

NC HBH Reference Manual v4.1.1

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This Reference Manual provides details and documentation requirements for each item on the NC HealthyBuilt Homes Statewide Checklist, Version 4.1.1

NOTE: *All projects started after October 1, 2009 will be required to use Checklist Ver. 4.1.1*

The NC HealthyBuilt Homes Program delivers technical and marketing assistance to small and medium size home builders who wish to reduce the environmental impact of the homes they construct.

[This work is made possible through our partners and sponsors \(click here for more info\):](#)



Minimum Requirements for each Section:

Site Opportunities:	10 pts
Water Opportunities:	9 pts
Energy Opportunities:	
<i>Building Envelope</i>	14 pts
<i>Comfort Systems</i>	18 pts
<i>Appliances, Lighting, and Renewables</i>	8 pts
Indoor Air Quality Opportunities:	15 pts
Materials Opportunities:	18 pts
Bonus Opportunities:	3 pts
Community Checklist (where available):	5 pts

Rating Scale

105-160	points:	Certified
161-210	points:	Silver Certified
211-300	points:	Gold Certified
301+	points:	Platinum Certified



REQUIRED DOCUMENTATION GUIDELINES

1. Basic Information

- a. **Documentation** should be submitted to the NC HBH Statewide Partner unless you are served by a HBH Community Partner, in which case all documentation is submitted to the Community Partner. Refer to the "Chart Your Project" document for the HBH Statewide Partner process.
- b. All documentation should be provided in **electronic format** unless approved by HBH Statewide and Community Partner staff.
- c. All references to "HBH staff" in the HBH Reference Manual or Checklist refer to HBH Statewide Partner staff.

2. Specific Types of Documentation - Descriptions

- a. Providing a "**Signature**" by a responsible party as documentation for a checklist item indicates that the party signing is accepting responsibility that the item has been completed in full and that all reasonable care has been taken to meet the stated intent of that checklist item. **Photographic documentation will be accepted for signature items if the photo clearly indicates item implementation / completion.**
- b. Each completed Checklist item requiring a "**Signature**" **must be signed by the Responsible Party** (often the builder) on the "**Document Signature Sheet.**" The builder should maintain a single electronic or hard copy of this document for the collection of signatures. The builder/developer may provide all of the required signatures. The provider of a signature assumes responsibility for the credit item signed for. The original signed signature sheet will be provided to the homeowner (see Prerequisite 11).
- c. An "**Inspection**" by an HBH approved inspector indicates that the item has been verified by the inspector. **Approved HBH inspectors are:** HBH Statewide and Community partner staff, HBH Independent Inspectors (described in item 3 below), and HERs raters that have completed approved HBH training. These raters are listed on the HealthyBuiltHomes.com web site. Only Statewide and Community Partner HBH staff, and HBH Independent Inspectors will perform final inspections. Completed checklists require the signature (or initials) of the inspector next to each item requiring an inspection. **Photographic documentation will be accepted for inspection items if the photo clearly indicates item implementation / completion.**
- d. "**Signature and Inspection**" indicates that **both** a signature by a Responsible Party **and** an inspection by an approved HBH inspector are required to receive credit for the item.
- e. "**Signature or Inspection**" indicates that **either** a signature by a Responsible Party **or** an inspection by an approved HBH inspector are required to receive credit for the item - **not both.**
- f. "**Final Walkthrough**" (**FW**) is a required inspection of the completed home by **HBH staff, Community Partner Staff,** or an **HBH Independent Inspector** (see item 3 below). Some items require both a **FW** verification as well as some other form of documentation.
- g. "**FW; Signature or Inspection**" indicates that a Final Walkthrough inspection **and either** a signature by a Responsible Party **or** an inspection by an approved HBH inspector are required for the item.

3. HBH Independent Inspectors are allowed to register and inspect new homes without pre-authorization from HBH staff. They may also certify that a house has met all of the requirements for receiving a certificate from the NC HealthyBuilt Homes program. For a list of approved HBH Independent Inspectors, contact the HBH Statewide office.

4. Disclaimer. The HealthyBuilt Homes program, its representatives, and approved inspectors (see item 2b above) are only responsible for verifying HBH Checklist requirements that have been implemented. HBH verification **should not be considered a warranty** as to the quality or appropriateness of the selected feature or installation.

5. All Final measurements and calculations are subject to a 2% deviation allowance (5% allowance for Blower Door and Duct Blaster measurements).

Feel free to ask for clarification at any time. We are here to help you achieve a NC HealthyBuilt Home.

To contact the NC HealthyBuilt Homes Program you can email the NC HBH Coordinator at: hbhcoordinator@ncsu.edu

Prerequisites

Item	Intent	Resources
<p>Prerequisite 1: Comply with all federal, state and local government requirements including but not limited to: NC Building Code, NC Energy Code, local development regulations and other local regulations.</p> <p><u>DOCUMENTATION:</u> Copy of the Certificate of Occupancy A copy of the site layout and building floor plan(s) indicating the finished conditioned and unconditioned square footage, shall be available upon request.</p> <p><u>INFORMATION:</u> If local government codes exceed state or federal regulations, a home may be eligible to use those local government codes as points for compliance with the requirements of another section or item of this checklist. It is the responsibility of the builder to provide appropriate documentation for any request which could potentially result in points towards a home's HBH certificate.</p>	<p><i>Intended to insure that a home meets the basic legal requirements of the local jurisdiction.</i></p>	<p>NC Building Code: www.ncdoi.com/OSFM/Engineering/BCC/engineering_bcc_home.asp</p> <p>Local Ordinance Database: www.ces.ncsu.edu/nreos/forest/ordinance/ordinance.ces.php?hidden1=municipalities&select1=all_local_governments</p>
<p>Prerequisite 2: Home qualified by the national ENERGY STAR program (www.energystar.gov)</p> <p><u>DOCUMENTATION:</u> Electronic copy of the ENERGY STAR Certificate The following information must be available upon request: 1. HERS Index, if applicable; 2) Verification company or organization; 3) Test results ("ENERGY STAR Summary" report in REM/Rate)</p> <p><u>INFORMATION:</u> This is third party testing verification, and will require the builder to engage a RESNET Certified Rater to provide this qualification.</p>	<p><i>Intended to insure that a home meets a minimum standard of energy efficiency.</i></p>	<p>ENERGY STAR: www.energystar.gov/index.cfm?c=new_homes.hm_index</p>
<p>Prerequisite 3: Perform a blower door test and meet a minimum standard of 0.35 CFM50/sf of a building envelope's surface area, or 3.5 ACH/50Pa.</p> <p><u>DOCUMENTATION:</u> Copy of blower door test results signed by the RESNET Certified Rater who performed the test</p> <p><u>INFORMATION:</u> This is third party testing verification. Provide the test results as shown on the "ENERGY STAR Summary" report in REM/Rate. All homes must meet this minimum requirement as approved by the RESNET Certified Rater and their provider agreement. Sample testing may be allowed (using RESNET sampling protocol) when a minimum of 3 homes in a row have met the standard when performing the initial blower door test.</p>	<p><i>Intended to insure that a home meets a minimum standard of air infiltration, providing energy efficiency and comfort.</i></p>	<p>NC ENERGY STAR, Locate HERS raters: www.ncenergystar.org/professionals</p> <p>Residential Energy Services Network: www.resnet.us/builder/default.htm and www.resnet.us/standards/default.htm</p> <p>NC Green Professionals Directory http://greenprofessionals.org</p>
<p>Prerequisite 4: Seal all ductwork joints and penetrations with low toxic mastic (aerosolized sealant allowed for existing homes). Test all air distribution systems (at 25 Pascals) to have no more than 6% leakage to the outside (measured in CFMs of leakage per conditioned square footage), and no more than 8% total duct leakage. Mastic tape is not approved for this Prerequisite.</p> <p><u>DOCUMENTATION:</u> Copy of duct leakage test results signed by the RESNET Certified Rater who performed the test</p> <p><u>INFORMATION:</u> This is third party testing verification. All ductwork must meet this minimum requirement as approved by the RESNET Certified Rater and their provider agreement. Sample testing is expected to be allowed (use RESNET sampling protocol) when a minimum of 3 homes in a row have passed the testing protocol on the first test. 'Inside' is defined as being inside the thermal and air infiltration envelope of the building. If a home does not include ductwork, then this prerequisite is not applicable.</p>	<p><i>This prerequisite applies to homes that have an air distribution system and is intended to ensure that ductwork meets the air delivery design, providing energy efficiency and comfort.</i></p>	<p>Residential Energy Services Network: www.resnet.us/builder/default.htm and www.resnet.us/standards/default.htm</p>

Item	Intent	Resources
<p>Prerequisite 5: All space heating and cooling equipment sized according to ANSI/ACCA Manual J 7th Edition, or equivalent room by room load calculations. The total cooling capacity of each cooling system must be within 1/2 ton (6,000 Btu/h) of the Manual J cooling load for the space the system serves. See information paragraph in the Reference Manual regarding heat pumps in cold regions of the state and mini-split ductless systems. Use of other systems/equipment that deviate from the prerequisite must be reviewed and approved by HBH staff.</p> <p>DOCUMENTATION: Equipment size and signature provided by party responsible for Manual J calculations Copy of Manual J calculations available upon request</p> <p>INFORMATION: It is a NC Energy Code requirement to provide Manual J calculations for each home. This item extends that requirement to sizing cooling equipment within 1/2 ton (6,000 Btu's) of the cooling calculations because oversizing of cooling equipment can lead to reduced removal of humidity in a home in most NC climate areas. Excess humidity in a home can potentially lead to mold growth. Oversized cooling systems also use more energy and tend to be less durable. Heat Pumps in Cold Climates: In some of the coldest areas of the state where the design heating load is much larger than the design cooling load, a heat pump may need to be oversized in cooling in order to meet the required heating capacity for that climate. Such systems may have issues providing adequate dehumidification in humid periods of the year. This prerequisite may be waived if the system designer provides a letter to both HBH and the homeowner explaining that the system is sized to meet but not exceed the heating load, and that additional dehumidification may be necessary during the cooling season. Mini-split (ductless) systems often use an inverter technology that allows the compressor to run efficiently over a relatively wide range of capacities. In these systems, the low end of the rated cooling capacity range is the capacity which must be within 1/2 ton (6,000 Btu/h) of the Manual J cooling load for the space that it serves.</p>	<p><i>Intended to minimize the over design of HVAC systems, providing energy efficiency, durability, and comfort.</i></p>	<p>ACCA Manual J website: www.acca.org/store/product.php?pid=172</p> <p>EERE article on Sizing of HVAC Equipment: www.eere.energy.gov/consumer/your_home/spac_e_heating_cooling/index.cfm/mytopic=12340</p>

Item	Intent	Resources
<p>Prerequisite 6: All Combustion equipment including (but not limited to) furnaces, water heaters, and fireplaces conform with the following requirements:</p> <ul style="list-style-type: none"> • Equipment is sealed combustion, power vented, or located outside the conditioned space, including sealed crawl space. • Unvented fireplaces are not permitted. • Masonry fireplaces have tight fitting doors (see <u>Note</u>) and a sealed firebox exhausted to the outside, with dedicated outside air intake able to withstand flame exposure. Door gaskets are encouraged for best operation. • Gas logs having a fan that blows any portion of the combustion gases into the living space are not permitted. • Operable doors on gas fireplaces that are not tested to provide sealed combustion when closed are not allowed. Testing can be provided by manufacturer or other HBH approved source. • One carbon monoxide (CO) detector installed per 1,000 sq. feet of living space (minimum 1 per floor) in all houses with an attached garage, or with any combustion appliance. <p><u>DOCUMENTATION:</u> Final Walkthrough If gas fireplace(s) use operable doors, a copy of the test results</p> <p><u>INFORMATION:</u> <u>Note:</u> 1. Gas cooking stoves with properly designed exhaust hoods are exempt from the sealed combustion requirement. 2. Tight fitting doors for purposes of this requirement have no gaps into which a stack of two (2) credit cards will easily slip (1/16" gap)</p> <p>The by product of combustion appliances is carbon monoxide. Carbon Monoxide can cause health issues at low level exposures and death at high level exposures. Unvented or vent free fireplaces produce low levels of carbon monoxide. If a traditional wood-burning fireplace or stove is desired, it is recommended that one select a factory-built fireplace, insert, or wood stove that is UL-listed and meets EPA standards for particulate emissions. Because masonry fireplaces are allowed without completely sealed combustion or power venting, they must be carefully addressed to limit the possibility that carbon monoxide is introduced into the home. Fireplaces rely on a strong chimney draft to pull combustion products up and out of the home. However, fireplaces do not always maintain a draft adequate to keep carbon monoxide out of the home, particularly when the house is under negative pressure (due to air leakage or exhaust fans). Additionally, carbon monoxide from a dying fire can make back drafting both more dangerous and more likely.</p> <p>Regarding chimney design, it is recommended that a chimney be constructed inside of the building envelope, and exit the roof as high as possible for greatest efficiency. Among other benefits, a warm chimney drafts better than a cold one. Tight fitting fireplace doors help the fire heat much more efficiently, and reduce the chances of carbon monoxide entering the home. Doors with gaskets further improve the seal, and are recommended. Lastly, a dedicated outside air intake in the fire box provides combustion air directly to the fire. This increases the heating efficiency of the fireplace and may help reduce the chance of carbon monoxide entering the home. Research has shown that at times, particularly during a gusty wind, the flow of air in a fireplace can reverse and the air intake can temporarily fill with hot gases and/or flames. For this reason the outdoor air intake must be able to withstand very high temperatures and must not be near flammable material.</p>	<p><i>Intended to reduce exposure to carbon monoxide by providing a minimum standard for the use of combustion appliances in conditioned spaces, providing health and safety benefits.</i></p>	<p>The NAHB Rehab Guide (part 2 of the document) discusses methods of rehabilitating existing fireplaces: www.toolbase.org/ToolbaseResources/level4DG.aspx?ContentDetailID=1321&BucketID=4&CategoryID=42</p> <p>Install an EPA certified fireplace insert. www.epa.gov/woodstoves/fireplaces.html</p> <p>Other options for minimizing potential sources of pollutants (NAHB Green Home Guidelines): www.hopewelltpw.org/NAHB%20Green%20Home%20Guidelines%202005.pdf</p> <p>Oikos Carbon Monoxide detector locations and standards: http://oikos.com/esb/32/co.html</p> <p>EPA Indoor Sources of Air Pollution-Carbon Monoxide: www.epa.gov/iaq/co.html</p>

Item	Intent	Resources
<p>Prerequisite 7: A mechanical ventilation system providing fresh outside air from a clean source at a rate equivalent to a constant supply of 7.5 CFM per bedroom, plus an additional 7.5 CFM, plus .01 CFM per square foot of fully conditioned space. System must operate at least every three hours.</p> <p>DOCUMENTATION: Final Walkthrough and Signature of Responsible Party Measurements of flow rate and documentation of fresh air delivery schedule</p> <p>INFORMATION: A tight house does not naturally leak enough fresh air for the health of the occupants, so a ventilation system providing fresh air is required. A mechanical, whole-house ventilation system can better ensure a controlled, clean source of air than ventilation based on a leaky building envelope. Because of this, the occupants are more comfortable, particularly during extreme weather events, when a leaky envelope tends to over-ventilate. Additionally, the occupants have plenty of fresh air in very mild weather when a leaky envelope tends to under-ventilate the home. Mechanical rooms, storage rooms, and areas near any exhaust vents are not clean sources of fresh air.</p> <p>Whole-house ventilation strategy options are classified as: 1. Supply ventilation - fan(s) force outside air into the home A common, recommended supply ventilation strategy uses the air handler of the HVAC system and an additional control device to provide a small amount of fresh air when the HVAC fan is operating. The control device is required to ensure that the system operates throughout the day and that the correct amount of fresh air is supplied. The control device is scheduled to turn the air handler on to provide adequate ventilation even when no heating or cooling is needed. It also closes a mechanical damper in the fresh air duct when the heating or cooling system is running for long periods of time. The supply air flow rate should be measured with the air handler fan on and the fresh air damper fully open. All outdoor air brought into the HVAC system as ventilation air should be filtered before it is introduced into the home. Note: If fresh air is introduced into the air handling system without an electronic controller for the fresh air damper, RESNET requires that the duct blaster test be run with the damper open, which will increase the duct leakage reported.</p> <p>2. Exhaust ventilation - fan(s) force inside air out Exhaust-only ventilation strategies rely on fans to exhaust air from the homes. The most common approach for this type of system is to have one or two continuously running bathroom exhaust fans that are rated for continuous use. The exhausted air is made up by fresh ventilation air seeping into the house through a multitude of cracks and crevices; therefore, the source of the ventilation air is uncontrollable. Because of this, precautions should be taken before using this strategy on a home with an attached garage or crawlspace. An exhaust-only strategy is not recommended in hot and humid climates because humid summer air entering the home can contact surfaces cooled by air conditioning and cause condensation. Depending on where this condensation is located, it has the potential to lead to mold growth or the decay of building components. The flow rate of exhaust air must be measured to meet this prerequisite.</p> <p>3. Balanced ventilation - fan(s) force equal quantities of air in and out. One method for providing balanced ventilation is to install an Energy Recovery Ventilator (ERV) between the air handler and outside air ducts. ERVs exchange heat and moisture between the inside and outside air, and can reduce the energy needed to heat, cool, and dry the fresh air brought into the home. For proper performance, the flow rate of the supply and exhaust flows should be balanced. The supply air flow rate must be measured to meet this prerequisite.</p> <p>ASHRAE Standard 62.2 provides guidance on requirements for residential ventilation systems. Note: Compliance with ASHRAE 62.2, verified by the HERS rater or other approved professional, will be considered complying with this Prerequisite.</p>	<p><i>Intended to provide a minimum standard for indoor air quality.</i></p>	<p>CFM = (# of bedrooms * 7.5) + 7.5 + (.01 * s.f.) = amount of fresh air required</p> <p>EPA: Three Basic Strategies to Indoor Air Quality: http://www.epa.gov/iaq/is-imprv.html</p> <p>Consumer's Guide to Whole House Ventilation from the Department of Energy: http://apps1.eere.energy.gov/consumer/your_home/insulation_airsealing/index.cfm/mytopic=11860</p> <p>Ventilation Control Systems at Toolbase: http://www.toolbase.org/Home-Building-Topics/Indoor-Air-Quality/ventilation-control-systems</p>

Item	Intent	Resources
<p>Prerequisite 8: Install exhaust fans vented to the outside with the following rated flow rate:</p> <ul style="list-style-type: none"> • Baths with showers exhaust 50 CFM, minimum. • Kitchen range hoods exhaust 100 CFM, minimum. Provide nearby make-up air for range hoods rated to exhaust 400 CFM or greater (see <u>Note</u>). <p>DOCUMENTATION: Final Walkthrough and signature of Responsible Party</p> <p>INFORMATION: Spot ventilation is critical in the bathroom as well as the kitchen of high performance homes because this is where much of the moisture and odors in a home are created. Neglecting to provide adequate ventilation in a tight home may lead to moisture related building material failures and/or mold growth. Since installation can affect the actual CFM's a fan will pull, fans must be tested once installed to demonstrate they are exhausting a minimum CFM to the outside.</p> <p>Kitchen exhaust fans rated greater than 400 CFM can cause a significant negative pressure in the home while running, creating an environment that will pull air through any areas of least resistance (often leaks through the building envelope, attic, and/or crawlspace) which may result in potential indoor air quality issues and building failures. To balance the pressure and avoid pulling air into the home from undesirable locations, intentional make-up air shall be provided for any kitchen vent fan rated at greater than 400 CFM. The mechanical system designer/contractor on the project should be consulted on the placement of the nearby make-up air.</p> <p><u>Note:</u> Compliance with the LEED for Homes "back-draft potential test," verified by the HERS rater or other approved professional, will be considered justification for kitchen vent fans rated greater than 400 CFM without make-up air.</p>	<p><i>Intended to give credit for providing effective spot ventilation to remove excess moisture from daily human activities.</i></p>	<p>Spot Ventilation fact sheet: http://www.nrel.gov/docs/fy03osti/26466.pdf</p> <p>Range Hoods affect Indoor Air Quality: http://oikos.com/esb/53/rangehood.html</p> <p>LEED for Homes Reference Guide: www.usgbc.org/Store/PublicationsList.aspx?CMSPageID=1518</p>
<p>Prerequisite 9: Air in attached garage separated from conditioned air.</p> <ul style="list-style-type: none"> • Provide air barrier between conditioned living space and garage; including weatherstripping at all penetrations, sealed drywall joints, and other measures as necessary. • Air Handlers may <u>not</u> be installed in a garage. <p>Note: see Prerequisite 6 for carbon monoxide detector requirement for all homes with an attached garage.</p> <p>DOCUMENTATION: Final Walkthrough and Signature of Responsible Party.</p> <p>INFORMATION: Conditioned living space includes any space that is heated and/or cooled. The air barrier shall be continuous. If the garage is conditioned, it should be separated from all other living spaces and should not use the same heating and cooling system as the living space. New air handler installations are not reasonably airtight in most cases. The average air handler leakage is great enough to result in significant energy penalties and contribute to poor air quality. (See FSEC study in "Resources").</p>	<p><i>Intended to reduce exposure to carbon monoxide by setting a minimum standard for separating attached garages from conditioned space.</i></p>	<p>Air Barriers—Airtight Drywall Approach: www.buildingscience.com/documents/information-sheets/4-air-barriers/air-barriers2014airtight-drywall-approach/?searchterm=air%20sealing</p> <p>FSEC Air Handler leakage study: www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1660-06.pdf</p>

