



# 2012 Earth Advantage Residential Measures Resource Guide

## 1 Planning and Design

### 1.1 Land Use

#### 1.1.1

**Infill Lot- Build home(s) on open lot in existing neighborhood**

Energy	Health	Land	Materials	Water
0	0	2	0	0

Description: Build home(s) on an open or reclaimed lot within an existing neighborhood. Infill areas are vacant or under-utilized lots of land served by existing physical assets such as roads, power lines, sewer and water, and other infrastructure. An infill lot is defined as a lot or development where 75% of the border of the property is next to or adjacent to previously developed property.

Benefit: Building on an infill site utilizes existing infrastructure, maximizing the current community investment. It can also help reduce the environmental stress of developing on "green-field" sites.

Verification: EA Rater can verify that the lot is sited in an existing neighborhood or surrounded by at least 75% of previously developed property. For example, if the lot has four sides, there would be development on three of them. Verify on site.

#### 1.1.2

**Lot Size** (4300 sf / 2900 sf / 2000 sf)

Energy	Health	Land	Materials	Water
0	0	1/2/3	1	0

Description: Select a lot no larger than these thresholds to create greater housing density.

Benefit: Higher residential densities allow for a greater opportunity for efficient use of available land. Larger green spaces can be developed, more units can be built, and less infrastructure used for each unit developed. Sometimes building codes and land use planning prohibit higher residential density, but when available, this measure should be investigated.

Verification: The builder or responsible party will complete the Accountability Form for this measure and forward it to the EA Rater.

#### 1.1.3

Accountability Form: General

**Build on Greyfield or Brownfield** (Greyfield / Brownfield)

Energy	Health	Land	Materials	Water
0	0	1/3	0	0

Description: A greyfield site is traditionally defined as an area that has been previously developed, with at least 50 percent of the surface area covered with impervious material.

Brownfield: A brownfield is an abandoned, idle, or under-used industrial or commercial site, where construction is complicated by real or perceived environmental contamination. This measure develops a site that has been classified as a brownfield and provides remediation as required by EPA's Brownfield Redevelopment or other applicable Federal program requirements.

Benefit: Targeting greyfields or brownfields reduces development pressure on undeveloped areas, including farmland, forests, etc. Redevelopment of a greyfield site can provide an efficient use of land and infrastructure. Greyfield development allows for the preservation of open space and wildlife habitat in the midst of growth. Brownfield development provides an efficient use of land and infrastructure while allowing for the preservation of open space and wildlife habitat in the midst of growth. The EPA estimates there are 450,000 to 1,000,000 such sites around the country. Grants, loans, and training are available through the EPA's Brownfield Initiative to assist builders and developers in the remediation of brownfield sites.

Verification: Greyfield: Documentation or photographs of previous site's characteristics noted on Accountability Form. Brownfield: Confirmation from a federal, state or local brownfield's site inventory that the site is designated as a brownfield. The builder or responsible party will complete the Accountability Form for this measure and forward it to the EA Rater.

1.2 Site Planning

1.2.1

Accountability Form: General

Energy	Health	Land	Materials	Water
0	1	2	0	0

Access to Public Transit- within 1/2 mile

Description: This measure rewards projects that are located within a 1/2 mile walk of a public transit stop and are accessible to pedestrians. The distance to the stop is measured along the shortest safe walking route that uses marked crossings at major streets.

Benefit: Locating the house within walking distance to public transportation (public shuttle, bus, train, park & ride, or light rail) allows household members to more easily use the system. Use of public transportation reduces the number of daily auto trips. Studies have shown that people who have accessibility to public transportation are more likely to use the system. Benefits include reduced energy consumption and a reduction of other environmental concerns associated with vehicle transportation. Walking also promotes good health.

Verification: Building team documents the availability of public transportation options that meet the requirement. Online maps are good resources to create the necessary documentation. The builder will complete the Accountability Form for this measure and forward it to the EA Rater.

1.2.2

Accountability Form: General

Energy	Health	Land	Materials	Water
0	1	2	0	0

Access to Community Amenities- Minimum 6 within 1/2 mile

Description: This measure rewards projects that are within 1/2 mile of at least six (6) household services, such as schools, hospitals, restaurants, groceries, convenience stores, child care, library, post office, entertainment, retail stores, publicly accessible open spaces, etc. These are services that most people would visit on a regular basis. Only two of each service type may count toward the total. For example, if there are three restaurants within 1/2 mile, only two will count towards the total of six services.

Benefit: Walking saves energy and improves health. The availability of household services can reduce the number of daily auto trips. Studies have shown that when household services are accessible by walking, people are less likely to drive and more likely to access them by walking. Benefits include reduced energy consumption, pollution, cost and other concerns associated with vehicle transportation. Walking also promotes good health. Locating the house within walking distance of essential services allows household members to more easily access these services by walking to them.

Verification: Building team documents the availability of qualified household services that meet the requirement. Online maps are good resources to create the necessary documentation. Builder needs to sign an Accountability Form attesting to the fact that the project meets the requirements of the measure.

1.2.3

Accountability Form: Erosion Control

Energy	Health	Land	Materials	Water
Prerequisite				

Develop and Implement Erosion Control Site Plan

Description: No visible erosion shall leave the site during or after construction. No sediment or pollutant shall exit the site, enter the public right-of-way, or be deposited into any water body or storm drainage system. Depositing or washing soil into a water body, or the storm drainage system, is prohibited. This includes soil carried into the street on the tires of vehicles and construction equipment. Select at least seven (7) items from the EA Erosion Control Checklist.

Benefit: Soil erosion strips valuable top soil from the land, and pollutes bodies of water, such as streams and lakes. Because construction sites are disturbed, erosion can be a serious problem.

Verification: The EA Rater will verify that the goals of this measure have been met. The builder will complete the Accountability Form (AF4 Erosion), taking responsibility for the implementation of the appropriate erosion control measures and forward it to the EA Rater.

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1.2.4	Accountability Form: General	Energy	Health	Land	Materials	Water
Existing Trees of 4" Caliper or Larger Saved		0	0	1	0	1

Description: This measure rewards the preservation of trees already on site. Points are awarded for one mature tree saved. Mature tree is defined as a tree in good health that is not considered a nuisance or invasive species, 4" caliper or larger at 4 feet above the ground. A second point can be awarded for three or more trees saved on the lot. This measure is awarded on a per lot basis. A typical application would be fencing at the drip line of a mature tree or fencing off the area around the tree to remain undisturbed by equipment.

Benefit: Trees contribute to the economic and ecological value of a site. In addition to their physical beauty, trees provide wildlife habitat, help manage the flow of stormwater, clean the air, and they protect critical features such as stream buffers or hillsides. In addition, properly trimmed and positioned shade trees protect the house from the hot summer sun, reducing cooling loads. Considering the effects on energy usage, erosion control, pollution, and wildlife habitat, a single mature tree provides substantial annual and resale value.

Verification: This measure applies to single lots. However, points can be awarded to all lots in a development if a significant number of trees or trees of significant value (heritage trees) have been preserved in a green space that is available to all residents.

1.2.5	Accountability Form: General	Energy	Health	Land	Materials	Water
Stormwater Control: Bio-retention system onsite- 100 percent of lot/development		0	0	2	0	1

Description: Develop an on-site infiltration system for rainwater for the lot and development, exclusive of the footprint of the house roof. This is a water drainage system that routes water into the soil and groundwater of the house site. The swale must contain plants whose roots and associated organisms cleanse the water as it percolates through the root zone. Bio-swales and rain gardens are examples of this approach. The main goal is to keep rainwater that arrives on the site to stay on the site. An additional goal is to maintain runoff flows, runoff durations and runoff volumes after construction as closely as possible to the natural condition of the site and minimize adverse effect on stream flows. System should be sized to hold runoff of a 2-year storm event.

Benefit: Every building affects the natural function of a site's hydrology, particularly its processing of stormwater and the way groundwater is replenished. One way to reduce this impact is to allow the stormwater that falls on the site to soak into the soil instead of allowing it to flow off-site. This can decrease annual runoff volume by as much as 50 percent. It also reduces the potential for flooding and erosion and helps recharge groundwater sources for streams and wells. Bio-retention protects the water quality in local streams by preventing silt, pollutants, and untreated sewage from washing into these bodies during heavy rains. This helps protect the habitats of endangered aquatic species. In addition to being environmentally responsible, allowing water to soak into the ground is resource efficient. Re-use of this water could lower irrigation costs.

Verification: EA Rater will visually inspect stormwater storage features on the site. In subdivisions, EA rater will locate all retention systems and verify how many exist. Plant material must be positioned in the swale or along the sloped sides of the swale. This measure INCLUDES On-site Infiltration of Roof Drains, so that measure should be taken in addition to this one.

1.2.6

Energy	Health	Land	Materials	Water
0	0	2	0	1

Onsite Infiltration System: For roof drains

Description: Wherever we build, we impact the natural function of the site's hydrology, particularly its processing of stormwater, and the way in which groundwater is replenished. One way to reduce this impact is to allow the water from downspouts to soak into the soil instead of washing off-site. This can decrease annual runoff volume by as much as 50 percent. It reduces the potential for flooding and erosion and helps recharge groundwater sources for streams and wells. On-site infiltration protects the water quality in local streams by preventing silt, pollutants, and untreated sewage from washing into these bodies during heavy rains. This helps protect the habitats of endangered aquatic species. In addition to being environmentally responsible, allowing water to soak into the ground is resource efficient. The practice may lower irrigation bills. Stormwater effluent that is allowed to infiltrate on site is not treated in the municipal system, and a discount on sewer fees may be offered to the homeowners by the city through a "downspout disconnect" program.

Benefit: On-site infiltration for roof drains is a water drainage system that routes water away from rooftops to the soil and groundwater. Bioswales, rain gardens, drywells and French drains are examples of this approach. The main goal is to keep rainwater that arrives at the site to stay at the site. An additional goal is to maintain runoff flows, runoff duration, and runoff volumes after construction as closely as possible to the natural condition of the site and minimize adverse effects on stream flows.

Verification: Landscape plans and onsite inspection. This will need to be inspected at foundation stage. In subdivisions it is acceptable to look at a nearby new housing start for verification. The builder or responsible party will complete the Accountability Form for this measure and forward it to the EA Rater. Subdivision-wide projects qualify, if the rain drains of all homes are attached to a common system located in the development.

1.2.7

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	2	0	1

Compostable Erosion Control Amendment: 2- inch minimum, spread over all exposed soil at the beginning of the construction cycle

Description: Spreading compost on the exposed soil at the beginning of the construction process helps protect the soil from erosion. Preservation of top soil influences how well plants adapt and survive. Healthier soil promotes plant growth and holds water better. A 2-inch layer of sand is also acceptable on heavy clay soil where it will contribute to improved soil texture.

Benefit: This measure provides for erosion control at the beginning of the construction cycle and provides amendments to the soil after the house is complete. Amendments are typically compost, shredded leaves, or other organic matter. If compost is used, it may be tilled in as soil amendment as landscaping begins. See additional points for the Soil Amendment measure in the Outdoor Water and Lansdcaping section of this document. These measures are separate and the points may be added. It is recommended that the compost be certified under the US Composting Council Seal of Testing Assurance program. This test examines the following criteria: 1) pH; 2) soluble salts (conductivity); 3) nutrient content (N-P-K); 4) organic matter; 5) Moisture percent; 6) maturity; 7) stability; 8) inerts; 9) trace metals; and 10) weed seeds and pathogens. It is recommended that an application of 2- inches of compost be applied rather than straw or sawdust to control erosion and for mitigation of erosion on construction sites after some damage is done.

Verification: EA rater will look for compost on the ground around the house. All areas of disturbed soil must be covered.

1.2.8	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	1	0	1

**Preserve Natural Features**

Description: The protected area must be identified with construction fencing, flagging, silt fence or a similar method.

Benefit: Clearing, grading, and preparing land for construction can damage natural features that add character and value to property. This can have serious effects on hydrologic and habitat functions. For this reason, it is vital to protect sensitive areas from direct encroachment. Such areas provide an essential cover, feeding, nesting, and breeding habitat for many species of fish and wildlife. They also slow the path of water allowing it to percolate through the soil recharging groundwater supplies. Protecting sensitive areas is environmentally responsible, and in most cases it is required by law. Sensitive features include streams, lowlands (areas with small streams and associated wetlands), wetlands, shorelines, rock outcroppings and bluffs.

Verification: Builder will identify the area on the site plan. EA Rater will visually identify protected areas and the fencing or flagging that identifies it.

1.2.9	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	2	0	1

**Protect Non-Grading Areas**

Description: Protect non-graded areas of lot from ground disturbance by equipment, vehicles, and material staging as well as topsoil removal. The protected area should be at least 30% of the lot and must be identified with construction fencing, flagging, or a similar method. The disturbed area should not extend past 20 feet of home's foot print.

Benefit: An essential characteristic of healthy soil is air space within the soil structure. These soil pores transport air, water, and allow plant roots to grow more easily. Equipment on a jobsite compacts the soils, lessening their ability to absorb rainwater. Damage to existing root structures can occur if equipment and vehicles move too close to trees.

Verification: EA Rater will visually identify protected areas and see that fencing or flagging is installed.

1.2.10	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	0	1/2

**Pervious Surface (25%-50% / >51%)**

Description: Replace impervious surfaces, such as asphalt or concrete, with pervious materials that allow rainfall to percolate into the soil on the site. Points are awarded based on the percentage of the hardscape that is pervious. Hardscape includes driveways, walks, patios, etc. Pervious surfaces include pervious concrete, porous asphalt, permeable interlocking concrete pavers, vegetated or gravel-filled plastic grids, and porous gravel surfaces. Rock layers beneath the surface must be properly sized to hold typical storm events. Spaces between pavers (if used) must be filled with rock, not sand, so that underlying material remains pervious. In poorly draining soils, it is suggested the builder consult with a geotechnical engineer. Overflow or perforated pipes may be required in poor soils. No fine-grained materials should be stored on or adjacent to a pervious paved area, nor should they be used where they can wash onto a pervious surface. Examples of such materials include bark dust, compost, topsoil, and other material stockpiles. Pervious materials should be installed after the remainder of the site is stabilized to avoid clogging during construction.

Benefit: Groundwater is replenished by rainwater that soaks into the ground. Covering the ground with impermeable materials interrupts the natural recharging of ground water. One way to reduce this impact is to replace impervious surfaces, such as driveways, sidewalks, roofs, and patios with pervious surfaces that allow the surface water to percolate into the ground on site. Replacing impervious areas with pervious surfaces reduces the potential for flooding, both on and off-site, by allowing more water to soak directly into the ground.

Verification: EA Rater will identify the pervious surfaces and visually estimate the amount of the hardscape that qualifies. If available, landscape or site plans can assist. On-site verification at final inspection.

**1.3 Building Design**

1.3.1

Energy Health Land Materials Water

Calculated

Energy Modeling: Use EPS energy scoring system

Description: Energy efficiency is fundamental to green building. Earth Advantage requires a minimum level of energy efficiency that is 10 percent better than building code. The Energy Performance Score (EPS) score is used to calculate EPS points for all energy-related measures in this Points Worksheet. When the EPS value is reduced beyond the 10 percent minimum performance requirement, additional Earth Advantage points are granted. Once the EPS reaches the 10 percent improvement threshold, two Earth Advantage points are granted for every one EPS point reduction.

A Home Energy Rating (HERS) can be provided upon request for an additional fee.

Benefit: The Energy Performance Score assigned to this house allows you to compare energy use with other houses. This is especially useful when the time comes to sell the home. In Energy Trust of Oregon territory, prospective buyers can use EPS to shop for a home that meets their energy performance expectations.

Verification: EA Rater enters the EPS value in this measure to calculate corresponding.

1.3.2

Energy Health Land Materials Water

Calculated

House Size

Description: Houses less than 2200 sq. ft. receive 1 energy point for every 50 sq. ft reduction. For example, a home that is 1800 sq. ft would receive 8 energy points, while a 1500 sq. ft. home would receive 14 energy points. These points are granted in addition to points calculated by the Energy Performance Score (Measure 1.3.1). The reason for this two-pronged points allocation is to compensate for the disadvantage that smaller homes have in gaining points through the other method. In addition, one materials point is given for each 200 sq. ft. reduction in size below 2000 sq. ft.

Benefit: This measure encourages smaller, space-efficient designs. The size of the average house in the United States has grown to almost 2,400 sq. ft. At the same time, households have fewer people. House size affects every aspect of energy and resource efficiency, including energy use, material use, furnishings, and even the quantity of cleaning chemicals. Smaller houses allow greater development density, which reduces infrastructure costs and supports mass transit systems. House size is the most significant environmental issue, so smaller houses are rewarded with significant points in Land and Materials.

Verification: EA Rater will determine conditioned floor area from house plans and measurements made at the site.

1.3.3

Energy Health Land Materials Water

0 0 3 2 0

Accessory Dwelling Unit (attached or detached)

Description: Build an accessory dwelling unit (ADU) on the same lot as the primary residence. The ADU can be attached or detached. The ADU must be built to the same specifications and best practices as the primary residence.

Benefit: Providing flexibility and adaptability for different family configurations over time can provide more density of people within the home. This reduces the overall impacts of the home on a per person basis. ADU spaces can also act as office spaces to allow telecommuting and potentially reduce transportation impacts of work commuting.

Verification: EA Rater will verify that the ADU is built to the same energy specifications as the primary residence.

1.3.4	Energy	Health	Land	Materials	Water
House has detached or no garage	0	2	0	0	0

Description: The garage is designed as a separate isolated structure from the house or there is no garage built.

Benefit: The garage is usually the storage place of a wide range of herbicides, pesticides, fertilizers, paints, adhesives, and petroleum products. It is also a place where internal combustion engines operate in a poorly ventilated space. The best way to prevent harmful fumes from entering the living space is to build the garage as an entirely separate structure.

Verification: EA Rater will verify that the garage and house do not share a common wall, ceiling, or floor, or that there is no garage built.

1.3.5	Energy	Health	Land	Materials	Water
Green Team Meeting	0	1	1	1	0

Description: Owner/Developer, Designer/Architect, General Contractor/Builder, Earth Advantage Team Member, and the following subcontractors (framing, electrical, HVAC, insulation, landscaper) participate in a meeting. This meeting must take place before construction begins. At this meeting the builder can emphasize the goals of the project and new building details, and give the subcontractors drawings and instructions on how to accomplish their roles in the project. This meeting will go help people understand their roles and responsibilities. Make sure that the subcontractors are aware that the Earth Advantage team will be conducting inspections. Note that both the ductwork and the building envelope will be tested for air tightness. It may be necessary, especially for the first certified home, to hold additional training sessions with key subcontractors. One meeting per project is required for points. A project could be defined as a custom or development. That is, for production builders this meeting will need to take place before the start of each new subdivision. Additional charges may apply.

Benefit: A meeting where the Green Team gather to review the project goals and specific green building measures helps ensure success of the project.

Verification: EA Rater is one of the members of the Green Team and will be able to award this measure once the meeting has taken place.

1.3.6	Energy	Health	Land	Materials	Water
Moisture Modeling: WUFI Condensation Point Analysis	0	0	0	1	0

Description: WUFI is a moisture modeling computer program developed by Oak Ridge National Laboratory (ORNL)/Fraunhofer IBP. It allows realistic calculation of the transient coupled one-dimensional heat and moisture transport in multi-layer building components exposed to natural weather. It is based on the newest findings regarding vapor diffusion and liquid transport in building materials and has been validated by detailed comparison with measurements obtained in the laboratory and on outdoor testing fields. WUFI analysis can be performed by EAI or a credible third party. Contact the Earth Advantage staff for more information on pricing.

Benefit: High performance wall systems can sometimes create moisture issues inside the wall cavity of a home if the point of condensation is not carefully considered. WUFI Analysis allows for a complete analysis of the entire building assembly including thermal barriers, air barriers, vapor barriers, and area weighted U-values.

Verification: EA Energy Modeler will perform the analysis and report the results to the builder.

## 2 Waste Management

### 2.1 Waste Management



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2.1.1	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	1	2	0

Develop and implement waste reduction plan

Description: Develop a waste reduction plan that identifies local options for diverting construction debris from the landfill. A copy of this document will be provided to Earth Advantage to gain credit for the measure. A new plan will need to be submitted with each contract renewal or a minimum of once per year.

Benefit: Develop and follow a Waste Management Reduction Plan. This is a document that specifically lists the actions the builder and all trades will take to reduce waste. This document is to be provided to the builder by an EA representative.

Verification: Builder will provide EA a copy of the Waste Reduction Plan. EA Rater will verify that the plan is being implemented by identifying examples of action items in the field. In addition, the builder or responsible party will complete the Accountability Form for this measure and forward it to the EA Rater.

2.1.2	Accountability Form: General	Energy	Health	Land	Materials	Water
		Prerequisite				

Recycle 95% of clean wood and cardboard

Description: Recycle 95% of all wood scrap and cardboard from the jobsite. Wood scraps can be ground up and used as mulch or as fuel. Cardboard is generally used in the production of new paper products. Using construction waste for the production of new products or the generation of electricity is the preferred practice but jobsite warming fires are allowed during winter months.

Benefit: Wood and cardboard are both highly recyclable materials, and recycling facilities are readily available in most urban and rural areas. The intent of this measure is to divert material from the landfill. Material diverted from landfills becomes new consumer products, building materials or fuel for boilers.

Verification: The builder or responsible party will complete the Accountability Form stating that this measure was completed. Verifiers will look for material separation on site.

2.1.3	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	1	0	0

Recycle drywall

Description: The intent of this measure is to reward builders who go beyond the required recycling of wood and cardboard. Construction creates a large quantity of drywall scrap. Builder must recycle 90% of each material to gain the points for this measure. Points will not be given for disposing of or burning these items on site.

Benefit: Recycling reduces the amount of material that is shipped to the landfill.

Verification: Builder shall provide an Accountability Form. EA with documentation from the recycling facility or waste hauler identifying the material and quantity diverted.

2.1.4		Energy	Health	Land	Materials	Water
Donating construction materials		0	0	1	1	0

Description: Left-over construction materials such as plywood, oriented strand board (OSB) or framing lumber can be donated to a legal non-profit, for example, Habitat for Humanity ReStore. Sheet goods, half sheet and larger, and framing lumber, 5 feet or longer, must be clean and free of paint, caulking and concrete. Paints, stains, and sealant containers must be new and unopened.

