that describes the filter's ability to trap particles such as dust and pollen. Filters with higher MERV ratings are more effective in capturing particulates, but these filters must be changed on a regular basis, or they become clogged and reduce furnace efficiency. For more information on MERV ratings see: <http://www.furnacefiltercare.com/merv-ratings.php>

Credit 5.7: Vent remote exhaust systems in kitchens and bathrooms directly to the outside. (0.5 point per fan max. 2 points);

Credit 5.8: Perform a post-construction, pre-occupancy flush by keeping windows open and the HVAC system fan running continuously for a minimum of one week. Replace air filter upon completion of flushing period. (1 point);

Credit 5.9: Install a central vacuum cleaner system in the residence. (1 point);

Central vacuum cleaner systems vent to the outdoors, preventing the return of particles into the home through the exhaust vent found in standard vacuum cleaners.

Cochise County Residential Green Building Program

Credit 5.10: Provide an airtight area, directly ventilated to the exterior, designated for furnace and hot water heater installation. A utility closet with a sealed door and all equipment vented to the outside qualifies for this credit. (1 point).



SECTION 6: OPERATION, MAINTENANCE, & OWNER EDUCATION

Homeowner Education & Maintenance

1. Provide an informational package to homeowners at closing, including a description of all features and systems, maintenance manual describing and illustrating the care and maintenance the homeowner should perform on all features and systems to keep them operating properly, a list of service providers/equipment suppliers for all features, and any other appropriate materials for the construction and system type. The manual shall also outline ongoing service and care of common open space, retention/detention basins, wildlife corridors, and environmental management areas as appropriate. (2 points for custom homes, 1 point for models);
2. In addition to the manual above, commission all systems by performing a system start up, verifying system operating performance, and simulating failure/back up modes. Document the results of the commissioning, adjustments made, and ongoing issues requiring additional maintenance or adjustment. Submit documentation to owner. (2 points);

Innovation Points

The field of green building and sustainable residential design continues to evolve as experience and insight into the best possible practices for delivering high quality green products increases. The Cochise County Regional Residential Green Building Program encourages applicants to pursue credit for noteworthy achievements in performance; design and construction (Please note that innovation is not limited by Prescriptive code application since applicants may pursue building code alternative compliance through the ICC Performance Code for Buildings and Facilities). Innovation points are available in every category for green building measures and methods that result in superior performance, efficiency, cost reduction or environmental benefits. Points are awarded based on the individual measure's difficulty of implementation and level of impact, and typically range from 0.5 to 5 points.