Item	Intent	Resources
<p>Prerequisite 10: Install window and door flashings at all <u>exposed</u> exterior openings. Install as recommended by the manufacturer in conjunction with recommendations by the weather resistant barrier manufacturer. Additional points may be awarded under 'Materials Opportunities' for flashing openings that are not exposed.</p> <p>DOCUMENTATION: Signature of Responsible Party and inspection by approved HBH inspector</p> <p>INFORMATION: An <u>exposed opening</u> is one where the overhang has a Projection Factor less than 0.375 above and to each side of the opening. The Projection Factor is the ratio of the overhang width to the overhang height above the door threshold or window sill.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div data-bbox="289 402 562 618"> <p style="text-align: center;">Projection Factor</p> </div> <div data-bbox="709 402 1192 618"> <p style="text-align: center;">Flashing Example</p> </div> </div> <p>All windows and exterior doors shall have appropriate flashing installed a maximum of six inches above the top of the window or door. All windows and exterior doors shall have a water-resistant flashing installed on the side and base of window and door rough openings to direct water leaks out of the framing. Flashing shall be compatible with materials it touches (for example, steel and aluminum are incompatible and shall not be installed so that they touch) and shall meet manufacturers' (window, door and flashing) specifications.</p>	<p><i>Intended to give credit for providing an effective water management system at all exposed exterior openings to minimize water intrusion and increase durability.</i></p>	<p>The National Green Building Standard: www.nahbrc.org/technical/standards/greenbuilding.aspx</p> <p>The Engineered Wood Association - flashing details for windows and doors: www.apawood.org/bbh_walls.cfm</p>
<p>Prerequisite 11: Builder/Developer provides original <u>Document Signature Sheet</u> to the homeowner (see <u>Note</u>).</p> <p>DOCUMENTATION: Copy of "Document Signature Sheet" signed by the responsible parties and the homeowner</p> <p>INFORMATION: The <u>Document Signature Sheet</u> is a list of all Checklist items signed by the responsible parties throughout the construction process. This document provides the builder and other members of the building team a way to stand behind the products and strategies that were used to build the owner's high performance green home. Builders are responsible for maintaining a single hardcopy of the <u>Document Signature Sheet</u> for the collection of signatures. At the end of the project, the builder will provide the homeowner with the original copy of the signed document, which the homeowner will also sign. The builder/developer is encouraged to contact the HBH staff for clarifications regarding the current process for creating and completing this document.</p> <p>Note: For speculatively built homes, the builder may provide a letter in lieu of a homeowner signature on the Document Signature Sheet (use the Letter Template provided in the checklist). This letter will indicate that the signed Document Signature Sheet will be delivered to the future homeowner.</p>	<p><i>Intended to provide building team accountability to the homeowner.</i></p>	
<p>Prerequisite 12: Builder/Developer enrolled in the statewide NC HealthyBuilt Homes program.</p> <p>DOCUMENTATION: Signed enrollment form and receipt for payment of enrollment fees</p> <p>INFORMATION: Builders are encouraged to enroll in the NC HealthyBuilt Homes program prior to beginning construction on a home they intend to receive a certificate. Homes can receive a certificate if enrolled after construction begins but may not qualify for the maximum number of points available without additional documentation.</p> <p>Note: Statewide HealthyBuilt Homes membership is included with all Community Program HBH memberships.</p>	<p><i>Intended to verify that the Builder or Developer is a member of the NC HBH program.</i></p>	<p>Program enrollment form: http://healthybuilthomes.org/docs/HBH%20Enrollment%20Form%20v3_2.pdf</p> <p>Custom home registration form: http://healthybuilthomes.org/docs/HBH%20Custom%20Home%20Reg%20Form%20v3_2.pdf</p>

Site Opportunities (Minimum Points: 10)

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Item	Pt	Intent	Resources
<i>Soil / Amendments</i>			
<p>1 Erosion control (credit available for ONE of the following):</p> <p style="padding-left: 20px;"><i>Develop an erosion control site plan</i></p> <p style="padding-left: 20px;"><i>Develop and implement an erosion control site plan during construction</i></p> <p><u>DOCUMENTATION:</u> Signature provided by responsible party that a plan was developed to manage erosion; Implementation points must be documented with dated photos, or viewed in place by approved HBH inspector</p> <p><u>INFORMATION:</u> The plan should indicate and include areas where topsoil will be removed, where contours of slopes will be cleared or reshaped, the location and types of erosion control measures, the stormwater and sediment management systems, and a vegetative plan for temporary and permanent soil stabilization. A sample Erosion and Sedimentation Control Plan is provided in the DENR Erosion and Sediment Control Plan Planning and Design Manual (see "Resources").</p> <p>The North Carolina Sedimentation Pollution Control Act of 1973 requires anyone involved in land disturbing activities to take special precautions to reduce soil erosion and to prevent sedimentation damage to waterways and property. Disturbances larger than one acre are required to file an erosion control plan with the state and to obtain an Erosion Control Permit, or face serious fines. Disturbances on areas less than one acre are still required to implement erosion control strategies. Contact the NC Department of Natural Resources (DENR), Division of Land Resources, for information on county or city ordinances that may apply to your area.</p>	<p style="text-align: center;">1 3</p> <p style="text-align: center;"><i>Intended to give credit for creating and implementing a cohesive erosion control plan.</i></p>	<p>Sample Erosion and Sedimentation Control Plan: www.dlr.enr.state.nc.us/images/Sediment_design_manual_June2006/ChapterSeven_20060614.PDF</p> <p>Residential Erosion Control guide, courtesy of Catawba County Erosion Control Program www.co.catawba.nc.us/depts/u&e/ECbrochure.pdf</p>	
<p>2 Surface Stabilization (credit available for ALL of the following):</p> <p style="padding-left: 20px;"><i>Plant temporary cover crops on disturbed land areas within two weeks of completing rough grading activities</i></p> <p style="padding-left: 20px;"><i>Use redundant mulch, compost, or straw bales for erosion control</i></p> <p><u>DOCUMENTATION:</u> Inspection by approved NC HBH inspector Installation must occur within 2 weeks of ground disturbance to obtain these points.</p> <p><u>INFORMATION:</u> Temporary planting of cover crops is the use of rapidly growing annual grasses, small grains or legumes to provide initial, temporary soil stabilization for erosion control on disturbed areas for less than twelve (12) months. The DENR Erosion and Sediment Control Plan Planning and Design Manual (Chapt. 6), provides guidance for the selection and installation of practices such as the use of ground covers, mulching, and rolled erosion control products. The same chapter also gives guidance on the selection and installation of temporary seeding suitable for different areas of the state including Rye (grain), Annual lespedeza, tall fescue, and German millet. <i>Rough grading</i> is defined as the initial land disturbance that allows building construction to begin at sub finish grade levels.</p> <p>In addition to, or in place of required silt fencing, the builder shall install mulch, straw bales, or compost berms or blankets. Recommended locations for these strategies include steep slopes, locations where silt fences do not hold up, and around storm drains. Redundant mulch is the use of excess mulch in order to provide effective erosion control. Best Management Practices indicate that a combination of strategies appropriate for the site results in more effective control of sediment and minimizes soil erosion.</p>	<p style="text-align: center;">2 3</p> <p style="text-align: center;"><i>Intended to give credit for soil stabilization.</i></p>	<p>DENR Erosion and Sediment Control Plan Planning and Design Manual (Chapt. 6): www.dlr.enr.state.nc.us/images/Sediment_design_manual_June2006/ChapterSix_20060614.PDF</p> <p>Erosion Control for Home Builders fact sheet: http://clean-water.uwex.edu/pubs/pdf/storm.erosio.pdf</p> <p>Compost for Erosion Control: www.carolinacompost.com/USE%20COMPOST/Erosion%20Control.htm</p> <p>Storm Water Technology Fact-sheet: Vegetative Covers www.epa.gov/owm/mtb/vegcvr.pdf</p>	

	Item	Pt	Intent	Resources
3	<p>Stormwater Control (credit available for ALL of the following):</p> <p>Create a permanent stormwater control plan</p> <p>Create a permanent stormwater control system maintenance schedule for homeowner</p> <p>Install permanent rain gardens, bio-retention basins, or infiltration strips to reduce storm water impacts</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party that a control plan and/or maintenance schedule has been created Final Walkthrough</p> <p><u>INFORMATION:</u> <u>Stormwater</u> runoff (rainfall onto impervious surfaces that does not filter into the ground) mixes with pollution such as fertilizer, pesticides, sediment, motor oil, litter, and pet and yard waste. In most cities of North Carolina, stormwater runoff does not go to a treatment plant, but flows directly into streams and rivers.</p> <p><u>Rain gardens</u> are placed between storm water runoff sources (roofs, driveways, parking lots) and runoff destinations (storm drains, streets, streams). A rain garden (referred to as a bio-retention cell in commercial sizes) is a shallow depression in the ground that captures runoff from a driveway or roof and allows it to soak into the ground, rather than running across roads, capturing pollutants, and delivering them to a stream. Plants and soil work together to absorb and filter pollutants and return cleaner water through the ground to nearby streams. Rain gardens reduce flooding by moving water underground rather than into the street; additionally they can provide habitat for beneficial insects and wildlife.</p> <p>Improper maintenance of a storm water control system decreases it's efficiency and can also detract from the aesthetics. Adequate maintenance is defined as good working condition so storm control systems are performing their design functions. A storm water control maintenance schedule often includes the following: (See EPA Stormwater Control Operation & Maintenance in "Resources")</p> <ul style="list-style-type: none"> • Naming a responsible entity for the maintenance (including emergency maintenance) • Detention pond, retention pond, dam, and spill way maintenance. • River, stream, natural pond, and lake protection maintenance. • Gutter and downspout maintenance, including downspout extensions, pipes, and culverts. • Vegetation maintenance, especially ground cover that used for erosion control and slope protection. • Post-storm repairs and animal burrows 	<p>1</p> <p>1</p> <p>3</p>	<p>Intended to give credit for utilizing the landscape to manage and /or filter stormwater.</p> <p>Stormwater Management for Homeowners: www.soil.ncsu.edu/assist/homeassist/stormwater/</p> <p>Backyard Rain Gardens, NC Cooperative Extension: www.bae.ncsu.edu/topic/raingarden/</p> <p>EPA Stormwater Control Operation & Maintenance: www.epa.gov/nps/ordinance/stormwater.htm</p>	
4	<p>Composting -- provide backyard compost bin or designated compost area with enclosure</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Compost has the ability to help regenerate poor soils. The composting process encourages the production of beneficial micro-organisms (mainly bacteria and fungi) which in turn break down organic matter to create humus. Humus--a rich nutrient-filled material--increases the nutrient content in soils and helps soils retain moisture. Compost has also been shown to suppress plant diseases and pests, reduce or eliminate the need for chemical fertilizers, and promote higher yields of agricultural crops. Source: EPA: "Basic Information and Environmental Benefits of Composting" (see "Resources")</p>	<p>1</p>	<p>Intended to give credit for creating a soil amendment through recycling.</p> <p>Basic Information and Environmental Benefits of Composting: www.epa.gov/compost/</p> <p>Composting For Home Gardens: www.ces.ncsu.edu/depts/hort/hil/hil-8100.html</p>	

	Item	Pt	Intent	Resources
<i>Vegetation</i>				
5	<p>Invasive plant species (credit available for ALL of the following):</p> <p>No invasive plant species introduced into the landscape</p> <p>Existing invasive plant species removed from the landscape</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Often times, exotic plants that are not native to a region's environment are not suited to local rainfall conditions, and require more water to remain healthy. In addition, invasive species sometimes crowd out natural vegetation. The NC Native Plant Society invasive plant list is currently the best resource for our state, and was reviewed by most of the conservation organizations of the state. No plants included in the "Rank 1 - Severe Threat" category should be introduced into the landscape. It is highly recommended that all existing "Rank 1 - Severe Threat" species be removed.</p> <p>*Credit for removal of invasives applies as follows: ALL "Rank 1" invasives must be removed from a site/lot that is less than 1/5 acre. For sites/lots that are greater than 1/5 acre, all "Rank 1" invasives within 50' of the structure(s) must be removed. *Source: "Florida Green Home Standard Reference Guide, Version 6," Prerequisite P3.1</p>	2 3	Intended to give credit for increasing the potential of landscape diversity.	A list of invasive plants can be found at: www.ncwildflower.org/invasives/list.htm
6	<p>Nontoxic Pest Control/Integrated Pest Management (IPM)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party that an IPM plan has been provided to the homeowner. Copy of plan available upon request.</p> <p><u>INFORMATION:</u> Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.</p> <p>To properly implement IPM, there are maintenance issues that need to be undertaken by the homeowner after construction, therefore an IPM maintenance plan should be developed and included in a homeowner's manual that is presented to the homeowner.</p> <p><u>Note:</u> IAQ Opportunity 35 gives credit for termite treatments applied to the structure.</p>	2	Intended to give credit for reducing toxic chemicals in the environment.	<p>Basic IPM Principles and Information: http://www.epa.gov/opp00001/factsheets/ipm.htm</p> <p>IPM Information from the NC Cooperative Extension: www.ces.ncsu.edu/depts/hort/consumer/hortintern et/lpm.html</p>

	Item	Pt	Intent	Resources																					
7	<p>Natural features and trees on site protected during construction (credit available for ALL of the following):</p> <p>Fence individual trees at drip line (1 point per tree, max. 5 trees)</p> <p>Protect undisturbed area. For every .25 acre increase in lot size (up to 2.5 acres max.), decrease % for allowable disturbance (see chart in <u>INFORMATION</u>)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector Signature of Responsible Party and inspection by approved HBH inspector</p> <p><u>INFORMATION:</u></p> <table border="1" data-bbox="558 423 1146 691"> <thead> <tr> <th>Acreage</th> <th>% Allowable Disturbance</th> <th>Max. Allowable Disturbance in Acreage</th> </tr> </thead> <tbody> <tr> <td><.25</td> <td>90%</td> <td>0.225</td> </tr> <tr> <td>.25 - < .5</td> <td>70%</td> <td>0.35</td> </tr> <tr> <td>.5 - < .75</td> <td>60%</td> <td>0.45</td> </tr> <tr> <td>.75 - < 1</td> <td>50%</td> <td>0.5</td> </tr> <tr> <td>1 - 2.5</td> <td>25%</td> <td>0.625</td> </tr> <tr> <td>> 2.5</td> <td colspan="2">not eligible for points</td> </tr> </tbody> </table> <p>Protect Undisturbed Area</p> <p>The bulk of a tree's roots are a mat of finely meshed feeder roots located primarily within the top 12 inches of soil, that fan out well beyond the tree's dripline (the outermost edge of the tree canopy). Feeder roots are easily damaged during typical residential construction, and should be protected by fencing. A simple rule of thumb accepted by the American Forestry Association is to allow one foot out in horizontal distance for each inch of the tree's diameter, extending at minimum to the dripline.</p> <p>Natural features include but are not limited to regionally appropriate vegetation, areas important to wildlife habitat, streams, and creek beds. To prevent root damage, do not grade, pile soil, or park vehicles near trees or vegetation marked for preservation. Compacted soil will damage root systems and can ultimately destroy the vegetation. Place plastic mesh or snow fence barriers around the marked vegetation to protect the roots.</p>	Acreage	% Allowable Disturbance	Max. Allowable Disturbance in Acreage	<.25	90%	0.225	.25 - < .5	70%	0.35	.5 - < .75	60%	0.45	.75 - < 1	50%	0.5	1 - 2.5	25%	0.625	> 2.5	not eligible for points		1-5 3	<p>Intended to give credit for protecting existing natural features from damage and for saving specific trees.</p>	<p>National Arbor Day Foundation's Building with Trees program: www.arboday.org</p> <p>Preventing Construction Damage to trees: http://extension.missouri.edu/publications/DisplayPub.aspx?P=G6885</p> <p>Techniques to minimizing site disturbance: http://www.psp.wa.gov/downloads/LID/LID_manual_2005.pdf</p> <p>Find a professional to help inventory your natural features: www.asca-consultants.org/directory/</p>
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1 - 2.5	25%	0.625																							
> 2.5	not eligible for points																								
8	<p>Tree planting (min. 12 trees per acre of developed land)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; provide total acreage of lot, number of trees planted, and average per acre</p> <p><u>INFORMATION:</u> For example, if the house is built on a ½ acre lot, 6 trees must be planted.</p>	3	<p>Intended to give credit for increasing the quantity of trees on developed land.</p>	<p>Information on tree planting, types and care: www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/</p>																					

	Item	Pt	Intent	Resources
9	<p>Tree preservation (credit available for ONE of the following):</p> <p>Develop a tree preservation plan</p> <p>Develop and Implement a tree preservation plan</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating preservation plan visibly posted on job site Inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Identify areas to be preserved and develop a strategy for avoiding mechanical and chemical damage, grade changes, trenching, filling, and compaction. An arborist (sometimes available through the local planning department) can help you decide which trees can be saved and can work with the builder to protect the trees throughout each construction phase. It is important to involve a knowledgeable professional during this planning phase to ensure actual survival of trees. The end result should be a document (written or graphic) that can be physically posted on the job site. The Tree Preservation Plan shall be reviewed with subcontractors and posted on the job site at the beginning of the project.</p>	1 2	Intended to give credit for the preservation of existing trees.	<p>Find a certified Arborist: www.isa-arbor.com/findArborist/findarborist.aspx</p> <p>Create a successful landscape preservation plan: www.extension.umn.edu/info-u/environment/BD443.html</p>
10	<p>80% of stumps and limbs ground for mulch</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> Builder shall grind a minimum of 80% of all tree stumps and limbs for mulch. Use of mulched material on-site is encouraged. It cannot be buried in a landfill.</p>	2	Intended to give credit for reuse of small tree debris removed during construction, either on or off site.	<p>Mulching Tip Sheet: www.nrcs.usda.gov/feature/backyard/Mulching.html</p>
11	<p>80% of cleared logs milled (credit available for ONE of the following):</p> <p>Mill logs offsite</p> <p>Mill, season and use logs onsite</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector Final Walkthrough; Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> A minimum of 80% of logs that meet commercial sawmill standards (minimum diameter of 6") shall be taken to a sawmill for processing into lumber, pulp or other use. Logs cannot be buried in a landfill, burned or chipped.</p>	1 4	Intended to give credit for reuse of large tree debris removed during construction and for using local products.	<p>Tree volume estimation: http://oak.snr.missouri.edu/nr3110/topics/volume.html</p> <p>Find a sawmill: www.woodfinder.com</p>
12	<p>Backyard Wildlife Habitats preserved or created using the National Wildlife Federation certification or equivalent</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party that Backyard Wildlife Habitat meets the requirements indicated by the National Wildlife Federation</p> <p><u>INFORMATION:</u> Habitat restoration is critical for wildlife where commercial and residential development has eliminated most natural areas. Wildlife especially need+B105 help during the cold winter months. Gardening practices that help wildlife, like reducing chemicals and conserving water, also help to improve air, water and soil quality throughout your neighborhood. For habitat restoration ideas and assistance, visit the <i>National Wildlife Federation</i> website.</p>	2	Intended to give credit for preservation or creation of natural areas that can function as habitats for wildlife.	<p>National Wildlife Federation website: http://www.nwf.org/backyard/</p> <p>Backyard Conservation www.nrcs.usda.gov/feature/backyard/</p>

Item	Pt	Intent	Resources
<i>Development/Transportation</i>			
<p>13 Site selection (credit available for ALL of the following):</p> <p><i>Do not build within 100 ft. of any water body (including wetlands)</i></p> <p><i>Do not build at or below the 100 year floodplain elevation (as defined by FEMA)</i></p> <p>DOCUMENTATION: Signature of Responsible Party Copy of FEMA Flood map showing location of property</p> <p>INFORMATION: Under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." (from U.S. EPA, Code of Federal Regulations).</p> <p>FEMA Flood maps indicating 100 year floodplain elevations are available online at the FEMA Map Service Center (see "Resources").</p>	<p>2</p> <p>2</p>	<p><i>Intended to give credit for avoiding development on environmentally sensitive sites.</i></p>	<p>More information on the benefits of wetlands can be found here: www.epa.gov/owow/wetlands/</p> <p>FEMA Map Service Center: http://www.msc.fema.gov/webapp/wcs/stores/serve/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1</p>
<p>14 Home located close to business district with 90% sidewalk access (credit available for ONE of the following):</p> <p><i>Home within 1 mile of 3 businesses</i></p> <p><i>Home within 1 mile of 5 businesses</i></p> <p>DOCUMENTATION: Final Walkthrough</p> <p>INFORMATION: A continuous sidewalk will connect the home to a business district located no more than 1 mile from the home. Walkable communities encourage sustainability of resources (both natural and economic) in urban environments as well as curb urban sprawl. Examples of businesses include banks, convenience stores, supermarkets, daycare centers, pharmacies, etc.</p>	<p>3</p> <p>5</p>	<p><i>Intended to give credit for connecting a house to amenities to encourage walkable communities and the reduction of transportation.</i></p>	<p>Designing Walkable Communities: www.walkable.org</p> <p>The Practice of Low Impact Development: www.huduser.org/publications/destech/lowImpactDev.html</p>
<p>15 Alternative transportation access to business district -- Min. 3 businesses (credit available for ONE of the following):</p> <p><i>Bicycle access within 2 miles of business district</i></p> <p><i>Greenway access within 2 miles of business district</i></p> <p><i>Bus access within 1/2 mile of home (bus scheduled for more than 9 transit rides per weekday)</i></p> <p>DOCUMENTATION: Final Walkthrough</p> <p>INFORMATION: Examples of businesses include banks, convenience stores, supermarkets, daycare centers, pharmacies, etc. Bicycle access includes walk/bike paths, designated bike lanes, or roads with paved shoulders.</p>	<p>1</p> <p>2</p> <p>2</p>	<p><i>Intended to give credit for connecting a house to amenities to encourage walkable communities and the reduction of transportation.</i></p>	<p>The Practice of Low Impact Development: www.huduser.org/publications/destech/lowImpactDev.html</p>