Benefit: Builder donates material to a non-profit organization or government agency. These materials are kept from the landfill and have the added benefit of not needing to be remanufactured into a new product. These items can be used with no additional energy expenditure or additional carbon impact. These products are typically used for smaller home and garden projects, reducing the need to purchase more expensive new materials. Many non-profit stores give receipts for tax deductible donations.

Verification: To gain credit for this measure, the donated materials must be valued at \$250 or more. Builder shall provide EA with copy of the donation receipt.

2.1.5	Accountability Form: General	Energy	Health	Land	Materials	Water
On-site recycling and reuse		0	0	1	0	0

Description: Benign materials, such as land clearing debris and drywall are ground and mixed into soil on the site. Rock excavated from the site is used for site amenities.

Benefit: Reusing materials on site reduces landfill waste and transportation of debris.

Verification: Builder will complete an Accountability form specifying the material and approximate quantity. Verifier will attempt to confirm that materials were reused on site.

2.1.6		Energy	Health	Land	Materials	Water
Concrete clean out pit		0	0	2	0	0

Description: The U.S. Environmental Protection Agency (EPA) does not allow the discharge of concrete wash water into the groundwater, storm drains, or waterways. Concrete wash water is generated by the cleaning of concrete trucks, chutes, pump trucks and equipment of the trade. Additionally, do not dispose of the left over concrete that was not used on the job on site, but rather into the wash out area. Concrete wash out areas allow for the evaporation and eventual safe removal of solid material. Washout facilities can be prefabricated containers, or they can be built on site either above grade or below grade. Facilities need to be watertight, and sized to accommodate the expected load. Size the wash out area to be large enough to handle all excess concrete, wash water, and rain to prevent overflow. To achieve a water tight site built wash out area the pit, or structure, should be lined with 10 mil plastic sheeting that has no holes, tears, or lapped edges. Wash out areas should be at least 10 ft. x 10ft. and at least four feet deep. Consider covering the basin with a grate to prevent people and animals from stepping into the pit. Plan the location of your concrete wash out areas into your site plan and construction schedule, always keeping the distance from the concrete work to the wash out area relatively close. When cleaning out a wash out area be sure to wait until the concrete has thoroughly cured and there is no liquid in the pit from concrete wash out activities. The plastic sheeting must be discarded after cleaning the pit, as it will assuredly be ripped.

Benefit: Installing concrete wash out areas not only prevents pollution, it contributes to a professional appearance for the job site. The recycling of this concrete into crushed aggregate is highly encouraged. Concrete wash water is alkaline, contains high levels of chromium, and can increase the pH of waterways. It is toxic to fish, can cause storm drain clogging, and can contaminate drinking water supplies.

Verification: The EA rater will confirm that a concrete wash out area has been installed on site, is being used, and that there is no apparent leaching of liquids into the ground. Additionally, confirmation shall be made that the pit, or structure, does not connect to a storm drain or drain into a waterway.

### 3 Building Envelope

#### 3.1 Durability Strategies

3.1.1

Accountability Form: General

Energy Health Land Materials Water

Prerequisite

#### Integrated Weather Barrier, Window & Door Flashing System: Installed Properly

**Description:** A weather barrier is part of the water management system that creates the drainage plane in exterior wall assemblies. This system consists of a code-approved housewrap or building paper that is installed so that the upper sheets overlap the lower sheets and integrated flashings at building openings and penetrations. All systems must be installed according to the manufacturer's instructions. Window and door openings are the most common areas of moisture problems, and proper flashing details allow for drainage to the outside. These systems typically use sill pans and flexible flashing type materials (peel and stick).

Fully flash all window and door openings, including pan flashing at sills, side flashing that extends over pan flashing, and top flashing that extends over side flashing and integrate with the weather barrier. Kick-out flashing is also required.

**References:**

ASTM 2112

Energy and Environmental Building Association (EEBA) Builder Guides EEBA Water Management Guide, 2005 Edition

**Benefit:** Proper installation of housewrap and integrated flashing is important to ensure that any water that penetrates the exterior siding is directed down and out of the wall assembly. House wrap that has been installed incorrectly can channel water into the interior of the wall assembly. Water that is allowed to penetrate the exterior wall assembly can degrade the performance of the insulation, damage the exterior sheathing, interior wall board, and potentially, the interior flooring and other assemblies. Chronic moisture in wall assemblies can also support the growth of mold and fungi that damage the building and can seriously harm the occupants. A properly integrated weather barrier will reduce the possibility of the penetration of water into the exterior wall assembly.

**Verification:** EA Rater will verify that a housewrap or building paper layer is properly installed. It must cover the entire outside wall surface. Sheets must be installed such that the sheets higher up overlap the ones below. Window and door flashing must be integrated and overlap properly to shed water. Sill pans are required. Manufacturer's installation specifications must be followed.

3.1.2

Accountability Form: General

Energy Health Land Materials Water

Prerequisite

#### Rainscreen Wall System: 3/8" airspace under masonry cladding

**Description:** A rainscreen wall is a moisture-management system, incorporating exterior cladding, an air cavity (typically 3/8 inch), flashings, a drainage plane (building paper or housewrap) with drainable openings at flashings and bottom terminations, and an airtight support wall to offer multiple moisture-shedding pathways. When used behind masonry, cultured stone, stucco or brick cladding, the air space must be kept free of mortar droppings with a drainage mat to receive this credit, and the bottom course must have open head joints at every other unit. When combined with top venting (screened vent with siding or open head joints at every other masonry unit), the rainscreen also accelerates cavity drying.

**Benefit:** This technique helps extend the life of the masonry and the exterior walls of the home under the masonry. It also prevents moisture from entering the wall cavity. This is accomplished by neutralizing wind-driven rain, offering multi-layered redundancy, and integrating drainage and ventilation to accelerate cavity moisture removal.

**Verification:** EA Rater will identify exterior masonry and verify the presence of a properly constructed rainscreen. Critical details are at least 3/8-inch air space between the masonry and the drainage plane.

3.1.3	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	2	0

Rainscreen Wall System: 3/8" airspace under siding (whole house)

Description: A rainscreen wall is a moisture-management system incorporating exterior cladding, a 3/8-inch air cavity, flashings, a drainage plane (building paper or housewrap). The cavity is open at the top and bottom for drainage of liquid water and ventilation of water vapor.

Benefit: This technique helps extend the life of the siding, helps paint on the siding to last longer, and helps prevent moisture from entering the wall cavity. This is accomplished by neutralizing wind-driven rain, offering multi-layered redundancy, and integrating drainage and ventilation to accelerate cavity moisture removal.

Verification: EA Rater will verify the presence of a properly constructed rainscreen. Critical details are at least 3/8-inch air space between the siding and the drainage plane.

3.1.4		Energy	Health	Land	Materials	Water
		Prerequisite				

Low-point Drain: Crawl space or basement

Description: A low point drain removes water that collects in the crawlspace during construction and in the event of a plumbing leak or high water event. The floor of the crawlspace is graded to one or more low points. Provide a drain at each low point that slopes to daylight or to a sump pump with a sealed cover. Use a backflow valve to prevent reverse flow of outside water into the crawl space, and to reduce the chance of vermin entry. Gutter drains and foundation drains must not be connected to the crawl space drain.

Benefit: Standing water in crawlspaces can be a common source of moisture problems in houses. Water vapor rises from the crawlspace and enters the building. This can lead to structural decay and moisture problems.

Verification: EA Rater will identify the presence of the drain and verify that the waste line opens to daylight in a way that provides proper drainage.

3.1.5		Energy	Health	Land	Materials	Water
		Prerequisite				

Third-Party Framing Lumber Moisture Test: 19% or lower

Description: Have a framing lumber moisture content (MC) test performed by a third-party, such as Earth Advantage. Moisture content (MC) of the lumber must be 19 percent or lower.

Benefit: Lumber that is moist (higher than 19 percent moisture content) has a much greater chance that it will foster the growth of mold in the cavity of the wall after it is covered by drywall and other materials. Moist lumber can shrink slightly as it dries out, potentially causing cracks in drywall and other materials that have been attached to the framing lumber.

Verification: EA Rater or a third-party uses a moisture meter to measure the moisture content (MC) of framing and sheathing lumber. The most important locations to test are framing members and subfloors around window and door openings, bottom plates, as well as larger dimension lumber (beams and posts). Builder will be notified if any areas do not meet the requirement of 19%. Testing will be conducted at five (5) window areas and an additional fifteen (15) random areas within the house.

3.2 Foundation Systems

3.2.1

Energy	Health	Land	Materials	Water
0	0/1	0	0/1	0

**Basement Wall Insulation: R19 minimum fiberglass only/Rigid foam (w/fiberglass acceptable)** (fiberglass insulation / rigid insulation)

Description: Insulate the basement walls to minimum R19 or better with an appropriate system for a below grade application. Careful attention to air sealing around the rim of the first floor is important. R19 Fiberglass only: Basement stud wall insulated with minimum R19 fiberglass insulation. This will ensure that you meet the ENERGY STAR requirements. An air space between the framing and cement wall blocks required. Insulation batts must be kraft back, and be stapled to the face of the framing members. A cavity-insulated stud wall with a polyethylene vapor retarder has a very high risk for condensation and is not recommended. Rigid Foam used with fiberglass cavity insulation: Rigid foam insulation is used between stud wall and concrete foundation wall. This will act as a capillary break between the studs and the concrete. This type of installation will also function as the vapor barrier between the warm, moist air, in the home and the cooler, condensing surface of the concrete foundation wall. This is the preferred method because of the added moisture protection benefits. Rigid foam should account for 40% or more of the total R-Value to avoid condensation in winter if used without an interior vapor retarder. Seams of foam should also be taped. Insulated Concrete Forms (ICFs) can be used to earn the rigid foam point.

Benefit: Insulating the walls of a basement has several advantages. It is easier to seal the foundation walls than the floor. There is no need to insulate the HVAC system or pipes in a conditioned basement. Warm basements are much less likely to have condensation-related mold and mildew problems. It is preferred that insulation on basement walls never has a plastic vapor retarder. Code may require insulation to have a vapor retarder on the "warm in winter" side. However, this may be eliminated if rigid foam is used between studs and concrete wall.

Verification: EA Rater will verify that minimum R19 insulation is installed. The R-value of batt insulation is marked on the paper facing or ink-jet printed on un-faced batts.

3.2.2

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	1	0

**Slab in Unconditioned Space Insulated for Future Use**

Description: Install R-10 insulation installed under the entire concrete slab in unheated basement or garage so this space can be converted to living space in the future.

Benefit: Concrete slabs in unconditioned spaces like basements or garages are typically left un-insulated or only have perimeter insulation. Because remodeling over existing slabs is common, it is crucial to address the insulation under the slab during construction.

Verification: Builder signs accountability form and provides photo documentation of rigid insulation to EA rater prior to concrete pour.

3.2.3

Accountability Form: General

Energy	Health	Land	Materials	Water
Calc	0	0	0	0

**Slab Insulation: R10 concrete slab fully insulated (R15 if radiant heat)**

Description: Recommended upgrade: insulate the entire slab-on-grade to a minimum of R10. When radiant heat is present the insulation level must be R15. This measure is required in all slab radiant floor heating systems. The insulation material should be rigid foam boards with the appropriate compressive strength and approved for below grade use. Generally, this is extruded polystyrene (XPS). The use of foil-faced "bubble-wrap" insulation or other "radiant" insulation products does not qualify.

Benefit: Heat loss from the underside of the slab is high, particularly at the edge. Insulating the slab reduces this loss of heat.

Verification: The builder will complete the Accountability Form indicating the R-value, insulation material, and insulation thickness and forward to the EA Rater along with photo documentation.

3.2.4

Energy	Health	Land	Materials	Water
0	1	0	0	0

Slab on Grade

Description: In a slab on grade foundation, a concrete floor sits directly on the soil with no space beneath. It must cover the entire footprint of the house to obtain the points for this measure. A slab on grade foundation can be vulnerable to radon gas from the soil. If the home is built in radon Zone 1, mitigation will be required.

Benefit: A slab on grade foundation can reduce air infiltration through the first floor, as compared to a crawl space foundation. Decreasing the air infiltration in the first floor of a home will significantly reduce stack effect, and the potential for pollution of indoor air. Insulation is covered under a separate measure (3.2.3) for this system.

Verification: EA Rater will confirm the floor construction on building plans. On site, the rater will visually identify the slab and confirm that it covers the entire footprint.

3.2.5

Energy	Health	Land	Materials	Water
0	2	0	0	0

Unvented Conditioned Crawlspaces: Insulated walls with rat slab

Description: An unvented, conditioned crawlspace (also called a short basement) is constructed by attaching rigid or sprayed foam insulation to the foundation wall. Insulation (at least R-19) and air sealing must extend from the bottom of the subfloor to the footing. The insulation must extend around the entire perimeter and can be placed either on the interior or exterior of the foundation. Insulating concrete forms may also be used. Air-sealing is critical to reduce outside air infiltration, especially at the mud sill and rim joist. Air flow into the crawl space area is required, at a rate no less than 0.02 cfm per square foot of horizontal area. This will ensure that the crawl space maintains positive pressure with respect to the finished portion of the home. Typically a rat slab is poured in the crawl space, further reducing the home's exposure to moisture and soil contaminants.

Benefit: Properly constructed conditioned crawlspaces are cleaner and dryer than conventional crawlspaces. Dry crawlspaces are less likely to harbor pests, termites, and mold. Although the energy benefits are still being debated for homes in the heating dominated climates, perimeter insulation is considered to be more effective than under-floor insulation in cooling climates. HVAC ducting installed in this area need not be insulated because it is now a conditioned space. However, ducts are required to be sealed with mastic paste.

Verification: Due to the importance of air sealing and insulation details in a conditioned crawlspace, a cross-section drawing must be included on the building plans in order to obtain points for this measure. When planning a conditioned crawlspace, Earth Advantage recommends utilizing a building science resource such as "Conditioned Crawl Space Construction, Performance and Codes" by Joe Lstiburek ([www.buildingscience.com](http://www.buildingscience.com)). On site, the rater will confirm the presence of each component and its detailing.

3.3 Floor Framing and Insulation

3.3.1

Energy Health Land Materials Water

Prerequisite

**Floor Insulation: R 38 Suggested** (Fiberglass batt / Blown-in fiberglass / Blown-in cellulose / Low-density SPF / High-density SPF / Other (please specify))

Description: Recommended upgrade: under-floor insulation to R-38. Nominal 12-inch floor joists provide enough depth to install a standard density R-38 batt. If there is not enough room for the 12-inch batt, a high-density product can be installed to achieve R-38 in the space available in a nominal 10-inch joist. In all cases, insulation should fill the entire cavity, touching the subfloor above. Other techniques may involve furring down beams or joists to accommodate the 12-inch batts, rigid foam, spray foam, blown-in insulation, or any combo there these.

Underfloor insulation should not be installed until the building is closed to the weather.

Benefit: Additional insulation saves energy and improves the comfort of adjacent interior spaces. Wood-framed floors typically account for a large percentage of the surface area of the building.

Verification: EA Rater will examine the floor insulation to check for proper depth, subfloor contact and complete cavity filling.

3.3.2

Energy Health Land Materials Water

0 0 0 1 0

**I-joists framing over crawlspace** (Fiberglass batt / Blown-in fiberglass / Blown-in cellulose / Low-density SPF / High-density SPF / Other (please specify))

Description: I-joists are used for framing all floors, especially the first floor where some builders still use post-and-beam construction. If open web trusses are used for the second floor, this point is awarded.

Benefit: I-joists are composite, engineered wood products made from rapidly renewable, smaller dimension trees and mill scraps. Using this material dramatically reduces the demand on forest timber and eliminates many large- dimension wood beams. They also support longer spans and allow greater depth to hold floor insulation.

Verification: EA Rater will visually confirm the subfloor material during the rough inspection.

3.3.3

Energy Health Land Materials Water

0 0 0 2 0

**Open-web floor trusses - blown-in insulation** (Blown-in fiberglass / Blown-in cellulose / Low-density SPF / High-density SPF / Other (please specify))

Description: If open-web floor trusses are installed as part of the thermal boundary, they must be filled with blown-in insulation. Batt insulation is very difficult to install correctly. For example, floors above garages must be filled with blown-in insulation.

Benefit: Open-web joists are parallel chord trusses designed to support floors and can be used in the same way as I-joists or dimensional lumber. The top and bottom chord of each truss is usually 2x4 dimensional lumber or laminated veneer lumber (LVL). Metal or wood web members connect the top and bottom chords. Open-web trusses allow for ductwork, plumbing, electrical, and other utilities to be easily run across the joists. The space between webs facilitates easier installation of ductwork, wiring, and plumbing to significantly reduce the system depth and cost. This design can be one component of a strategy to bring HVAC equipment and ductwork into the conditioned envelope of the house. Open-web trusses allow longer spans, and utilizing these lighter weight systems will generally result in reduced size of bearing walls, foundations, and footings.

Verification: EA Rater can visually confirm open-web joist trusses.

3.4 Wall Framing and Insulation

3.4.1

Energy Health Land Materials Water

Prerequisite

Intermediate Framing

Description: Intermediate framing improves two thermal weaknesses of typical wood frame construction. The first provides a method to insulate corners. Typically, each corner needs solid wood backing to support the drywall. Instead of framing the old-fashioned "box", which is inaccessible to insulation, other methods of supporting the drywall can be used. The most common method is to turn a stud lengthwise to the wall so that insulation can be placed behind it. Other methods include ladder blocking and drywall clips.

The second provides a method to insulate the headers, another area where insulation is needed. Exterior walls are now framed with 2x6 lumber, but most headers don't need to be 5½-inches thick. A 4x header leaves room for 1.5 inches of rigid insulation over the entire surface. High-density blown-in insulation is also acceptable at headers.

Benefit: Intermediate framing uses less wood, requires less labor, produces less waste, and improves overall insulation value of the wall assembly.

Verification: EA Rater will verify that 80 percent of all corners and headers have insulation. In some cases, a corner may be required to be solid wood to meet seismic requirements. For example, an outside corner may be two or more studs nailed together with a metal bracket that connects them to the foundation. Full-thickness headers might be required for wider window or door openings.

3.4.2

Energy Health Land Materials Water

0

0

0

1

0

Advanced Framing Techniques

Description: Advanced framing means using less wood to frame a house. This technique eliminates wood where it is structurally unnecessary, or where its use is likely to cause other problems such as drywall cracks. The advanced framing technique uses 2 x 6 studs, 19.2 or 24 inches on-center to frame the exterior walls as well as follows all other requirements of Intermediate Framing (see measure 3.3.1). Ladder blocking and the use of hardware like drywall clips, in place of lumber, are common elements in this technique. The following are additional elements that can be implemented in advanced framing: Design homes on 2-foot modules to make the best use of common sheet material sizes and reduce waste and labor. This includes overall dimensions, partitions, and aligning window locations with stud spacing. Space floor joists and roof rafters 19.2-inches or 24-inches on-center. Use two-stud corner framing and inexpensive drywall clips or scrap lumber for drywall backing instead of studs. Use one-stud framing at partitions with ladder blocking, drywalls clips, or scrap lumber for drywall backing. Use a precut framing package. Eliminate headers in non-load-bearing walls. Eliminate unneeded cripple studs under window ends. Use single top plates (requires framing alignment and connector plates). Size headers to their actual loads. Use single top plates when appropriate. Fill in any blind spaces during framing with rigid insulation.

Benefit: A typical wall assembly can be as much as 25 percent wood. The insulating value of wood is R1 per inch. Fiberglass, cellulose and other materials have insulating values that range from 2.8 to 4 per inch. It is easy to see that reducing the percentage of wood will increase the percentage of insulation. The result is a wall assembly that will lose much less heat and require less labor and material to build. Advanced framing is one green building technique that reduces construction costs.

Verification: EA Rater will visually inspect the framing to see that the techniques listed above were employed. Builder must at minimum use increased spacing between studs, 2-stud corners where possible, insulated headers, and eliminate headers in non load bearing walls.



3.4.3

Engineered Wood Studs

Energy	Health	Land	Materials	Water
0	0	0	1	0

Description: Use engineered studs for at least 90 percent of the wall framing.

Benefit: Engineered studs are made from smaller pieces of wood fiber that are glued together and cut into standard dimensions. Engineered studs are straighter, stronger, and reduce waste. Engineered studs can take several forms, including laminated, stranded or finger-jointed. This technique is used to replace large dimensional lumber, typically cut from single trees or larger pieces of wood. Engineered lumber uses raw materials more efficiently. By combining together smaller pieces of wood to form a single piece, less of the log is wasted. This reduces the pressure on forest resources. In addition, because it is a more consistent product (fewer warped or split pieces), using finger-jointed lumber means less wood is scrapped. This decreases the demand on local landfills. Using this form of lumber may also lower the embodied energy of a home by eliminating the energy needed to harvest, mill, transport and dispose of the lumber scrapped or otherwise wasted.

Verification: EA Rater will visually inspect the lumber.

3.4.4

Insulating Concrete Forms (ICFs): Foam/Recycled

Energy	Health	Land	Materials	Water
0	1	0	0	0

Description: Insulating concrete forms are typically made from EPS (expanded polystyrene) foam insulation with cavities for placing concrete. The forms remain in place to serve as insulation for the walls. Some ICFs are made with post-consumer recycled foam while others are made with mineralized wood from post-consumer sources. These recycled products, such as Faswal, Duriosl and Rastra can gain an additional point under Materials. Points can be earned using ICFs for basement walls, above grade walls or both. The insulating value of ICFs can vary depending on the unique characteristics of each product, including the thickness of the foam and the type of ties used to hold the structure together. In order to give proper credit, check manufacturer's literature for the static R-value of the specific unit. "Dynamic" R-value and "thermal mass effect" are not accepted for expressing heat loss. The air leakage benefits are included in air leakage testing.

Benefit: ICFs reduce the use of wood framing, provide exceptionally air tight walls and offer uniform insulating value without thermal bridging. They offer exceptional noise reduction qualities even when located in noisy areas. A skilled crew may be able to erect ICF walls quickly. ICF homes are very strong and stand a better chance of surviving strong winds, wildfires and earthquakes. ICF products with post-consumer recycled content also reduce solid waste. ICF walls don't allow water vapor intrusion that can lead to mold and decay.

