2012 Earth Advantage Residential Prerequisite Measures

1 Planning and Design

1.1 Land Use

No Prerequisites in this section

1.2 Site Planning

1.2.3

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.

1.3 Building Design

No Prerequisites in this section

2 Waste Management

2.1 Waste Management

2.1.2

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 uses 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.

3 Building Envelope

3.1 Durability Strategies

3.1.1

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

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.

3.1.4

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

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

No Prerequisites in this section

3.3 Floor Framing and Insulation

3.3.1

Floor Insulation: R 38 Suggested

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.

3.4 Wall Framing and Insulation

3.4.1

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.

3.4.5

Wall cavity Insulation suggested R-23 blown-in

Description: Install blown-in fiberous 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.

3.5 Roof Framing and Insulation

3.5.1

Flat Ceiling Insulation: R49 Minimum

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

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

Scissor Truss Sloped Ceiling: R 38 Minimum

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 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.

3.6 Roofing Material

No Prerequisites in this section

3.7 Exterior

No Prerequisites in this section

3.8 Exterior Coatings

No Prerequisites in this section

3.9 Windows, Skylights and Doors

No Prerequisites in this section

3.10 Other Shell Measures

No Prerequisites in this section

3.11 Air Sealing

3.11.1

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

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.

3.12 Resource Efficient Materials

No Prerequisites in this section

4 Heating and Cooling

4.1 Fireplace

4.1.1

Gas Fireplace/Heater/Sealed Combustion, Direct Vent with electronic ignition

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.

4.2 High Efficiency Equipment

4.2.1

Forced Air Gas: Minumum 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

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

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.

4.2.5

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.

4.3 Ductwork

4.3.1

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.

4.3.5

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.

4.3.10

Zonal Pressure Relief (ZPR) for ducted systems

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.

4.4 Air Quality

4.4.1

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 Advantge 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.

5 Ventilation

5.1 General Ventilation

No Prerequisites in this section

5.2 Spot Ventilation

5.2.1

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

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.

6 Lighting, Appliances and Water Heating

6.1 Lighting

6.1.1

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.

6.2 Appliances

6.2.1

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). 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.

6.3 Water Heating

6.3.1

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

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.

6.3.6

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

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.

7.2 Cabinets and Countertops

No Prerequisites in this section

7.3 Millwork and Interior Trim

No Prerequisites in this section

7.4 Flooring

7.4.5

Low urea-formaldehyde underlayment below flooring

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).

8 Water Efficiency

8.1 Indoor Water Efficiency

No Prerequisites in this section

8.2 Irrigation

No Prerequisites in this section

8.3 Landscaping

8.3.9

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

No Prerequisites in this section

10 Innovations

10.1 Innovations

No Prerequisites in this section