	Item	Pt	Intent	Resources
16	<p>Compact Development (credit available for ONE of the following):</p> <p>Build on site within 1/2 mile of existing water and sewer infrastructure</p> <p>Build on infill site</p> <p>Build home on 1/10-acre (max.); or build in development with density of 10 or more homes per acre</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; other information on request</p> <p><u>INFORMATION:</u> New development can have a large environmental impact. Building on vacant infill sites or adjacent to existing communities minimizes environmental impact, because it prevents further loss of habitat and farmland. Compact or high density development uses land more efficiently, and preserves environmentally sensitive land. It also enables greater use of mass transit, and encourages walkable communities. Source: "LEED for Homes Reference Guide, 2008," Item LL2 (see "Resources"). For purposes of this credit item, an infill site is located on a street where the majority of homes on adjacent sites are seven or more years old. Credit for this item cannot be taken if an existing home is demolished.</p>	1 2 4	Intended to give credit for building practices which conserve land and encourage walkable communities.	<p>Urban Land Institute: www.washington.uli.org</p> <p>Smart Growth Network: www.smartgrowth.org</p> <p>LEED for Homes Reference Guide: www.usgbc.org/Store/PublicationsList.aspx?CMSPageID=1518</p>
17	<p>B20 blend bio-diesel used for diesel fueled construction equipment (credit available for ALL of the following):</p> <p>Use B20 for 90% of diesel fueled equipment used during land clearing phase</p> <p>Use B20 for 90% of diesel fueled equipment used during construction phase</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party and name of fuel provider</p> <p><u>INFORMATION:</u> B20 blend Biodiesel can be used directly in any diesel vehicle, no vehicle modification is needed. Using biodiesel in place of petroleum diesel provides a significant reduction in harmful emissions such as CO, CO2, Air Toxins, and Particulates. The contractor may propose to use additional fuels at the beginning of a project, based on their environmental qualities.</p>	2 2	Intended to give credit for using an alternative fuel in construction equipment.	<p>Alternative Fuel providers: http://www.trianglecleanities.org/cgi-bin/fuelcsvs.plx</p> <p>Retail fueling sites in NC: www.biodiesel.org/buyingbiodiesel/retailfuelingsites/default.shtm</p> <p>Biodiesel/alternative fuels technical info: www.biofuels.coop/ www.ncsc.ncsu.edu/</p>
18	<p>Compressed Natural Gas (CNG) Residential Pump Installed</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Natural Gas is an abundant fuel source found in most parts of the world. While Natural Gas is considered a fossil fuel, methane (or biogas) can be made from agricultural waste, human waste, and garbage. Traditional motor vehicles are a large source of air pollutants and produce more than 60% of all carbon monoxide pollution. Natural Gas contains less carbon than any other fossil fuel and thus reduces exhaust emissions when used as a substitute for other fossil fuels. For indoor installation (e.g., in the garage) a methane detector must be installed.</p>	2	Intended to give credit for accommodating vehicle refueling that is less harmful to the environment.	<p>Sample gas & electric feed specifications for a home garage CNG compressor: www.cityofchino.org/civica/filebank/blobdload.asp?BlobID=3611</p> <p>Manufacturers Web site: www.myphill.com/index.htm</p>

Item	Pt	Intent	Resources
<i>Innovation Points</i>			
<p>19 Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Water Opportunities (Minimum Points: 9)

[Back](#)

Item	Pt	Intent	Resources
<i>Outdoor</i>			
<p>1 Drought resistant planting (credit available for ONE of the following):</p> <p style="padding-left: 20px;"><i>Provide a site specific drought resistant planting plan for homeowner / buyer</i></p> <hr/> <p style="padding-left: 20px;"><i>Install drought resistant landscape in disturbed, non-paved area</i> (credit available for ONE of the following):</p> <p style="padding-left: 40px;"><i>50% of non-paved area</i></p> <hr/> <p style="padding-left: 40px;"><i>100% of non-paved area (no irrigation system installed)</i></p> <p><u>DOCUMENTATION:</u> Copy of plan Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> Drought resistant planting, sometimes referred to as Xeriscaping in more arid regions, focuses on how the landscape as a whole can work to conserve and efficiently manage water. Several characteristics of a drought resistant plan include the designed use of shade to cool the landscape, use of native and drought tolerant species to reduce water demand, and zoning of plants with similar water needs for effective water management.</p> <p>The <i>drought resistant planting plan</i> should be a complete landscape plan of the actual building site, designed to conserve water use, identifying the species of plants and turf installed. If minimal landscaping is installed, points will be awarded for providing an example of a drought resistant planting plan, identifying specific plants and turf that could potentially be installed in addition to the existing landscaping on the site. It is highly recommended that the plans be developed by a landscape architect, horticulturist, or other landscape professional, but this is not required.</p> <p>As water use increases during the Spring and Summer months, drought resistant planting is key to conserving water resources. Landscaping with native trees, shrubs, and ground covers will help conserve water as they are already suited to survive the specific climate. Turf is generally the largest consumer of water in the landscape. A drought tolerant type of turf grass should be used in sunny areas of the landscape and no turf should be planted in densely shady areas.</p> <p>For information on native and drought tolerant plants in your area, contact your local County Cooperative Extension Office.</p>	<p>2</p> <hr/> <p>3</p> <hr/> <p>6</p> <p style="text-align: center;"><i>Intended to give credit for supporting landscape practices that reduce water use.</i></p>	<p>How to Plan & Design a Wise-Water-Use Landscape, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_2.html</p> <p>Xeriscaping, NC Division of Water Resources: www.ncwater.org/Water_Supply_Planning/Water_Conservation/xeriscaping.php</p> <p>Native plant species, NC Botanical Gardens: http://ncbg.unc.edu/</p> <p>Organic Lawn Care: www.turffiles.ncsu.edu/PDFFiles/004494/Organic_Lawn_Care_AG562.pdf</p> <p>The National Turfgrass Evaluation Program (NTEP): www.ntep.org</p> <p>Local Cooperative Extension Offices by county: www.ces.ncsu.edu/</p>	
<p>2 Drought resistant soil -- apply mulch 3 - 4 inches deep around plants</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> To minimize the impact of drought, soil needs to capture the rainwater that falls on it, store as much of that water as possible for future plant use, and allow for plant roots to penetrate and proliferate. These conditions can be achieved through management of organic matter, which can increase water storage by 16,000 gallons per acre foot for each 1% organic matter. Organic matter also increases the soil's ability to take in water during rainfall events, assuring that more water will be stored. Ground cover also increases the water infiltration rate while lowering soil water evaporation. When all these factors are taken together the severity of drought and the need for irrigation are greatly reduced.</p>	<p>2</p> <p style="text-align: center;"><i>Intended to give credit for enhancing the drought resistance of the landscape.</i></p>	<p>Horticulture Information Leaflet 608 - Mulch: www.ces.ncsu.edu/depts/hort/hil/pdf/hil-608.pdf</p>	

	Item	Pt	Intent	Resources
3	<p>Permeable materials used for hardscapes (credit available for ALL of the following):</p> <p>Use permeable materials for 50% of walkways and patios</p> <p>Use permeable materials for 90% of driveways (see <u>Note</u> in INFORMATION)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u></p> <p>Permeable materials act as a storage reservoir for run-off, offering improved filtration, and recharging of groundwater as well as reducing the runoff of pollutants such as oil, grease, hydrocarbons, and nutrients</p> <p>At least 50% of <u>walkways</u> and <u>patios</u> shall allow for infiltration of water. Brick, block, and concrete/stone pavers reduce the percentage of a site's impervious surface area as well as the demand for conventional storm water management facilities. It is important to note that all pavers which are intended to receive this credit should be loose laid (no grout, cement or concrete between joints) and be placed on a drainable subsurface material such as stone or sand.</p> <p><u>Driveways</u> shall have a pavement system that allows for infiltration of water. Water-pervious materials include but are not limited to pervious concrete, pervious asphalt, gravel, crushed stone, open paving blocks or pervious paving blocks. A pervious paving material that can use the most porous sub base appropriate for the soil type is recommended. Builders should take precautions to prevent concentrated compaction of the soil and the introduction of sediment into the pore spaces during and after the installation process.</p> <p><u>Note:</u> the percentages above pertains only to the portion of the driveway under control of the builder.</p>	2 4	Intended to give credit for allowing water infiltration through landscape surfaces that would normally not absorb water.	<p>Best management practices for materials: www.bae.ncsu.edu/stormwater/PublicationFiles/BMPs4LID.pdf</p> <p>Examples of pervious paving in NC (search keyword "pervious paving"): www.ncgreenbuilding.org/site/ncg/public/search.cfm</p> <p>Pervious Paving Materials, Sourcebook for Green and Sustainable Building: www.greenbuilder.com/sourcebook/PerviousMaterials.html</p> <p>List of permeable paving and surfacing products: http://oikos.com/green_products/menu.php?sub_div=Paving%20and%20Surfacing</p>
4	<p>Vegetated roof system to reduce impervious surface (credit available for ONE of the following):</p> <p>25% of roof is vegetated roof system</p> <p>50% of roof is vegetated roof system</p> <p>75% of roof is vegetated roof system</p> <p>100% of roof is vegetated roof system</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u></p> <p>The benefits of a vegetative roof system include roof membrane protection, potential savings on heating and cooling costs, acoustic insulation from noise pollution, stormwater management, and aesthetic appeal, potentially increasing property value. Vegetative roof systems can be extensive (requiring little to no maintenance with vegetation 2-3 inches high) or intensive (light to heavier weight soil with plants 3-15 feet high, with maintenance required).</p> <p>The slope, structural loading capacity, roof materials, drainage systems, waterproofing, electrical and water supplies, maintenance expectations, as well as sun and wind exposure to the roof should all be considered when developing a design. <i>These points apply to the house and garage only.</i></p>	2 4 6 8	Intended to give credit for allowing water infiltration through roof surfaces that would normally not absorb water.	<p>Green Roof Research, NCSU www.bae.ncsu.edu/greenroofs/</p> <p>Green Roofs for Healthy Cities: www.greenroofs.net/</p>

Item	Pt	Intent	Resources
<i>Irrigation reduction strategies / Site water management</i>			
<p>5 Rainwater harvested and directed toward landscaping needs (credit available for ONE of the following):</p> <p>Install a system of gutters along with a simple collection system such as a rain-barrel</p> <p>Install a system capable of collecting and storing runoff from a 3/4 inch rainfall event using at least 50% of the roof area</p> <p>Install a system capable of collecting and storing runoff from a 3/4 inch rainfall event using at least 90% of the roof area</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> As a general rule of thumb, for every inch of rainfall, approximately 0.62 gallons of water per square foot of collection surface can be collected (3/4 inch of rain on 1000 square feet of roof area equals about 468 gallons of water).</p> <p>Rainwater is generally harvested from a roof surface, and system components include properly designed gutters, piping, roof washers, screens, and a storage tank/cistern. Grounds should be graded to capture and distribute water from rainfall to the landscape in a controlled manner. System capacities can range from thousands of gallons with pumping to trashcan-sized rain barrels with faucets.</p>	<p>2</p> <p>3</p> <p>4</p> <p>Intended to give credit for collection, direction and reuse of stormwater from roof surfaces.</p>	<p>Rainwater Harvesting Systems and info, Town of Cary: www.townofcary.org/depts/pwdept/water/waterconservation/rainbarrels.htm</p> <p>Rainwater system design and sizing information: http://ag.arizona.edu/pubs/water/az1052/</p> <p>Rainwater System Pictures: www.bae.ncsu.edu/stormwater/downloads.htm</p>	
<p>6 Irrigation system conserves water (credit available for ALL of the following):</p> <p>Irrigation system is zoned separately for turf and bedding areas</p> <p>Irrigation system includes a soil moisture or rain sensor, or other irrigation efficiency device</p> <p><u>DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party indicating system will be demonstrated to owner</p> <p><u>INFORMATION:</u> Irrigation system must utilize approved techniques, such as a multiple program controller, that can divide the landscape into zones and operate the different zones for different and appropriate lengths of time. Therefore, lawns that require a large amount of water from sprayers or rotors can be separated from more drought tolerant plants that require little or no water, resulting in efficient water use and care of plants.</p> <p>Installed devices should, at minimum, automatically turn off the irrigation system if it is operating during a rain event. Additional management features, such as sensors that operate at times when more water will be used by the plant, are encouraged but not required. Systems should be installed and checked for proper installation by a qualified technician.</p>	<p>2</p> <p>2</p> <p>Intended to give credit for an irrigation system that reduces water use.</p>	<p>Efficient Irrigation Systems, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_6.html</p> <p>Irrigation Controllers - Recommended Water Saving Features: www.epa.gov/owm/water-efficiency/docs/irrigation508.pdf</p>	

	Item	Pt	Intent	Resources
7	<p>Irrigation system uses non-potable water (credit available for ONE of the following):</p> <p>Reclaimed water used for irrigation (where available) -- See <u>Note</u></p> <p>Greywater irrigation system installed where allowed by code</p> <p><u>DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party indicating system will be demonstrated to owner</p> <p><u>INFORMATION:</u> <u>Note:</u> The use of a <i>greywater</i> irrigation system shall be approved by the local building and/or health department(s), and at a minimum shall have a dedicated clothes washer box with 2-inch drain connected to a subterranean drain field. A separate clothes washer box shall be provided that connects to the sanitary drain system as a backup system.</p> <p>*Reclaimed water is wastewater that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility. Reclaimed water is not potable, but is made available by municipalities and wastewater utilities for purposes such as irrigation and toilet flushing. Although infrastructure costs can be high to arrange for reclaimed water service, once available the actual cost for the water is relatively inexpensive. Reuse of reclaimed water provides a useful method for treatment facilities to dispose of their treated wastewater.</p> <p>*Source: "Florida Green Home Standard Reference Guide, Version 6," Item W4</p> <p>Greywater is generally defined as domestic wastewater from any source except toilets and the kitchen sink. 60% of the outflow water produced in homes is greywater, which contains no pathogens and thus does not require the same treatment as blackwater (water from toilets). By designing plumbing systems that separate greywater from blackwater, greywater can be recycled for irrigation, toilets, and exterior washing, resulting in water conservation. When using greywater for edible plant irrigation, care should be taken to have the water tested to identify any chemicals that could be passed along through the plant if eaten.</p>	2 5	Intended to give credit for reusing non-potable water for irrigation.	<p>PATH link: www.toolbase.org/Technology-Inventory/Sitework/greywater-reuse</p> <p>Wastewater rules and regulations, NC Division of Water Quality http://h2o.enr.state.nc.us/wastewater.html</p> <p>Information on Involving the Public in Reuse Planning can be found in this EPA publication: www.epa.gov/ord/NRMRL/pubs/625r04108/625r04108.htm</p> <p>FGBC Source: www.floridagreenbuilding.org/db/standards/homes/HomeV6RefGuide.pdf</p>
<i>Indoor</i>				
8	<p>Kitchen faucet fitted with aerator restricting flow to 2.2 gpm</p> <p><u>DOCUMENTATION:</u> Cut sheet or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> Faucet aerators reduce the flow emitted by a faucet fixture, while also increasing flow velocity by injecting air into the water stream. The flow rate is typically written on the outside edge of the of the faucet cover where the water exits.</p> <p><u>Note:</u> the same model can have different fittings emitting different flow rates.</p>	1	Intended to give credit for conserving the use of domestic water.	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p>

	Item	Pt	Intent	Resources
9	<p>Lavatory faucets (ALL) are EPA WaterSense labeled, restricting flow to 1.5 gpm or less (credit available for ONE of the following):</p> <p>1.5 gpm flow rate</p> <p><1.5 gpm flow rate</p> <p><u>DOCUMENTATION:</u> Cut sheet or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> Faucet aerators reduce the flow emitted by a faucet fixture, while also increasing flow velocity by injecting air into the water stream. The flow rate is typically written on the outside edge of the of the faucet cover where the water exits. Note: Lavatory is the terminology used in the Energy Policy Act of 1992 and ASME A112.18.1 to describe the types of faucets to which the standards apply. In this specification, lavatory means any bathroom sink faucets intended for private use (see "Resources").</p>	1 2	Intended to give credit for conserving the use of domestic water.	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p> <p>WaterSense® High-Efficiency Lavatory Faucet Specification: www.epa.gov/watersense/docs/faucet_suppstat_final508.pdf</p>
10	<p>Non-lavatory faucets (ALL) restrict flow to 1.5 gpm or less (credit available for ONE of the following):</p> <p>1.5 gpm flow rate</p> <p><1.5 gpm flow rate</p> <p><u>DOCUMENTATION:</u> Cut sheet or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> Faucet aerators reduce the flow emitted by a faucet fixture, while also increasing flow velocity by injecting air into the water stream. The flow rate is typically written on the outside edge of the of the faucet cover where the water exits.</p>	1 2	Intended to give credit for conserving the use of domestic water.	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p>
11	<p>Showerheads (ALL) restrict flow to 2.25 gpm or less -- no credit given for shower stalls with multiple heads (credit available for ONE of the following):</p> <p>2.25 gpm flow rate</p> <p>1.75 gpm flow rate</p> <p><u>DOCUMENTATION:</u> Cut sheet or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> All showerheads in the home must be rated as having a 2.25 gal/min flow or less. Present types of high efficiency shower heads use one to two gallons per minute if the user controls the water pressure to the shower head, and about two to three gallons per minute with full-flow valves. Water usage while showering can be reduced by at least half by switching to installing high efficiency showerheads.</p>	1 2	Intended to give credit for conserving the use of domestic water.	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p>

Item	Pt	Intent	Resources
<p>12 High efficiency toilets (max. 4 points)</p> <p>Toilets are EPA WaterSense labeled (1 point per toilet, max. 2 points)</p> <p>Toilets are dual flush: 1.6/0.8 - 1.1 gpf (2 points per toilet, max. 4 points)</p> <p><u>DOCUMENTATION:</u> Cut sheet or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> Toilets installed in a home must be high efficiency toilets. WaterSense toilets use a maximum of 1.45 gallons per flush (gpf). Dual flush toilets use 1.6/0.8-1.1 gpf. High Efficiency Toilets use a minimum of 20% less water than standard 1.6 gpf toilets. Dual Flush Toilets save water by offering a separate, low water use flush setting for liquids (between .8-1.1 gpf) in addition to the standard 1.6 gpf for solids. Toilets represent the largest source of indoor water use in the home, accounting for up to 30%-40% of water demand.</p>	<p>1-2</p> <p>2-4</p>	<p>Intended to give credit for conserving the use of domestic water.</p>	<p>EPA WaterSense Web site: http://epa.gov/owm/water-efficiency/index.htm</p>
<p>13 Toilets with UNAR MaP rating -- 350 grams per flush (1 pt. per toilet, max. 2 pts.)</p> <p><u>DOCUMENTATION:</u> Cut sheet or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> MaP (Maximum Performance) Testing of toilets was developed to identify how well popular toilet models perform bulk removal using a realistic test media, and to grade each toilet model based on this performance. Test results for specific Models can be found at the Alliance For Water Efficiency. UNAR stands for the Unified North American Requirements for Toilet Fixtures.</p>	<p>1-2</p>	<p>Intended to give credit for using toilets that eliminate multiple flushing.</p>	<p>Maximum Performance Testing of Popular Models: www.allianceforwaterefficiency.org/MaP-main.aspx</p>
<p>14 Clothes washer is an ENERGY STAR labeled product</p> <p><u>DOCUMENTATION:</u> ENERGY STAR label or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> ENERGY STAR washers use nearly 50% less water and 30%-40% less energy per load. The washer design also causes less wear and tear on clothes. In addition, better water extraction means less drying time, which yields further energy savings. Both top-loading and front-loading ENERGY STAR labeled clothes washers are available.</p>	<p>2</p>	<p>Intended to give credit for conserving the use of domestic water and reducing energy use.</p>	<p>ENERGY STAR appliances: www.energystar.gov/index.cfm?c=appliances.pr_appliances</p> <p>Energy Efficient Appliances Consumer Guide: www.aceee.org/consumerguide/index.htm</p>
<p>15 Dishwasher is ENERGY STAR labeled, or meets or exceeds ENERGY STAR criteria</p> <p><u>DOCUMENTATION:</u> ENERGY STAR label or make & model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u> ENERGY STAR dishwashers save by using both improved technology for the primary wash cycle, and by using less hot water to clean. These appliances include energy efficient motors and other advanced technologies such as sensors that determine the length of the washing cycle and the temperature of the water necessary to clean the dishes. ENERGY STAR® dishwashers also minimize water use, saving the energy required to heat it. ENERGY STAR® dishwashers must exceed minimum federal standards by at least 13% to be considered ENERGY STAR®.</p>	<p>2</p>	<p>Intended to give credit for conserving the use of domestic water and reducing energy use.</p>	<p>ENERGY STAR appliances: www.energystar.gov/index.cfm?c=appliances.pr_appliances</p> <p>Energy Efficient Appliances Consumer Guide: www.aceee.org/consumerguide/index.htm</p>

Item	Pt	Intent	Resources
<p>16 Water filtration system installed (credit available for ONE of the following):</p> <p>Point-of-use system (1 point per system, 2 points max.)</p> <p>Whole house system installed (NSF certified; passive technology)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> A 2003 study by the Natural Resources Defense Council found that pollution and deteriorating, out-of-date plumbing are sometimes delivering drinking water that might pose health risks to some residents. Household water filter systems can be used to address the specific contaminants that may be present in tap water. Water Quality testing should be performed to determine the system that is most appropriate for a home. County Cooperative Extension Offices can provide you with a list of certified water quality laboratories in North Carolina.</p> <p>Point-of-use water filter systems treat water as it reaches a specific faucet, as opposed to whole house filter systems. As a general rule, look for filters labeled as meeting NSF/ANSI standard 53. Under sink filters, often installed in the kitchen and drinking water areas, can be effective in filtering many pollutants of concern and can be less expensive than a whole house filter system. Another example of a point-of-use system is a showerhead filter.</p> <p>Whole house water filter systems filter water before it is distributed throughout the home and have a capacity for significantly higher flow rates than point-of-use systems. They are an ideal choice for homes affected by heavy sediment problems. A whole house system will prevent contaminant build up from damaging water heaters and soiling laundry or dishes in addition to creating clean drinking water. If it is suspected that the home's plumbing system may be contributing contaminants to the water supply, consider point-of-use filtration/purification.</p> <p>NSF International is a not-for-profit organization that develops standards and certifies products which focus on public health and safety.</p>	<p>1-2</p> <p>4</p>	<p><i>Intended to give credit for cleaning potable water and increasing the durability of appliances.</i></p>	<p>Consumers guide to water filters: www.nrdc.org/water/drinking/gfilters.asp</p> <p>NC Clean Water Lead Testing site: www.leadtesting.org/</p> <p>Guidelines to test your home water quality: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag473_2.html</p> <p><i>Selecting a household water treatment system:</i> www.nsf.org/consumer/drinking_water/selecting_DWTU.asp?program=WaterTre</p>
<i>Innovation Points</i>			
<p>17 Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	<p>1-7</p>	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Building Envelope (Minimum Points: 14)