Verification: EA Rater will readily see that ICFs have been installed. The specific type and dimensions of the ICF units should be noted. If necessary, manufacturers' literature will be used to establish the static R-value.

3.4.5

Wall cavity Insulation suggested R-23 blown-in (Blown-in fiberglass / Blown-in cellulose / Low-density SPF / High-density SPF / Other (please specify))

Energy	Health	Land	Materials	Water
Prerequisite				

Description: Install blown-in fibrous insulation or sprayed-in-place foam (SPF). Insulation must fill the cavity and touch all six surfaces.

Benefit: Insulation in wall cavities have two performance issues: quality and quantity. At minimum, Earth Advantage suggests blown-in or sprayed-in-place foam that fill the cavity without leaving voids. Insulation levels above the code minimum are encouraged.

Verification: EA Rater will visually verifier the insulation material. However, the density cannot be established accurately by visual inspection. (Low-density foam yields to the touch, while high-density products are rock-hard.) The builder or responsible party may be asked to document the density and R-value.

3.4.6

Energy	Health	Land	Materials	Water
0	0	0	1	0

Exterior Rigid Insulation

Description: Install rigid insulation on the exterior of the house's structural wall system. Energy points are determined by modeling the house. The adequate R-value for your climate zone needs to be determined to receive points.

Benefit: Exterior rigid insulation provides a thermal break between framing members and external conditions, improving the thermal performance of the wall structure. Continuous rigid insulation provides much more net R-value to the wall because it covers the "thermal bridge" created by wood framing. Rigid insulation is commonly attached to the structural wall sheathing, over a traditional weather barrier, with the exterior siding nailed over it. Some builders worry that the layer of foam sheathing will trap moisture in the wall, but studies have shown that foam sheathing reduces condensation by keeping the wall cavity warmer.

Verification: EA Rater will visually inspect the presence of foam sheathing and measure the thickness.

3.4.7

Energy	Health	Land	Materials	Water
0	1	0	0	0

Structural Insulated Panels (SIPs): Expanded Polystyrene - Walls Only/  
Walls & Roof

Description: Structural Insulated Panels (SIPs) usually consist of expanded polystyrene panels, faced on each side with oriented strand board (OSB). The entire assembly is glued together in a press at the manufacturing plant. The panels are typically pre-cut at the factory and brought to the job site where they are assembled by a team within a short period of time. Points can be earned for SIPs installed for walls only or walls and roof.

Benefit: SIP panels provide a continuous insulation system. This reduces heating and cooling costs, and if carefully sealed during installation, helps control air movement within the structural shell. When this system is used for walls and ceilings, they eliminate 1/2 - 2/3 of the traditional dimensional lumber. These panels are typically made from expanded polystyrene (EPS) or isocyanurate foams. EPS contains no chlorofluorocarbons (CFC's) or chlorine, and do not outgas harmful chemicals. These panels have several benefits. They are pre-cut to the house plan so they can go up very fast. Since little cutting is needed, less waste is produced. They contain about 75 percent less wood than a framed wall. Panels have higher insulation value, reduce air leakage (when installed and sealed properly), and resist moisture and rot. Some panels are treated with borates to keep insects from burrowing into them. Siding and dry-wall can be nailed onto the panels.

Verification: EA Rater can easily identify SIPs on the site and should record the thickness of the panels used for the walls and/or roof.

3.4.8

Energy	Health	Land	Materials	Water
0	0	0	1	0

Panelized Wall Systems

Description: Panelized wall systems are individual sections of wall manufactured off-site and delivered to the jobsite for final assembly. Panels are usually built with dimensional lumber and oriented strand board sheathing and can be delivered with doors and windows installed.

Benefit: A higher level of quality control and consistency can be achieved by producing the panels at a manufacturing facility. Material waste is greatly reduced since shorter pieces can be stored and used for future projects. Construction time is much shorter, which reduces the amount of time framing is exposed to the weather. This system works well for projects with limited staging areas since the panels are delivered on a truck and can be immediately lifted into place by a crane.

Verification: The builder or responsible party will complete the Accountability Form for the panelized wall system and forward it to the EA Rater.

3.5 Roof Framing and Insulation

3.5.1

Energy Health Land Materials Water

Prerequisite

**Flat Ceiling Insulation: R49 Minimum** (Blown-in fiberglass / Blown-in cellulose / Low-density SPF / High-density SPF / Other (please specify) / Fiberglass batts)

**Description:** Increase insulation level to a minimum R-49 in flat ceilings. Attic insulation is typically a loose-fill material which blown in by a professional contractor. Blown insulation is preferred, because it can be uniformly installed to cover framing members. This eliminates gaps and compression that is characteristic of batt insulation in an attic application.

**Benefit:** Thick insulation in the attic can improve the energy performance of the home and is one of the easiest ways to improve a home's energy performance at a minimal cost. Thick attic insulation reduces heat loss in winter and heat gain in summer.

**Verification:** EA Rater will measure the depth of insulation and confirm that the particular material installed offers adequate insulating value at that depth. The installer's insulation certificate can also be used. The rater should also look for portions of the attic where the depth may be inadequate.

3.5.2

Energy Health Land Materials Water

Prerequisite

**Vaulted Ceiling Insulation: R 38 Suggested**

**Description:** Recommended upgrade: increase insulation level to a R-38 in vaulted ceilings. This generally requires rafters at least 12-inches deep. Insulation shall be uniformly installed to fill rafter cavities with no compression, gaps or voids. Structural ventilation must be installed according to building code.

**Benefit:** Vaulted ceilings have interior finish material (gypsum board) attached to the lower surface and roofing attaching to the upper surface creating an enclosed cavity. Thick insulation in the roof cavity improves the energy performance of the home. Thick roof insulation reduces heat loss in winter and heat gain in summer.

**Verification:** EA Rater will measure the depth of insulation and confirm that the particular material installed offers adequate insulating value at that depth. The installer's insulation certificate can also be used. The rater should also look for portions of the roof where the depth may be inadequate or compressed.

3.5.3

Energy Health Land Materials Water

Prerequisite

**Scissor Truss Sloped Ceiling: R 38 Minimum** (Blown-in fiberglass / Blown-in cellulose / Low-density SPF / High-density SPF / Other (please specify) / Fiberglass batts)

**Description:** Scissor trusses have a bottom chord that is angled to create a sloped ceiling in the living space below. Increase insulation level to a minimum R-38 in scissor truss ceilings. Loose fill insulation is preferred, but can only be installed for ceiling slopes up to 5:12. If batt insulation is used it shall be uniformly installed with no compression, gaps or voids.

**Benefit:** Additional insulation levels in the attic can improve the energy performance of the home and is one of the easiest ways to improve a home's energy performance at a minimal cost.

**Verification:** EA Rater will measure the depth of insulation and confirm that the particular material installed offers adequate insulating value at that depth. The installer's insulation certificate can also be used. The rater should also look for portions of the attic where the depth may be inadequate.

3.5.4

Energy Health Land Materials Water

Prerequisite

Energy or Raised Heel Truss:

Description: The heel height will allow for more consistent thickness of attic insulation. Baffles that follow the contour of the raised heel are to be used to ensure maximum insulation at these points as well. In other words the baffle is to be vertical at the outside edge of the wall and then follow the angle of the roof. The raised heel needs to be at least 12-inches tall. The intent is for roof framing will accommodate the full thickness of ceiling insulation. If the framing doesn't allow this, rigid insulation or spray foam can be used to reach the appropriate R-value. Raised heels can also be built into scissor and parallel chord trusses.

Benefit: Typical trusses for low-slope roofs severely restrict the amount of space available for attic insulation around the attic perimeter (near the exterior walls). This can allow considerable heat loss and cause ice dams to form in cold climates. The raised heel truss, also called an energy truss, is designed to allow the more insulation in this critical area.

Verification: The EA Rater will confirm that the raised heel trusses have been incorporated into the house plans and measure the heel depth during the onsite inspection to determine if the minimum insulation value has been met and the baffles are installed correctly.

3.5.5

Energy Health Land Materials Water

Extended Eaves: Minimum extension - 24" from vertical

0 0 0 1 0

Description: Eaves are extended to 24 inches from the wall, instead of the typical 12 to 14 inches. This can be done with trusses or stick-framing. An exception will be made for rakes and fly-rafters which only need to extend from the face of a gable-end 12 inches. In order to acheive this measure, at least 80 percent of the eaves must meet the requirement.

Benefit: Extended eaves protect the home's exterior from the elements, lengthening its useful life. They also help reduce the potential for health risks caused by unwanted moisture. Extended eaves protect the wall, as well as window and door openings, from rainfall. Extended eaves block summer sun and reduce the need for mechanical cooling. They shield furnishings and building materials from exposure to the sun's damaging UV rays.

Verification: EA Rater will measure the distance from the exterior wall to the outer most point of the roof, including the gutter.

3.6 Roofing Material

3.6.1

Energy Health Land Materials Water

Eco-Roof: Vegetated/green roof (minimum 25% of roof area)

0 0 1 0 1

Description: An eco-roof is a low-maintenance vegetated roof system, used in place of a conventional roof. They are typically designed as various roofing layers, with a growing medium, and specially selected plants. The roof should be designed by professionals so that it is properly integrated into the home and any relevant code issues can be addressed.

Benefit: An eco-roof provides stormwater retention, improved water quality through filtering, and improved air quality through evapotranspiration and carbon storage. Sound reduction, reduced glare from the roof surface, slower roof degradation, and animal habitat, are other benefits attributable to eco-roofs. Not all people find an eco-roof a visually appealing choice, and there may be community covenants or code issues that need to be addressed during the design of an eco-roof.

Verification: EA Rater will verify the presence of the green roof during onsite inspection, and collect documentation regarding design.

3.6.2

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	1	1	0

Durable Roof

Description: Install a durable roof, such as clay tile, concrete tile, slate, metal, or composition shingles with a lifetime warranty.

Benefit: Installing longer-lasting materials is better for the environment than cheaper, less-durable products. Durable materials are environmentally preferable for several reasons. First, durable materials limit the demand for scarce resources and the pressure on local landfills for disposal of used products. Durable shingles will be replaced less often than the typical product with a 20-year warranty. Second, because they must be replaced less often, durable materials avoid the embodied energy costs incurred by the replacement of the shorter lived products. Finally, durable materials are a better investment in the long run because they tend to require less maintenance and fewer repairs. Composition shingles are made using asphalt, a petroleum-based product. This requires significant energy resources to manufacture and generates VOC's when installed. VOC's pose a health risk to construction personnel and contribute to ground level ozone, a major component of smog. By using the most durable products available, these impacts can be reduced. All other things being equal, the more durable the product, the better its overall resource efficiency.

Verification: The builder will complete the Accountability Form, attesting to the 40-year or longer warranty of the product or documentation demonstrating comparable performance, and forward it to the EA rater.

3.6.3

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	1	0

Recycled Content: Metal or composition (50% recycled content)

Description: Install roofing material that contains at least 50 percent recycled content. This can be post industrial, post consumer, or a mix of the two. Metal roofing comes in several forms, including standing seam and shingles. Composite roofing can also contain recycled content in the form of mineral aggregate. Several companies make recycled plastic roofing. This is generally a mix of wood waste and recycled plastic or rubber. These composite materials are relatively new in the market, so the actual durability is unknown.

Benefit: Roofing material has a large life cycle impact, because it must be replaced many times over the life of a house. Using recycled content material reduces the raw materials and processing energy required to make replacement material. The main benefit of metal roofing is durability. Most steel contains recycled content, generally assumed to be about 60 percent industry-wide. Metal roofing has a well-established system for collecting and recycling steel. It also lasts longer, which means less embodied energy for each year of service. Metal roofing is a good investment in the long run because it tends to require less maintenance and fewer repairs. Some roofing products come with high-quality finishes that protect them from moisture and ultraviolet degradation. Composite roofing that contains recycled material also reduces industrial waste. However, composites are unlikely to be recyclable themselves when it is time to replace them.

Verification: EA Rater can easily identify standing seam metal roofing. The builder or responsible party will complete the Accountability Form for recycled content shingles and forward it to the EA Rater.

3.7 Exterior

3.7.1

Energy	Health	Land	Materials	Water
0	0	0	1	0

Fiber Cement Siding: (50-100%)

Description: Install fiber-cement siding as either lap siding or panels. It is strongly advised that clippers or pneumatic shears are used to cut the siding during installation instead of circular saws. Fiber cement siding releases silica dust when it is sawn. Silica dust is extremely fine and can lead to respiratory problems if inhaled.

Benefit: Fiber cement siding is made with Portland cement, sand, clay, and wood fiber. It is very durable and requires less painting and repairs. However, the embodied energy is high because of the large quantity of Portland cement.

Verification: EA Rater will verify that fiber cement siding is installed on at least 50% of the house.

3.7.2	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	1	0

Durable Exterior Trim

Description: Install fiber-cement trim or cedar trim on all exterior trim areas of the home. It is strongly advised that clippers or pneumatic shears are used to cut the siding during installation instead of circular saws. Fiber cement siding releases silica dust when it is sawn. Silica dust is extremely fine and can lead to respiratory problems if inhaled. If cedar trim is used it must be back primed and all end cuts primed before installation.

Benefit: Fiber cement trim is made with Portland cement, sand, clay, and wood fiber. It is very durable and requires less painting and caulk repairs than spruce-pine-fir (SPF) trim products. When properly installed cedar trim will provide the same durability as the fiber cement products.

Verification: EA Rater will verify that fiber cement trim or cedar trim is installed on the home.

3.7.3	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	1/2	0

Durable Exterior Surface not Painted: Masonry or other durable surface (25-50%/51-100%) (20-50% / 51-100%)

Description: This measure refers primarily to stone, masonry, stucco and metal siding that, when properly installed, are durable and do not need additional paint. Vinyl siding doesn't qualify for this measure due to its high life cycle impacts. Point values are determined by the amount of the exterior structure covered by the material. Masonry and wood must be installed over a rainscreen system (measure 3.1.4).

Benefit: Exterior painting is perhaps the most common maintenance task required by any house. This consumes a considerable amount of material over the life of the building. By selecting durable siding materials that do not need re-painting, this material can be eliminated. Local stone is better for the environment because it's very durable and doesn't travel far. (Points for local materials are granted under Measure 3.10.1.) Stucco with integral pigment also requires no paint. Metal siding is awarded points because of its durability and recyclability.

Verification: EA Rater will estimate the amount of exterior surface covered by the durable, un-painted surface.

3.7.4	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	1	1	0

Outdoor Decking: Recycled plastic lumber (50% post-consumer)

Description: Recycled plastic lumber or plastic/wood composite lumber provides a durable alternative to solid wood for exterior applications. The installed product must contain at least 50% post consumer recycled content. These products are weather and insect resistant. Plastic lumber is also rot and corrosion proof, and will not crack, splinter, or chip. Although not generally used for structural applications, specific products can be used in structural, below-grade, or marine applications. Not all plastic lumber contains post-consumer recycled material.

Benefit: Plastic lumber can be made of plastic alone or a mixture of plastic and wood fiber. It is durable, requires no painting and resists rot and damage. For these reasons, it will outlast most wood. Since a single piece of plastic lumber replaces many boards that would decay over its extended lifetime, it may lower the embodied energy of a home project. Recycled plastic lumber lowers the demand for scarce virgin materials and limits the impact upon local landfills. Plastic lumber used in place of pressure-treated lumber avoids the use of hazardous chemicals. This helps to maintain a healthier environment inside the home and lowers the impact that such chemicals have on the environment at large.

Verification: EA Rater will verify the presence of recycled plastic lumber. Specific products such as Trex and ChoiceDek are well-known to contain recycled content. Other brands may require documentation to establish the percentage of recycled content. All decks at the house must use this material to qualify for points under this measure.

3.7.5

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	1	0

Outdoor Patio: Concrete or Pavers

Description: Install a patio made of concrete or pavers. Be sure to slope the surface away from the foundation. If using concrete, fly ash is recommended to reduce the amount of Portland cement used.

Benefit: A concrete or paver patio represents a much more durable solution than a wood deck.

Verification: EA Rater will verify the presence of the concrete or paver patio.

3.7.6

Energy	Health	Land	Materials	Water
0	0	0	1	0

Plywood sheathing for walls and roof

Description: Install plywood sheathing as part of the wall or roof structure.

Benefit: Plywood is generally more durable than other products, such as oriented strand board (OSB). When plywood gets wet, it expands evenly throughout the panel, dries more quickly, and shrinks down to its original size more rapidly than OSB. Also plywood is more permeable to water vapor and has a higher drying potential, making it a good material for exterior sheathing.

Verification: EA Rater will visually identify plywood sheathing and check the grading stamp during construction.

### 3.8 Exterior Coatings

3.8.1

Energy	Health	Land	Materials	Water
0	1	0	0/1	0

Exterior Paint/Stain: Low VOC (150 gpl or lower)/Lifetime warranty  
(Standard / Lifetime)

Description: Low-toxic and low-VOC paints/stains/clear finishes are alternatives to conventional solvent-based products such as alkyd-based paint, lacquer, shellac, silicone, and linseed oil. VOC exterior stains are appropriate for siding or decks. Paint with a lifetime warranty is typically permeable, hydrophobic, contains ceramic filler pigments, and has a high-solids volume. This helps the paint last longer than other exterior paints.

Benefit: The primary reason for using low-VOC paints and sealers is to maintain air quality. Use of these products can minimize air contamination. For most applications, low-toxic, low-VOC clear finishes are safer to handle and just as, or more durable than, conventional products. Factory workers and painters are exposed to fewer toxic materials when making and applying low-VOC paint. (See glossary for information on VOC's.) Paint manufacturers are offering lifetime warranties on exterior-grade paint. This type of paint has characteristics that lead to much longer life and less maintenance.

Verification: EA Rater will examine paint containers to determine the level of VOC's in the paint used on site. The builder should save containers until the final inspection for this purpose.

3.8.2

Energy	Health	Land	Materials	Water
0	0	1	1	0

Exterior Paint: Recycled content (50% post-consumer)

Description: Recycled latex paint is made from unused latex paint collected from households, government, businesses, and painting contractors. New materials are sometimes added to improve the paint's consistency and to make standard colors. Recycled paint must contain at least 50 percent post-consumer content.

Benefit: Using recycled content latex paint offers a number of environmental and economic benefits. First, by incorporating used paint, the manufacturer diverts it from taking up space in hazardous waste facilities. Second, using recycled content products lowers the demand on limited new resources. Third, using recycled content paint reduces the embodied energy of a home and the amount of pollution that results from the extraction, transportation, and disposal of the materials necessary to build it. Fourth, recycled paint costs less than virgin paint, and its performance is the same. Finally, in addition to the environmental benefits of its recycled content, choosing paints with low-VOC content also helps protect air quality both indoors and out.

Verification: EA Rater will examine paint containers to confirm that the material comes from Metro Paint or another known source of recycled paint.

3.9 Windows, Skylights and Doors

3.9.1

Energy	Health	Land	Materials	Water
0	0	0	0	0

Window Efficiency Suggested: U-0.30

Description: Enter the U-value of windows. A heat loss rating of U-0.30 or lower is strongly recommended. This is an area-weighted average of all windows and glazed doors.

Benefit: Window heat loss is described by U-value. Window manufacturers use a standard procedure for testing and reporting window characteristics established by the National Fenestration Rating Council (NFRC). The U-value is reported on a sticker attached to each window. The heat loss of a window with a U-value of 0.30 is about 14 percent less than the heat loss of a window with a U-value of 0.35. Low emissivity coatings that contribute to the lower heat loss also block much of the ultraviolet radiation that passes through the window. This reduces fading in interior furnishings and finishes. These windows often have argon gas fill.

Verification: EA Rater will look at the NFRC sticker on each window.

3.9.2

Energy	Health	Land	Materials	Water
0	1	0	1	0

Window framing Material: Composite or Wood with clad exterior

Description: Install composite (fiberglass composite) and wood windows with an exterior cladding.

Benefit: Composite framing uses a fiberglass composite that is very stable under extreme conditions. Wood framing is a natural product, and the exterior cladding eliminates maintenance. Neither product contains compounds that are toxic during manufacturing or when burned.

Verification: EA Rater will visually inspect window frames to determine the material.



3.9.3

Energy	Health	Land	Materials	Water
0	1	0	0/1	0

**Skylight or tubular skylight** (Traditional / Tubular)

Description: Install skylights according to manufacturers instructions. Maximum heat loss rate for traditional standard skylight is U-0.50. Tubular skylights must have a heat loss rating no higher than U-0.32 and have a gasketing lens. Qualifying TDDs do not require additional insulation around shaft. Tubular skylights receive a materials point because they use considerably less materials.

Benefit: Skylights allow light to enter rooms that are not served by a window. This saves energy because electric lighting may not be needed. In addition, day-lighting has been proven to enhance mental and physical well-being, boosting concentration and energy levels. It has also been shown to reduce depression. Installing energy-efficient skylights reduces energy consumption over standard skylights. They also improve comfort, have less condensation, increase the light and view, reduce fading (if using low-e) and lower HVAC operating costs.

Verification: EA Rater will identify the skylight and inspect for the R-value of the insulation on the shaft or tube. Must meet all Thermal Enclosure requirements.

3.9.4

Energy	Health	Land	Materials	Water
0	0	0	1	0

**Exterior Doors: Steel and /or Fiberglass: R-5**

Description: Doors leading directly from the living space to the outside must insulated to R-5. One door, up to 28 ft<sup>2</sup>, is exempt. Doors that are mostly glass are considered windows. Whenever possible, insulated doors with thermally-broken frame should be specified.

Benefit: Insulated doors generally have an exterior skin made of steel or fiberglass. The stable nature of steel and fiberglass doors reduces the demands for coatings throughout their life. Wood flaws are eliminated, and their foam core provides better R-value and more positive sealing. These products are very durable and reusable.

Verification: EA Rater will visually inspect the door.

3.10 Other Shell Measures

3.10.1

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	1/2	0

Recycled Content Insulation: Cellulose, Cotton or Fiberglass (25% - 50% / 51% and greater Post-consumer) (20-50% / 51-100%)

Description: Insulation must meet one of two post-consumer recycled content thresholds: 25 - 50 percent or greater than 50 percent. At least all of one component is to meet this spec to be eligible for the points (i.e., floors, walls or ceilings).