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	Item	Pt	Intent	Resources
1	<p>Home HERS Index \leq 82 (1 to 42 points)</p> <p><u>DOCUMENTATION:</u> Dated report documenting analysis results based on actual finished construction conditions provided by the certified HERS rater who performed the test</p> <p><u>INFORMATION:</u> Note: 1 credit point is awarded for every 2 HERS points decrease in the HERS Index, beginning with 1 credit point for a HERS Index of 82.</p> <p>The HERS Index provides a scale of energy use relative to an IECC (International Energy Conservation Code) baseline home, which has a HERS Index of 100. To encourage increased levels of energy efficiency, this opportunity awards points for homes that are at least 18% more efficient than the IECC baseline.</p> <p>1 credit point is awarded for every 2 HERS points that the home scores below 84 on the HERS Index. For example, a home with a HERS Index of 55 indicates that the home has an efficiency of 45% greater than the baseline home. This example HERS Index of 55 is 27 points below the threshold for this item (HERS 82) and would therefore be awarded 13 points. Efficiency must be verified / documented by a certified HERS rater.</p>	enter pts	Intended to give credit for energy efficiency above and beyond the prerequisite requirements.	<p>List of Certified raters at Residential Energy Services Network: www.natresnet.org</p>
2	<p>Energy Bill Guarantee program: Examples include, but are not limited to System Vision and Environments for Living</p> <p><u>DOCUMENTATION:</u> Form provided by Energy Bill Guarantee Program identifying that the house is enrolled in the program</p> <p><u>INFORMATION:</u> Energy bill guarantee programs allow the builder to guarantee to the homeowner that the home will perform with the energy efficiency and comfort level for which it has been certified within a specific cost range. Most programs will guarantee that the energy used to heat and cool the home will not exceed a specified amount and that the temperature in the center of any conditioned room will not vary more than three degrees from the thermostat setting. If for any reason the home does not perform as specified, the guarantee program will correct the issue at no cost to the homeowner and/or reimburse the homeowner for energy costs that exceed the guaranteed amount.</p>	4	Intended to give credit for using a program that insures energy savings.	<p>Advanced Energy's SystemVision™ Guarantee: www.advancedenergy.org/buildings</p> <p>Masco's Environments for Living guarantee program: www.environmentsforliving.com/index.jsp?action=hb_guarantee</p>
3	<p>Blower door test performed with following minimum standards met: (credit available for ONE of the following :</p> <p>Minimum standard of 0.25 CFM50/sf of surface area or 2.5 ACH/50Pa</p> <p>Minimum standard of 0.15 CFM50/sf of surface area or 1.5 ACH/50Pa</p> <p><u>DOCUMENTATION:</u> Dated blower door test report documenting analysis results based on actual finished construction conditions provided by the certified HERS rater who performed the test</p> <p><u>INFORMATION:</u> Air leakage can increase heating and cooling costs over 30% and contribute to comfort, health and safety problems. Finding hidden air leakage sites, called bypasses, can be difficult without the use of a blower door. This diagnostic equipment uses a fan to pressurize (force air into) or de-pressurize (force air out of) a building and allows the buildings leakage to be measured in terms of air leakage per cubic feet per minute (CFM).</p>	3 5	Intended to give credit for exceeding the Prerequisite 4 requirement for providing energy efficiency and comfort.	<p>NC ENERGY STAR, Locate HERS raters: www.ncenergystar.org/professionals/index.php?type=Home%20Energy%20Rater%20Service%20(HERS)</p> <p>Building America Technical Resources: www.eere.energy.gov/buildings/building_america</p> <p>Diagrams of air sealing techniques in the Builder's Guide to Mixed Humid or Hot Humid Climates available from: www.eeba.org</p>

Item	Pt	Intent	Resources
<i>Insulation and Framing</i>			
<p>4 Slab Insulation: Horizontal (credit available for ONE of the following):</p> <p>Provide rigid insulation under slab edge (min. 2 ft.) for the entire slab perimeter: NC climate <u>zone 3</u> - min. R5; <u>zone 4</u> - min. R8; <u>zone 5</u> - min. R13</p> <p>Provide rigid insulation under entire slab: NC climate <u>zone 3</u> - min. R5; <u>zone 4</u> - min. R8; <u>zone 5</u> - min. R13</p> <p>DOCUMENTATION: Signature of Responsible Party or inspection by approved HBH inspector; Photo encouraged.</p> <p>INFORMATION: <u>Note:</u> Insulation of most slab-on-grade floors is required by the NC Energy Code (402.2.7). Slabs lose energy primarily as a result of heat conducted outward and through the perimeter of the slab. Insulating the edge of the slab can reduce winter heating bills by up to 10-20%. Slab insulation will not only save energy, but also improve comfort.</p> <p>If the entire slab is insulated, the room above it will respond more quickly to changes in thermostat settings since the heat source doesn't have to heat the slab as well as the space. Insulating under the entire slab is especially important if the home is located on a high water table, where groundwater can carry away heat from the floor. It is also a must for heated slabs, ensuring that the heat flows only towards the space to be heated.</p>	<p>1</p> <p>2</p>	<p>Intended to give credit for creating a thermal barrier at the foundation.</p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p> <p>A NC CLIMATE ZONE LIST is provided at the end of this Building Envelope Section</p>
<p>5 Slab/foundation insulation: Vertical (credit available for ONE of the following):</p> <p>Rigid insulation installed vertically at slab edge (2 foot Minimum) NC climate <u>zone 3</u> - min. R5 (Heated slabs - Minimum R8) NC climate <u>zone 4</u> - min. R8; <u>zone 5</u> - min. R13</p> <p>Rigid exterior insulation installed on concrete or masonry basement walls (continuous floor to ceiling - see <u>Notes</u>) NC climate <u>zone 3</u> - min. R5 NC climate <u>zone 4</u> and <u>zone 5</u> - min. R13</p> <p>DOCUMENTATION: Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: <u>Notes:</u> 1. Credit is given for cavity insulation if R value is equal to or greater than R19. 2. Insulation of basement walls is required by the NC Energy Code (402.2.6). Basement walls are covered on the exterior from floor level to ceiling. It is advisable to insulate to the top of the wall footing. Care should be taken that a thermal discontinuity is not created at the top or bottom of the wall.</p> <p>Foundation walls are covered on the exterior with permanent insulation from the top of the wall to the footing. Several product-types are appropriate for this application, with extruded polystyrene (XPS) and polyisocyanurate being two of the more common. EPS or "bead board" should not be used in exterior applications. One of the challenges with this application is protecting the section of insulation that is above-grade from UV degradation. Several products exist to suit this purpose, from self-adhering membranes to lengths of fiber-cement board. *Built Green Colorado checklist</p>	<p>1</p> <p>1</p> <p>2</p> <p>2</p>	<p>Intended to give credit for creating a thermal barrier at the foundation.</p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p> <p>A NC CLIMATE ZONE LIST is provided at the end of this Building Envelope Section</p>

6	Item	Pt	Intent	Resources
	<p>Framed floor over unconditioned space insulated (credit available for ONE of the following):</p> <p>R22 or greater insulation in <u>continuous</u> contact with subfloor (R30 is required in climate zone 5; where Building Code exception allows R19, points available for R22)</p> <p>R22 or greater insulation in <u>continuous</u> contact with air barrier on <u>all 6 sides</u> (R30 is required in climate zone 5; where Building Code exception allows R19, points available for R22)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough where visible Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> <u>Note:</u> Permanent contact of the insulation under subfloor decking is required by the NC Energy Code (402.2.5).</p> <p>Framed floors over unconditioned space shall have continuous R22, or greater, insulation. Batt insulation shall be in direct and continuous contact with the subfloor and supported at least every 18 inches. Spray Foam insulation, when installed to meet the local building code requirements, creates an air barrier as well as a thermal barrier and meets this requirement.</p>	1 3	Intended to give credit for increasing the thermal barrier between conditioned and unconditioned space above NC Code requirements.	A NC CLIMATE ZONE LIST is provided at the end of this Building Envelope Section
	<p>Closed crawl space as per NC Building Code (credit available for ONE of the following):</p> <p>Insulated floor or walls</p> <p>Insulated walls; conditioned as per Sec. R409.5 of the NC Residential Code</p> <p><u>DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party indicating compliance with accepted sealed crawlspace recommendations (www.crawlspace.org) or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Closed crawl spaces have been proven to reduce energy consumption and provide better moisture management, which improves building durability and indoor environmental quality. Review plans with local building officials to ensure code compliance.</p>	3 4	Intended to give credit for creating a closed, dry, and insulated crawl space.	For additional updated information: www.crawlspace.org
	<p>Framing Efficiency Package for wood stud construction with at least 3 of the following components (requires a framing inspection by a third party)</p> <ol style="list-style-type: none"> 1. Insulated headers, minimum R-10 2. 2-stud corner with drywall clips or alternate framing detail using 2 studs 3. Insulated framing corners 4. Insulated T-walls with drywall clips or alternative framing detail 5. Window rough openings eliminate jack stud 6. Non-structural headers in exterior non-load bearing walls 7. Non-load bearing exterior wall studs @ 24 in. centers 8. Single top plate with stacked (in-line) framing 9. Reduced framing, interior partitions (24 in. O.C. studs at interior non-bearing walls) 	3	Intended to give credit for using framing techniques that reduce solid wood use and increase the thermal barrier continuity.	For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america Diagrams of Efficient Framing in the Builder's Guide to Mixed Humid or Hot Humid Climates available from: www.eeba.org

Item	Pt	Intent	Resources
<p><u>DOCUMENTATION:</u> Inspection by approved HBH inspector</p> <p><u>INFORMATION:</u></p> <p>1. Insulated headers, minimum R-10. Exterior walls with headers (over window and door openings) shall be framed to achieve an R-10 value at the header location between and including interior and exterior sheathing (air barrier). Some examples include boxed headers with insulation batts or structural insulated panel headers. An example of an acceptable R-10 header in a 2x4 framed wall would include the following:</p> <ul style="list-style-type: none"> - 5/8" rigid foam exterior sheathing as an air barrier - 1/2" rigid foam inside two 2x members as the header - 1/2" drywall on the interior as an air barrier. <p>2. 2-stud corner with drywall clips or alternate framing detail using 2 studs. Corner framing shall eliminate non-structural studs and allow for full corner insulation through the use of drywall clips, horizontal nailers, or other means to support drywall.</p> <p>3. Insulated framing corners. The intersecting corner of two outside walls shall be framed so that insulation is continuous in the external wall (corners with unnecessary 2x4's are not permitted). A "California corner" is a method of achieving this.</p> <p>4. Insulated T-walls with drywall clips or alternative framing detail. The intersection of exterior and interior walls shall eliminate non-structural studs and allow for increased exterior wall insulation area and coverage through the use of drywall clips or other alternative techniques. An example of this type of</p> <p>6. Non-structural headers in exterior non-load bearing walls. Non-load bearing walls shall not have structural window and door headers.</p> <p>7. Non-load bearing wall studs @ 24-in. centers. All non-load bearing exterior walls shall be framed with wood stud walls at 24 in. on center to allow for increased insulation area and coverage.</p> <p>8. Single top plate with stacked (in-line) framing; 24" centers. Center of roof rafters and ceiling joists or trusses shall align within 1 inch of exterior wall studs such that a single top plate can transfer loads to the wall framing increase insulation coverage. May require review by Structural engineer, architect or other design professional, particularly in complex designs. All non-load bearing exterior walls shall be framed with wood stud walls at 24 in. on center to allow for increased insulation area and coverage.</p> <p>9. Reduced framing, interior partitions (24. O.C. studs at interior non-bearing walls). All non-load bearing interior walls shall be framed with wood stud walls at 24 in. on center.</p>			
<p>9 Exterior wall stud cavities insulated to R19 or higher (R21 in climate zone 5)</p> <p><u>DOCUMENTATION:</u> Inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Insulation between stud cavities in exterior walls shall be R19 or greater, and R21 in NC climate zone 5. Insulation shall be installed according to manufacturer's specifications and provide complete coverage and full contact with the air barrier.</p>	3	<p><i>Intended to give credit for increasing the thermal barrier of exterior walls, above the amount required in the NC Bldg. Code.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>

	Item	Pt	Intent	Resources
10	<p>Exterior Wall: Thermal barrier continuous on exterior -- min. 75% of wall area (credit available for ONE of the following):</p> <p>Insulated exterior wall sheathing (R2.5 min. in addition to the NC Code requirement)</p> <p>Use pre-cast Autoclaved Aerated Concrete (AAC) (R10 min.; R13 min. in zone 5)</p> <p>Use Insulated Concrete Form (ICF) wall system (R20 min.)</p> <p>Use other wall system (points determined by HBH staff)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> <u>Note:</u> credit taken for this item excludes credit for item #9. The sheathing for exterior walls shall be equal to or greater than R2.5. Sheathing shall be installed with no gaps larger than 0.25 inch and provide complete coverage except for where structural sheathing is required by code (maximum of 25%). Source: EarthCraft House™ Guidelines including Low-rise Multifamily, Version June, 2005 (v062305); "Required Insulation" section</p> <p>Autoclaved Aerated Concrete blocks are solid blocks composed of cement, sand, lime, and an aerating agent, which is cured in an autoclave oven. The result is a very lightweight insulated concrete product. Blocks and panels are stacked similar to bricks and held together with adhesive* type latex based thin set mortar.</p> <p>Insulated Concrete Forms are a family of exterior wall systems that provide the strength of structural concrete walls with the thermal performance of integral insulation and high thermal mass. Generally, a Styrofoam form is filled with poured concrete.</p>	2 4 6 pts	Intended to give credit for increasing the thermal barrier of exterior walls, above the amount required in the NC Building Code.	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p> <p>AAC summary and information: www.toolbase.org/Technology-Inventory/Foundations/autoclaved-aerated-concrete</p> <p>Autoclaved Aerated Concrete Products Association: www.aacpa.org</p> <p>ICF summary and information: www.toolbase.org/Technology-Inventory/walls/Insulating-Concrete-Forms</p> <p>Insulating Concrete Forms Association: www.forms.org</p> <p>A NC CLIMATE ZONE LIST is provided at the end of this Building Envelope Section</p>
11	<p>Structural Insulated Panels (SIPs) (credit available for ALL of the following):</p> <p>Exterior walls - R14 min.; R21 in climate zone 5 (min. 75% of wall area)</p> <p><u>or</u> - R20 min.; R25 in climate zone 5 (min. 75% of wall area)</p> <p>Floor - R25 min.; R30 in climate zone 5 (min. 75% of floor area)</p> <p>Roof - R30 min.; R38 in climate zones 4 & 5 (min. 75% of roof area)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> <u>Note:</u> credit taken for this item excludes credit for item #9. Structural Insulated Panels (SIP's) consist of two (outer) layers of oriented strand board which enclose a foam core, ranging from 2 to 12 inches thick. They can be used to build exterior walls, roofs, and floors. To receive points SIP walls must be elevated at minimum 24" above soil grade and use Molded Expanded Polystyrene (MEPS) type foam treated with borates or other non-ozone depleting alternative blowing agent; and builder provide code compliance data for SIP panel (not just its components).</p>	3 6 4 4	Intended to give credit for using an alternative structural system that incorporates virtually continuous insulation.	<p>Structural Insulated Panel Association: www.sips.org</p> <p>A NC CLIMATE ZONE LIST is provided at the end of this Building Envelope Section</p>

	Item	Pt	Intent	Resources
12	<p>Raised heels of 6" or more on trusses to provide for complete insulation installation over top plates</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> Raised heel or cantilever trusses must allow at least 6 inches of insulation to be placed without compression at the top plate of the exterior wall. A truss qualifies as long as there is room for 6 inches of insulation at the top plate. Additional sheathing and siding is required with raised heel trusses.</p>	2	<p><i>Intended to give credit for providing continuous and consistent insulation for the entire ceiling area, including the area above the wall structural system.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
13	<p>Ceiling Insulation (credit available for ALL of the following):</p> <p>Flat ceilings (R38 - climate zone 3; R42 - climate zones 4 & 5)</p> <p>Vaulted and tray ceilings (R38 - climate zone 3; R42 - climate zones 4 & 5)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Ceilings with unconditioned attic space above shall have complete coverage of attic insulation equal to or greater than R38 (see zone requirements above). 15% of the ceiling area is exempt, but must meet the requirements of the NC Building Code. A maximum of 5% of ceiling area shall be R25 or greater to accommodate elevated attic flooring for storage and mechanical equipment. Vaulted, tray, or cathedral ceilings shall be insulated to R38 or greater (see zone requirements above).</p>	2 2	<p><i>Intended to give credit for increasing the level of insulation in the roof/ceiling area beyond the NC Code requirements.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
14	<p>Attic kneewall stud cavities insulated with air barrier towards attic (credit available for ONE of the following):</p> <p>Combined insulation and sheathing R-value is R15 or greater</p> <p>Combined insulation and sheathing R-value is R17 or greater</p> <p>Combined insulation and sheathing R-value is R19 or greater</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> <u>Note:</u> credit cannot be taken for this item if the kneewall is also an exterior wall.</p> <p>For purposes of this Checklist, an air barrier is defined as any solid material that blocks air flow between a conditioned space and an unconditioned space, including necessary sealing to block excessive air flow at edges and seams. Additional information on proper air sealing of thermal bypasses can be found on the Building America Web site, and in the EEBA Builder's Guides (see "Resources"). These references include guidance on identifying and sealing air barriers, as well as details on many of the items included in the Checklist.</p> <p>Spray Foam insulation, when installed to meet the local building code requirements, creates an air barrier as well as a thermal barrier and meets this requirement.</p>	1 2 3	<p><i>Intended to give credit for properly insulating and sealing vertical attic walls that separate conditioned from unconditioned space.</i></p>	<p>EEBA Builder's Guides: www.eeba.org</p> <p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>

	Item	Pt	Intent	Resources
15	<p>Attic roof insulated with spray foam (must meet NC Building Code requirements)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Spray Foam insulation, when installed to meet the local or NC Building Code requirements (either prescriptive or performance), creates an air barrier as well as a thermal barrier.</p> <p>See definition of an air barrier in item above.</p>	2	<p><i>Intended to give credit for installing an insulation material that acts as both an air and thermal barrier.</i></p>	<p>EERE Consumer's Guide: http://apps1.eere.energy.gov/consumer/your_home/insulation_airsealing/index.cfm/mytopic=11700</p>
16	<p>Attic ceiling radiant heat barrier; installed facing attic space</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> A radiant heat barrier must be installed per manufacturer's instructions over at least 80% of the vented attic space. The radiant barrier must have a reflective surface facing down (shiny side facing the attic space) and have an emissivity rating of 0.05 or less. Attic flooring should have no breaks in the insulation.</p>	2	<p><i>Intended to give credit for reducing heat gain.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
17	<p>Light Reflectance Value (LRV): 0.50 or greater for roofs with a slope of: > 2:12 0.65 or greater for low slope roofs: ≤ 2:12</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> The US Environmental Protection Agency (EPA) defines a cool roof as one with a high reflectance, greater than .65 (65%) for low sloped roofs (<2:12); greater than .25 (25%) for high sloped roof (>2:12); and a high emittance, greater than .8 (80%). High sloped roofs must have a LRV of .50 or greater to receive credit for this item.</p>	2	<p><i>Intended to give credit for reducing heat gain.</i></p>	<p>Cool Roofing Rating Council: www.coolroofs.org/products/search.php</p> <p>ORNL-Cool Roofing Materials Database: http://eetd.lbl.gov/CoolRoofs/</p>
18	<p>Water heater with insulating blanket installed to water heater manufacturer's specifications (credit available for <u>renovations</u> only)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Significant energy loss with hot water heater tanks is through thermal losses associated with the tank. Increasing insulation, when appropriate, can improve the energy efficiency of the tank. Always follow water heater and blanket manufacturer directions.</p>	1	<p><i>Intended to give credit for increasing the energy efficiency of the hot water heater.</i></p>	<p>US DOE - Energy Savers - Insulate Your Water Heater Tank for Energy Savings: www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13070</p>

Item	Pt	Intent	Resources
<p>19 Hot water pipes insulated to R-4 (credit available for ALL of the following):</p> <p>All hot water pipes insulated to R-4 in conditioned spaces</p> <p>All hot water pipes insulated to R-4 in <u>un</u> conditioned spaces</p> <p><u>DOCUMENTATION:</u></p> <p>Final Walkthrough where visible Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u></p> <p>All hot water piping (including that which is buried) must be insulated; install insulation materials according to manufacturer specifications for the use of that hot water piping. Examples of insulation materials (with a ¾" wall thickness) known to provide R-4 are:</p> <ul style="list-style-type: none"> - Black flexible elastomeric foam pipe insulation - Flexible black polyethylene pipe insulation - Flexible closed cell gray polyolefin/polyethylene pipe insulation <p>Other insulation material and wall thickness may be approved for credit if the capability to provide R-4 is sufficiently documented. A photo of the buried insulated lines must be available or a receipt for the appropriate amount of pipe insulation must be provided in order to receive points.</p> <p><u>Note:</u> the NC Building Code requires R-2 insulation for hot water piping.</p>	<p>1</p> <p>2</p>	<p>Intended to give credit for reducing hot water waste and increasing water efficiency.</p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
<p><i>Windows and Doors</i></p>			
<p>20 Low-E windows (credit available for ONE of the following):</p> <p>NFRC rated U-Factor of 0.36 or less minimum 75% of units</p> <p>NFRC rated U-Factor of 0.32 or less minimum 75% of units</p> <p><u>DOCUMENTATION:</u></p> <p>Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector; NFRC Energy Performance sticker MUST REMAIN INTACT on window for inspection in order to receive points (or provide a photo of sticker in place).</p> <p><u>INFORMATION:</u></p> <p>Windows shall have a minimum of two glazing layers and the inner surface of one layer shall contain a low emissivity (low e) coating. The U-factor rating can be found on the NFRC Energy Performance sticker, usually adhered to the window. The sticker must be left on the window so that appropriate U-factor can be verified by an approved HBH inspector.</p>	<p>1</p> <p>2</p>	<p>Intended to give credit for the use of energy efficient windows with a lower U-Factor than currently required by NC Code.</p>	<p>National Fenestration Research Council www.nfrc.org</p> <p>Energy Efficient Window Collaborative www.efficientwindows.org/nfrc.cfm</p>
<p>21 10 year warranty on all insulated glazing</p> <p><u>DOCUMENTATION:</u></p> <p>Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u></p> <p>Insulated glazing units for exterior windows and doors shall have a minimum 10-year manufacturer's warranty against sealed glass failure. Warranty documentation must be provided to the home buyer.</p>	<p>1</p>	<p>Intended to give credit for the use of a durable product.</p>	<p>National Fenestration Research Council www.nfrc.org</p> <p>Energy Efficient Window Collaborative www.efficientwindows.org/nfrc.cfm</p>
<p>22 Exterior doors (includes door from house to garage) insulated to R5 or greater</p> <p><u>DOCUMENTATION:</u></p> <p>Cut sheet or model number must be available at Final Walkthrough</p> <p><u>INFORMATION:</u></p> <p>All exterior doors, including doors to the garage, but not including sliding glass doors, should be insulated to R-5 or better. Most insulated (foam core) fiberglass and metal exterior doors qualify for this point. *Built Green Colorado checklist guide</p>	<p>2</p>	<p>Intended to give credit for the use of doors with greater energy efficiency.</p>	<p>Energy Star Residential Windows, Doors, and Skylights for Consumers: www.energystar.gov/index.cfm?c=windows_doors_pr_windows</p> <p>National Fenestration Research Council www.nfrc.org</p>

Item	Pt	Intent	Resources
<p><i>Innovation Points</i></p> <p>23 Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	Intended to give credit for innovative green building strategies.	

TABLE 301.1
CLIMATE ZONES BY COUNTY

NORTH CAROLINA	Hyde	Tyrrell	Franklin	Rockingham
Zone 3	Johnston	Union	Gates	Rutherford
Anson	Jones	Washington	Graham	Stokes
Beaufort	Lenoir	Wayne	Granville	Surry
Bladen	Martin	Wilson	Guilford	Swain
Brunswick	Mecklenburg		Halifax	Transylvania
Cabarrus	Montgomery	Zone 4	Harnett	Vance
Camden	Moore	Alamance	Haywood	Wake
Carteret	New Hanover	Alexander	Henderson	Warren
Chowan	Onslow	Bertie	Hertford	Wilkes
Columbus	Pamlico	Buncombe	Iredell	Yadkin
Craven	Pasquotank	Burke	Jackson	
Cumberland	Pender	Caldwell	Lee	
Currituck	Perquimans	Caswell	Lincoln	Zone 5
Dare	Pitt	Catawba	Macon	Alleghany
Davidson	Randolph	Chatham	Madison	Ashe
Duplin	Richmond	Cherokee	McDowell	Avery
Edgecombe	Robeson	Clay	Nash	Mitchell
Gaston	Rowan	Cleveland	Northampton	Watauga
Greene	Sampson	Davie	Orange	Yancey
Hoke	Scotland	Durham	Person	
	Stanly	Forsyth	Polk	

Source: 2009 NC Energy Conservation Code

Comfort Systems (Minimum Points: 18)

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Item	Pt	Intent	Resources													
<i>Passive Solar Heating and Cooling Strategies</i>																
<p>1 Provide one ceiling fan per 750 sf of conditioned space - each sized appropriately for the space (no more than 5 fans required)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Locate fans over areas where groupings of people are expected. In the summer, moving air with ceiling fans allows building occupants to feel comfortable at higher temperatures, typically 2 to 4 °F higher. In the winter, the warmest air naturally raises and collects near the ceiling. A ceiling fan can push this warmer air down to floor level. Look for ENERGY STAR fans to assure you have an energy efficient fan. In a standard room with 8' ceilings, a ceiling fan should have a minimum clearance of ten inches between ceiling and fan to provide adequate ventilation. In rooms with higher ceilings, fans should be mounted 7.5 to 8.0 feet above the floor. See the table in "Resources" for help in determining the proper fan size.</p> <p>Summer Operation: Set thermostat temperature higher. Turn fans off when the room is unoccupied. Winter Operation: Set fans to the lowest speed so there will be no wind chill effect and flip the switch on the fan to winter mode (which runs the fan clockwise); this allows the ceiling fan to push warm air down from the ceiling without blowing directly on anyone.</p>	<p>1</p> <p><i>Intended to give credit for providing a strategy that will encourage the owners to use less space conditioning energy while maintaining comfort levels.</i></p>	<p>ENERGY STAR Ceiling Fan Information: www.energystar.gov/index.cfm?c=ceiling_fans.pr_ceiling_fans</p> <table border="1" data-bbox="1507 402 1955 703"> <thead> <tr> <th colspan="2">Ceiling Fan Sizes</th> </tr> <tr> <th>Largest Room Dimension</th> <th>Minimum Fan Diameter (inches)</th> </tr> </thead> <tbody> <tr> <td>12 feet or less</td> <td>36</td> </tr> <tr> <td>12 – 16 feet</td> <td>48</td> </tr> <tr> <td>16 – 17.5 feet</td> <td>52</td> </tr> <tr> <td>17.5 – 18.5 feet</td> <td>56</td> </tr> <tr> <td>18.5 or more feet</td> <td>2 fans</td> </tr> </tbody> </table>	Ceiling Fan Sizes		Largest Room Dimension	Minimum Fan Diameter (inches)	12 feet or less	36	12 – 16 feet	48	16 – 17.5 feet	52	17.5 – 18.5 feet	56	18.5 or more feet	2 fans
Ceiling Fan Sizes																
Largest Room Dimension	Minimum Fan Diameter (inches)															
12 feet or less	36															
12 – 16 feet	48															
16 – 17.5 feet	52															
17.5 – 18.5 feet	56															
18.5 or more feet	2 fans															
<p>2 Home orientation allows solar heating (long dimension faces within 15 degrees East or West of solar south)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Site plan with North arrow</p> <p><u>INFORMATION:</u> Passive solar collection occurs on the south facing side of a home. By orienting a home so that its long dimension faces true south (not magnetic south) the amount of area for solar collection is maximized. When glazing is oriented more than 15 degrees off true south, not only is winter solar performance reduced, but summer air conditioning loads increase. The ideal orientation for solar glazing is within 5 degrees of true south to provide maximum performance. In general, southeast orientations present less of a problem than southwest.</p> <p>Although orientation alone without employing other passive solar strategies may or may not provide energy efficiency gains, it is a critical step that allows for future retrofit for passive and active solar.</p> <p>When applying for Passive Solar Tax Credits in NC this orientation must be within 15 degrees of solar south for new construction and 20 degrees of solar south for retrofits.</p>	<p>7</p> <p><i>Intended to give credit for orienting a home to take advantage of passive and active solar technologies.</i></p>	<p>Find the difference between magnetic south and true south for your zip code: www.ngdc.noaa.gov/geomagmodels/Declination.jsp</p> <p>See list of downloadable tax forms and instructions in left column (NC Solar Center): www.ncsc.ncsu.edu/information_resources/publications.cfm</p>														

Item	Pt	Intent	Resources
<p>3 Provide overhang, located between one and two feet above all south windows, with a minimum depth as follows below (may include gutter as part of the overhang; long dimension of home faces within 15 degrees East or West of solar south) :</p> <p>Mountain region: 1'-8"</p> <p>Piedmont region: 2'-0"</p> <p>Coastal region: 2'-4"</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Site plan with North arrow</p> <p><u>INFORMATION:</u> Fixed overhangs are an inexpensive feature, and require no operation by the home owner. Proper overhangs above the south windows will shade the entire window from midday sun in the summer yet expose the full window to the warming winter sun. Homes in warm climates will benefit from larger overhangs that provide good window shade into spring and fall. Homes in cooler climates will benefit from slightly smaller overhangs that will limit the shading on the south windows in early and late winter. To achieve the desired performance, overhangs must be sized as specified based on your climate, as determined by your region of the state. The lengths provided in this item assume the windows are no more than 6' tall. For windows over 6' tall, refer to the design information in the "NC Solar Center Passive Solar Design Checklist" (see "Resources"). It is important to provide an overhang for each level of the home so that all south windows are properly shaded in the summer.</p>	3	<p><i>Intended to give credit for reducing summer and increasing winter heat gain.</i></p>	<p>NC Solar Center Passive Solar Design Checklist: www.ncsc.ncsu.edu/information_resources/factsheets/PassiveDesignChecklist.pdf</p> <p>Online graphic overhang design tool by Susdesign: www.susdesign.com/overhang/</p>
<p>4 Implement strategies to reduce heat gain and/or heat loss, such as exterior-mounted sunscreens, operable insulated window coverings, or operable awnings. At minimum, implement on the southern and westernmost faces of the home.</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Site plan with North arrow</p> <p><u>INFORMATION:</u> A house can achieve a large unwanted solar heat gain during the non-winter morning and early evening hours as the sun rises and sets. At these times the sun is not necessarily shaded by fixed overhangs above the windows because of the angle of the sun, but other simple devices can be used to block the solar heat gain at these times. Strategies that reduce unwanted solar heat gain in late spring, summer, and early fall can reduce air conditioning costs and improve indoor comfort. Strategies can include but are not limited to:</p> <ul style="list-style-type: none"> • External sun screens – block solar gain and look similar to regular insect screens • Awnings that can be operated to block unwanted solar gain • Porches to shade the home and windows • Operable insulated window coverings <p>On winter nights when windows are not used for views or to collect solar heat gain, they lose a lot of heat. Operable, insulated window coverings can greatly reduce these heat losses through windows in the wintertime.</p>	5	<p><i>Intended to give credit for reducing summer heat gain.</i></p>	<p>NC Solar Center Factsheet on Summer Window Shading and Window Insulation: www.ncsc.ncsu.edu/information_resources/factsheets/03shadng.pdf</p>

	Item	Pt	Intent	Resources
5	<p>East facing glazing less than 3% of total conditioned floor area (glazing faces within 45 degrees north or south of east)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Site plan with North arrow; Calculations</p> <p><u>INFORMATION:</u> East facing glazing area can equal no more than 3% of the floor area. East windows catch the morning sun. Because the sun rises much further south in the winter than in the summer, east facing windows get much more summer sun than winter sun. This imbalance means that east windows are not able to provide significant energy in the winter, but collect enough solar energy in the summer to cause the home's air conditioner to work much harder. This has the potential to cause overheating problems. There are few shading systems that will be effective enough to offset the potential for overheating from a large east-facing window. East windows should use glass with a low solar heat gain coefficient (SHGC) to limit solar heat gain. If the views or other elements in the house's design dictate many east windows, shading should be designed with particular care.</p>	2	<p><i>Intended to give credit for reducing heat gain on the eastern face of the home.</i></p>	<p>See passive solar resources in item 8</p> <p>Efficient Windows Collaborative: www.efficientwindows.org</p>
6	<p>West facing glazing less than 2% of total conditioned floor area (glazing faces within 45 degrees north or south of west)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Site plan with North arrow; Calculations</p> <p><u>INFORMATION:</u> West facing glazing area can equal no more than 2% of the floor area. West windows catch the afternoon sun. Because the sun sets much further south in the winter than in the summer, west facing windows get much more summer sun than winter sun. This imbalance means that west windows are not able to provide significant energy in the winter, but collect enough solar energy in the summer to cause the home's air conditioner to work much harder. This has the potential to cause overheating problems. West windows are more problematic than east windows because the outdoor temperatures are much higher in the afternoons when the west windows receive the most sunlight. There are few shading systems that will be effective enough to offset the potential for overheating from a large west-facing window. West windows should use glass with a low solar heat gain coefficient (SHGC) to limit solar heat gain. If the views or other elements in the house's design dictate many west windows, shading should be designed with particular care.</p>	2	<p><i>Intended to give credit for reducing heat gain on the western face of the home.</i></p>	<p>See passive solar resources in item 8</p> <p>Efficient Windows Collaborative: www.efficientwindows.org</p>
7	<p>South facing glazing between 6-7% of total conditioned floor area (long dimension faces within 15 degrees East or West of solar south)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Site plan with North arrow; Calculations</p> <p><u>INFORMATION:</u> In a conventional house about 25% of the windows face south, which amounts to about 3% of the house's total floor area. In a suntempered house, the percentage is increased to a maximum of about 7% of the floor area. Suntempering systems are a very low cost strategy, using no additional thermal mass beyond that which is already in the drywall, framing, and furnishings of a typical house. As would be expected, energy savings are more modest than full passive solar design. Above this 7% limit, thermal mass material such as a 4" thick concrete floor must be added to prevent the house from overheating during the day.</p>	5	<p><i>Intended to give credit for creating a suntempered passive solar design that meets the requirements of the NC Passive Solar Tax credits.</i></p>	<p>See passive solar resources in item 8</p>

Item	Pt	Intent	Resources
<p>8 Passive solar heating provides 15% - 50% of home's heating needs <i>(To calculate points, multiply 0.4 times the percentage of heating needs provided through passive solar design, rounded to the nearest point)</i></p> <p><u>DOCUMENTATION:</u> Final Walkthrough Copy of calculations indicating the contribution of the passive solar system to the home's heating requirement; Calculation worksheets for your region are available upon request</p> <p><u>INFORMATION:</u> The solar contribution to the home's heating requirement can be calculated using an approved design tool such as the Sustainable Buildings Industries Council (SBIC) Builder Guide worksheets (available upon request for your region from the HBH program) or Energy-10 software. Passive solar heating can be a simple and low cost method to provide significant renewable energy to a home. By placing most of the home's windows on the south side of the home, using proper window overhangs, and providing adequate thermal mass (concrete, brick, or tile for example) the heating costs for a home can be greatly reduced. See "Resources" for more information on passive solar design.</p>	6-20	Intended to give credit for creating a passive solar heating system that meets the NC Passive Solar Tax credits.	<p>NC Solar Center Factsheet on Summer Window Shading and Window Insulation: www.ncsc.ncsu.edu/information_resources/factsheets/03shadng.pdf</p> <p>Energy-10: www.sbicouncil.org/displaycommon.cfm?an=1&subarticlenbr=112</p> <p>ASU affordable passive solar designs: www.tec.appstate.edu/construction/APSplanbook%20WEB%20PAGE/Index.htm</p>

Mechanical Comfort Systems

<p>9 Perform duct blaster test and meet the following minimum standards when measured in CFM of leakage at 25 Pascals; Leakage = total duct leakage <i>(credit available for ONE of the following):</i></p> <table border="1" data-bbox="142 727 1201 836"> <tr> <td data-bbox="142 727 1201 764">Leakage of 5% of the home's heated square footage</td> <td data-bbox="1201 727 1247 764">1</td> </tr> <tr> <td data-bbox="142 764 1201 802">Leakage of less than 4% of the home's heated square footage</td> <td data-bbox="1201 764 1247 802">3</td> </tr> <tr> <td data-bbox="142 802 1201 836">Leakage of less than 3% of the home's heated square footage</td> <td data-bbox="1201 802 1247 836">5</td> </tr> </table> <p><u>DOCUMENTATION:</u> Copy of duct leakage test results provided by certified Home Energy Rater who performed the test</p> <p><u>INFORMATION:</u> Duct leakage can reduce the heating and cooling efficiency of a forced air HVAC system by as much as 30%. Unbalanced duct leakage cause pressure imbalances in the home which can lead to major indoor air quality problems and put an increased strain on the heating and cooling system. To properly seal ducts, all transverse seams in supply and return ducts, including supply and return plenums and leakage sites in the air handler, should be sealed with duct mastic. Duct tape is not a suitable sealant for ducts, but may be used for sealing leakage sites at the air handler's removable access panels and at filter access panels. The leakiness of a duct system is tested via a duct blaster test. A minimum leakage rate must be met in order to qualify as an ENERGY STAR home. This item gives credit for exceeding the minimum specified by ENERGY STAR.</p>	Leakage of 5% of the home's heated square footage	1	Leakage of less than 4% of the home's heated square footage	3	Leakage of less than 3% of the home's heated square footage	5		Intended to give credit for exceeding the Prerequisite requirement for an efficient air distribution system.	<p>Ductwork questions and answers from Southface: www.southface.org/web/resources&services/publications/factsheets/2duct_q&a.pdf</p> <p>Better Duct Systems for Heating and Cooling (DOE): http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/30506.pdf</p>
Leakage of 5% of the home's heated square footage	1								
Leakage of less than 4% of the home's heated square footage	3								
Leakage of less than 3% of the home's heated square footage	5								

Item	Pt	Intent	Resources
<p>10 Air distribution system located within thermal envelope (credit available for ALL of the following):</p> <p><i>Air handler located within thermal envelope (all units)</i></p> <p><i>Ducts located within thermal envelope (min. 90%)</i></p> <p>DOCUMENTATION: Final Walkthrough or inspection by approved HBH inspector</p> <p>INFORMATION: All <i>air handlers</i> must be located within conditioned space to receive credit for this item. Vented combustion closets are not considered conditioned space.</p> <p>Typically <i>ducts</i> are located in unconditioned spaces. These spaces often contain very hot or cold, and sometimes very humid, air. This situation increases unwanted heat loss and heat gain and maximizes the negative effects of any duct leakage. By placing at least 90% of all supply and return ducts within conditioned space(s), the unwanted heat loss/heat gain from the ducts to outside of the home is almost eliminated and the negative effects of any duct leakage are minimized. Thus, having the ducts within the thermal envelope reduces the energy required for heating and cooling the home.</p>	<p>2</p> <p>5</p>	<p><i>Intended to give credit for minimizing energy losses and condensation potential in the space conditioning system.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/30506.pdf</p> <p>Ducts in conditioned space (PATH): http://toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=762&BucketID=6&CategoryID=6</p>
<p>11 Duct system sized, designed and installed in accordance with latest ANSI/ACCA Manual D</p> <p>DOCUMENTATION: Signature of Responsible party or inspection by approved HBH inspector</p> <p>INFORMATION: Proper duct system design is important for achieving the desired heating and cooling performance from an HVAC system. Ductwork design shall comply with the ANSI/ACCA Manual D guidelines.</p>	<p>3</p>	<p><i>Intended to give credit for a properly designed air distribution system.</i></p>	<p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
<p>12 No building cavity used as part of forced-air distribution system (supply or return)</p> <p>DOCUMENTATION: Signature of Responsible party or inspection by approved HBH inspector</p> <p>INFORMATION: <u>Note:</u> Because this is required in the 2009 NC Building Code, only 1 point is granted for this item.</p> <p>It is virtually impossible to adequately seal building cavities used as air ducts. When building cavities are used as return ducts they will often pull in air from unconditioned spaces. When used as part of the supply lines they will leak conditioned air to the unconditioned spaces. Not only does this increase the energy required to heat or cool a home, it may contribute to the depressurization of the home thereby potentially increasing the indoor air pollutants and unplanned air infiltration.</p>	<p>1</p>	<p><i>Intended to give credit for avoiding duct locations that increase the risk of heat loss and poor air quality.</i></p>	<p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>

	Item	Pt	Intent	Resources
13	<p>Airflow measured and balanced within 10 CFM or 10% of ACCA Manual J room-by-room load calculations</p> <p><u>DOCUMENTATION:</u> Signature of Responsible party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> ACCA Manual J calculations specify the flow rate of conditioned air to each room needed to meet the heating and cooling load of that room. To receive credit for this item the airflow to each room must be measured to be within 10% of the airflow requirement determined by the Manual J calculations. If initial measurements are not within 10% of Manual J calculations, the system must be adjusted/ balanced until the airflow from each room is measured to be within 10% of Manual J calculations.</p>	3	<p><i>Intended to give credit for a properly installed air distribution system.</i></p>	<p>ACCA Residential HVACR Manuals: http://www.acca.org/store/category.php?cid=2</p>
14	<p>No ducts in exterior walls or vaulted ceilings</p> <p><u>DOCUMENTATION:</u> Signature of Responsible party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> There are several reasons why placing ducts in exterior walls should be avoided. Ducts in exterior walls displace wall insulation, are exposed to more extreme temperatures which leads to greater heat loss, and typically require longer duct runs. To receive credit for this item, no supply or return ducts, boots, or registers may be located in exterior walls. This includes vaulted ceilings and insulated walls between conditioned and unconditioned spaces such as the common wall between the garage and the rest of the house.</p>	2	<p><i>Intended to give credit for avoiding duct locations that increase the risk of heat loss and poor air quality.</i></p>	<p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
15	<p>Airtight recessed can fixtures used between conditioned spaces</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> <u>Notes:</u> 1. 2009 NC Bldg Code requires airtight cans between <i>conditioned</i> and <i>unconditioned</i> spaces 2. if no can lights exist throughout the home, these points are automatically granted</p> <p>Recessed can fixtures can be a major source of air leakage between spaces. This can negatively impact the proper delivery of air to the effected spaces. Airtight recessed can fixtures are typically available at major home improvement stores.</p>	2	<p><i>Intended to give credit for minimizing uncontrolled air exchange between conditioned spaces.</i></p>	<p>Air Sealing Fact Sheet (DOE): http://apps1.eere.energy.gov/buildings/publication/pdfs/building_america/26446.pdf</p>
16	<p>Insulate all ducts outside conditioned space using a minimum of R-8 (supply) and R-4 (return)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, where visible Signature of Responsible party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> When ducts are located outside of the conditioned space they undesirably either gain or lose heat to the air in the unconditioned space. This includes ducts in cantilevers, exterior walls, and garage ceilings. The amount of energy wasted can be greatly reduced by properly insulating all ducts outside the conditioned space.</p>	2	<p><i>Intended to give credit for installation of air distribution systems that will minimize thermal losses over the life of the system.</i></p>	<p>ENERGY STAR fact sheet on duct insulation: www.energystar.gov/ia/home_improvement/home_sealing/DuctInsulationFS_2005.pdf</p>