Benefit: Cellulose: Cellulose insulation is made from a minimum of 75 percent post-consumer recycled paper, typically from phone books or newspaper, treated with borate that repels insects, deters mold, and resists fire. Cellulose is a loose material that can be dry-blown or dense-packed into enclosed cavities, or wet-sprayed into open wall cavities. It is commonly blown into attics. Because of it is blown in, it fills spaces well. This feature improves its energy efficiency by preventing cold spots in the building shell. This limits the pressure on scarce natural resources, as well as the demand for space in local landfills. Cellulose may also lower the overall embodied energy of the home if used instead of insulation made from virgin materials.

Cotton: Cotton insulation is made from 100 percent post industrial recycled cotton. The insulation comes in batt form and is currently available in R-13, R-19, R-21 and R-30 products. The benefits are the same as cellulose insulation.

Fiberglass: All fiberglass insulation contains some recycled content, although the amount and the sources vary between manufacturers. A product that is made from recycled bottles and other post consumer glass goods helps promote recycling, as well as supplementing the production of new products by using what was once in the market.

Verification: EA Rater will verify the type of insulation present. The amount of post-consumer recycled content for cellulose and cotton will be assumed to be greater than 50 percent. The builder or responsible party will sign an Accountability Form attesting to the recycled content of the product.

3.10.2

Blown-in Vaulted Ceiling or Floor Insulation

Energy	Health	Land	Materials	Water
0	0	0	1	0

Description: Blown-in insulation can also be installed in ceilings and floors. To be eligible for points, one component, either vaulted ceilings or floors, must use this practice. This refers to BIBS, Spider and similar proprietary insulation systems that use either fiberglass or cellulose material.

Benefit: Blown-in insulation fills the cavity more effectively around obstructions, such as pipes and wires, than batt insulation. This method also tends to reduce air leakage through the building shell, which is reflected in a better air leakage test (Measure 3.11.1). Because it is installed at a higher density than batts, blown-in insulation has a higher R-value, too.

Verification: EA Rater will check to be sure that insulation fills the cavity. If the insulation is installed behind netting, the netting should be taught and firm to the touch.

3.10.3

Certified No Added Urea Formaldehyde Insulation (100%)

Energy	Health	Land	Materials	Water
0	1	0	0	0

Description: Both the Green Guard Environmental Institute's Children & Schools label and Scientific Certification Systems' (SCS) Indoor Advantage Gold label certifies that specific insulation products have no added urea formaldehyde. Blown in insulation also meets this requirement because it uses acrylic binders that do not contain urea formaldehyde. All insulation in the house must meet this requirement in order to receive this point.

Benefit: Formaldehyde is recognized by the U.S. and European governments as a human carcinogen. In the past, insulation contained high levels of formaldehyde. Many products now meet standards for "no added urea formaldehyde." The primary purpose of this measure is to limit the presence of formaldehyde in the home.

Verification: EA Rater will identify the brand of insulation and confirm it is on the Green Guard or SCS list of qualifying products. Blown in insulation will also be accepted as seen on site.

3.10.4

Accountability Form: General

Concrete with Fly Ash or Slag (15% - 24% mix) (> 24%) (15-24% / 25-60%)

Energy	Health	Land	Materials	Water
0	0	1/2	1/2	0

Description: Fly ash, a coal-fired power plant waste product, or blast furnace slag, a by-product of iron manufacturing, can be used as a substitute for Portland cement in a concrete mix. The percentage of fly ash must be at 15 to 24 percent to receive one point and above 24 percent to receive two points. The percentage can be up to 60 percent in ICF walls.

Benefit: Portland cement requires huge amounts of energy to make, and is responsible for about five percent of the total greenhouse gas emissions worldwide. Using fly ash or slag in the concrete mix reduces the impact of Portland cement. Replacing Portland cement with fly ash reduces the energy used to produce cement, reduces emissions, diverts waste materials from landfills, and increases long-term durability. Slag promotes better concrete workability, easier finish-ability, higher compressive and flexural strength, lower permeability, improved resistance to aggressive chemicals, more consistent plastic and hardened properties, and lighter color.

Verification: The concrete supplier or responsible party will complete an Accountability Form, identifying the percentage of fly ash or slag and forward it to the EA rater.

3.11 Air Sealing

3.11.1

Energy Health Land Materials Water

Prerequisite

Building Air Leakage (Blower Door Test 5.0 ACH50 or lower)

Description: Reduce building air leakage to no more than 4 air changes per hour (ACH) at 50 Pascals.

Benefit: A tight house saves energy by reducing the amount of uncontrolled air infiltration or exfiltration. Air sealing prevents drafts which improves comfort and control. A tightly constructed home also reduces unwanted flow of air from outside the living space that can carry toxins such as pesticide treatments, soil gases, and ground moisture. Cracks and openings that allow drafts also allow warm moist air from the interior to seep into building cavities where it can encounter cold surfaces. This can cause condensation that can promote the growth of mold and decay; thus a tight house is better protected against moisture damage. Air tightening also improves the performance of mechanical ventilation systems by reducing random leakage that can 'short-circuit' mechanical air distribution. Mechanical systems perform better in a tight building. Techniques to accomplish air tightening: All exterior wall bottom plates need to be caulked on the inside before drywall is installed. Any penetrations of pipes, wires or HVAC ducting from a heated to a non-heated area must be foamed or caulked to prevent air infiltration. All windows and door rough openings must be sealed from the inside. Tub, shower, and toilet drain access must be patched and sealed as well as possible. All recessed light fixtures must be sealed where the can meets the drywall on the interior of the house. Better yet, eliminate all recessed lights in insulated ceilings. Other areas to consider may include: Cantilever floors, pocket doors, walls between garage and living space, common walls in attached product, fire places, and between the metal and dry wall of spot ventilation fans.

Verification: EA Rater will conduct a blower door test to measure the air leakage rate.

3.11.2

Energy Health Land Materials Water

Prerequisite

Thermal Enclosure Checklist

Description: A comprehensive checklist ensure all potential air leaks are sealed. The checklist is available from your Earth Advantage Representative or it can be downloaded from the Earth Advantage web site. This may require an additional inspection. Ask your Earth Advantage representative for details.

Benefit: The Thermal Enclosure Checklist (TEC) is a comprehensive list of all potential air leakage sites. Using the list makes it easier to achieve very high levels of air tightness.

Verification: EA Rater will visually inspect that all required items on the TEC are completed. An informal walk-through of the building can be requested to occur just before insulation is installed.

3.11.3

Energy Health Land Materials Water

0

0

0

1

0

Insulated Ceiling is Free of Recessed Lights

Description: Do not install any recessed light fixtures in insulated ceilings.

Benefit: Recessed lights in insulated ceilings interfere with insulation and create openings that can leak air and water vapor into building cavities. The openings can also allow potentially harmful dust and emissions from building materials to invade the living space. This is true even of recessed lights that are rated for insulation contact and those with air tight ratings, although they are better than standard recessed lights.

The best approach is to eliminate recessed lights entirely from insulated ceilings.

Verification: EA Rater will examine the ceilings of the house to verify that no recessed cans have been installed.

3.12 Resource Efficient Materials

2012 Earth Advantage Residential  
Measures Resource Guide

3.12.1	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	1/2/3/4	0

Local Materials: Within 500 miles - 1 point each - up to 4 items (1 material / 2 materials / 3 materials / 4 materials)

Description: To qualify for these points the raw materials must be extracted, refined, processed, and assembled within a 500 mile radius of the building site. One point is awarded for each item from the list below. The percentage of local material used in the building for that component is listed next to the item to earn the point. One point is granted for each material on the list up to four points total. In the Pacific Northwest most dimensional lumber can be assumed to be local. Manufactured products must contain local raw materials and be manufactured within the 500 mile radius. The builder should provide documentation for materials claimed to be local. Percentages are calculated by weight or volume, not cost. Points appear here for selections made in the pop-up table. Materials that traditionally travel only a short distance, such as gravel, rock and aggregate, are not allowed under this measure. Identify the materials being claimed in the notes field.

Benefit: Raw materials that originate and are processed within 500 miles of the building site are considered to be local materials. Local materials reduce fuel use and pollution from transportation. Local products reflect bioregional architecture that helps the home fit with the landscape and local vernacular. Local materials support local economies.

Verification: EA Rater will visually verify the presence of the materials selected.

3.12.2	FSC Wood Guidance: Walls equal 50%, roof framing is 25% and floor framing is 25%.	Energy	Health	Land	Materials	Water
					Calculated	

Description: Certified wood, such as framing, flooring and cabinets, are selected from the pop-up table. Points appear here for those selections.

Benefit: Wood that has been certified by the Forest Stewardship Council (FSC) is documented to come from well-managed forests. (See glossary for more information on FSC.)

Verification: EA Rater will visually verify the presence of the materials selected.

3.12.3	Reclaimed Wood (see Materials table) Guidance: Walls equal 50%, roof framing is 25% and floor framing is 25%.	Energy	Health	Land	Materials	Water
					Calculated	

Description: Reclaimed wood, such as framing, flooring and cabinets, are selected from the pop-up table. Points appear here for those selections.

Benefit: Reclaimed materials have been removed from a structure during remodeling or demolition rather than harvested from a forest. This relieves pressure on the forest resource and reduces solid waste.

Verification: EA Rater will visually verify the presence of the materials selected.

<b>3.12.4</b>		<b>Energy</b>	<b>Health</b>	<b>Land</b>	<b>Materials</b>	<b>Water</b>
Cradle-to-Cradle Certification: Product receives minimum Silver certification (1 / 2 / 3 / 4)		0	0	1/2/3/4	1/2/3/4	0

Description: Cradle-to-Cradle certified products are inspired by patterns found in nature, eliminating the concept of waste entirely and using the product at the end of its life cycle as feed stock for either nature or other human industrial systems. Points are determined by the number of "built in" products (I.E. Carpet, paint, etc.) that have received the Cradle-to-Cradle Certification designation. Currently only one organization is certifying products. A total of up to four (4) products can receive this designation and be awarded Earth Advantage points. A list of certified products is available at the Cradle-to-Cradle website.

Benefit: Products that receive this designation have a reduced environmental impact because they do not enter the waste stream and end up in landfills. These products also reduce the amount of new material used in assembling building products, lowering the impact on extraction and or harvesting requirements.

Verification: Builder team presents documentation showing the Cradle-to-Cradle certification for each product submitted for approval to the EA Rater.

## 4 Heating and Cooling

### 4.1 Fireplace

<b>4.1.1</b>		<b>Energy</b>	<b>Health</b>	<b>Land</b>	<b>Materials</b>	<b>Water</b>
Gas Fireplace/Heater/Sealed Combustion, Direct Vent with electronic ignition		Prerequisite				

Description: Install a direct vented gas fireplace that is controlled by an electronic ignition system rather than a pilot. This system also uses outside air for combustion and vents the combustion materials outside effectively sealing the living area from any combustion by-products. Unvented fireplaces are prohibited.

Benefit: Sealed combustion units vent all combustion gasses, including the nitrogen oxide, nitrogen dioxide, and carbon monoxide to the outdoors, while drawing combustion in through a sealed duct. Using an electronic ignition system reduces the amount of fuel that is normally consumed by the pilot light while it is idle.

Verification: EA Rater will examine the fireplace for an electronic ignition device. In most cases, wiring and a battery holder (that operates the EI during a power outage) is a good indication that EI is present. Back up documentation can be provided by manufacturer product literature. EA Rater will also examine the vent pipe for combustion supply air.

<b>4.1.2</b>		<b>Energy</b>	<b>Health</b>	<b>Land</b>	<b>Materials</b>	<b>Water</b>
No Fireplace or Wood Burning Stove Installed in House		0	1	0	0	0

Description: The dwelling has no combustion fireplace (wood or gas) or wood-burning stove installed.

Benefit: Many fireplaces and wood stoves are installed for aesthetic reasons and aren't used for heating. Combustion efficiency is generally much lower in fireplaces and wood stoves than in furnaces. Each combustion device requires an outside air supply for combustion and a vent to carry away fumes. These additional penetrations through the building shell make insulation and air sealing difficult and somewhat reduce overall shell efficiency. Eliminating combustion appliances also reduces the risk that combustion gasses may leak into the building.

Verification: EA Rater will verify that no combustion appliance or flue is installed.

## 4.2 High Efficiency Equipment

### 4.2.1

Energy Health Land Materials Water

Prerequisite

#### Forced Air Gas: Minimum 92% AFUE furnace

Description: Install a forced-air gas furnace with an Annual Fuel Utilization Efficiency (AFUE) rating of 92 percent or better.

Benefit: Typical gas furnaces are rated at 80 percent efficiency. Installing a unit that has higher energy efficiency improves the HVAC performance and lowers operational costs. These high-efficiency models also have sealed combustion, so they draw combustion air from outside and are less vulnerable to back-drafting of combustion gasses.

Verification: EA Rater will record the model number of the furnace and note the efficiency, if it is shown on the unit. The model number can be used to find equipment efficiency in the Gas Appliance Manufacturers Association directory.

### 4.2.2

Energy Health Land Materials Water

Prerequisite

#### Heat Pump: central system min. HSPF 8.5 (9.0 east of Cascades) with SEER 13+

Description: Install a high-efficiency heat pump. When a heat pump is installed, back up heat may be provided by an 80 AFUE gas furnace. However, it is suggested that a 92 AFUE (or greater) is used.

Benefit: Space heating and cooling can account for as much as 50 percent of the total energy usage of the home. Installing a high efficiency heat pump improves the energy efficiency and comfort of the house. With a heat pump installation, less carbon pollution is released into the air from the home heating system, causing less atmospheric deterioration. Compared to an electric resistance furnace, an air-source heat pump can deliver two to three times as much heat for each unit of electricity consumed.

Verification: EA Rater will record the model number and serial number of the outdoor unit. HVAC contractor will supply the heat pump commissioning report from either CheckMe! or PTCS. HVAC contractors must be trained and certified by the appropriate regional authority to conduct the commissioning procedure.

### 4.2.3

Energy Health Land Materials Water

Prerequisite

#### Ductless Heat Pump System: Min. HSPF 8.5

Description: Install a ductless heat pump. To qualify for this measure, the heat pump must use "inverter" technology, which makes the system capable of variable speed operation. Minimum efficiency is 8.5 HSPF. Despite their name, some of the indoor units are designed for short duct runs that allow a single unit to serve more than one room. These units and all associated ducts, must be installed in the conditioned space.

Benefit: Ductless heat pumps (also called mini-splits) use refrigerant to distribute heating and cooling to the building without the use of air handlers and ductwork. They are well-suited to smaller homes, multi-family and townhome dwellings that do not have space available for HVAC ducts. They are also appropriate for smaller homes with smaller heating and cooling loads. In larger homes, multiple units can provide zoning capability. Because they do not require ducts, they don't suffer from duct losses. Most ductless heat pumps use ozone-friendly refrigerants, such as R-410A. Ductless heat pumps offer a method for adding cooling to homes with radiant floor heat.

Verification: EA Rater will record the model number and serial number of the outdoor unit. HVAC contractor will supply documentation that the refrigerant charge meets manufacturer's specifications.

4.2.4

Energy	Health	Land	Materials	Water
0	0	0	0	0

Heat Pump: Ground Source or Water Source, Minimum 3.0 COP

Description: High efficient heat pumps use the stable temperature of the earth (below frost line) or water in the earth as a heating or cooling resource. The heat pump needs to be Energy Star labeled and/or operate at 3.0 COP or greater.

Benefit: Energy savings are from high efficiency equipment and a steady heating/cooling source. While the system is more expensive than other heating and cooling means, it can greatly reduce heating and cooling costs over the lifetime of the house.

Verification: EA Rater will record the model number and serial number of the outdoor unit. HVAC contractor will supply documentation that the refrigerant charge meets manufacturer's specifications.

4.2.5

Energy	Health	Land	Materials	Water
Prerequisite				

Heat Pump Commissioning: Documentation Required

Description: Heat pump commissioning is a series of air and refrigerant tests completed on a newly installed heat pump to ensure proper installation. Heat pump commissioning is required for homes with ducted heat pumps. This includes hybrid systems that utilize heat pumps and gas furnaces for space heating. Ductless mini-split heat pumps are typically exempt from this requirement unless the line set exceeds the manufacturer's line set length limitation.

Benefit: To achieve rated operating efficiency, central air-source heat pumps must have the proper refrigerant charge and air flow across the indoor coil. Since these elements can be affected by installation, they must be checked for each job. Only by ensuring proper installation can air-source heat pumps be reliable energy savers.

Verification: HVAC contractor will supply the heat pump commissioning report from either CheckMe! or PTCS. HVAC contractors must be trained and certified to conduct the commissioning procedure. EA Rater will include the commissioning report with building's verification records.

4.2.6

Energy	Health	Land	Materials	Water
0	0	0	1	0

Integrated Space / Water Heating System: Turbonic/Hydronic equipment

Description: A home uses the same heating equipment to serve space heating and domestic water heating needs. Integrated systems may be boilers, high performance water heaters, solar-assisted water heaters or variable-speed, air-source heat pumps. Boiler systems may require maintenance by specialty certified technicians. Contractors may be unfamiliar with this type of system, and installation costs may be higher than a more conventional system. These points are for the space-heating portion of the system, additional points for water heating are applied in section 6.3. Equipment efficiency must meet the same level as required in other sections for boilers, water heaters, etc. Distribution pipes for hydronic systems must be insulated when they pass through unconditioned areas.

Benefit: High efficiency homes can often use a single smaller heating plant for both space and water heating. This reduces the amount of equipment needed and the floor space dedicated to mechanical systems. In many cases, combustion equipment intended for this use are highly efficient.

Verification: EA Rater will record the brand and model number of the heating equipment.



4.2.7

Alternate Cooling System: No capacity to use refrigerants

Energy	Health	Land	Materials	Water
0	0	0	1	0

Description: Employ cooling methods that do not use refrigerants. This may be a ceiling fan, evaporative cooler, whole house fan, night ventilation system, or building design elements (such as shades or trellises). If a forced-air heating system is installed, it must have no accommodation for future addition of air conditioning equipment, including the installation of refrigerant lines. In other words, the HVAC system cannot be "AC ready".

Benefit: Residential cooling is becoming common in new home construction, even though mechanical cooling may not be needed to maintain comfort. Many strategies exist to cool homes without the high energy consumption of typical refrigeration based cooling. By using a non-refrigerant system there are no ozone-depleting, greenhouse gasses (HCFCs) released into the atmosphere.

Verification: EA Rater will identify the alternative cooling method and record a short description in the verification records. It may be necessary to contact the builder for details.

4.2.8

Gas Furnace and A/C Commissioning

Energy	Health	Land	Materials	Water
1	1	0	0	0

Description: Follow the HVAC equipment manufacturer's installation and start up procedure. Meet manufacturer's specifications for these items:

Measure static pressure of the supply and return ducting. Then calculate overall static pressure on HVAC system.

Measure air temperature in both supply and return ducting. Then calculate air flow using the temperature delta or a Trueflow plate.

For gas furnaces, measure gas pressure at the manifold; adjust for local gas pressure and elevation.

Check combustion efficiency using a flue gas analyzer.

For air conditioners, check refrigerant charge.

Clean interior of furnace/air-handler to remove construction dust and debris.

Benefit: HVAC systems work most efficiently when installed to manufacturer's specifications. This requires following written installation procedures and testing.

Verification: HVAC professional shall provide commissioning documentation that the HVAC system meets the manufacturer's specifications.

4.3 Ductwork

4.3.1

Energy Health Land Materials Water

Prerequisite

Duct Leakage Test: Max Leak < .06 CFM per sq. foot OR 75 CFM loss @ 50 Pa or whichever is greater, and all ducts sealed with water based mastic

Description: HVAC contractors must seal all joints and openings in the forced air heating system's ductwork with mastic paste. Tape of any kind is not allowed. (Tape may be used on access panels that are removed to perform regular maintenance, such as the filter rack and the panel covering the blower and control wiring.) Duct leakage is tested according to PTCS guidelines. Target leakage in cubic feet per minute is equal to the conditioned floor area of the home times 0.06 (square feet x 0.06 = cfm). Testing must be completed by a certified performance tester.

This test is not required if the home meets all requirements of Ductwork and Air Handling Equipment in Heated Space.

Benefit: Typical forced air heating systems can lose up to 12 percent of the heated air before it reaches the building. Sealing ducts reduces this loss to 6 percent or less and saves a significant amount of energy. Return ducts that pull air from the house to the furnace produce suction (negative pressure) so any leakage in a return duct pulls air in. Returns typically run through attics or crawlspaces where air is contaminated by dust, soil gasses, and moisture. Duct sealing reduces the amount of these contaminants that enter the building. Finally, sealed ducts deliver conditioned air more effectively and increase occupant comfort.

Verification: EA Rater will visually confirm that all visible openings and joints are sealed with mastic. HVAC contractors will perform a duct test on each house and report the results to the EA Rater. Duct test result may be applied as a sticker to the HVAC system and should be present at the time of the rough inspection.

4.3.2

Energy Health Land Materials Water

0 1 0 0 0

No HVAC in Garage, Crawlspace or Attic

Description: No air handling equipment or ducts are located within the garage, unconditioned crawlspace or unconditioned attic. The best location is a mechanical room inside the thermal envelope, unless placed in a isolated, air-sealed mechanical rooms with an outside air source. The mechanical room may be constructed adjacent to the garage. The furnace must have combustion directly air from outside. The walls must be fully insulated and air sealed. Doors to the garage are weatherstripped. The mechanical room is contained within the "pressure boundary" of the conditioned space. This can be done by NOT insulating the wall between the mechanical room and the conditioned space OR providing a pressure relief grille or transfer duct. This measure also requires that furnaces and air handlers may not be installed in attics or crawlspaces.

This measure can be taken in conjunction with Ductwork and Air Handling Equipment in Heated Space.

Benefit: The garage contains a multitude of potentially harmful chemicals. It is common practice to place the furnace and air handler in the garage. A furnace or air handler in the garage creates a situation where the pollutants in the garage may be drawn into the air stream and distributed through the house via the ducting system. Similar air quality issues exist in unconditioned attics and crawlspaces. Isolating the furnace or air handler from these areas removes a significant source of indoor pollution.

Verification: EAI Rater will verify that any air handling equipment that shares a wall with the garage is air-sealed or isolated from the garage and is supplied with an outside air source.

4.3.3

Energy	Health	Land	Materials	Water
0	2	0	2	0

Ductwork and Air Handling Equipment in Heated Space

Description: Install the air handler and all ductwork within the thermal boundary of the home. HVAC equipment must not be installed in the garage, crawlspace or attic space. Since most home designs fail to make any accommodation for ducts, it is often necessary to carefully plan where the ducts will run. Several methods can be used. Dropped soffits and thick walls can be built to hold ducts. Attics or crawlspaces can be enclosed and insulated to bring them "inside". In two story designs, open floor trusses allow tremendous flexibility for ducts. Up to 5 percent of the total duct length may extend outside the thermal boundary.

Benefit: Placing ductwork within the thermal envelope eliminates heat loss and air leakage from ducts. It also prevents many of the indoor air problems associated with running ductwork in the crawl space and/or garage. Duct sealing with water-based mastic is still mandatory.

Verification: EA Rater will verify that all ducts are inside the conditioned space and are sealed with mastic paste. A duct test (leakage to outside) may also be required if the home is trying to qualify for the Federal Tax Credit.

4.3.4

Energy	Health	Land	Materials	Water
0	2	0	0	0

Air Balancing Forced Air System: Performance Test

Description: Have the total supply air flow rates and temperatures in each room tested using a flow hood with doors closed. The flow rates should match Manual J system sizing provided by the HVAC contractor.

Benefit: Third-party testing of the HVAC distribution air flows can identify problems with the design and installation of the air distribution system. These problems can surface after the installation of the distribution system such as ducts that are blocked, crushed, or punctured by other trades during the construction of the home. An ineffective distribution system can reduce comfort and waste energy.

Verification: EA Rater will verify the following: Supply air flow rates must be within +/- 15% (or +/- 10cfm) of calculated values from ACCA Manual J. Multi-speed HVAC systems will be tested at full capacity. Supply air flow requirements must meet the higher of the cooling or heating designed air flow for each room. Set to heating mode, measured cfm at each register, report results to general contractor. Ductless systems qualify for this credit if sized to the actual heating load.

4.3.5

Energy	Health	Land	Materials	Water
Prerequisite				

Protect Duct Vents: Cover supply boots in floor during construction and install temporary filter on cold return

Description: Cover supply register boots in the floors and ceilings during construction with a durable material that will prevent dirt, dust or construction debris from entering the duct system. Floor covers must be rigid enough to support construction activity. In addition, a temporary filter must be installed on the cold air return grille to keep debris and small particles from entering the ducting system. This measure is required of all Earth Advantage projects that utilize a ducted system for heating and cooling air distribution.

Benefit: Duct vents and returns can collect a lot of dust, dirt, and construction debris. Covering the vents and returns during construction protects the HVAC equipment and improves the indoor air quality.

Verification: EA Rater will confirm that supply registers in the floor are covered and that a temporary filter is placed over the cold return opening.

4.3.6

Accountability Form: General

Energy	Health	Land	Materials	Water
0	1	0	2	0

House Dry-out: No central heating or propane used

Description: This measure rewards methods other than using the house's forced air system or portable propane heaters for house dry out. Suggested methods include large fans, dehumidifiers, and portable electric heaters.

Benefit: Drywall compound brings a large quantity of water into the building. Drying out the project is typically done by running the forced air heating system. This practice draws dust, debris and moisture into the ducts and reduces indoor air quality for the occupants. Portable propane heaters are not allowed because, combustion can add several gallons of water vapor to the air for each gallon of fuel burned.

Verification: EA Rater will visit the home during the dry out period to confirm the method used. (This will likely be an unscheduled visit when the rater is nearby.)

4.3.7

Energy	Health	Land	Materials	Water
0	0	0	1	0

Hard Ducting: All ducting is metal

Description: The duct system is built with galvanized sheet metal and sealed with water-based mastic on all mechanical seams and manufactured connections to reduce air leakage. Ducts in unconditioned spaces will be insulated to R8.

Benefit: Metal duct is strong and durable and should last for decades. Metal duct also creates less resistance to air flow so that more conditioned air reaches the building. Finally, metal duct can be cleaned many times over its life to protect indoor air quality.

Verification: EA Rater will examine the duct during the rough inspection. The rater will confirm that mastic paste has been used to seal all joints and that duct in unheated spaces is properly insulated.

4.3.8

Energy	Health	Land	Materials	Water
1	0	0	0	0

Forced Air Zoning System

Description: A forced air zoning system regulates air flow to different parts of the building. These systems should be electronically controlled. This could be a system with a single furnace and dampers to create heating zones or multiple furnaces to serve different areas. All systems need to have a thermostat in each zone.

Benefit: Often only a portion of the building needs heating or cooling, but with most systems it isn't possible to send conditioned air to just one area. Forced air zoning systems target heating and cooling energy only to areas where it is needed. This improves comfort and reduces energy by not over-conditioning some areas unnecessarily.

Verification: EA Rater will confirm the presence of forced air zoning by identifying zone dampers in the duct system. This is best done during the final inspection.

4.3.9		Energy	Health	Land	Materials	Water
Non-ducted System		0	3	0	3	0

Description: Designing the house with a non-ducted heating or cooling system. Systems that should receive these points are ductless heat pumps, hydronic heat, and zonal electric.

Benefit: Duct systems account for a very large amount of the energy used in buildings. Much of the impact is direct heat loss and air leakage from the ducts. However, large furnace blowers also create pressure differences throughout the building that contribute to building air leakage. These imbalances can also pull moisture, allergens, and harmful soil gases into the house or create moisture problems in building cavities. Forced air heating systems and the associated ductwork also consume a considerable amount of valuable space.

Verification: EA Rater will confirm a non-ducted heating system on the plans and during site visits.

4.3.10		Energy	Health	Land	Materials	Water
Zonal Pressure Relief (ZPR) for ducted systems		Prerequisite				

Description: A properly-installed HVAC duct system balances house pressures through all living spaces of the house. Air must have an unobstructed path from each supply register to the return grille. Zonal pressure relief is required in any room that is 75 square feet or larger, has a supply register, and has a door. Pressure relief can be provided in several ways. 1) Cut the bottom of the door to allow a full one-inch space between the bottom of the door and the top of the finished flooring. 2) Install a transfer grille through the wall. 3) Install a transfer duct from the room into the central zone. 3) Install a direct return in each room. The goal of pressure relief is to maintain a pressure difference across the door of no more than 3 Pa. Door undercuts are effective only in smaller rooms with only one supply. In rooms with more than one supply, a transfer duct or direct return is usually the most effective method.

Benefit: Forced-air heating systems include large blowers to move conditioned air through the house. Ideally, all the air that is delivered to the house through supply registers flows through the house to the central return. Unfortunately, interior doors block the ideal air flow and create severe pressure imbalances. Supply air is "bottled up" behind bedroom doors, while other areas are starved for air. Pressure problems in houses can also cause naturally-vented combustion appliances to back-draft, which brings harmful flue gasses into the building. Systems with adequate pressure relief provide better safety, comfort, and efficiency.

Verification: For ducted systems, EA Rater will identify the method of zonal pressure relief for each room (usually bedrooms) and will measure zonal pressure. The pressure difference of each bedroom with respect to the main living area (or hallway) must not exceed +5 Pa.

4.3.11		Energy	Health	Land	Materials	Water
Pre-fabricated Sealed Boot		0	1	0	0	0

Description: A pre-fabricated sealed boot is a mounting system that allows air supply boots to be tightly sealed to a ceiling, wall, or sub floor. (A boot is the termination that connects a round duct to a rectangular grille opening.) Some models come with an adjustable boot hanger that quickly attaches between joists, trusses, or studs. A foam gasket provides a tight seal to the drywall or sub floor. A cardboard cover prevents dirt and debris from entering the duct during construction. It is most common to use this product in the ceiling.

Benefit: This product can save labor, keep ducts clean, and reduce air leakage.

Verification: EA Rater will visually verify the presence of pre-fabricated sealed boots.

## 4.4 Air Quality

4.4.1

Energy Health Land Materials Water

Prerequisite

**Combustion Appliance Zone Safety (CAZ): Pressure test required for combustion within shell**

Description: The Combustion Appliance Zone (CAZ) Pressure test identifies potentially dangerous air pressure conditions within the home. Earth Advantage prohibits natural draft combustion appliances in conditioned spaces except a fireplaces or stoves that burn gas or wood. These must have fresh air supply directly to the firebox and tight-fitting glass doors. If an open draft fireplace is incorporated in the home, the following strategies can help in reducing the chance of a backdraft situation. 1. provide pressure relief throughout the home, 2. proper duct sizing, and, 3. locating the clothes dryer as far away from the fireplace as possible.

Benefit: Atmospherically vented combustion devices, including most water heaters, draw air for combustion from their own immediate area. Exhaust gases rise through the flue because they are naturally warmer and lighter than the air in the house. However, the force of rising warm air is very weak. It can be overpowered by a weak negative pressure in the house. When this happens dangerous flue gasses, including carbon monoxide, spill into the house and threaten the occupants. Negtive pressure is most often caused by forced air heating and cooling systems that do not allow adequate air flow from the many supply registers throughout the house to the one or two centrally-located return grilles.

Verification: EA Rater will conduct a CAZ test. Pressure in the combustion zone cannot be lower than - 3 Pa. The test result is recorded on inspection documents.

4.4.2

Energy Health Land Materials Water

0 1 0 0 0

**Air Filter: minimum MERV 8**

Description: Air filters are given a Minimum Efficiency Reporting Value (MERV) rating number, which describes a filter's ability to trap particles ranging in size from 3.0 microns to 10.0 microns. The higher the MERV rating, the more efficient the filter is, and the more particles it can filter. A MERV rating of 8 means the filter is about 35 percent efficient at capturing the measured particles. A MERV rating of 9 means the filter is about 40 percent efficient at capturing the measured particles. A MERV rating of 12 means the filter is about 75 percent minimum efficient at capturing the measured particles. Residential filters commonly have MERV ratings of 1-12 but can go as high as MERV 16. HEPA air filters are typically rated at MERV 16. MERV is an industry standard rating, so it can be used to compare filters made by different companies. Some manufacturers also have their own rating systems. Filters must be matched to air handling equipment. For air filters to be effective, they need to be changed regularly. Consult the manufacturer's recommendations regarding the installed filter. Electronic air filters do not have MERV ratings. If a filter does not have a MERV rating, they are not eligible for points under this measure.

Benefit: Most furnaces contain filters which collect particulates from the air and protect the furnace from excessive wear. However, standard fiberglass filters remove less than 8 percent of airborne dust. Pleated media filters remove significantly more contamination than standard fiberglass filters and are as much as 95 percent effective. Better filters remove more particulate matter, pollen, dust, and mold before they enter the building. Installing pleated media filters in the furnace can improve the quality of indoor air in your heating system. However, installing improved filters requires attention during duct design due to HVAC system design, because better filters create more resistance to air flow.

Verification: EA Rater will visually inspect the filter. Record the model number of the filter rack on the EA inspection form and verify that the appropriate filter is in place. Also check for filter loading and construction dust and recommend changing the filter if necessary. The MERV rating is often printed on the filter itself. Additional documentation (product literature, invoice, or spec. sheet) from the HVAC contractor or the builder will often be required.

4.4.3

Energy	Health	Land	Materials	Water
0	1	0	1	0

Humidity Control System: Permanently installed

Description: An automatic system is installed to add or remove water vapor in order to control relative humidity levels in the home. The equipment must be permanently attached to supply or waste plumbing. Electricity may be supplied by a plug and outlet. The system must be designed to maintain the relative humidity at or below 60 percent.

Benefit: The optimum level for indoor relative humidity (RH) is generally considered to be between 30 percent and 50 percent. However, an occupant's specific health issues may dictate a different RH target. This system controls the humidity levels in the living space to maintain optimum humidity levels for the occupants. In humid climates lowering the humidity level minimizes the conditions conducive to the growth of a variety of molds. In dry climates adding humidity prevents the growth of certain micro-organisms and keeps skin and mucus membranes healthy.

Verification: EA Rater will visually verify the presence of a dehumidifier that is attached to a drain for condensate or a humidifier that is permanently plumbed to a water supply line.

4.4.4

Energy	Health	Land	Materials	Water
0	0	0	1	0

Central Vacuum: Provide rough-in for future use

Description: Design and install the piping for future use by a central vacuum system. Rough-in vacuum exhaust must be vented to the outside to eliminate the re-circulation of dust inside the living area.

Benefit: Installing the ports and pipes during the construction of a home is less expensive than installing the components as a retrofit at a later date. Installing pipes in a completed house also violates the air leakage barriers installed with great care during construction. If installed during construction, central vacuum penetrations can be sealed more effectively.

Verification: EA Rater will inspect for the presence of a duct to the garage or basement with outlets located at logical places within the house. For this measure, a garage or basement is considered "inside" and the exhaust must be ducted through the wall to the exterior of the building.

4.4.5

Energy	Health	Land	Materials	Water
0	1	0	0	0

Central Vacuum: Install and vent to exterior of conditioned space

Description: Central vacuum systems incorporate a motor and dust receptacle which is fixed. It is generally installed in the garage, basement, or utility room to minimize occupant exposure to motor noise and emissions. Vacuum exhaust must be vented to the outside of the home to eliminate the re-circulation of dust inside the living area.

Benefit: This measure recognizes efforts to maintain good indoor air quality and a healthier living environment. Most stand-alone vacuums fail to trap much of the dust and tiny particles and simply re-circulate them into the room. Even the best vacuum cleaners cannot avoid sending some of the dirt, pollen, and other allergens back out into the room along with the exhaust. Suspended particulate can trigger asthma and other allergic reactions in occupants. By installing a central vacuum cleaner with an exhaust to the outside, dirty air is expelled from the house.

Verification: Visually inspect the presence of the central vacuum motor unit and the exhaust duct to the outside. For this measure, a garage or basement is considered "inside" and the exhaust must be ducted through the wall to the exterior of the building.

## 5 Ventilation

### 5.1 General Ventilation

5.1.1

Energy	Health	Land	Materials	Water
0	3	0	2	0

Premium Package - HRV/ERV system

Description: HRVs and ERVs must be installed according to manufacturer's installation instructions, including air flow balancing. They typically operate continuously on a low speed. Some have the ability to boost flow when more ventilation is needed. These may be used in place of local ventilation in bathrooms, provided they deliver enough ventilation at high speed to meet local ventilation requirements. Ideally, the duct system for HRVs and ERVs should be independent of a forced air heating system. However, they may be attached to a forced air heating system if the air handler has an electrically-commutated motor (ECM), also called a brushless DC motor, blower set to run at low speed during ventilation cycles. (Ventilation can occur during a heating or cooling cycle when the blower is operating at a higher speed.)

Benefit: HRVs and ERVs are considered the premium ventilation systems. Using multiple points of exhaust and supply they provide superior means of air circulation and distribution. By tempering incoming air, these units provide greater comfort in extreme climates than other types of ventilation systems. They are highly effective and reduce the energy penalty associated with all fresh air ventilation. One drawback to fresh air ventilation is that fresh air pulled into the building must be heated or cooled to the comfort temperature. While this "energy penalty" is lower than the overall savings from air sealing, it is still a concern. Heat recovery ventilators (HRVs) address this issue by capturing from 50 percent to 90 percent of the heat from outgoing air and transferring it to the incoming air. Energy Recovery Ventilators (ERV's) take the idea one step further by recapturing the moisture from the outgoing air as well. This increases overall efficiency up to 85 percent and can prevent excessive dryness that sometimes occurs. Ventilators with ECM motors have the added value of super-efficient, quiet operation. HRVs and ERVs are balanced ventilators in which the exhaust and supply air is roughly equal.

Verification: EA Rater will record the brand and model of the HRV or ERV along with the rated air flow. Rater will verify the Supply air is routed from outdoor sidewalls, gable end wall, or soffit vent (with sealed ductwork to the exterior so no attic air can be drawn in.)

5.1.2

Energy	Health	Land	Materials	Water
0	2	0	1	0

Supply Only - Forced air system

Description: Outdoor air is introduced into the return side of the forced air HVAC system. An electronically controlled adjustable mechanical damper must be used to control air flow to the air handler. The electronic control system must prioritize outdoor air delivery during normal heating and cooling cycles. Supply air must be routed from outdoor sidewalls, gable end wall, or soffit vent. The fresh air duct must be sealed with mastic paste. Avoid drawing supply air from the roof or any area that may generate harmful gasses or unpleasant odors. Install a controller that is capable of meeting the requirements of ASHRAE 62.2. A 24-hour clock timer is not allowed. The HVAC contractor must measure the flow of incoming fresh air to verify proper ventilation rate. The fresh air duct includes a manual or electronically-controlled adjustable damper set to an airflow rate meeting ASHRAE 62.2 2006 requirements. The damper must be adjusted to limit airflow to specified ventilation levels at the blower high speed setting.

Benefit: This system can improve the indoor air quality of the house by mixing fresh air from outside. Because fresh air is introduced upstream of the typical air filter location, the incoming air can be filtered for pollen and dust that may be carried along with outdoor air. Existing ductwork distributes the fresh air throughout the building.

Verification: EA Rater will engage the test mode to ensure that the furnace blower operates and the fresh air damper opens. The HVAC contractor will complete the Accountability Form attesting that they have designed the system to comply with ASHRAE 62.2 and measured the flow of the incoming fresh air to verify proper ventilation rate.



5.1.3

Balanced System - Exhaust and supply balanced w/o heat recovery.

Energy	Health	Land	Materials	Water
0	2	0	1	0

Description: There are several different ways to create a balanced ventilation system without heat recovery. In all cases, exhaust fans installed in the living area must be ENERGY STAR labeled. Remote-mounted fans in attics, crawlspaces, garages do not require ENERGY STAR labels, but should be selected for low-energy, quiet operation.

Option 1: Using an inline supply air fan and a branched duct system to DELIVER fresh air to multiple locations (typically bedrooms.) A single exhaust fan shall be wired to the same circuit to operate simultaneously with the supply fan. A 24 hour programmable timer must control the system to meet ASHRAE 62.2

Option 2: Using an inline exhaust fan and a branched duct system to REMOVE stale air from multiple locations (typically bathrooms, laundry or kitchen.) A single low volume inline supply fan shall be wired to the same circuit to operate simultaneously with the exhaust fan. A 24 hour programmable timer must control the system to meet ASHRAE 62.2

Option 3: An integrated exhaust system with multiple exhaust fans plus a passive supply air duct with a mechanically controlled damper. The supply air duct may connect to the air handler or be the through wall type. The system must have a common controller which can coordinate the fans with the opening of the supply air duct. The controller must also be programmable to meet ASHRAE 62.2.

Option 4: In homes with forced air heating systems, a single exhaust fan and a fresh air duct to the air handler are wired to the same control. This operates the exhaust and supply at the same time to provide balanced ventilation.

Option 5: An exhaust fan with adjustable air flow rate set to ASHRAE 62.2 runs continuously. A supply duct is connected to the air handler on the return side with a manual damper installed. The damper shall be adjusted so that the flow rate is set to ASHRAE 62.2 when the air handler is running at high speed.

Option 6: An exhaust fan is installed in a central location. A supply duct is connected to the air handler on the return side with a motorized damper installed. An adjustable damper is set to allow the air flow rate to be set to ASHRAE 62.2. The exhaust fan, motorized damper and furnace blower are all connected to the same 24-hour timer set to run 10 minutes each hour.

Benefit: This fresh air ventilation system removes stale indoor air and also supplies fresh outdoor air. This improves the indoor air quality of the home. This system can improve the indoor air quality of the house by mixing fresh air from outside. Balancing supply and exhaust provides better ventilation while reducing the potential for pressure imbalance inside the home.

Verification: EA Rater will engage the system to ensure that the exhaust and supply are operating simultaneously. Rater will verify the Supply air is routed from outdoor sidewalls, gable end wall, or soffit vent (with sealed ductwork to the exterior so no attic air can be drawn in.)

5.1.4

Spot HRV/ERV

Energy	Health	Land	Materials	Water
0	2	0	1	0

Description: One spot HRV/ERV per approximately 1000 sq ft is required in order to have sufficient ventilation capacity. HRVs and ERVs typically operate continuously on a low speed. Some have the ability to boost flow when more ventilation is needed. These may be used in place of local ventilation in bathrooms, provided they deliver enough ventilation at high speed to meet local ventilation requirements.

Benefit: HRVs and ERVs are considered the premium ventilation systems. They are highly effective and reduce the energy penalty associated with all fresh air ventilation. By tempering incoming air, these units provide greater comfort in extreme climates than other types of ventilation systems.

Verification: EA Rater will engage the system to ensure that the exhaust and supply are operating simultaneously. Rater will verify the Supply air is routed from outdoor sidewalls, gable end wall, or soffit vent (with sealed ductwork to the exterior so no attic air can be drawn in.)

5.1.5

Energy	Health	Land	Materials	Water
0	1	0	1	0

Exhaust Only

Description: Exhaust-only ventilation systems include an ENERGY STAR labeled exhaust fan that is rated for continuous use. A noise rating of 1.0 Sones or less is required. This is entirely separate fan from the spot ventilation fans in bathrooms and laundry rooms. The fan should be placed in a central location, such as a hallway. Another option would be a laundry room as long as there was a clear air connection with the main house, either a louvered door or transfer grille. Exhaust duct should be installed as described in EA Measure 7.1.7. Install a 24-hour programmable timer or other automatic control to operate the fan, which shall be located in a closet or other inconspicuous location.

Benefit: This system improves indoor air quality of the house by exhausting stale, moisture-laden indoor air to the exterior of the house.

Verification: EA Rater will record the brand and model of the whole-house exhaust fan, and verify that the control operates the fan.

5.1.6

Energy	Health	Land	Materials	Water
0	1	0	0	0

Ventilation Make-up Air - Meets ASHRAE 62.2

Description: Some ventilation systems use a fresh air duct or port to the outside. This may be connected to the return side of an air handler or furnace. Builder requests EA verifier to measure the flow rate of this make-up air brought into the home to verify that the requirements of ASHRAE Standard 62.2-2010 are met. In homes without forced air systems, install exhaust ducts according to Table 7.1 of ASHRAE Standard 62.2-2010, and either test the flow rate out of the home or conduct air flow tests to ensure back-pressure of  $\leq 0.20$  inches w.c.