	Item	Pt	Intent	Resources
17	<p>Air transfer grills, insulated jumper ducts, or return-air ducts are provided in every bedroom</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, where visible Signature of Responsible party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Closing off rooms that have a supply-air duct but no return-air duct, or other clear return flow path, can create positive air pressure in the affected rooms and starve the HVAC system for return air, forcing the system to take air from unintended sources (attics, crawl spaces, flues). This situation most often occurs in bedrooms. The results of this situation are decreased heating and cooling system efficiency and an increased risk of drawing in indoor air pollutants. The solution to this problem is to provide the supply air in a closed-off room a clear path to a return grill. This can be done with the installation of transfer air grills or insulated jump-ducts. Alternatively a return grill could be placed in each of these rooms. When using transfer grills, privacy can be maintained by offsetting low and high grills in the bedroom wall. Houses with undercut doors are not acceptable for points.</p>	3	<p><i>Intended to give credit for the use of strategies that save energy and improve comfort.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/30506.pdf</p> <p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
18	<p>Rigid metal supply plenum</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> To receive credit for this item a substantial rigid metal supply plenum shall supply multiple take-offs with supply air. An “octopus” system with all duct runs originating at a small supply plenum is not acceptable. See the provided resources for more information on proper duct design, including the use of a rigid metal supply plenum.</p>	2	<p><i>Intended to give credit for durable air distribution system components.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/30506.pdf</p> <p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
19	<p>Ductless Heating/Cooling system -- hydronic distribution pipes located in unconditioned spaces must be insulated (R-3 or better)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough (note existence and operation of visible components) Signature of Responsible Party indicating ductless system has been installed as designed and that the building envelope has not been compromised, and that a copy of operation and maintenance instructions will be provided by builder to homeowner</p> <p><u>INFORMATION:</u> <u>Notes:</u> 1. if no duct system is installed, points for Comfort Systems items 12 and 14 may also be taken 2. see Prerequisite 5 for more information regarding the sizing of mini-split systems</p> <p>Ductless heating and cooling systems avoid the potential issues and inefficiencies of ducts and can provide many years of good service if they are designed, operated, and maintained properly. Common ductless heating and cooling systems are mini-split heat pumps, and radiant floor heating either without air conditioning, or with mini-split air conditioning. Other types of systems are also possible. The main point to consider in the role of ductless systems is indoor air quality. The building envelope must not be compromised by installation, and humidity in the home must be dealt with in order to avoid mold and mildew problems. It is important to note that improperly installed chilled-water pipes that run through a building can sweat, which is a problem that can go largely unseen.</p>	10	<p><i>Intended to give credit for innovative systems that avoid the potential issues of ducts.</i></p>	<p>Ductless (mini-split) heat pump system overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=137</p> <p>A consumers guide to ductless (mini-split) systems (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12630</p> <p>Radiant Floor system overview (when not installed in slab) (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=108</p> <p>A consumer’s guide to radiant floor heating (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12590</p>

Item	Pt	Intent	Resources
<i>Controls</i>			
<p>20 Programmable ENERGY STAR thermostat (with written instructions and demonstration given to homeowner)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> A programmable thermostat will allow at least day and night settings. Some models offer more than two programmed temperature settings per day which can offer an increased degree of control and savings. A programmable setback thermostat can save a significant amount of energy when properly used (approximately 1% savings for each degree setback). Providing clear instructions, or demonstrating its operation, to the homeowners will help ensure proper operation.</p>	1	<p><i>Intended to give credit for controls that maximize the potential for comfort and energy savings.</i></p>	<p>Overview of programmable thermostats (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=282</p>
<p>21 Single HVAC system with multiple-zone heating and/or cooling control (with written instructions and demonstration given to homeowner)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> Zoned heating and/or cooling systems send heating and/or cooling only to the rooms calling for conditioning. Savings will be realized only if zones are properly adjusted for the conditions of the room (occupancy, appropriate comfort levels, etc.). The control system includes automatic dampers that fit into the ducts and a control panel that allows for the feedback of information between the programmable thermostat, indoor climate and damper position.</p>	3	<p><i>Intended to give credit for mechanical system design that maximizes comfort and efficiency by serving only those areas that require conditioning.</i></p>	<p>HVAC 'smart' zoning controls (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=185</p>

Item	Pt	Intent	Resources						
<i>Equipment</i>									
<p>22 Gas furnace at least 90% efficient (credit available for ONE of the following):</p> <table border="1" data-bbox="142 180 1203 293"> <tr> <td data-bbox="142 180 1203 220">Heating system efficiency (AFUE) at least 90</td> <td data-bbox="1203 180 1247 220">3</td> </tr> <tr> <td data-bbox="142 220 1203 261">Heating system efficiency (AFUE) at least 92</td> <td data-bbox="1203 220 1247 261">4</td> </tr> <tr> <td data-bbox="142 261 1203 293">Heating system efficiency (AFUE) at least 94</td> <td data-bbox="1203 261 1247 293">5</td> </tr> </table> <p>DOCUMENTATION: Final Walkthrough or inspection by approved HBH inspector</p> <p>INFORMATION: <u>Notes:</u> 1. Partial credit not available for efficiencies lower than AFUE 90 2. Gas furnaces must meet all requirements of Prerequisite 6</p> <p>The <u>Annual Fuel Utilization Efficiency</u> (AFUE) must be at least 90 percent. In order to reach this level of efficiency, a gas furnace must collect the heat in the exhaust gases to the point that the exhaust cools enough to condense the water vapor produced in the combustion process (a condensing furnace). The AFUE rating for a condensing unit can be much higher (by more than 10 percentage points) than a non-condensing furnace. Although condensing units cost more than non-condensing units, the condensing unit can save money in fuel costs over the 15- to 20-year life of the unit, and is a particularly wise investment in cold climates. Condensing furnaces are much less likely to suffer from corrosion caused by condensation in the unit or its flue and chimney. These models typically exhaust through a plastic pipe that exits through a side wall, and do not use the chimney.</p> <p>Furnaces can achieve an even higher AFUE by modulating their firing rates (and distribution fan speed) to reflect the actual energy needs of a home as a function of current weather conditions. Since the distribution fan runs for a greater part of the heating season, a good quality filter can be employed to contribute to enhanced indoor air quality with this system. It is also important to also be aware that longer fan run times amplify any problems that may exist in the duct system.</p>	Heating system efficiency (AFUE) at least 90	3	Heating system efficiency (AFUE) at least 92	4	Heating system efficiency (AFUE) at least 94	5		<p><i>Intended to give credit for installing furnaces that exceed minimum efficiency standards.</i></p>	<p>Consumer guide to furnaces and boilers: www.aceee.org/consumerguide/heating.htm</p> <p>Consumer guide to furnaces and boilers (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12530</p> <p>Modulating furnace overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=259</p>
Heating system efficiency (AFUE) at least 90	3								
Heating system efficiency (AFUE) at least 92	4								
Heating system efficiency (AFUE) at least 94	5								
<p>23 Boiler at least 85% efficient (credit available for ONE of the following):</p> <table border="1" data-bbox="142 938 1203 1052"> <tr> <td data-bbox="142 938 1203 979">Heating system efficiency (AFUE) at least 85</td> <td data-bbox="1203 938 1247 979">1</td> </tr> <tr> <td data-bbox="142 979 1203 1019">Heating system efficiency (AFUE) at least 87</td> <td data-bbox="1203 979 1247 1019">3</td> </tr> <tr> <td data-bbox="142 1019 1203 1052">Heating system efficiency (AFUE) at least 90</td> <td data-bbox="1203 1019 1247 1052">5</td> </tr> </table> <p>DOCUMENTATION: Final Walkthrough or inspection by approved HBH inspector</p> <p>INFORMATION: <u>Note:</u> Boilers must meet all requirements of Prerequisite 6</p> <p>The Annual Fuel Utilization Efficiency (AFUE) must be at least 85 for boilers. In order to reach this level of efficiency a gas boiler must collect the heat in the exhaust gases to the point that the exhaust cools enough to condense the water vapor produced in the combustion process (a condensing furnace). See 'Furnace' item above and resources provided for more information.</p>	Heating system efficiency (AFUE) at least 85	1	Heating system efficiency (AFUE) at least 87	3	Heating system efficiency (AFUE) at least 90	5		<p><i>Intended to give credit for installing boilers that exceed minimum efficiency standards.</i></p>	<p>Consumer guide to furnaces and boilers: www.aceee.org/consumerguide/heating.htm</p> <p>Consumer guide to furnaces and boilers (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12530</p>
Heating system efficiency (AFUE) at least 85	1								
Heating system efficiency (AFUE) at least 87	3								
Heating system efficiency (AFUE) at least 90	5								

Item	Pt	Intent	Resources				
<p>24 SEER 14 or higher cooling system (min 75% of conditioned space); 1 additional credit point can be earned for SEER ratings higher than 14 up to SEER 18</p> <p><u>DOCUMENTATION:</u> Final Walkthrough or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Central air conditioners are rated according to their Seasonal Energy Efficiency Ratio (SEER). SEER indicates the relative amount of energy needed to provide a specific cooling output. Many older systems have SEER ratings of 6 or less. SEER 13 is the current minimum for air conditioners.</p>	1-5	Intended to give credit for air conditioning equipment that exceeds minimum efficiency standards.	<p>Consumers guide to central air conditioners (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12440</p>				
<p>25 HSPF 8.5 or higher heat pump (min 75% of conditioned space) (credit available for ONE of the following):</p> <table border="1" data-bbox="142 448 1203 529"> <tr> <td data-bbox="142 448 1203 488">HSPF at least 8.5</td> <td data-bbox="1203 448 1478 488">3</td> </tr> <tr> <td data-bbox="142 488 1203 529">HSPF at least 9.0</td> <td data-bbox="1203 488 1478 529">4</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> <u>Note:</u> Partial credit not available for efficiencies lower than HSPF of 8.5</p> <p>Heating efficiency for air-source electric heat pumps is indicated by the Heating Seasonal Performance Factor (HSPF), which is the ratio of the seasonal heating output in Btu's divided by the seasonal power consumption in watts. The Heating Seasonal Performance Factor (HSPF) rates both the efficiency of the compressor and the electric-resistance elements. In September 2006, the new standard for central heat pumps limited heat pumps to a minimum HSPF of 7.7. In warmer climates, SEER is more important than HSPF; in colder climates, focus on getting the highest HSPF feasible.</p>	HSPF at least 8.5	3	HSPF at least 9.0	4	3 4	Intended to give credit for heat pumps that exceed minimum efficiency standards.	<p>Consumer guide to air-source heat pumps (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12620</p>
HSPF at least 8.5	3						
HSPF at least 9.0	4						
<p>26 Ground source (geothermal) heating and cooling system</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Using basic refrigeration science, heat pumps can extract heat from the ground for space heating in the heating season, and move heat from the building to the ground in the cooling season. Electricity is used to move fluids to and from the ground, as well as to run the internal refrigerant compressor.</p>	10	Intended to give credit for using the earth's constant temperature as a heat transfer source.	<p>Ground Source Heat Pump Overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=130</p>				

Item	Pt	Intent	Resources						
<p>27 In-floor hydronic heating system (credit available for ONE of the following):</p> <table border="1" data-bbox="142 175 1203 289"> <tr> <td>System active in 40% of conditioned floor area</td> <td>3</td> </tr> <tr> <td>System active in 65% of conditioned floor area</td> <td>5</td> </tr> <tr> <td>System active in 90% of conditioned floor area</td> <td>7</td> </tr> </table> <p>DOCUMENTATION: Final Walkthrough (controls/equipment) Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: <u>Note:</u> if no duct system is installed, see Comfort Systems item 19 regarding possible additional points</p> <p>There are three types of radiant floor heat: radiant air floors (air is the heat-carrying medium); electric radiant floors; and hot water (hydronic) radiant floors. <u>Hydronic systems are by far the most common and most cost effective type of in-floor heating system.</u> There are two general classes of radiant floor installations: “wet installations” in which the tubes are set into concrete and “dry installations” in which the tubes are sandwiched between two layers of plywood or attached under the finished floor or subfloor. Regardless of the type of hydronic floor installation, it is very important to properly insulate under, and at the edges of, the heated floor or slab in order to direct the heat in the desired direction. Hydronic systems can conveniently make effective use of solar hot water for home heating.</p>	System active in 40% of conditioned floor area	3	System active in 65% of conditioned floor area	5	System active in 90% of conditioned floor area	7		<p>Intended to give credit for using a strategy that improves comfort and efficiency.</p>	<p>Consumer’s guide to radiant heating (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12590</p>
System active in 40% of conditioned floor area	3								
System active in 65% of conditioned floor area	5								
System active in 90% of conditioned floor area	7								
<p>28 Energy efficient ventilation (credit available for ONE of the following):</p> <table border="1" data-bbox="142 781 1203 862"> <tr> <td>Heat Recovery Ventilator (HRV) installed (points available in climate zone 5 only)</td> <td>3</td> </tr> <tr> <td>Energy Recovery Ventilator (ERV) installed</td> <td>6</td> </tr> </table> <p>DOCUMENTATION: Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: A balanced mechanical ventilation system with heat recovery exchanges inside and outside air while recovering the heat of the exiting air. Controlled ventilation is increasingly important as houses are built tighter to prevent excessive air infiltration and energy losses. A combination of tighter homes and out gassing from new building materials (glues, paints, carpets, pads, cabinets) can create indoor air quality problems that range from mildly irritating to severe. An Energy (aka enthalpy) Recovery Ventilator (ERV) is preferable in a humid climate because it can not only exchange heat between the outgoing stale air and the incoming fresh, but it can also exchange moisture between the two air streams. This is very helpful in most of North Carolina in the summer when outdoor air is very humid.</p>	Heat Recovery Ventilator (HRV) installed (points available in climate zone 5 only)	3	Energy Recovery Ventilator (ERV) installed	6		<p>Intended to give credit for whole house ventilation systems that exchange heat and moisture with outdoor air.</p>	<p>Energy and Heat Recovery Ventilators (ERV/HRV) (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=122</p> <p>Use and Misuse of Energy Recovery Ventilators (ERVs) in Hot, Humid Climates: www.advancedenergy.org/buildings/knowledge_library/ventilation/erv.pdf</p>		
Heat Recovery Ventilator (HRV) installed (points available in climate zone 5 only)	3								
Energy Recovery Ventilator (ERV) installed	6								
<p>29 Outdoor thermostat for heat pump</p> <p>DOCUMENTATION: Final Walkthrough or cutsheet on site</p> <p>INFORMATION: In any climate, installing an outdoor thermostat for an air source heat pump set at 32°F or 34°F prevents the heat strips from activating unless outdoor temperatures fall lower. This increases the heating seasonal performance factor of the system by limiting the amount of time the system must rely on the much less efficient back-up resistance heating elements to provide heat to the home.</p>	1	<p>Intended to give credit for heat pumps that exceed minimum efficiency standards.</p>	<p>Specification of Energy-Efficient Installation and Maintenance Practices for Residential HVAC Systems (Consortium for Energy Efficiency): www.cee1.org/resid/rs-ac/hvac1-36.pdf</p>						

Item	Pt	Intent	Resources
<p>30 Cooling equipment uses non-HCFC refrigerant</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Note: Because the manufacture of equipment using HCFC refrigerant is prohibited by the Federal Government beginning January 1, 2010 (see "Resources"), only 1 point is granted for this item.</p> <p>HCFCs are one class of chemicals being used to replace CFCs. They contain chlorine and thus deplete stratospheric ozone, but to a much lesser extent than CFCs. Hydrofluorocarbons (HFCs) are a family of refrigerants that have been specifically developed to provide alternatives to CFCs and HCFCs. They have many of the favorable characteristics of CFCs especially those of zero flammability and zero toxicity. "Freon" is a trade name for CFC and HCFC refrigerants sold by DuPont. An example of a non-HCFC refrigerant is R410A.</p>	1	<p><i>Intended to give credit for using refrigerants that minimize their impact on atmospheric degradation.</i></p>	<p>Questions and Answers on Alternative Refrigerants (EPA): www.epa.gov/ozone/snap/refrigerants/qa.html</p> <p>HCFC Phaseout Schedule: www.epa.gov/ozone/title6/phaseout/hcfc.html</p>
<p>31 Refrigerant charge tested (and corrected if necessary)</p> <p><u>DOCUMENTATION:</u> Refrigerant charge worksheet and test results</p> <p><u>INFORMATION:</u> Refrigerant charge is the amount of refrigerant in a system. It is defined as the ratio of refrigerant required, to the cooling capacity provided by a piece of equipment. Many residential cooling systems have been found to have unsatisfactory refrigerant charge levels. The efficiency, longevity, and capacity of cooling equipment can be reduced by either undercharging, or overcharging.</p> <p>One standard charge test procedure is provided by the California Energy Commission (See "Resources"). Any method approved by the OEM that will ensure proper refrigerant charging of the system is acceptable to meet this requirement. Source: ANSI/ACCA 5 QI-2007 "HVAC Quality Installation Specification," 4.2 (see "Resources")</p>	2	<p><i>Intended to give credit for ensuring equipment performance.</i></p>	<p>HVAC Quality Installation Specification (ANSI / ACCA 5 QI 2007): www.acca.org/quality/</p> <p>CA 2008 Building Energy Efficiency Standards - RA3.2 Procedures for Determining Refrigerant Charge for Split System Space Cooling Systems Without a Charge Indicator Display: www.energy.ca.gov/2008publications/CEC-400-2008-004/CEC-400-2008-004-CMF.PDF</p>
<p>32 Responsible third party performs Manual J calculations</p> <p><u>DOCUMENTATION:</u> Final Walkthrough (controls/equipment) Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Proper Manual J calculations are needed to correctly size and design a heating and cooling system. To receive credit for this item the Manual J calculations for the home must be performed or reviewed and approved by a RESNET Certified Rater, or other HBH approved professional.</p>	2	<p><i>Intended to give credit for right sizing the mechanical system.</i></p>	

Item	Pt	Intent	Resources
<p>33 Third party verification of proper design and installation of ERV / HRV ALL of the following must be completed:</p> <p>Confirm balanced air flow</p> <p>No exhaust collection points in full bathrooms</p> <p>Unit installed according to manufacturer's specifications</p> <p>Homeowner understands system operation and maintenance schedule</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party and inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Fresh air requirements vary depending on project size and number of occupants. ERV / HRV capacities vary and performance is subject to proper installation and set-up. Select a professional familiar with the installation, operations, and maintenance of ERVs / HRVs for testing and inspection of the unit. The professional should verify that the unit was installed according to the manufacturer's specifications, and best industry practices. They should verify that despite any unit rating capacity, the system in-place is capable of introducing adequate fresh. The professional should verify that operating instructions for the fresh air introduction system are available to homeowners, and that the owners understand the operations of the unit and are familiar with the maintenance schedule.</p> <p>The draft (March 2009) ENERGY STAR Heat/Energy Recovery Ventilators Specification provides these installation recommendations from section 5.2:</p> <ul style="list-style-type: none"> • To ensure quiet operation of ENERGY STAR qualified HRV/ERVs, each product should be installed using sound attenuation techniques appropriate for the installation. For general ventilation applications, at least 8 feet of insulated flexible duct must be installed between any exhaust or supply grille(s) and the HRV/ERV. • The way that your Heat/Energy recovery ventilator is installed may make a significant difference to the electrical energy that you will use. To minimize the electricity use of the Heat/Energy recovery ventilator, a stand-alone fully ducted installation is recommended. If you choose a simplified installation that operates your furnace air-handler for room-to-room ventilation, an electrically efficient furnace that has an electronically commutated (EC) variable speed blower motor will reduce your electrical energy consumption and operating cost. 	2	<p><i>Intended to give credit for third party verification of adequate fresh air ventilation.</i></p>	<p>ENERGY STAR Heat/Energy Recovery Ventilators Specification: www.energystar.gov/index.cfm?c=new_specs.hrv_erv_spec</p> <p>Use and Misuse of Energy Recovery Ventilators (ERVs) in Hot, Humid Climates: www.advancedenergy.org/buildings/knowledge_library/ventilation/erv.pdf</p>
<i>Innovation Points</i>			
<p>34 Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Appliances, Lighting and Renewables (Minimum Points: 8)

[Back](#)

	Item	Pt	Intent	Resources
1	<p>All refrigerators are ENERGY STAR labeled (Max 4 pts.) (credit available for ONE of the following):</p> <p>Refrigerators are ENERGY STAR labeled</p> <p>1 Refrigerator (min.) is super efficient; rated to use less than 280 kWh per year</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Model Number should be accessible</p> <p><u>INFORMATION:</u> Refrigerators are the single largest power consumer of all appliances in most households. ENERGY STAR models incorporate better insulation, more efficient compressors, better heat transfer surfaces, and more precise temperature and defrost mechanisms. To be considered ENERGY STAR they must exceed current federal standards by 15%. Current ENERGY STAR refrigerators use 40% less energy than the typical refrigerator sold in 2001. As a result of the better insulation and more efficient operation, installation of such a refrigerator will also keep the kitchen cooler, providing more savings from space cooling. An ENERGY STAR refrigerator can be recognized by the blue ENERGY STAR® label.</p> <p>Some refrigerators are significantly more energy efficient than ENERGY STAR models. Also, some households do not have the need for a larger refrigerator and can easily reduce their annual energy use by simply purchasing a smaller refrigerator.</p>	2 4	Intended to give credit for appliances that exceed minimum federal energy efficiency standards.	<p>ENERGY STAR Website on Refrigerators: www.energystar.gov/index.cfm?c=refrig.pr_refrigerators</p> <p>Find a Store: www.energystar.gov/index.cfm?fuseaction=store.store_locator</p> <p>Savings Calculator: www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Consumer_Residential_Refrig_Save_Calc.xls</p> <p>List of ENERGY STAR Refrigerators and Annual Energy Usages: www.energystar.gov/index.cfm?fuseaction=refrig.display_products_html</p>
2	<p>Gas clothes dryer with electronic ignition and moisture sensor</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Model Number should be accessible</p> <p><u>INFORMATION:</u> The clothes dryer is typically the second largest electricity consuming appliance after the refrigerator. A gas clothes dryer will use less primary source energy than an electric dryer. Directly using the heat from the gas to dry clothes is much more efficient than using heat to create electricity at a power plant to be used as heat for drying. All new gas clothes dryers are now required to have an electronic ignition, and therefore do not have a pilot light. There is not currently an ENERGY STAR certification for clothes dryers because, except for differences in fuel type, most use similar amounts of energy. However, a dryer with moisture sensors that can automatically shut down when the clothes are dry can reduce energy use by 15%.</p> <p><u>Note:</u> see HBH Prerequisite 6 regarding the sealed combustion requirement.</p>	1	Intended to give credit for appliances that exceed minimum federal energy efficiency standards.	<p>Consumer Energy Center: Clothes Dryers (California Energy Commission): www.consumerenergycenter.org/home/appliances/dryers.html</p> <p>Buying a New Dryer: www.aceee.org/consumerguide/laundry.htm#newdryer</p>
3	<p>If appliances are not included, a list of energy efficient appliances is provided to homeowner</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating copy of list will be provided to owner</p> <p><u>INFORMATION:</u> If major appliances are not installed at the time of occupancy, the builder can encourage the homeowners to install energy efficient appliances by providing the homeowner with a printed list of energy efficient appliances. See www.energystar.gov for a current list of ENERGY STAR models. Providing explanatory information with the list of appliances is highly encouraged.</p>	1	Intended to give credit for promoting appliances that exceed minimum energy efficiency standards.	<p>ENERGY STAR Appliances (links to lists of ENERGY STAR models): www.energystar.gov/index.cfm?c=appliances.pr_appliances</p>