Benefit: A well designed whole-house outdoor air ventilation system will exhaust air pollutants from the home and provide comfort to the homeowner or tenant. These system may not operate properly as designed because of installation errors, equipment problems, or accidental interference by other trades during the construction of the home. Performance testing ensures that make-up air flow meets industry standards.

Verification: EA Rater will conduct a flow rate test to determine if the system is performing as designed. Test ventilation air flow rates and verify that the requirements of ASHRAE 62.2 are met; OR, Verify that the ventilation air flow rates tested by a qualified energy rater meet the requirements in ASHRAE Std. 62.2. In order to conduct this test, the supply air inlet to the house must be accessible using a 6-foot ladder. Verifier will inform the builder that an adjustment is needed.

5.1.7

Accountability Form: General

Energy	Health	Land	Materials	Water
1	0	0	0	0

Energy Star Ceiling Fans

Description: Ceiling Fans that carry the Energy Star label. A list of Energy Star qualified fans: [http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product.showProductGroup&pgw\\_code=CF](http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=CF)

Benefit: Ceiling fans are a low-energy way to make the occupants feel cooler. Also, fans assist a non-ducted HVAC system to distribute conditioned air.

Verification: Builder will provide an Accountability Form or EA Rater will confirm that Energy Star labeled ceiling fan is installed.

5.2 Spot Ventilation

5.2.1

Energy	Health	Land	Materials	Water
Prerequisite				

Bath Fans: ENERGY STAR labeled

Description: All bath fans in full bathrooms must carry the ENERGY STAR label. ENERGY STAR qualified fans use less energy and are more than 50 percent quieter than standard models. They feature high performance motors and improved blade design, providing better performance and longer life. Bathrooms with bathing facilities must install a fan rated at 80 cfm or higher. Bathrooms without bathing facilities must be 50 cfm.

Benefit: Effective local ventilation using exhaust fans helps to maintain a healthy living environment by removing stale air and odors. It also helps control mold and mildew growth by removing excess humidity. Typical low-cost bath fans are not effective for two reasons. They are so loud that people are annoyed and turn them off, and they don't move as much air as they should. Installing an ENERGY STAR labeled fan will provide more effective ventilation. These fans are tested to meet specific air flow and noise requirements. The lower sound level should encourage occupants to operate the fan for longer periods of time. Specifying quiet fans increases the likelihood that they will be used as often as needed. However, exhaust fans do have an energy penalty. It takes a relatively small amount of energy to power the fan itself, but somewhat more energy to heat or cool the fresh air that is pulled in to replace the air removed from the home. Because of the improved air quality, health risks can be reduced. On the whole, tight construction with controlled ventilation gives better energy performance and comfort than leaving a house "leaky". A list of ENERGY STAR labeled fans can be found at [http://energystar.gov/index.cfm?c=vent\\_fans.pr\\_vent\\_fans](http://energystar.gov/index.cfm?c=vent_fans.pr_vent_fans)

Verification: EA Rater will note the presence of an ENERGY STAR logo. If the logo isn't visible, the brand name and model number of the fan will be recorded and checked against the current list of ENERGY STAR products.

5.2.2

Energy	Health	Land	Materials	Water
0	1	0	1	0

Bath Fan Air Flow Test: Meet ASHRAE 62.2

Description: Conduct an air flow test to measure the actual air flow of each ventilation fan in a full bathroom. The fan must meet the current ASHRAE 62.2 required air flow. The following are suggestions to help meet the ventilation requirements. Ducts should be short, straight and smooth. They should also be sealed properly to prevent moist indoor air from leaking into building cavities where condensation can occur. Prevent low points that can collect condensation. All joints sealed with mastic. Duct should be insulated to R-8 anywhere it runs through unconditioned space. If you choose to use flexible ducts, then it needs to be six-inches in diameter. If you choose to use rigid ducts (hard duct, either PVC, aluminum or galvanized pipe), see the table of duct lengths under Links.

Benefit: The actual air flow of a bath fan once it is installed can be affected by many factors, including the length of the duct run, the number of turns, and the texture of the duct surface. Bath fan ducts are notorious for being too small, too long, and too convoluted. This condition often means that bath fans cannot deliver adequate ventilation. A properly installed duct will help the fan perform its purpose. The fan test ensures that there is adequate spot ventilation.

Verification: During rough inspection, EA Rater will visually inspect the bath fan ducts and see that the above measures are met. EA Rater will use a calibrated flow hood to measure the CFM air flow of the fans.

5.2.3

Energy	Health	Land	Materials	Water
0	1	0	0	0

Kitchen Exhaust Performance Test: Meet ASHRAE 62.2

Description: Test the air flow the kitchen range hood for compliance with the requirements of Section 5 of ASHRAE Standard 62.2-2010. The minimum air flow is 100 cfm, but the actual requirement may be higher depending on the size of the kitchen. (Enter ASHRAE formula.)

Benefit: Kitchen range hoods remove odors and moisture from the living space of homes. Many fans are installed that meet the stated requirements of air flow for the area, but do not actually perform at their rated capacity due to poor installation practices, long exhaust duct runs or mechanical problems with the fan. Conducting performance testing of these exhaust fans can verify that a minimum required air flow is met to ensure that the installed fans will actually perform as intended.

Verification: Verification: EA Rater will test the exhaust air flow rates for kitchens and bathrooms and verify that the requirements of ASHRAE Std. 62.2 are met.

5.2.4

Energy	Health	Land	Materials	Water
0	1	0	0	0

Exhaust Fan for Attached Garage

Description: A through-the-wall or ceiling-mounted exhaust fan is installed in the garage to remove unhealthy gases from the air. It can be set to begin when the garage door closes, and automatically shut-off after after it has operated for one-hour each time the system is actuated. Fans should be installed in the ceiling or sidewall and vented to the exterior. Fans should be a minimum 70 cfm if it does not have a duct and 100 cfm if the fan is ducted.

Benefit: Unhealthy gases in an attached garage have been shown to migrate into the house. An automatically controlled fan can reduce exposure to these gases. Automobile exhaust contains many hazardous chemicals. Running an internal combustion engine, especially small engines, for even a short period will fill the space with an unhealthy level of carbon monoxide and other gases. The garage is usually the storage place of a wide range of herbicides, pesticides, paints, adhesives, and petroleum products. Any home with an attached garage is a candidate for a garage exhaust fan. Protecting good indoor air quality means removing pollutants before they can enter the living area.

Verification: EA Rater will identify the exhaust fan and test the control to be sure it works as intended.

6 Lighting, Appliances and Water Heating

6.1 Lighting

6.1.1

Energy Health Land Materials Water

Prerequisite

**Efficient Lighting Package: 80 percent of fixtures are fitted with ENERGY STAR products**

Description: Install ENERGY STAR rated fluorescent lighting products or LED products in 80 percent or more of the lighting fixtures of the house. These may be dedicated fixtures or standard fixtures with screw-in CFL's or ENERGY STAR LED's.

Benefit: Energy efficient lighting products are readily available. Compared to old-fashioned bulbs, they use less energy and last longer. This is the simplest way to reduce energy use and save on electric costs. Compact fluorescent lights (CFL's) are available with the same type of base as an incandescent bulb, so they can be used in all standard light fixtures. A dedicated fixture is hard-wired and uses pin-based bulbs (GU24). Linear fluorescent tubes come in a variety of sizes T2, T5 and T8, all of which are thinner than the old-fashioned T12 tubes. Fixtures are good in high use areas (four or more hours of use per day) examples are; kitchen, bathroom, hallway or family room.

Fluorescent lights use about one-third the energy as incandescent bulbs to produce the same amount of light. Fluorescent lights last thousands of hours instead of hundreds of hours for incandescent lights. Light-emitting diodes (LED's) are even more efficient and last even longer than fluorescents.

Verification: EA Rater will count the number of installed fixtures to determine if at least 80 percent of the fixtures have been installed with qualified products. As an alternative, a lighting density calculation can be done to show that total lighting energy use is 0.8 watts per square foot or less. Ask your EA representative for more information.

6.1.2

Energy Health Land Materials Water

1 0 0 0 0

**Lighting Controls: Interior and/or exterior. minimum two lighting zones**

Description: Devices that limit or control the operating time and energy use can be installed wherever lighting is needed.

Sensors can control either interior or exterior lights. Interior motion sensors will automatically sense when an occupant enters or leaves a room, which minimizes the amount of time the lights are left on in an unoccupied room. Exterior sensors will automatically turn security lights on when it detects motion. It's not a good idea to control fluorescents with motion sensor. This measure does not include dimmers.

Points are awarded for each application. One point for one type of installation, with a maximum of two points.

Benefit: Lighting controls reduce energy use by limiting the amount of time lights are burning unnecessarily. Outdoor lights often run the longest hours and are excellent candidates for lighting controls. Fluorescent lights should not be installed in applications with frequent cycles and short on times. These applications are best suited to LED's.

Verification: EA Rater will count the number of lighting controls or confirm the presence of a home automation system that controls at least two independent light zones. For example, three pendants over a counter is one zone.

6.2 Appliances

6.2.1

Energy	Health	Land	Materials	Water
Prerequisite				

Dishwasher: ENERGY STAR specs

Description: Dishwasher must meet current ENERGY STAR requirements at the time of the final inspection. For a list of qualifying models, visit the ENERGY STAR website ([www.energystar.gov](http://www.energystar.gov)). Consumers who want to buy the highest efficiency units should compare the kiloWatt-hour and gallons per cycle ratings. Lower numbers are better. Better performance ratings are reflected in the modeled energy use (EPS score).

Benefit: Dishwashers that qualify for the ENERGY STAR label save both energy and water compared to standard models.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.2.2

Energy	Health	Land	Materials	Water
1	0	0	0	1

Clothes Washer: ENERGY STAR specs

Description: Clothes washers must meet current ENERGY STAR requirements at the time of the final inspection. For a list of qualifying models, visit the ENERGY STAR website ([www.energystar.gov](http://www.energystar.gov)).

Benefit: Clothes washers that qualify for the ENERGY STAR label save both energy and water compared to standard models.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.2.3

Energy	Health	Land	Materials	Water
1	0	0	0	0

Refrigerator: ENERGY STAR specs

Description: Refrigerators must meet ENERGY STAR requirements at the time of the final inspection. For a list of qualifying models, visit the ENERGY STAR website ([www.energystar.gov](http://www.energystar.gov)). Energy points are granted through the energy model and don't appear here.

Benefit: Refrigerators that qualify for the ENERGY STAR label save energy compared to standard models.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.3 Water Heating

6.3.1

Energy	Health	Land	Materials	Water
Prerequisite				

Gas High Efficiency: Minimum .61 EF

Description: Install a gas-fired water heater tank with an Energy Factor (EF) rating of 0.61 or above. The EF rating is given only to water heaters that are classified as residential products. Large volume water heaters are classified as commercial products and are not given an EF rating. If the project includes a water heater that is 70 gallons or more, contact Earth Advantage for advice on finding a qualifying model.

Benefit: Water heating is the second largest use of energy in a typical home. The amount of energy used to heat water is closely associated with the number of people in the household. Higher efficiency water heaters save considerable energy.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.3.2

Energy	Health	Land	Materials	Water
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Prerequisite

Electric High Efficiency: 70 gal. or less - .93 EF, 71 gal. or larger - .92 EF

Description: Install an electric water heater tank with the Energy Factor (EF) rating: 70 gallons or less, 0.93; 71 gallons or more, .92. Electric water heaters with a high energy factor rating generally use foam insulation that resists heat loss better than standard fiberglass insulation.

Benefit: Water heating is the second largest use of energy in a typical home. The amount of energy used to heat water is closely associated with the number of people in the household.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.3.3

Energy	Health	Land	Materials	Water
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Tankless Gas: 0.82 EF or greater

0	0	0	1	0
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Description: Install a gas-fired, tankless water heater with an EF rating of 0.82 or higher. For best efficiency, a tankless water heater should be located as close to the end use as possible. It may be better to install two or more smaller units rather than one large unit to serve all the fixtures in a larger home.

Benefit: Gas-fired tankless water heaters are about 20 percent more efficient than gas-fired water heater tanks. This is a combination of more efficient burners and the lack of stand-by losses that would occur from a tank.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.3.4

Energy	Health	Land	Materials	Water
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Heat Pump Water Heaters: minimum COP 2.0

0	0	0	0	0
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Description: Install a heat pump water heater with a COP rating of 2.0 or higher. Because the HPWH draws heat from space that it's located in, placement is very important. Unheated garages and basements are best. They should not be located inside the conditioned space of the building in heating climates.

Benefit: Uses refrigeration technology to heat water at greater efficiency.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products.

6.3.5

Energy	Health	Land	Materials	Water
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No supply or waste pipes in exterior walls.

0	0	0	1	0
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Description: Plan plumbing runs so that there are no supply, waste lines or vents in exterior walls.

Benefit: Pipes shouldn't be placed in exterior walls. This practice reduces chances of freezing pipes and catastrophic failure. It also improves insulation quality by removing obstructions. Finally, there are fewer openings where air can leak through the building air barrier.

Verification: EA Rater will visually inspect during the rough inspection.

6.3.6

Energy Health Land Materials Water

Prerequisite

Direct or Power Vented Water Heater: If in conditioned space

Description: Install a sealed combustion or power vented water heater inside the conditioned space of the building. The unit must meet the efficiency requirements in Section 6.3.1.

Benefit: Water heaters are often located in garages where cold temperatures can accelerate stand-by losses from the tank. Locating a water heater inside the conditioned space reduces the stand-by loss and contributes waste heat to the building. Earth Advantage requires that all combustion equipment located in the conditioned space be sealed combustion, which means that a dedicated source of combustion air is piped directly to the unit. However, with this measure, Power venting is allowed.

Verification: EA Rater will record the brand and model number and check it against the list of qualifying products. The rater will also confirm that the combustion air source is directly connected to the outside.

7 Interior Materials

7.1 Interior Surface Coatings

7.1.1

Energy Health Land Materials Water

Prerequisite

Wall and Ceiling Latex Paint: Low-VOC (< 150) grams per liter

Description: Low-VOC paints are water-based with fewer indoor air quality impacts than solvent-based paints. For most applications there is little or no difference in performance. A minimum of 150 gpl or less is required for homes to be certified.

Benefit: Low-VOC paint reduces harmful substances in the air for home occupants and workers. The VOC amount listed on the label doesn't include VOCs in pigments.

Verification: EA Rater will visually check the VOC rating on containers found at the job site. In subdivisions, it is acceptable to look at nearby jobs by the same contractor to locate containers. The builder can provide documentation in the form of a receipt showing purchase of a particular product. If there is any doubt that a particular product meets a specific VOC rating, the builder must provide an MSDS.

7.1.2

Energy Health Land Materials Water

Wall and Ceiling Latex Paint: Low-VOC (< 50) grams per liter (0 grams per liter / < 50 grams per liter)

0	2/1	0	0	0
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Description: Paints with VOC ratings at or below 50 GPL or less receive 1 Health point.

Benefit: Low-VOC paint reduces harmful substances in the air for home occupants and workers. Low-VOC paints are water-based with fewer indoor air quality impacts than solvent-based paints. For most applications there is little or no difference in performance.

Verification: EA Rater will visually check the VOC rating on containers found at the job site. In subdivisions, it is acceptable to look at nearby jobs by the same contractor to locate containers. The builder can provide documentation in the form of a receipt showing purchase of a particular product. If there is any doubt that a particular product meets a specific VOC rating, the builder must provide an MSDS.



7.1.3

Paint meets recognized environmental standard: Additional points to measure 7.1.2

Energy	Health	Land	Materials	Water
0	0	1	0	0

Description: Use wall and ceiling paint that has received one of the approved designations. These points are in addition to the low VOC measure. Paint must also meet VOC requirements for these points to be awarded.

Benefit: Paint meets one of the following standards. Green Seal (GS-11 or GS-43), Green Wise, CARB EPA Method 24 (0 VOC), and GREENGUARD. Paint that has met any of these standards strives to achieve a healthier, cleaner environment by utilizing ingredients that are less toxic, less polluting and less wasteful. They conserve resources and habitats, and minimize global warming and ozone depletion.

Verification: EA Rater will record the manufacturer and brand name. If the approved designation is not shown on the container, the product must be listed on the certifying agency's collateral or web site.

7.1.4

Interior Wall and Ceiling Surface: Requires No Paint

Energy	Health	Land	Materials	Water
0	1	1	1	0

Description: This measure grants EA points for projects that have surfaces that require no paint, stain, lacquer or wallpaper. In most cases this will require that the structure of the wall and ceiling is attractive enough to remain exposed. One example of this approach would be to build a wall of insulating concrete forms and apply a plaster containing pigment. The plaster would never need painting. This condition must cover half the living space. For example, living room, dining and kitchen. This doesn't include wall paper or wood paneling. This does not include the trim which may be coated.

Benefit: Painting and repainting interior surfaces uses resources and generates potentially unhealthy indoor air quality. Using a material that does not require a surface coating negates the need for the use of a periodic maintenance task that consumes time and materials.

Verification: EA Rater will visually verify that the interior wall and ceiling surface has no coating.

7.1.5

Trim Paint: Low VOC (150 grams per liter or less)

Energy	Health	Land	Materials	Water
0	1	0	0	0

Description: Apply trim paint with a VOC rating of 150 gpl or less.

Benefit: Low-VOC paint reduces harmful substances in the air for home occupants and workers. See the glossary for more information.

Verification: EA Rater will visually check the VOC rating on containers found at the job site. In subdivisions, it is acceptable to look at nearby jobs by the same contractor to locate containers. The builder can provide documentation in the form of a receipt showing purchase of a particular product. If there is any doubt that a particular product meets a specific VOC rating, the builder must provide an MSDS.

7.1.6

Accountability Form: General

Energy	Health	Land	Materials	Water
0	1	0	0	0

Clear Wood Finish: Low VOC (150 grams per liter or less)

Description: Incorporate wood floor finishes that have VOC content of 150 gpl or less. To meet this measure all of one component must comply. For example: all wood floors or all cabinets or all interior doors and trim. Prefinished products meet this measure if they can document the VOC rating of the finish.

Benefit: Low-VOC wood finishes reduce harmful substances in the air for home occupants and workers. See definitions for more information on VOC's.

Verification: EA Raters visually check the VOC rating on containers found at the job site. The builder can provide documentation in the form of a receipt showing purchase of a particular product. If there is doubt that a particular product meets a specific VOC rating, the builder must provide an MSDS.

7.1.7

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	1	1	0

Recycled Content Paint: (min 50% post-consumer)

Description: Use recycled paint . Points in this category are granted in addition to points for low-VOC. Look for the Green Seal label with the GS-43 designation, which indicates recycled content. This must be used on 100 percent of the interior or exterior.

Benefit: Using recycled content latex paint offers a number of environmental and economic benefits. First, by incorporating used paint, it conserves space in hazardous waste facilities. Second, using recycled content products lowers the demand for limited new resources. Third, using recycled content paint reduces the embodied energy of a home and the amount of pollution that results from the extraction, transportation, and disposal of the materials necessary to build it. Fourth, recycled paint costs less than new paint. Finally, in addition to the environmental benefits of its recycled content, choosing paints with a low-VOC content also helps protect air quality both indoors and out.

Verification: EA Raters visually check labels on containers found at the job site. The builder can provide documentation in the form of a receipt showing purchase of a particular product. In Oregon, Metro Paint is a well-recognized brand of recycled paint.

7.2 Cabinets and Countertops

7.2.1

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	1/2	0

Exterior Plywood: Base cabinet (Kitchen OR Bath Vanities / Kitchen AND Bath Vanities)

Description: Use exterior-grade plywood for the construction of cabinet carcasses, shelves and/or closet storage. One point is awarded for all kitchen or all bath vanities/laundry cabinets. Two points are awarded when all cabinets and vanities in the house are plywood.

Benefit: Exterior grade plywood is made with moisture-resistant adhesive that lasts longer than typical particle board. Also, it releases a tiny amount of formaldehyde gas, which is considered to be insignificant to most people.

Verification: Builder must provide an Accountability Form indicating the type of material used.

7.2.2

Accountability Form: General

Energy	Health	Land	Materials	Water
0	1/2/3	0	0	0

No added Urea-Formaldehyde (25-50% / 51-75% / 76-100%)

Description: Use plywood, particle board and MDF that doesn't contain added urea-formaldehyde. Components that qualify are kitchen cabinets (50 percent), bathroom vanities (25 percent) and closet shelving (25 percent). Garage storage is not included.

Benefit: The most common material for a cabinet carcass is interior grade particleboard, which contains a volatile urea-formaldehyde binder. Alternative binders, such as exterior grade phenol-formaldehyde, methyl-diisocyanate (MDI) and newer soy-based binders do not contain volatile formaldehyde. Cabinet makers who use one of these alternatives are improving the indoor air quality of the home, and reducing their own exposure. Breathing formaldehyde is unhealthy (see Glossary), so points are awarded for reducing the presence of materials containing it.

Verification: Builder or responsible party must sign an Accountability Form attesting that the product is formaldehyde free. EA Verifier will determine the percentage of material based on a visual inspection.

7.2.3

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	1	0

Recycled Content Countertop: 25% Post-consumer content

Description: To gain points under this measure, countertop material must contain 25 percent post-consumer recycled content. Examples of products that meet this measure would be certain brands of porcelain tile, Richlite, Paperstone, glass, terrazzo, wood, bio-composites and concrete counters containing fly-ash.

Benefit: Countertops are a very prominent feature in most homes. Typical plastic laminate materials are easily worn, stained and scarred, needing to be replaced frequently. Counter materials that contain recycled content reduce the amount of raw materials used and the amount of waste sent to landfills.

Verification: EA Rater can visually identify known products. If the type of material is not known, the builder must provide product literature or an Accountability Form that specifies product name and the amount of recycled content.

7.2.4

Energy	Health	Land	Materials	Water
0	0	1	0	0

Built-in Recycling Center: Minimum 2 major receptacles

Description: Install built-in storage bins located conveniently near where recyclable materials are generated, such as in the kitchen. Dedicated bins or receptacles should be present that are clearly distinct from household waste receptacles.