	Item	Pt	Intent	Resources								
4	<p>Water heater meets ENERGY STAR Criteria (Max. 3 pts.) (credit available for ONE of the following):</p> <table border="1"> <tr> <td data-bbox="142 175 1205 214">Gas Storage - Energy Factor (EF) > 0.67</td> <td data-bbox="1205 175 1247 214">2</td> </tr> <tr> <td data-bbox="142 214 1205 253">Gas Condensing (EF) > 0.8</td> <td data-bbox="1205 214 1247 253">3</td> </tr> <tr> <td data-bbox="142 253 1205 292">Whole-Home Gas Tankless (EF) > 0.82</td> <td data-bbox="1205 253 1247 292">3</td> </tr> <tr> <td data-bbox="142 292 1205 331">Heat Pump Water Heater (EF) > 2.0</td> <td data-bbox="1205 292 1247 331">3</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough, Model Number should be accessible</p> <p><u>INFORMATION:</u> <u>Note:</u> credit for this item can only be taken once (i.e. 2 or more water heaters will not each receive credit for this item).</p> <p>The energy efficiency of a domestic water heater is indicated by its Energy Factor (EF). Energy Factor is the ratio of useful energy output from the water heater to the total amount of energy delivered to the water heater, and is determined by a DOE test procedure.</p>	Gas Storage - Energy Factor (EF) > 0.67	2	Gas Condensing (EF) > 0.8	3	Whole-Home Gas Tankless (EF) > 0.82	3	Heat Pump Water Heater (EF) > 2.0	3		<p>Intended to give credit for appliances that exceed minimum federal energy efficiency standards.</p>	<p>ENERGY STAR Program Requirements for Residential Water Heaters: www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeater_ProgramRequirements_2008.pdf</p> <p>How It Works — Heat Pump Water Heaters: www.energystar.gov/index.cfm?c=heat_pump.pr_how_it_works</p> <p>Consumer Guide to Water Heaters (American Council for an Energy Efficient Economy): www.aceee.org/consumerguide/waterheating.htm</p>
Gas Storage - Energy Factor (EF) > 0.67	2											
Gas Condensing (EF) > 0.8	3											
Whole-Home Gas Tankless (EF) > 0.82	3											
Heat Pump Water Heater (EF) > 2.0	3											
5	<p>Ground source (geothermal) water heating</p> <table border="1"> <tr> <td data-bbox="142 643 1205 682">Desuperheater provides hot water</td> <td data-bbox="1205 643 1247 682">2</td> </tr> <tr> <td data-bbox="142 682 1205 721">Integrated demand system provides hot water</td> <td data-bbox="1205 682 1247 721">3</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> There are two different features that can be included in a ground source heat pump that will allow it to provide 50 to 100% of a home's domestic hot water needs. The least costly option is a desuperheater. A desuperheater is a small, auxiliary heat exchanger that uses superheated gases from the heat pump's compressor to heat water. This hot water then circulates through a pipe to the home's normal water heater tank. In summer, when the geothermal heat pump is in the cooling mode, the desuperheater merely uses excess heat that would otherwise be expelled to the loop. When the geothermal heat pump is running frequently, homeowners can obtain all of their hot water in this manner virtually for free. A conventional water heater meets all household hot water needs that the desuperheater isn't able to meet.</p> <p>The second option to heat water with a geothermal heat pump is known as integrated demand water heating (sometimes referred to as full-demand or demand water heating). This feature includes a water heating function in the refrigeration cycle. Integrated demand water heating differs from a desuperheater in that the integrated demand water heating model provides all, or nearly all, of the domestic hot water needs and provides hot water even when space conditioning is not required.</p>	Desuperheater provides hot water	2	Integrated demand system provides hot water	3		<p>Intended to give credit for appliances that exceed minimum federal energy efficiency standards.</p>	<p>Geothermal Heat Pumps (ENERGY STAR): www.energystar.gov/index.cfm?c=geo_heat.pr_geo_heat_pumps</p> <p>Geothermal Heat Pumps (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=130</p>				
Desuperheater provides hot water	2											
Integrated demand system provides hot water	3											

	Item	Pt	Intent	Resources
6	<p>Energy-efficient hot water distribution system (credit available for ONE of the following):</p> <p><i>Structured plumbing system</i></p> <p><i>Central manifold distribution system</i></p> <p><i>Compact design of conventional system</i></p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> <u>Structured plumbing system.</u> The system design must include a circulation loop that minimizes the use of hard elbows, is within 10 feet of every fixture, and has a demand controlled circulation pump. The total length of the recirculation loop must be less than 30 linear feet of plumbing. Branch lines run from the loop to each fixture are a maximum of ½" in diameter, and no longer than 10 feet. An electronic control must be installed in the kitchen and each full bathroom to activate the circulating pump. <u>Central manifold distribution system.</u> The system design must include a trunk line no longer than 10 feet from the water heater to the central manifold, and insulated (min. R4). Branch lines run from the manifold to each fixture are a maximum of ½" in diameter. The maximum branch line from the central manifold to each fixture is 20 feet in one-story homes and 30 feet in two-story homes. <u>Compact design of conventional system.</u> The water heater must be centrally located. Branch lines run from the header to each fixture and are a maximum of ½" in diameter. The maximum water heater to fixture piping run is 20 feet in one-story homes and 30 feet in two-story homes. *LEED for Homes Rating System</p>	4 4 4	Intended to give credit for reducing hot water waste and increasing water efficiency.	<p>ENERGY STAR Volumetric Hot Water Savings Guidelines: www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Volumetric_Hot_Water_Savings_Guidelines.pdf</p> <p>LEED for Homes Rating System (free download): www.usgbc.org/DisplayPage.aspx?CMSPageID=147</p>
7	<p>Shower drain waste heat recovery device</p> <p><u>DOCUMENTATION:</u> Signature of Responsible party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Any hot water that goes down the drain carries away energy with it. That's typically 75% or more of the energy used to heat water in a home. Drain water (or greywater) heat recovery systems capture this energy to preheat cold water entering the water heater or going to other water fixtures. Drain-water heat recovery technology works with all types of water heaters. Drain-water heat exchangers can recover heat from the hot water used in showers, bathtubs, sinks, dishwashers, and clothes washers. A unit with storage capacity is required for effective use with a dishwasher or clothes washer. Without storage capacity, useful energy can only be recovered during the simultaneous flow of cold water and heated drain water, for example while showering.</p>	1	Intended to give credit for reducing hot water waste.	<p>Drain-Water Heat Recovery (DOE): www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13040</p>

	Item	Pt	Intent	Resources										
<i>Lighting</i>														
8	<p>Recessed light fixtures use compact fluorescents - 50% of fixtures must have CFLs (no partial credit allowed)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Recessed light fixtures typically use incandescent lighting which uses three or four times the amount of energy to produce the same amount of light as an equivalent compact fluorescent (CFL). Screw-in type CFLs can be used in recessed light fixtures, but this is not the preferred type of CFL for recessed light fixtures. Much of the light from a standard CFL will be lost inside the recessed fixture. Reflector lamps address this problem, but there are currently few CFL reflector lamps available in consumer markets (see resources for some available bulbs). Further, when higher-wattage screw-in CFLs are used in an airtight recessed can, an additional challenge arises: heat generated by the lamp and ballast can become trapped inside the fixture, and excessive heat can cause CFLs to have lower light output and a shorter lifespan.</p> <p>These issues with screw-in CFLs can be avoided with the preferred type of CFL for recessed cans, a pin-based CFL, also called hard-wired. Use of this type of CFL requires a recessed light fixture made for pin-based CFLs. This type of fixture contains the CFL ballast, so, when a bulb does fail only the bulb will need to be replaced. Screw-in CFLs contain both the ballast and the bulb which requires a working ballast to be discarded whenever a bulb fails.</p>	2	Intended to give credit for utilizing energy efficient lighting.	<p>Compact Fluorescents (ENERGY STAR): www.energystar.gov/index.cfm?c=cfls.pr_cfls</p> <p>Light Fixtures (ENERGY STAR): www.energystar.gov/index.cfm?c=fixtures.pr_light_fixtures</p> <p>Compact Fluorescent reflector bulbs (Pacific Northwest National Lab): www.pnl.gov/rlamps</p>										
9	<p>Efficient lighting fixtures and lamps (credit available for ONE of the following; no partial credit allowed):</p> <table border="1" data-bbox="136 828 1205 1015"> <tr> <td data-bbox="136 828 1205 868">40% of light fixtures are fluorescent fixtures or use CFLs or LEDs</td> <td data-bbox="1205 828 1478 868">3</td> </tr> <tr> <td data-bbox="136 868 1205 909">60% of light fixtures are fluorescent fixtures or use CFLs or LEDs</td> <td data-bbox="1205 868 1478 909">4</td> </tr> <tr> <td data-bbox="136 909 1205 950">60% of light fixtures are ENERGY STAR labeled</td> <td data-bbox="1205 909 1478 950">5</td> </tr> <tr> <td data-bbox="136 950 1205 990">Meet ENERGY STAR Advanced Lighting Package (ALP) Guidelines</td> <td data-bbox="1205 950 1478 990">6</td> </tr> <tr> <td data-bbox="136 990 1205 1015">100% of light fixtures (fluorescent or LED) are ENERGY STAR labeled</td> <td data-bbox="1205 990 1478 1015">7</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough, Model Numbers should be accessible (for fixture only)</p> <p><u>INFORMATION:</u> Lighting can easily account for 15% of a home's yearly electric bill. Compact Fluorescent Lamps (CFLs) use 66% less energy than a standard incandescent bulb and last up to 10 times longer. Replacing a 100 watt incandescent bulb with a 32 watt CFL can save at least \$30 in energy costs over the life of the bulb. Fluorescent lights (tubes and CFLs) provide the same amount of light (lumens) as standard incandescent bulbs, but do so with only 1/3 to 1/4 of the electricity. A <u>light fixture</u> can contain more than one bulb.</p> <p>In order to qualify as an ENERGY STAR Advanced Lighting Package, the following requirements must be met:</p> <ol style="list-style-type: none"> 1. 60% of installed hard-wired fixtures (indoor and/or outdoor) must be ENERGY STAR labeled. 2. All ceiling fans must be ENERGY STAR labeled. ENERGY STAR labeled ceiling fan light kits can be counted toward the 60% lighting fixture requirement. <p>More information, including a list of distributors and labeled products are available at the ENERGY STAR web site (see "Resources").</p>	40% of light fixtures are fluorescent fixtures or use CFLs or LEDs	3	60% of light fixtures are fluorescent fixtures or use CFLs or LEDs	4	60% of light fixtures are ENERGY STAR labeled	5	Meet ENERGY STAR Advanced Lighting Package (ALP) Guidelines	6	100% of light fixtures (fluorescent or LED) are ENERGY STAR labeled	7		Intended to give credit for utilizing energy efficient lighting and fixtures.	<p>Compact Fluorescents (ENERGY STAR): www.energystar.gov/index.cfm?c=cfls.pr_cfls</p> <p>ENERGY STAR Advanced Lighting Package (ALP): www.energystar.gov/index.cfm?c=bldrs_lenders_raters.ALP_Builder</p>
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100% of light fixtures (fluorescent or LED) are ENERGY STAR labeled	7													

Item	Pt	Intent	Resources																																																							
<p>10 ENERGY STAR labeled SSL Luminaires (LED fixtures) 1 per 1,000 square feet (Max. 4 pts.) Note: refer to "Fixtures Table" located in Information</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Model Numbers should be accessible</p> <p><u>INFORMATION:</u> Solid-state lighting is a generic term for light emitting diodes (LEDs). An LED is a semiconductor device that glows when an electric current runs through it. LEDs are more efficient, more durable, and last longer than incandescents and fluorescents. After September 30, 2008, consumers should be able to locate ENERGY STAR labeled LED products in retail stores, through electrical distributors, or via online retailers (look for the ENERGY STAR logo). LED luminaires use less energy because the LEDs emit light in a specific direction and require no reflectors or diffusers. Conversely, an incandescent or fluorescent bulb inside of a recessed can wastes about half of the light that it produces, because most of the light is trapped in the can and never reaches the room below. Other advantages of LEDs are that they are compact in size; light instantly; are dimmable, and emit no infrared (heat) or UV light.</p> <table border="1" data-bbox="157 587 1180 782"> <thead> <tr> <th>Sq. Ft. ></th> <th>500</th> <th>1000</th> <th>1500</th> <th>2000</th> <th>2500</th> <th>3000</th> <th>3500</th> <th>4000</th> <th>4500</th> <th>5000</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td rowspan="4">required fixtures per sq. feet</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> <td>16</td> <td>18</td> <td>20</td> <td>4</td> </tr> <tr> <td>3</td> <td>5</td> <td>6</td> <td>8</td> <td>9</td> <td>11</td> <td>12</td> <td>14</td> <td>15</td> <td>3</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> <td>2</td> </tr> <tr> <td>1</td> <td>2</td> <td>2</td> <td>3</td> <td>3</td> <td>4</td> <td>4</td> <td>5</td> <td>5</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">Fixtures Table</p>	Sq. Ft. >	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	Points	required fixtures per sq. feet	2	4	6	8	10	12	14	16	18	20	4	3	5	6	8	9	11	12	14	15	3	1	2	3	4	5	6	7	8	9	10	2	1	2	2	3	3	4	4	5	5	1	1-4	Intended to give credit for utilizing energy efficient fixtures.	DOE Solid-State Lighting Web page: www1.eere.energy.gov/buildings/ssl/
Sq. Ft. >	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	Points																																															
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<p>11 Indoor lighting controls (Max.4 pts) (credit available for ALL of the following; only 1 strategy per room):</p> <p>Manual wall timer switch(es)</p> <p>Light dimming switch(es)</p> <p>Occupancy or Vacancy sensor(s)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> When lighting is left on inadvertently, occupancy or vacancy sensors will detect that the room is unoccupied, and turn the lights off automatically after a preset time-delay. The shorter the time delay, the higher the energy savings. California's Energy Code encourages the use of <u>vacancy sensors</u> because they avoid 'false-off' switching in rooms with minimal movement when the area is occupied (e.g., bathrooms). Lighting control devices should always be tested as the final step of the installation process.</p>	1 1 2	Intended to give credit for utilizing controls that minimize reduce light fixture use.	The Home Lighting Control Alliance: www.homelightingcontrol.org/learning/whitepapers/2008_vacancy_sensors.php The Lighting Research Center Rensselaer Polytechnic Institute www.lrc.rpi.edu/																																																							

	Item	Pt	Intent	Resources
12	<p>Switchable automatic outdoor lighting controls (e.g. motion/photo sensor)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Outdoor lighting is often inadvertently left on when not needed, even during daylight hours. Installation of simple controls can greatly reduce the amount of time outdoor lighting is needlessly operating. Adding an on/off switch (switchable) in addition to automatic controls gives the user an option to override automatic controls and turn off power to the lighting. Typical automatic control options include automatic photocells that turn the light on and off based on whether it is night or day, motion sensor controls that turn the light on when motion is detected, and timer controls that limit how long the lights stay on after they are turned on. These control options can combine to give even greater control over outdoor lighting use. High efficiency exterior lighting (high pressure sodium, fluorescent, or equivalent high efficiency) is greatly preferred over typical incandescent lighting.</p>	1	<p><i>Intended to give credit for utilizing controls that minimize reduce light fixture use.</i></p>	<p>Outdoor Lighting Design (DOE): www.eere.energy.gov/consumer/your_home/lighting_daylighting/index.cfm/mytopic=12020</p>
13	<p>Reduce electrical phantom plug loads -- also known as vampire loads (credit available for ONE of the following):</p> <p>Provide information on techniques for reducing plug loads</p> <p>Install whole house 'Master Off' switch or other control</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating information will be provided to owner Final Walkthrough</p> <p><u>INFORMATION:</u> Many appliances and devices waste electricity just by being plugged in (even if they are switched off!). Some appliances actually consume more electricity during the hours when they are not in use than during the times when they are. The technical term for this circumstance is "standby loss," however the consumer may be more familiar with the terms "phantom loads" or "vampire power." Methods for reducing these continuous energy losses include the use of smart socket adapters, and surge protectors with occupancy-controlled outlets. At least one company provides a system for shutting off all plug loads in a home with one master switch (see "Resources").</p>	1 3	<p><i>Intended to give credit for utilizing controls that minimize appliance energy use.</i></p>	<p>"How Vampire Power Works:" http://electronics.howstuffworks.com/vampire-power.htm</p> <p>GreenSwitch Energy Control System: http://greenswitch.tv</p>
14	<p>Whole-house automation system</p> <p><u>DOCUMENTATION:</u> Demonstration of system at final Walkthrough</p> <p><u>INFORMATION:</u> Whole-house automation systems are centrally controlled systems used to monitor the house and make adjustments to the heating, cooling, and lighting systems based on predetermined criteria or information provided by sensors. Data collected from sensors located throughout the house is used to maximize energy efficiency and comfort. These automation systems are managed via a computer, touch pad, remote control, or other device, and can also be used to control shades, turn off appliances, and monitor energy usage. Other subsystems that can also be automated are security and irrigation systems.</p>	4	<p><i>Intended to give credit for utilizing a system that provides advanced controls and monitoring</i></p>	<p>CEA TechHome (Industry Association): www.techhome.com/index.html</p> <p>The Custom Electronic Design & Installation Association (CEDIA) www.cedia.net/index.php</p>

Renewables		Item	Pt	Intent	Resources
15	<p>South roof area suitable for future solar hot water or photovoltaic collectors facing within 30° East or West of solar South</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Suitable roof area is defined as 100 sf (min.) of roof that is unshaded no earlier than 10 AM, and no later than 2 PM for all 12 months of the year. A roof facing due south will receive more sun than if it faced any other direction. By staying within 30° of south, collectors, solar hot water and photovoltaic will receive at least 95% of the total annual radiation of identical collectors facing true south (for most roof angles). The annual radiation available to the collectors begins to fall off more rapidly beyond 30° off of true south. See the figure to the right for the relative amount of annual solar radiation that would strike a collector (in Raleigh) at various orientations. These relationships will change very little for other locations in the state.</p>	2		<p><i>Intended to give credit for planning the use of renewable technologies.</i></p>	
16	<p>Rough-in for future solar energy system (credit available for ALL of the following):</p> <p>Chase installed for future solar energy system(s); 1 point each for PV and/or solar hot water system (max. 2 points)</p> <p>Appropriate conduit installed for photovoltaic system</p> <p>Insulated pipes and wiring installed for solar hot water system</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating that pipes and wiring are appropriate for future solar hot water system needs or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> In addition to providing south-facing roof area, the next step in preparing for a future solar energy system is to either provide a chase, or rough-in the piping, wiring, and conduit. 1. For a chase: provide minimum 6"x6" chase(s) for PV and/or solar hot water. 2. For future PV systems: provide appropriate sized conduit installed from near the current home circuit breaker panel to terminate in the attic space under the roof that will support the solar collectors. 3. For solar hot water systems: Install plumbing from the hot water tank location up to the roof. The piping should terminate in the attic space under the roof that will support the solar collectors, and it should be above the insulation for easy sighting. If there is no attic, the piping should end after penetrating the roof that will support the collectors. The two runs of piping shall be type M copper and be a minimum of 3/4 inch in diameter. All joints shall be soldered with lead-free solder. The piping shall be continuously insulated without any exposed piping with a minimum R-6. The pipe route should be as short as possible to limit heat losses and should be sloped so that the pipes can drain (1/4 inch per foot). If the pipes are not sloped so that they can drain the types of future solar hot water systems will be limited. Also, two-conductor twisted pair sensor wire (minimum gauge of 22) must be run along with the piping.</p>	1-2 1 2		<p><i>Intended to give credit for planning the use of renewable technologies.</i></p>	<p>Solar Water Heating overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=112</p> <p>Solar Water Heating overview (DOE): www.eere.energy.gov/de/solar_hotwater.html</p> <p>Solar Hot Water Education Resources including Training Video on Installation: www.solar-rating.org/education/education.htm</p>