Benefit: A designated recycling center avoids the messy clutter of loose cans and paper by providing a neat, orderly place for all recyclables. Placing it with easy access to the kitchen encourages everyone to use it.

Verification: EA Rater will verify the presence of at least two bins or receptacles dedicated to recyclable materials.

7.3 Millwork and Interior Trim

7.3.1

Accountability Form: General

Energy	Health	Land	Materials	Water
0	1	0	0	0

No added Urea-Formaldehyde Trim Material

Description: Install trim materials that don't contain added formaldehyde. One obvious material is solid wood trim. Engineered products might also use binders that do not contain formaldehyde or formaldehyde formulas that are not water-soluble and therefore do not escape the product. All trim must meet this measure in order to receive this point. This does not include doors themselves.

Benefit: Formaldehyde is a serious irritant and probably carcinogenic. Trim material can be a significant source of urea-formaldehyde when adhesive binders are used. (See glossary for more detail.)

Verification: EA Rater will visually identify solid wood trim. Some MDF may have a Green Guard designation as formaldehyde-free. If visual verification is not possible, the builder must supply product literature or an Accountability Form to the EA Rater.

7.4 Flooring

7.4.1

Energy	Health	Land	Materials	Water
0	1/2/3	0	1/2/3	0

Hard Surface: Finished floor (25-50% / 51-75% / 76-100%)

Description: Install hard surface floor instead of wall-to-wall carpet. Points are awarded based on the coverage of hard surfaces compared to the total conditioned floor space.

Benefit: Most carpet contains a number of harmful chemicals resulting from its manufacture, such as formaldehyde and VOC's. It also harbors organisms such as dust mites and mold that can affect health. Carpet collects household dust and debris, such as human skin, pet dander, along with food and drink residue that support these organisms. In addition, carpet wears out quickly, contributing to solid waste. Hard surface floors avoid all of these issues. They are more durable and longer lasting. Hard floors are easier to clean and less prone to promote the growth of harmful organisms.

Verification: EA Rater will visually identify areas with hard surface flooring and estimate the percentage needed for the appropriate point allocation. Exact measurements may be required if a visual estimate cannot reliably place the percent of floor area into a specific size class.

7.4.2

Energy	Health	Land	Materials	Water
0	0	0	1	0

Finished Structural Floor

Description: One way to reduce materials is to choose structural elements that also serve as the finish layer. One example would be a slab-on-grade floor that is colored to provide an attractive finished surface. Other examples include plywood or OSB structural subfloor that is highly finished. The main requirement is that at least one layer that would occur in a typical floor assembly has been eliminated.

Benefit: This measure recognizes efforts to improve the resource efficiency of floor systems by reducing materials. Typical floor systems have wood framing, structural subfloor, and one or more finish layers (underlayment, pad, and carpet, for example). Fewer resources are used by eliminating entire layers. This measure is most often accomplished by fashioning a structural component to serve as an aesthetic function as well.

Verification: EA Rater will visually inspect the floor.

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<b>7.4.3</b>	Accountability Form: General	Energy	Health	Land	Materials	Water
Carpet: Post-consumer recycled content (20-50% / 51-100%)		0	0	1/2	1/2	0

Description: Install carpet with documented recycled content. Points are awarded for different amounts of floor area covered by recycled content carpet.

Benefit: The carpet industry has made significant progress toward reclaiming and reusing carpet material in their manufacturing process. Using recycled content removes a significant source of solid waste from landfills and reduces the use of new resources, primarily petroleum. Other post-consumer materials are also recognized in this measure. The most common is polyethylene (PET) from soda bottles. There is some concern about the durability of PET carpet. Nylon carpets with 15 percent recycled content are also available. Recycled-content in fibers and carpet backing may be comprised of post-industrial waste, carpet manufacturing waste product, post consumer polyethylene, and post-consumer waste from carpet. Some companies also operate reclamation programs to remove used carpet from the waste stream, such as Shaw, Mohawk, and Interface.

Verification: Builder or carpet supplier must provide an Accountability Form that identifies the carpet manufacturer, product brand, whether content is post-consumer or post-industrial, and the percentage of recycled content.

<b>7.4.4</b>	Accountability Form: General	Energy	Health	Land	Materials	Water
Carpet and Pad: Carpet & Rug Institute (CRI) Green Label Plus		0	2	0	0	0

Description: Choose carpet carrying the Carpet and Rug Institute's (CRI) Green Label Plus designation to receive these points in addition to any other carpet points. Green Label plus is more rigorous than the basic Green Label program. For a list of qualifying products, visit CRI's website ([www.carpet-rug.com](http://www.carpet-rug.com)).

Benefit: Carpet manufacturers submit their products to an independent laboratory that tests the carpet against established criteria for harmful emissions. The manufacturer is allowed to use the CRI/IAQ Carpet Testing Program label for that specific product type if the test result does not exceed the stated emission criteria. Products are re-tested quarterly to monitor continued compliance with the test program requirements. The label is the industry's assurance that the product is a responsible, low-emitting carpet.

Verification: Builder will provide an Accountability Form showing the product name and CRI number, which can be verified on the CRI website.

<b>7.4.5</b>	Accountability Form: General	Energy	Health	Land	Materials	Water
Low urea-formaldehyde underlayment below flooring		Prerequisite				

Description: If underlayment is installed under carpet or sheet flooring, it must be certified as low urea-formaldehyde. If an additional layer of substrate is required under finish flooring such as sheet goods, use urea-formaldehyde free oriented strand board (OSB), plywood, or medium density fiberboard (MDF). Also, cement backer is generally used as substrate for tile and contains no formaldehyde. Exterior grade products are also acceptable due to the low emission of formaldehyde.

These points are granted if underlayment is eliminated and finish flooring are placed directly on exterior-grade structural subfloor.

Benefit: Interior-grade underlayment that includes urea-formaldehyde binder emits significant quantities of formaldehyde which is unhealthy for occupants.

Verification: Builder will provide an Accountability Form showing the product name and the formaldehyde standard that the product meets. One acceptable standard is the California Code of Regulations, Title 17, Sections 93120-9312.12 Phase 2 standard for particleboard (0.09 ppm) and MDF (0.11 ppm).

7.4.6

Renewable Materials: Linoleum, Cork, Bamboo, or Wool (5-20% / 21-100%)

Energy	Health	Land	Materials	Water
0	0	0	1/2	0

Description: Install a natural flooring product, such as wool carpet, natural linoleum (not vinyl), cork, and bamboo. Points are awarded based on the percentage of the total flooring area covered.

Wall-to-wall carpeting is made from 100 percent wool. Sisal, woven grasses, and other natural fibers also apply. 25% post-consumer recycled content Tile, will also be accepted. Wood is excluded. This measure does not apply to backing and pad.

Benefit: Natural flooring materials are made from renewable resources and are generally less toxic than synthetic products. Linoleum is a resilient flooring product made of linseed oil, pine rosin, sawdust, cork dust, limestone, natural pigments, and jute (backing). Cork is the outer bark of an oak tree, *Quercus Suber*, which is grown primarily in the Mediterranean region. Bamboo is a rapidly growing grass originating primarily in Asia. Wool fiber for carpet comes from sheep.

All of these products originate outside the United States, so there are some transportation impacts. However, less processing is required than petroleum-based flooring materials. These materials are very durable and will last for decades with minimal care. They are even biodegradable. If flooring adhesive is required, a low-toxic adhesive is recommended to follow through on the environmental benefits of the flooring.

Wool maintains a high quality and is well known for decades of service. The natural fiber in these materials is toxin free and ideal for many individuals with chemical sensitivities. Wool has some natural moisture buffering capacity and helps reduce swings in indoor relative humidity by absorbing and releasing water vapor. Like all carpets, wool harbors dust and human and animal dander, which supports dust mite populations and can aggravate allergies. Therefore, careful cleaning is important. Earthen floors are also recognized under this measure.

Verification: EA Raters will visually identify linoleum, cork, bamboo, or wool in the field and assess the area coverage.

7.4.7

Accountability Form: General

Low VOC Construction Adhesives: VOC content 70 gpl or less

Energy	Health	Land	Materials	Water
0	1	0	0	0

Description: Use indoor adhesives for flooring and other applications that has a VOC rating of 70 gpl or less. The performance of low-VOC adhesives is similar to conventional products.

Benefit: Unlike conventional products, low-VOC adhesives release fewer solvents during the curing process, protecting indoor air quality. Low-VOC adhesive helps protect workers who make them and those that use them during construction. Conventional adhesive requires hazardous solvents during clean up, such as acetone, turpentine, xylene and paint thinner. Using low-VOC construction adhesives helps maintain a healthy living environment, and is environmentally responsible because it avoids much of the ecological costs of using conventional construction adhesives.

Verification: EA Rater will check the VOC rating on containers found at the job site. If containers are not present, the builder must provide documentation in the form of a receipt showing purchase of a particular product. If there is any doubt that a particular product meets a specific VOC rating, the builder must provide an MSDS.

## 8 Water Efficiency

### 8.1 Indoor Water Efficiency

8.1.1

Whole-House Pressure Regulating Valve

Energy	Health	Land	Materials	Water
0	0	0	0	1

Description: A pressure-reducing valve is installed at the water meter to maintain consistent water pressure of 50 pounds per square inch (psi) entering the residence from the water supplying agency.

Benefit: The plumbing system is protected from the risk of damage by potential high water pressure. Less water is used because of regulated flow. Appliances and irrigation equipment are tested at specific pressure ranges and will not perform as labeled at higher pressures. Plumbing code currently requires a pressure-reducing valve only if the water main pressure exceeds 80 psi. If pressures increase after the home is built, the customer may not know about it until an equipment failure. It is more expensive to retrofit than initially install.

Verification: EA Rater will identify the pressure regulating valve near the water meter. Water supplying agency may provide documentation.

8.1.2

Efficient Showerheads: 2.0/1.75 gpm (2.0 gpm / 1.75 gpm)

Energy	Health	Land	Materials	Water
1	0	0	0	1/2

Description: Install showerheads limiting water flow to a maximum of 2.0 gallons per minute (gpm). The total allowable flow rate of water from all showerheads in a single compartment including rain systems, waterfalls, bodysprays, and jets, shall be limited to 2.0 gpm where the floor area of the shower compartment is less than or equal to 2,160 square inches or 15 square feet. For each increment of 2,160 square inches of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices is equal to or less than 2.0 gpm per compartment. Additional point given when flow rate is 1.75 gpm or less for the same shower compartment area.

Benefit: Showering consumes a significant amount of water, accounting for about 17 percent of indoor water use. Low-flow showerheads reduce this water use significantly.

Verification: EA Rater will read flow rates stamped on showerhead or measure the flow rate directly. Water Sense labeled products can be identified on the EPA website.

8.1.3

Efficient Lavatory Faucets: 1.5 gpm or less or Water Sense label

Energy	Health	Land	Materials	Water
1	0	0	0	1

Description: Install all lavatory faucets with aerators which limit flow to 1.5 gallons per minute or use Water Sense labeled products.

Benefit: Efficient faucets reduce water use.

Verification: EA Rater will read flow rates stamped on faucet aerators or measure the flow rate directly. Water Sense labeled products can be identified on the EPA website.

8.1.4

Efficient Kitchen Faucets: 1.5 gpm or less or Water Sense label

Energy	Health	Land	Materials	Water
1	0	0	0	1

Description: Install kitchen faucet with aerators which limit flow to 1.5 gallons per minute or use Water Sense labeled products.

Benefit: Efficient faucets reduce water use.

Verification: EA Rater will read flow rates stamped on faucet aerators or measure the flow rate directly. Water Sense labeled products can be identified on the EPA website.

8.1.5

Refrigerator: Through the door water and ice unit

Energy	Health	Land	Materials	Water
0	0	0	0	1

Description: Install a refrigerator with water and ice delivered through the door.

Benefit: A refrigerator with cold water supplied through the door uses less water when compared to running a water faucet until the water cools for drinking.

Verification: EA Rater will confirm the presence of a refrigerator with water and ice in the door.

8.1.6

High-Efficient Toilets: WaterSense qualified toilet, 1.28 gpf (WaterSense)

Energy	Health	Land	Materials	Water
0	0	0	0	3

Description: Install a Water Sense qualified toilet (1.28 gpf). Dual flush toilets also meet the requirement. Dual flush toilets use two flush modes. The first mode uses the full 1.6 gallons per flush for flushing solid waste. The second mode uses fewer gallons per flush (usually 0.6 - 1.1 gallon) for flushing liquid waste. Another method of achieving lower flush volumes is a pressure assist model. All dual-flush toilets in the home must meet this requirement to achieve measure points. Calculate the average flush volume using this formula. Dual Flush Average Flush = [(full flush) + 2(half flush)]/3.

Benefit: Toilets consume more clean water than any other indoor plumbing fixture, accounting for about 30 percent of indoor water use.

Verification: EA Rater will read flow rates stamped on the toilet and verify that all toilets meet this spec. Water Sense labeled products can be identified on the EPA website.



8.1.7

Energy	Health	Land	Materials	Water
1	0	0	0	3

Whole-House On-Demand Hot Water Delivery System

Description: A small pumping system delivers hot water to the faucet quickly. A manual switch must be installed to activate the pump. The unit must be installed per manufacturer instructions. The point is not available if the unit triggers on a motion sensor. This is not a typical hot water recirculation system in which a pump runs constantly to keep hot water immediately available to all fixtures. (Some systems include timers to limit operation to the times of day when hot water is typically used, but this generally means the pump still runs for many hours a day.) Water circulating in the pipes loses heat and drives up the stand-by loss of the water heater. Also, a small amount of electricity is used to operate the pump.

Benefit: On-demand hot water delivery systems save water by delivering hot water to the fixture quickly. Without this system the occupant will need to open the hot water tap and wait for the hot water to reach the fixture. This will allow the occupant to run the pump only when hot water is needed. Homes with a centrally-located water heater may not benefit as much from the installation because of short plumbing runs.

Verification: EA Rater will test the system to ensure proper operation. An on/off button will be located at the faucet furthest away from the water heater.

8.1.8

Energy	Health	Land	Materials	Water
1	0	0	1	2

Short Hot Water Piping Runs: 20 feet one story - 10 feet for each additional floor

Description: Plan plumbing runs to minimize the length of all hot water lines. Place water heater in a central location to reduce the length of hot water lines to fixtures. To qualify for this measure pipe runs need to be limited to no more than 20 feet for single story homes plus no more than 10 feet for each additional story. The key to efficient hot water distribution is to design the home's floor plan so that the kitchen, laundry, and bathrooms are near a centrally-located water heater.

Benefit: It is typical to run the faucet while waiting for the water to warm up. In addition to being wasteful of water, such an approach also wastes energy if the faucet is particularly far from the hot water source. Water sits in the pipes and cools, so that it must be flushed out again the next time. All the hot water that went down the drain is also replaced by cold water in the water heater, and it takes energy to heat it back up again. This has the added advantage of requiring less plumbing labor and materials to install.

Verification: At rough inspection, EA Rater will measure the distance from each fixture to the water heater.

8.1.9

Energy	Health	Land	Materials	Water
1	0	0	0	1

**Home Run Plumbing Distribution System: Plumbing manifold and PEX piping**

Description: Install a home-run plumbing system connected to a manifold that feed supply lines to individual fixtures. Although traditional copper piping can be used with this technology, cross-link polyethylene or PEX, piping lends itself especially well to home-run systems. Individual runs from manifold to fixtures must be no more than 20 feet for the first story and no more than 10 feet more for each additional story.

Benefit: Home run plumbing distribution systems also called "parallel" installations eliminate interim and hidden fittings that may leak. The system also allows pipe sizes to be reduced by 1/8-inch, which saves energy and water.

Plumbing manifolds and flexible PEX tubing can be installed more quickly than rigid pipe, with fewer fittings and no need for tees and elbows. The cost of home-run systems is typically competitive, and PEX piping is less expensive than copper tubing.

The system benefits homeowners by permitting several fixtures to be used simultaneously without dramatic changes in pressure or temperature. By downsizing supply plumbing, the system also increases water velocity and delivers hot water to fixtures more quickly.

Verification: EA Rater will visually identify the plumbing manifold and home-run tubing during the rough inspection.

8.1.10

Accountability Form: Landscape

Energy	Health	Land	Materials	Water
0	0	1	0	4

**Rainwater Collection: For non-potable indoor water use**

Description: Rainwater is collected from a roof and stored for use in the home. Typically the captured rainwater is used to flush toilets or wash laundry, but not for showers, sinks or kitchens. The storage tank must be large enough to hold water from a 1 inch rainfall event considering that 0.62 gallons of water are collected per sq. foot of roof space. Tank must be sized to accomodate at least half the roof area using this metric.

(Rainwater collection for potable use will be considered under the Innovative Measures Section.)

Benefit: The collection of rainwater reduces the amount of potable water required to operate a home. By requiring less water it limits the energy and pollution associated with filtering and transporting water to your home. Another benefit is less stormwater leaving the site which reduces flooding and erosion in natural systems.

Verification: EA Rater will visually identify the equipment for collecting, storing, and distributing rainwater to specific plumbing fixtures.

**8.2 Irrigation**

8.2.1

Accountability Form: Landscape

Energy	Health	Land	Materials	Water
0	0	0	0	2

**Low-Volume Irrigation System**

Description: Install a low-volume irrigation that slowly applies water to a plant's root zone. It is a form of micro-irrigation that includes drip and low volume irrigation systems.

Benefit: Up to 50 percent of municipal water use in the summer is for outdoor irrigation. That's also when rainfall is scarce and reservoirs, lakes, and streams are at their lowest levels. Low-volume irrigation systems can use 75 percent less water than sprinkler systems during the time of year that water supplies are lowest. Second, reducing water demand lowers the energy and environmental impacts associated with collection, transportation, and treatment needed to deliver water for outdoor irrigation use. Third, installing a low-volume system requires the thoughtful use of drought-tolerant and low-water plants appropriate to your site. Appropriate plants have a higher success rate and generally require fewer fertilizers and other artificial aids to establish themselves. This reduces the environmental consequences of fertilizer runoff, as well as the embodied energy to manufacture, transport, and dispose of the fertilizers themselves. Finally, installing a low-volume system saves money on the water bill.

Low-volume irrigation is more effective at meeting the plants watering needs. There are water savings for the homeowner over the lifetime of occupancy, and reduced peak summer demand provides savings for the municipality. Low-volume systems are adaptable to the landscape and can be easily removed when irrigation is no longer required.

Better systems will have higher up-front cost, but will be offset by reducing water usage. Planning and design are needed to determine system requirements including performance, minimum efficiency standards, and controller features. As with any irrigation system, regular monitoring is required to ensure proper operation.

One negative aspect applies to all types of irrigation, tubing for low-volume systems is often made from polyvinyl chloride (PVC), which is a significant source of toxins during manufacture and disposal. If possible, select alternatives to PVC such as polyethylene. Installation should be performed by a certified irrigation specialist and conform to local water use ordinances.

The average established shrub zone needs approximately 9,300 gallons per 1000 sq. feet each growing (peak) season. Low-volume irrigation has proven to save 60 percent to 70 percent water over the course of the season with no affect on plant health due to efficient saturation of the root zone. This is a possible savings of 5,000 - 6,000 gallons per 1000 sq. feet of shrub area installed with low-volume irrigation.

Verification: EA Rater will recognize a low-volume irrigation system by operating the system. System to be operated by technician to verify no overspray.

8.2.2

Accountability Form: Landscape

Energy	Health	Land	Materials	Water
0	0	0	0	1

**Hydro Zoning: Grouping of plants and lawn for watering**

Description: Establish separate watering zones for lawn and other plants. Each zone is designed to deliver the appropriate amount of water to each plant type. This includes selecting proper water delivery methods, such as sprinkler heads or drip emitters.

Benefit: An irrigation system that has been zoned to provide separate watering patterns for shrubs and lawn will use less water than non-zoned systems. Because lawn requires more water to survive, the over watering of plants will occur if separate systems are not installed. A study in Eugene, Oregon, showed that a typical lawn needs 18,600 gallons per 1000 sq. feet each growing (peak) season. Analysis indicates that established shrubs need 50 percent of the water that lawns need. This is a potential savings of 9,300 gallons for each 1000 sq. feet of shrub plantings.

Verification: EA Rater will confirm that plants and turf are grouped into similar water needs for each irrigation zone by turning on the irrigation system to confirm that the system delivers water to each planting zone.

8.2.3	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	0	0	3

**Weather Based Irrigation Controller**

Description: Weather based irrigation controllers use information about plant water demand to regulate irrigation. Satellite data, onsite weather stations, and soil sensors are common. Irrigation controller must have all of the features listed below to be awarded points.

Benefit: The amount of water plants need is determined by temperature, relative humidity, and soil moisture. The typical irrigation timer knows nothing about these factors. A smart irrigation control is a simple, economical and useful tool in preventing irrigation that would be wasteful. Over watering of landscape is common without the use of climate sensing/tracking systems. Local rain episodes are acknowledged by these systems to account for natural watering of landscape.

Verification: EA Rater will identify the make and model of the of irrigation controller and confirm that it uses weather data.

8.2.4	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	0	1	6

**No Permanent Irrigation Installed: All landscaping**

Description: Plants must be selected to minimize watering requirements. Drought tolerant plants are required and turf grasses are not allowed. Temporary irrigation (up to 3 years) may be installed to help plants get established. Temporary systems need to be installed so that they may be easily removed after landscape is established. A sample list of low water use plants is available from the Regional Water Providers Consortium at [www.wateruseitwisely.com](http://www.wateruseitwisely.com).

Benefit: With successful implementation, all permanent landscape irrigation requirements are eliminated.

Verification: Landscaper will provide an Accountability Form indicating that plant selection and other measures will ensure that no additional irrigation will be needed. The landscaper must use the WaterSense Water Budget Tool to document that irrigation can be eliminated.

**8.3 Landscaping**

8.3.1	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	0	0	1

**Low Water-Use Plants: Drought tolerant or Climate Appropriate**

Description: Low water-use plants inherently require little supplemental watering (native or adapted plants) and/or those that can be established within 1-3 years where they no longer require regular supplemental watering. Select plants whose needs (sun/shade, moisture, drainage, etc.) are met by the site. Avoid plants that are included on the local or state agency?s invasive or nuisance plant list. Local or state agencies have lists of recommended low-water use plants for your climate.

Points are awarded when at least 50 percent of the planted area is occupied by low water-use plants. These plants must be served by a dedicated irrigation zone or zones so they receive only the amount of water required for themselves.

Benefit: Using appropriate low water use plants will reduce long term water requirements on the site. In addition to saving water, drought-tolerant and low-water plants appropriate to your site are naturally acclimated to site conditions. Such plants have a higher success rate and generally require fewer fertilizers and artificial aids like pesticides to establish themselves.

Verification: Landscaper will provide an Accountability Form that includes descriptions of low water-use plants.

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8.3.2

Energy Health Land Materials Water

Limited Lawn/Turf: 25%-1% / 0% of landscape covered by turf (0% / 1-25%)

0 0 0 0 2/1

Description: Limit turf to functional areas (areas that serve practical uses, such as recreation, pets, or minor foot traffic or fire protection). This measure rewards lower turf plantings by giving points associated with the amount of turf planted in relation to the developable landscape area. This applies to the area installed at the time of construction, even if this means that only the front yard is treated.

Benefit: Limiting lawn turf to functional areas can significantly reduce landscape irrigation needs. Up to 50 percent of municipal water use in the summer is for outdoor irrigation. Keeping lawns green and healthy significantly increases landscape watering needs. Less lawn turf means that all the associated products and expenses will be lower, and, thus, have a lower environmental impact. Examples are lower fertilizer use, less chance the fertilizer will run off the lawn through over watering, lower power mowing expenses and their associated impacts of noise, fuel use, emissions, and lower impact on solid waste in the form of yard clippings.

Verification: EA Rater will estimate the percentage of turf compared to the total landscaped area (this measure will only apply to the landscaping in place at the time of the final inspection). Landscaped area is defined as the area of the lot not including the building footprint, sidewalks, patios, driveway and non-pervious surfaces. Pools and water features considered as lawn.

8.3.3

Accountability Form: Landscape

Energy Health Land Materials Water

Organic Matter: Added to soil - 2" tilled to 6-8" depth

0 0 1 0 3

Description: Adding 2 inches of organic amendments to the soil will greatly improve the quality of the soil. Amendments are typically compost, shredded leaves, or other fine organic matter. Apply 2-3 inches of amendments and work it into the soil to a depth of approximately 6 to 8 inches. Peat moss, Douglas Fir, or cedar chips are not recommended because they draw water from the soil and can negatively affect soil PH and nitrogen levels.

It is recommended that a soil test be conducted on the soil to determine what mix of amendments should be used.

It is recommended that the compost be certified under US Composting Council Seal of Testing Assurance program. This test examines the following criteria: 1) pH; 2) soluble salts (conductivity); 3) nutrient content (N-P-K); 4) organic matter; 5) moisture percent; 6) maturity; 7) stability; 8) inerts; 9) trace metals; and 10) weed seeds and pathogens.

Benefit: By adding soil amendments and tilling the soil, plant and grass root systems will get established quicker and deeper in the soil. Amendments will also reduce the amount of fertilizers required to meet the plant's nutritional requirements. Proven benefits are reduced summer irrigation demand, healthier plants, and reduced stormwater run-off. Other potential benefits are reduced pesticide use and run-off, reduced fertilizer consumption and run-off, reduced degradation of surface and groundwater, and cost savings to homeowners and municipalities.

In the Redmond, Washington report below, proven results for turf irrigation indicates the peak summer water use can be reduced by 60 percent at compost amended sites compared to non-amended top soil sites.

Verification: Landscaper or builder will provide an Accountability Form to the EA Rater.

8.3.4	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	1	0	1

**Test Soil: Implement Recommendations**

Description: Soil test of site soil conditions is performed by soil testing lab and recommendations are implemented with soil amendments to entire landscaped area. Samples should be taken from various areas in the yard -- front yard, side yard, back yard -- wherever plantings will happen. When sending the sample to a soil testing laboratory, they should be notified that recommendations are for native plants, low water use landscape, etc., so their recommendations are suitable.

Benefit: Soil tests will ensure that nutritional requirements of landscape plants are addressed. This will help plants to become established quickly. Over the long term the plants will use less water and require less fertilizer to remain healthy.

Verification: Landscaper will provide an Accountability Form and copy of the laboratory results and work order implementing the recommendations.

8.3.5		Energy	Health	Land	Materials	Water
		0	0	2	0	0

**One Tree per 1000 sq. ft. of Developed Landscape Area**

Description: Plant at least one tree for each 1,000 sq. ft. of total lot area. The number of trees planted or on site is determined by adding up all of the area to be developed for landscaping and dividing it by 1000 to determine the number of trees to claim this measure.

Benefit: Trees contribute significantly to the economic and ecological value of a site. In addition to their physical beauty, trees provide wildlife habitat and they help manage the flow of stormwater. They clean the air, and they protect critical features such as stream buffers or hillsides. In addition, properly trimmed and positioned trees protect the house from the cold winter winds and the hot summer sun, reducing heating and cooling bills. Considering the effects on energy usage, erosion control, pollution, and wildlife habitat, a single mature tree adds substantial annual and resale value. (Cooling Our Communities, A Guidebook on Tree Planting and Light-Colored Surfacing, U.S. Environmental Protection Agency, 1992.)

Trees protect soil and the house. They provide the ability to create a microclimate around the house. They also help reduce evaporation and reduce Heat Island Effect of the site. Young trees may use as much or more than the evaporation prevented. Here are a few recommendations: 1) Create a planting area with large soil storage for long term water needs; 2) low-water species selection; 3) Watering regime to establish large root zone in the first three years after planting the tree; 4) trees should be 1" caliper at one foot from the ground and approximately 6' tall.

It is recommended that the landscaper identify where utility services are, or will be installed, and select and plant trees according to industry practices.

Verification: EA Rater will count the number of newly planted trees and estimate the area of developed landscape in order to calculate the 1 tree per 1,000 sq. feet target.

8.3.6	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	1	0	1

**Install On-Site Storage for Rainwater: Used for landscaping**

Description: Large storage tanks (500 -1000 gallons capacity) are filled with rainwater, typically from roof surfaces. The collected rainwater is then used to water the landscape when required. Rain barrels do not qualify for this measure because they lack capacity for long term irrigation. Tank must be large enough to store rain water from a one inch rain event, where by one sq. foot of roof space equals 0.62 gallons as water. Tank must be large enough for at least 50% of roof area.

Benefit: This measure is designed to slow down the stormwater surge coming off of a roof during a rain shower. The water is collected off the roof in on-site storage units and then used to water the landscape. By holding a percentage of water that comes off the roof during heavy rains, it helps prevent the surge of water that goes through the stormwater system. The potential benefit helps prevent stormwater overflow incidents during heavy rains.

Verification: Builder or landscaper will provide Accountability Form describing the rainwater collection system.

8.3.7	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	0	0	2

**Design the Landscape with WaterSense Water Budget Tool**

Description: Design of the landscaped area shall be developed using the WaterSense Water Budget Tool.

Benefit: System should be designed to meet most irrigation demands during the dry season, filter and/or treat rainwater to irrigation levels.

Verification: Accountability form and submission of the completed budget tool.

8.3.8	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		0	0	1	0	1

**4:1 Slopes shall be vegetated**

Description: Slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1) shall be fully covered with landscape plants, landscape structures (e.g., terraces) or other stabilization measures.

Benefit: Long term erosion effects are reduced through the design and implementation of planting, terracing, retaining walls, landscaping, and restabilization techniques.

Verification: EA Verifier will estimate slope to be near the targeted rise to run ratio and will visually verify that these areas are vegetated.

8.3.9	Accountability Form: Landscape	Energy	Health	Land	Materials	Water
		Prerequisite				

**No irrigation over-spray on to house**

Description: Adjust sprinkler heads to eliminate irrigation over-spray onto pavement, the house or other permanent structures such as garages, sheds, etc. Significant run off must be prevented too.

Benefit: Irrigation spray heads can be poorly adjusted so that that water strikes pavement or drenches the building. This creates two serious problems. First, it wastes water. Second, it will likely lead to significant moisture damage and structural decay.

Verification: Inspector will operate the irrigation system and visually verify that water doesn't strike the house or other structures, nor does a significant amount of water run off of landscaped areas onto the driveway, sidewalks or streets.

## 9 Solar Measures

### 9.1 Solar Energy

#### 9.1.1

Sun Tempered Design: South windows equate to at least 7 percent of floor area

Energy	Health	Land	Materials	Water
0	1	0	0	0

Description: Sun tempered homes have good access to the sun and will gain significant benefits from solar heating. Solar may contribute between 10 and 20 percent of the space heating needs. The following features are required for a sun tempered building.

Orientation: one wall facing within 30 degrees of true south

Glazing: south-facing window area is at least 7 percent of floor area and 50 percent of total glazing

Thermal Mass: none

Floor plan: at least one living area (kitchen, dining, or living room) on south side

Benefit: Sun tempering is a cost-effective method of capturing solar energy without elaborate design features. The house is simply oriented properly with respect to the sun with most of the windows facing south.

Verification: EA Rater will use a compass to check orientation, confirm south window area on plans, or by measuring windows on site, and visually confirming presence of living space on south side.



9.1.2

Energy	Health	Land	Materials	Water
0	1	0	0	0

Passive Solar Design: South windows equate to at least 10 percent of floor area

Description: Passive solar heating is the aggressive use of the sun's energy to provide up to 50 percent of the home's heating energy. Planning for passive solar must begin during the schematic phase of design so that all requirements can be included. If the home owner intends to apply for Oregon Residential Tax Credits, they must meet the requirements available on the Oregon Department of Energy's website [www.oregon.gov/energy](http://www.oregon.gov/energy).

The following features are required for a passive solar building.

Orientation: one wall facing within 30 degrees of true south

Glazing: south-facing window area is at least 10 percent of floor area and about 50 percent of the total windows

Thermal Mass: diurnal heat capacity of thermal mass is 30 times the south-facing window area ( See ODOE website). Mass should be a darker color, such as brown or green and no more than 4 inches in thickness in exposed sunlit location (floor or wall). Mass must be insulated from ground contact on all sides and edges.

Floor plan: at least two living areas (kitchen, dining, or living room) on south side

Glazing: Solar Heat Gain Coefficient (SHGC) = .50 on south facing glazing, SHGC = .35 on west-facing glazing

Shading: < 5 percent from vegetation or buildings (sun chart required), roof overhangs min. 24 inches from wall

Ventilation: operable windows on opposite sides of building, operable skylights (optional) and ceiling fans

Benefit: Passive solar energy can supply up to fifty percent of annual heating needs without fuel costs. The heat is free. Large windows also offer superior day-lighting and reduce the need for artificial lighting.

Verification: EA Rater will:

- 1) Review plans to confirm room layout, window area, solar orientation, roof overhangs, and quantity of thermal mass.
- 2) Suggest that builder pursue Oregon Residential Energy Tax Credit.
- 3) Use compass to check orientation.
- 4) Visually inspect all passive solar features listed here.

9.1.3

Accountability Form: General

Energy	Health	Land	Materials	Water
0	0	0	0	0

Photovoltaic (solar electric system)

Description: Photovoltaic (PV) panels convert the sun's energy to electricity. PV systems can be connected to the utility distribution system or independent. The components for a residential, utility-tied system typically include panels (PV modules) and an inverter/controller. Off-grid systems must also have storage batteries and charge control devices. PV panels are mounted on the roof or on the ground at an appropriate angle (usually 30-60°). For best performance the panels should face true south. However, they can face any direction if a reduction in power production is acceptable. Utility incentive programs require that panels face within 30 degrees of true south. Points are awarded through energy modeling.

Benefit: Generating a portion of the electricity needed in the home will offset the need to build large power plants. PV systems do not generate on-site pollution.

Verification: Verification: EA Rater will identify the PV system components and sizing. The installer invoice will verify system capacity. Builder will supply system information on Accountability Form.

9.1.4

Energy	Health	Land	Materials	Water
0	0	0	1	0

Photovoltaic: Planning for future hookup

Description: Even if a photovoltaic system is not installed at the time of construction, one can be added later. Proper planning will increase system production and improve the aesthetic fit with the home. Consider the following:

1. The house should be oriented with a clear roof slope that faces within 30 degrees of true south.
2. The south-facing roof slope should be free of all obstructions that would interfere with the placement of PV panels, including plumbing stacks, skylights, roof vents, etc.
3. Reserve 300 sq. feet or more in a rectangular shape on the roof.
4. Space should be available near the electric panel for mounting an inverter and for making electrical connections (48 inches of clear horizontal space should be enough.)
5. There should be one free space for an additional breaker in the service panel.
6. Install metal conduit for future installation of wires.
7. Place a sign on electrical panel indicating the house is "Photovoltaic Ready".

Benefit: Planning the home to accommodate a PV system will reduce the disruption associated with installing one later. This can mean fewer materials, less demolition waste, and better aesthetic integration with the building's architecture.

Verification: EA Rater will visually inspect for the requirements identified here.

9.1.5

Energy	Health	Land	Materials	Water
0	0	0	0	0

Solar Water Heater System

Description: A solar water heater consists of a solar panel facing south or within 30° of south. A collection fluid (water or anti-freeze) is heated in the collector and circulates to a storage tank. The pre-heated water from that tank flows into the main water heater, which allows the primary tank to use less energy to heat the water. The complete system consists of collectors, storage tank, heat exchanger, water pump, and controls. Points are awarded by energy modeling.

Benefit: Solar water heaters have been proven over time and are relatively simple. System sizing is based on the number of people in the household and is generally meant to provide about 50 percent of the hot water over the course of the year, although most of the production will occur during the warmer months. Water heating is the second largest use of energy in the typical household, so reducing water heating has a major impact on overall household energy use.

Verification: EA Rater will visually verify the presence of system components.

9.1.6	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	2	0

Solar Water Heater: Pre-plumbed piping for future hookup

Description: Install water lines to serve a solar water heater so that a complete system can be installed later. Consider the following:

1. The roof must be oriented to the south and strong enough to support the weight of solar collectors.
2. Reserve 70 sq. feet of roof area for installation of system.
3. Space must be allowed to position a storage tank, heat exchanger, pump, and controls next to the standard water heater.
4. Pipes must be sized and located for the collectors and other equipment. It is best to select the exact equipment so that all of these details are known.
5. All plumbing lines must be pressure tested.
6. All plumbing lines must be insulated to R4.
7. Sensor wires shall run parallel to piping and attach securely to the outside of insulation.
8. Place a sign near the water heater indicating that the house is "Solar Ready".

Benefit: Pre-plumbing reduces the cost to retrofit the house for solar water heat panels in the future. Contact a qualified contractor/plumber for an estimate. Pre-plumbing also reduces the potential waste of materials during the retrofit process over installing at the time of house construction.

Verification: EA Rater will visually inspect for the elements listed here and complete the solar ready checklist.

## 10 Innovations

### 10.1 Innovations

10.1.1	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	1	1	1	1

EA Certified Professional: SHP or STAR

Description: The builder or superintendent for the project has graduated from the Earth Advantage Sustainable Homes Professional. A site superintendent or project manager of the project site must earn the designation. Larger builders should have a significant portion of their workers trained.

The real estate broker representing the property has graduated from the STAR course.

Benefit: A builder who has invested the time to earn the Sustainable Homes Professional certification has exhibited a desire to improve their construction and management practices. This typically results in the builder having a better understanding of the construction process when it comes to incorporating "green" construction practices. A real estate broker who has invested time in the Sustainable Training for Accredited Realtors has made a similar commitment to their representation of the home.

Verification: EA Rater verifies with Earth Advantage records.

10.1.2	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	1	0	0

Green Power: Builder utilizes local utility green power options for own office operations (<50% / 51-100%)

Description: The Builder participates in the local utility green power program for all office operations.

Benefit: Green power or renewable power reduces the environmental impact that traditional power generation incurs. Options from local utilities range from salmon friendly power to wind power to solar power.

Verification: Builder must provide an Accountability Form attesting to the purchase of green power from the local utility for all office operations.

10.1.3	Accountability Form: General	Energy	Health	Land	Materials	Water
		0	0	0	0	0

Alternative Construction System: Points determined by analysis

Description: This measure awards points on a non-traditional construction system that the Earth Advantage program does show explicitly on the Points Worksheet. These can be straw bale, rammed earth, and other systems.

Benefit: Non-traditional construction systems have energy and environmental benefits that can be recognized by alternative review methodologies. The evaluation of these systems will be on a case-by-case basis. It is recommended that the building team review their plans early in the construction review process with their Earth Advantage Representative.

Verification: On site inspection to verify and/or Accountability Form. Points are determined on a case by case basis.

10.1.4	Innovative Heating / Cooling System: Points by analysis	Energy	Health	Land	Materials	Water
		Calculated				

Innovative Heating / Cooling System: Points by analysis

Description: This measure awards a non-traditional heating or cooling system that can be documented to show energy efficiency performance equal to or greater than minimum requirements for Earth Advantage heating and cooling systems. Points for the measure will be awarded on the level of performance the system is able to achieve above the minimum level of Earth Advantage requirements. The preferred method for awarding points will be to use the HERS modeling tool, but the Earth Advantage team is open to other methodologies that can be supported by industry professionals. A hybrid electric heat pump/gas furnace system will qualify for this measure provided that both systems meet minimum Earth Advantage requirements (Refer to 4.2.1, 4.2.3, 4.2.6)

Benefit: Non-traditional heating and cooling systems have energy and environmental benefits that can be recognized by alternative review methodologies. The evaluation of these systems will be on a case-by-case basis. It is recommended that the building team review their plans early in the construction review process with their Earth Advantage Representative.

Verification: On site inspection to verify and/or Accountability form.

10.1.5	Innovative Measure: Propose a new measure	Energy	Health	Land	Materials	Water
		Calculated				

Innovative Measure: Propose a new measure

Description: Measures recorded here are innovative or have not been specifically identified elsewhere in the EA Points Worksheet. Some examples include: radon mitigation where it is not required by code, no polyvinyl chloride materials, drainwater heat recovery and installed used house parts (interior doors, trim, stairs, light fixtures, etc). Points will be determined by comparing the value of existing measures that are similar in nature. If the measure being proposed does not have any comparable Earth Advantage measure, then a study will need to be done to determine the point value of the proposed measure. A total of 2 innovative new measures can be awarded per project.

Benefit: Innovative measures push the envelope of current construction practice and move the industry toward a higher level of sustainability.

Verification: On site inspection to verify and/or Accountability form.

10.1.6

Energy Health Land Materials Water

Calculated

Innovative Measure: Propose a new measure

Description: Measures recorded here are innovative or have not been specifically identified elsewhere in the EA Points Worksheet. Some examples include: radon mitigation where it is not required by code, no polyvinyl chloride materials, drainwater heat recovery and installed used house parts (interior doors, trim, stairs, light fixtures, etc). Points will be determined by comparing the value of existing measures that are similar in nature. If the measure being proposed does not have any comparable Earth Advantage measure, then a study will need to be done to determine the point value of the proposed measure. A total of 2 innovative new measures can be awarded per project.

Benefit: Innovative measures push the envelope of current construction practice and move the industry toward a higher level of sustainability.

Verification: On site inspection to verify and/or Accountability form.

10.1.7

Energy Health Land Materials Water

2 0 0 0 10

WaterSense Certification

Description: WaterSense labeled new homes are designed to reduce residential water use indoors and out by 20% -- allowing families to enjoy all the comforts of their home while using less water and energy, and spending less money on utility bills. In fact, compared to a typical home, a WaterSense labeled new home can save a family of four 50,000 gallons of water a year or more! That's enough to wash 2,000 loads of laundry and could amount to utility bill savings of up to \$600 each year.

As the first national specification for water-efficient new homes, the WaterSense new homes specification sets criteria for indoor and outdoor efficiency, while allowing flexibility for regional landscaping preferences and green add-ons.

WaterSense Certified New Homes are homes that have met the strict guidelines set forth by the EPA and have been verified by a Certified WaterSense Inspector.

Complete all necessary measures to achieve the USEPA WaterSense certification. See [www.epa.gov/watersense/](http://www.epa.gov/watersense/) for more information.

Benefit: Earth may be known as the "water planet", but even though about 70 percent of its surface is covered by water, less than 1 percent is available for human use. Water supplies are finite and we can all help protect this critical and precious resource.

Managing water is a growing concern in the United States. Communities across the country are starting to face challenges regarding water supply and water infrastructure. As the map below shows, many of the states that have projected population growth increases also have higher per capita water use.

WaterSense will help protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices.

Water conservation equates to energy conservation as well. Almost every aspect of our modern water delivery system involves energy, whether it be to pump water from source to home, heat water for use, or treat water once it has been used by the home; water management is energy intensive. Thus, by saving water, we are also saving energy.

Verification: The points awarded for this measure are to be awarded above and beyond the other points accrued through compliance to other WaterSense Measures that appear in the EAI Points system; i.e. these points account for WaterSense specific measures that are NOT included in the EA Points System. Thus, all other Water efficiency measures that are completed in the home should also be selected and points acquired.

In order to claim these points the home must be verified by a certified WaterSense inspector to prove that it has met all guidelines and requirements of the Certification program. Once compliance has been proven to the WaterSense Provider and Certification has been granted, points may be awarded.

10.1.8

Accountability Form: General

Energy

Health

Land

Materials

Water

0

1

0

0

0

EPA Indoor airPLUS

Description: Incorporate the EPA's Indoor airPLUS program. The accomplishment of this program meets the following EA Homes measures: Points awarded are those not covered by other EA measures.

Benefit: The EPA's Indoor airPLUS program is a national program that certifies homes that have been built to Indoor airPLUS standards. The goal of this program is to improve the indoor air quality of homes for homeowners and tenants. Many of these measures also manage moisture, which has the additional benefit of increasing the durability. To earn the Indoor airPLUS label, the builder incorporates up to 30 home design and construction features to help protect qualified homes from moisture and mold, pests, combustion gases, and other airborne pollutants. Before the home officially earns the Indoor airPLUS label, it is inspected by an independent third-party to ensure compliance with EPA's rigorous guidelines and specifications.

Verification: EA Rater will verify that the measures listed in EPA Indoor airPLUS checklist item 2.1 have been achieved. Some of those measures appear on this EA Points Worksheet.