17	Item	Pt	Intent	Resources
	Photovoltaic (solar electric) system contributes to home's total annual energy use <i>(credit available for ONE of the following):</i>			
	PV system offsets 1% to 100% of home's total annual source energy use -- To calculate points, multiply 0.6 by the percentage of total source energy use offset by the PV system, rounded to the nearest point.	1-60		
	PV system offsets 100% of home's total annual source energy use, PLUS has 2.0 kW additional PV capacity for charging plug-in hybrid vehicle	75		
	<p><u>DOCUMENTATION:</u></p> <p>Final Walkthrough and Signature of Responsible Party <u>Source Energy and Emissions</u> report from REM/Rate software with the calculation described below typed or handwritten on the report (see <u>Note</u>)</p> <p><u>Calculation of Points:</u> Points for this item equal 0.6 times the percent of the total annual <i>source energy</i> consumption of the home that is offset by the electricity produced by the photovoltaic system. This calculation must be made using the <i>Source Energy Consumption (MMBtu/yr) - As Designed</i> values from the REM/Rate <u>Source Energy and Emissions</u> report. The PV system 'consumption' is listed in the report as a negative number; the positive value of this number is the PV system Production number that is to be used in the equation below:</p> $\text{Points for item} = 0.6 \times \frac{\text{Photovoltaics Production (MMBtu/yr)}}{\text{Total Consumption (MMBtu/yr)} + \text{Photovoltaics Production (MMBtu/yr)}}$ <p><u>Note:</u> REM/Rate is the software typically used by HERS raters in NC. HERS rating software other than REM/Rate must be approved by HBH staff.</p> <p><u>INFORMATION:</u></p> <p>Photovoltaics (PV) converts sunlight directly into electricity which can be used in the home. PV solar systems require adequate roof space, and unobstructed access to sunlight. A south-facing orientation is best, but a solar system will still perform adequately at less than optimal orientation. Present and future shading by maturing trees or nearby construction is more likely to affect system performance. Ideally, PV systems should not be shaded during the peak solar window (approximately 9:00 a.m. to 3:00 p.m.). In NC a homeowner can either use the PV electricity in the home and sell extra electricity back to the utility (net metering), or sell all of the PV electricity to the NC Green Power program (see "Resources"). Both of these connection options are considered equally for this credit item.</p> <p>PV is also becoming an increasingly important approach for recharging batteries in plug-in hybrid vehicles. To encourage the adoption of this charging strategy using free energy from the sun, extra points are awarded for installing the additional 2.0 kW capacity needed to charge a typical plug-in hybrid vehicle for normal daily use.</p> <p><i>Source energy</i> consumption is used in the calculation of points for this credit item because it provides a more accurate comparison of total use energy than end use consumption. A helpful explanation of <i>source energy</i> and its use in evaluating energy consumption is provided at the ENERGY STAR web site (see "Resources"). Some of the other resources explain how PV works and how it adds value to a home.</p> <p>Financial incentives are available for solar thermal systems. For more information, see tax incentive information in "Resources."</p>		<p><i>Intended to give credit for utilizing renewable energy technology strategies for meeting energy needs.</i></p>	<p>PV Overview (DOE): www1.eere.energy.gov/solar/photovoltaics.html</p> <p>Photovoltaics for Homebuilders, including "A Homebuilder's Guide to Going Solar:" www1.eere.energy.gov/solar/pv_builders.html</p> <p>Photovoltaics for Homeowners: www.nrel.gov/learning/ho_photovoltaics.html</p> <p>Photovoltaics for Consumers: www1.eere.energy.gov/solar/pv_consumers.html</p> <p>PVWatts Calculator: www.nrel.gov/rredc/pvwatts/version1.html</p> <p>North Carolina GreenPower: www.ncgreenpower.org</p> <p>Understanding Source and Site Energy: www.energystar.gov/index.cfm?c=evaluate_performance.bus_benchmark_comm_bldgs#diff</p> <p>State and Federal tax incentives available for PV systems: www.dsireusa.org</p>

	Item	Pt	Intent	Resources
18	<p>On-site renewable electricity generation (wind turbine or micro-hydro system) provides 1% - 100% of home's total annual energy use</p> <p>-- To calculate points, multiply 0.6 times the percentage of total annual energy use, rounded to the nearest point</p> <p><u>DOCUMENTATION:</u></p> <p>Final Walkthrough and Signature of Responsible Party Results from wind or micro-hydro simulation software indicating annual electricity (kWh) production of wind or micro-hydro system, and <u>Source Energy and Emissions</u> report from REM/Rate software with the calculation described below typed or handwritten on the report (see <u>Note</u>)</p> <p><u>Calculation of Points:</u> Points for this item equal 0.6 times the percent of the total annual source energy consumption of the home that is offset by the electricity produced by the wind or micro-hydro system. This calculation must be made using: 1) the <i>Source Energy Consumption (MMBtu/yr) - As Designed</i> values from the REM/Rate <u>Source Energy and Emissions</u> report and 2) the annual electricity (kWh) production of the wind or micro-hydro system from wind or micro-hydro simulation software. If the home also has a PV system, the PV system production must be added to the <i>Total</i> source energy consumption in order to determine the source energy consumption of the house without the PV system. The 0.0034 factor in the equation converts kWh/yr into MMBtu/yr. The 3.33 factor converts the electricity generated onsite into the source energy needed to deliver this amount of electricity from a fossil fueled power plant.</p> $\text{Points} = 0.6 \times \frac{\text{Wind or Micro-hydro Production (kWh/yr)} \times 0.0034 \text{ (MMBtu/yr)/(kWh/yr)} \times 3.33}{\text{Total Consumption (MMBtu/yr)} + \text{Photovoltaics Production (MMBtu/yr)}}$ <p><u>Note:</u> REM/Rate is the software typically used by HERS raters in NC. HERS rating software other than REM/Rate must be approved by HBH staff.</p> <p><u>INFORMATION:</u></p> <p>Most wind turbines require a steady wind of 5.5 to 10 mph in order to provide any electricity; this is known as the cut-in wind speed. In order for a site to be an economical location for a residential wind turbine the site needs to consistently provide winds above 6 or 7 mph. Modern residential wind turbine systems are grid-tied, which means any electricity the home needs that is not supplied by wind will come from the utility grid. Conversely, if the wind turbine produces more than the home needs this power is sold to the utility and put onto the grid. All of this is done automatically. There are no batteries in a modern residential wind system. Wind turbine systems are eligible to supply NC GreenPower with clean energy. For more information see the GreenPower website listed in resources.</p> <p>Micro-hydro is often defined as an installation producing less than 10kW of electrical energy, small hydro as one producing less than 10 MW. Only installations that can produce power with minimal impact on the stream and its life should be considered. Often micro-hydro can divert only part of the water flow and does not require a dam. A hydro system requires a suitable rainfall catchment area, a hydraulic head, a pipe or millrace carrying water to the turbine, and a turbine house containing power generation and water regulation equipment. While hydro could be used as mechanical energy to do any number of tasks, it is almost always used to generate electricity.</p> <p>See item 17 for information on <i>source energy</i>.</p>	1-60	<p><i>Intended to give credit for utilizing renewable energy technology strategies for meeting energy needs.</i></p>	<p>American Wind Energy Association site on Small Wind in North Carolina: www.awea.org/smallwind/northcarolina.html</p> <p>Wind Energy for Homeowners (NREL): www.nrel.gov/learning/ho_wind.html</p> <p>Consumers Guide to Small Wind Systems (DOE): www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind/small_wind_guide.pdf</p> <p>North Carolina GreenPower: www.ncgreenpower.org</p> <p>Hydroelectric Energy (NCSEA): www.ncsustainableenergy.org/resources/renewable/microhydro</p> <p>Introduction to Micro-hydro and list of more resources (DOE): www.eere.energy.gov/tribalenergy/guide/hydropower_small.html</p> <p>Understanding Source and Site Energy: www.energystar.gov/index.cfm?c=evaluate_performance.bus_benchmark_comm_bldgs#diff</p>

	Item	Pt	Intent	Resources
19	<p>Photovoltaic (solar electric) powered well water pumping system</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> PV is an ideal candidate for water pumping applications. These systems may be either direct systems, operating the pump only when the sunlight is sufficient, or they may pump water to an elevated or pressurized storage tank during sunny hours to provide available water at any time. Either system avoids the use of batteries, resulting in a decrease in initial cost and reducing maintenance needs.</p>	6	<p><i>Intended to give credit for utilizing renewable energy technology strategies for meeting energy needs.</i></p>	<p>Photovoltaic Applications (NC Solar Center): www.ncsc.ncsu.edu/information_resources/factsheets/PVApplication.pdf</p> <p>Detailed Information on PV Water Pumping: www.itdg.org/docs/technical_information_service/solar_pv_waterpumps.pdf</p>
20	<p>Battery back-up system for photovoltaic system</p> <p><u>DOCUMENTATION:</u> Final Walkthrough System sizing calculations signed by Responsible Party</p> <p><u>INFORMATION:</u> A battery back-up system can be added to a grid-tied PV system to supply a source of electricity, and a means for energy storage, during a power outage. Battery back-up for PV systems require high quality "deep-cycle" batteries, such as those used in fork lift or golf cart applications. PV systems with battery storage need a good quality charge controller to insure that the battery is never over-charged. Some chargers have a load controller built in to prevent the battery from being overly discharged. Over-charge and over-discharge can cause permanent damage to a battery. Sealed batteries require less maintenance than unsealed batteries. Depending on the amount of use, batteries will need to be replaced every 3 to 7 years.</p>	5	<p><i>Intended to give credit for providing an alternate source of power for critical systems.</i></p>	<p>Photovoltaic Fact Sheet (NC Solar Center): www.ncsc.ncsu.edu/information_resources/factsheets/PVElecSun.pdf</p>
21	<p>Photovoltaic (solar electric) panel for powering solar hot water circulation pump</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> Solar domestic hot water systems can use PV modules to convert sunlight into direct current (DC) electricity to power a DC pump that circulates water through the solar collectors. Typically a PV powered pump is limited to pressurized glycol systems because the pump never has to pump fluid up to a dry collector. Drainback systems on the other hand require a larger pump to overcome the head of pumping fluid to a dry collector each time the system starts up. Therefore, in order to use a PV powered pump on a drainback system a much larger panel is needed. A PV powered pump can only run when there is enough sunlight to pump water through the collectors, thus PV powered pump serves as the system controls as well. These systems are very simple, and tend to be reliable and efficient, providing hot water when other systems have been shut down by power outages.</p>	2	<p><i>Intended to give credit for utilizing renewable technology strategies for meeting energy needs.</i></p>	<p>Passive and Active Solar Domestic Hot Water Systems (NC Solar Center) www.ncsc.ncsu.edu/information_resources/factsheets/SolarDHW.pdf</p>
22	<p>Active solar domestic hot water system</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> In the southeast, heating hot water is typically about 15% of the energy use in a home. A typical solar hot water system can provide 50% to 85% of the energy needed to heat hot water in a year. The amount of hot water that solar energy will provide depends on the type and size of the system, the climate, and the quality of the site in terms of solar access (direction it faces and shading). All types of solar hot water systems include a back-up heating system so that the homeowners are never without hot water. See tax incentive information in "Resources."</p>	12	<p><i>Intended to give credit for utilizing renewable energy technology strategies for meeting energy needs.</i></p>	<p>Residential Solar Hot Water Systems (NC Solar Center) www.healthybuilt homes.org/docs/Solar%20Thermal_final_TC_DS.pdf</p> <p>State and Federal tax incentives available for PV systems: www.dsireusa.org</p>

	Item	Pt	Intent	Resources
23	<p>Active solar thermal heating system provides 2% - 100% of space heating needs -- To calculate points, multiply 0.3 by the percentage of total space heating energy consumption met by the solar thermal heating system, rounded to the nearest point</p>	1-30		
	<p><u>DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party, and <u>Component Consumption Summary</u> report from REM/Rate software with the calculation described below typed or handwritten on the report (see <u>Note</u>).</p> <p><u>Calculation of Points:</u> Points for this item equal 0.3 times the percent of the total <i>Heating Season</i> energy consumption met by the <i>Active Solar</i> heating system. This calculation must be made using the <i>Heating Season</i> energy values from the REM/Rate <u>Component Consumption Summary</u> report. The <i>Active Solar</i> system 'Consumption' is listed in the report as a negative number; the positive value of this number is the <i>Active Solar</i> Production that is to be used in the equation below:</p> <p>Points for item = $0.3 \times \frac{\text{Active Solar Production (MMBtu/yr)}}{\text{Total Consumption (MMBtu/yr)} + \text{Active Solar Production (MMBtu/yr)}}$</p> <p><u>Note:</u> REM/Rate is the software typically used by HERS raters in NC. HERS rating software other than REM/Rate must be approved by HBH staff.</p> <p><u>INFORMATION:</u> Active space heating typically consists of a group of solar hot water collectors plumbed to a large hot water tank. Such a system can be used for both space heating and for domestic hot water. The solar heated water, which is kept above a minimum temperature with a backup energy source, is pumped through an in-floor heating system (radiant flooring) or a water to air heat exchanger in the HVAC system air handler to provide heating for the home. Such a system is a very economical use of solar energy and creates a comfortable environment inside the home during the winter.</p> <p>A system that supplies a large percentage of space heating will have some unused capacity in the summer time. When there is no fluid moving through them, the solar collectors can reach very high temperatures. High temperatures can start to break down the antifreeze (glycol) in a pressurized glycol system and cause it to turn acidic. If the glycol is not tested for acidity and replaced when it becomes too acidic, there is a chance for corrosion and even failure of the system. This situation can be avoided by using a drainback system for space heating applications, or by including adequate over temperature protection with a heat dumping system.</p> <p><u>Note:</u> Financial incentives are available for solar thermal systems. For more information, see tax incentive information in "Resources."</p>		<p><i>Intended to give credit for utilizing renewable energy technology strategies for meeting energy needs.</i></p>	<p>Space Heating with Active Solar Energy Systems (NC Solar Center): www.ncsc.ncsu.edu/information_resources/factsheets/20acsph.pdf</p> <p>State and Federal tax incentives available for PV systems: www.dsireusa.org</p>

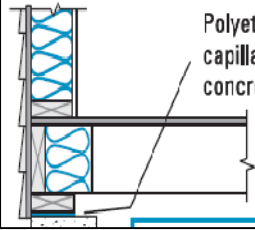
	Item	Pt	Intent	Resources										
24	<p>Sealed-combustion, biomass based solid fuel burning stove designed for space heating, with outside combustion air; EPA Certified</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party EPA certification must be available</p> <p><u>INFORMATION:</u> Today you can choose from a new generation of wood- and pellet-burning appliances that are cleaner burning, more efficient, and powerful enough to heat many average-sized, modern homes. These stoves emit more carbon dioxide and other pollutants than a natural gas furnace producing the same amount of heat, but the carbon is released from a renewable source. It is important to use a properly sized appliance for the space to be heated. When an appliance is too big, residents tend to burn fires at a low smolder to avoid overheating, which wastes fuel and causes a significant increase in air pollution.</p>	2	<p><i>Intended to give credit for utilizing a renewable fuel source for space heating.</i></p>	<p>Consumer's guide to Wood and Pellet Heating (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12570</p> <p>Information on the Emissions of Biomass Burning: http://burningissues.org/car-www/index.html</p>										
25	<p>Provide information on the NC GreenPower Program</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating information on the NC GreenPower Program will be provided to the owner or with the home upon closing.</p> <p><u>INFORMATION:</u> NC GreenPower is an independent, nonprofit program that uses voluntary contributions to purchase electricity generated from renewable energy sources to add to the state's power supply. Individuals may contribute as little as \$4 per month to add one block of 100 kilowatt-hours of renewable energy to the grid. More contributions mean more renewable energy produced in North Carolina, making North Carolina's environment healthier for everyone. All NC GreenPower contributions are tax-deductible. Each \$4 block purchased for a full year saves over 2,500 lbs of carbon dioxide and provides as much electricity as burning over 950 lbs of coal at a power plant.</p>	1	<p><i>Intended to give credit for utilizing a program that supports the growth of renewable energy infrastructure in NC.</i></p>	<p>North Carolina GreenPower: www.ncgreenpower.org</p> <p>Two Page Color Overview of NC GreenPower, including how to sign up: www.ncgreenpower.org/elements/pdfs/NCGP%20Glance%20Residential.pdf</p>										
26	<p>Buyer enrolls for one year in the NC GreenPower program for estimated energy use. Buyer purchases amounts based on the number of bedrooms in the home.</p> <p><i>Note: houses less than 1500 s.f. may use the 1 bedroom enrollment figure</i></p> <table border="1" data-bbox="142 1008 1205 1195"> <tr> <td>1 bedroom</td> <td>100 kWh (1 NC GreenPower block = \$4 per month)</td> </tr> <tr> <td>2 bedroom</td> <td>200 kWh</td> </tr> <tr> <td>3 bedroom</td> <td>400 kWh</td> </tr> <tr> <td>4 bedrooms</td> <td>600 kWh</td> </tr> <tr> <td>5 bedrooms or more</td> <td>800 kWh</td> </tr> </table> <p><u>DOCUMENTATION:</u> Copy of NC GreenPower enrollment form signed by the buyer</p> <p><u>INFORMATION:</u> See item above.</p>	1 bedroom	100 kWh (1 NC GreenPower block = \$4 per month)	2 bedroom	200 kWh	3 bedroom	400 kWh	4 bedrooms	600 kWh	5 bedrooms or more	800 kWh	5	<p><i>Intended to give credit for utilizing a program that supports the growth of renewable energy infrastructure in NC.</i></p>	<p>North Carolina GreenPower: www.ncgreenpower.org</p>
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4 bedrooms	600 kWh													
5 bedrooms or more	800 kWh													

	Item	Pt	Intent	Resources
27	<p>Utility Bill Agreement signed by homeowner (credit available for ONE of the following):</p> <p>Provide 12 months of electric and gas (if applicable) utility bills</p> <p>Provide all the above including water utility bills</p> <p><u>DOCUMENTATION:</u> Signed Utility Bill agreement</p> <p><u>INFORMATION:</u> The HealthyBuilt Homes program would like to collect data reflecting the electricity, gas, and water usage of HealthyBuilt homes. To encourage this, points are awarded if the homeowner agrees to collect 12 months of utility bills and provide these to the HealthyBuilt Homes program. To earn credit for this item, the Utility Bill Agreement letter template must be signed by the homeowner and submitted to HealthyBuilt Homes statewide staff. A copy of the Utility Bill Agreement letter template, is provided in the "Templates" section of the HBH Reference Manual.</p>	3 4	<p><i>Intended to give credit for providing energy and water usage data for analysis of the HBH program goals.</i></p>	
<i>Innovation Points</i>				
28	<p>Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Indoor Air Quality Opportunities (Minimum Points: 15)

[Back](#)

	Item	Pt	Intent	Resources
1	<p>House complies with recognized Indoor Air Quality (IAQ) standard or specification <i>House complies with the EPA Indoor airPLUS Program</i> <i>Other program: points determined by HBH staff</i></p> <p><u>DOCUMENTATION:</u> Copy of documentation certificate or label provided by the program that indicates the home has met their specific requirements</p> <p><u>INFORMATION:</u> The EPA Indoor airPLUS Program specification provides prescriptive measures for achieving a healthy indoor air environment. Other programs or specifications providing similar measures may also qualify.</p>	8	<p><i>Intended to give credit for participating in a recognized program promoting healthy indoor air quality.</i></p>	<p>EPA Indoor airPLUS Program: www.epa.gov/indoorairplus/index.html</p>
Structural Air Quality				
2	<p>Attached garage is isolated from house by extensive air-sealing; the garage-to-house pressure is at least 47 Pascals when the house is depressurized to 50 Pascals below ambient</p> <p><u>DOCUMENTATION:</u> Pressure test results indicating compliance</p> <p><u>INFORMATION:</u> <i>Note:</i> penetrations between a home and its attached garage must be sealed properly. An air barrier must be created to restrict air exchange between the garage/attic space over the garage and the living space. This can be accomplished by caulking and sealing of the top and bottom wall plates of the shared garage-living space walls, constructing an airtight partition between the garage attic space and the attic space over the living area, and weather stripping the garage door.</p> <p>A pressure test must be performed demonstrating that the garage to house pressure is at least 47 Pascals in order to receive item points.</p>	4	<p><i>Intended to give credit for reducing the potential for the introduction of air pollutants into conditioned space.</i></p>	<p>Air Sealing Factsheet: www.southface.org/web/resources&services/publications/factsheets/sf_factsheet-menu.htm</p> <p>Air Barriers—Airtight Drywall Approach: www.buildingscience.com/documents/information-sheets/4-air-barriers/air-barriers2014airtight-drywall-approach/?searchterm=air%20sealing</p>
3	<p>Detached garage or no garage (restrictions apply for no garage)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough Site layout indicating garage and/or home footprint and setbacks</p> <p><u>INFORMATION:</u> Home has a detached garage that does not share any common walls or passageways with the enclosed living space. The American Lung Association suggests building a detached garage to protect the living space against exposure to carbon monoxide levels found in the garage. Points for <u>no garage</u> will only be awarded if the footprint of the home is laid out such that no future garage could be added to the home. Documentation is a site layout indicating footprint and setbacks. These points should mostly assist multi-family housing as well as affordable housing/infill housing.</p>	5	<p><i>Intended to give credit for minimizing the potential for air pollutants associated with garages.</i></p>	<p>Carbon Monoxide and Garages: http://www3.abe.iastate.edu/human_house/aen207.asp</p>

	Item	Pt	Intent	Resources
4	<p>Capillary break between foundation and framing</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> A capillary break shall be installed between a concrete foundation wall and the sill plate. The capillary break should be a sill gasket, EPDM-type rubber, or other suitable membrane that can prevent bulk moisture from reaching the framing by way of capillary action.</p>	1	<p>Intended to give credit for integrating water management strategies into the building assembly in order to reduce moisture related problems.</p>	 <p>Polyethylene sill seal acts as capillary break between concrete and wood sill.</p> <p>NY State Div. of Code Enforcement & Admin: www.dos.state.ny.us/CODE/energycode/Forms_code/Rmanfound.pdf</p>
5	<p>Drainage board for below grade walls</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> All below grade walls shall be damp-proofed and feature a drainage plane material on the exterior of the wall that channels water down to the drain tile. Drainage plane materials include special drainage mats, high-density fiberglass insulation products, and washed gravel.</p>	2	<p>Intended to give credit for integrating water management strategies into the building assembly to reduce moisture related problems.</p>	<p>Drainage plane detail on a basement wall: www.eere.energy.gov/consumer/your_home/insulation_airsealing/index.cfm/mytopic=11770</p> <p>Drainage board overview: www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=709</p>
6	<p>Continuous foundation drain at outside perimeter edge of footing</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> A continuous foundation drain, flush with the bottom of the footing and covered with silt protection fabric, gravel, or both, shall be installed. All footing drain lines shall be connected away and downhill from the foundation.</p>	2	<p>Intended to give credit for integrating water management strategies into the building assembly to reduce moisture related problems.</p>	<p>Foundation Drainage technical sheet: www.pathnet.org/sp.asp?id=14136</p>
Appliance Air Quality				
7	<p>Duct protection throughout construction (credit available for ONE of the following):</p> <p>Protect ALL ducts from dirt and debris</p> <p>Seal ALL ducts from dust intrusion in addition to dirt and debris</p> <p><u>DOCUMENTATION:</u> Final Walkthrough (look at filter, spot check ducts) Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> All duct boots and other openings shall be protected from contamination during construction, including during sheetrock, finish floor installation, and painting. Duct openings should be protected with a fixed, stable cover or other technique that securely prevents entry of dirt and debris on a continuous basis. Sealing duct openings with a temporary register seal provides an extra level of protection against dust, and avoids the need for duct cleaning before occupancy. Seal edges of covered openings with tape or other appropriate sealant.</p>	2 4	<p>Intended to give credit for taking preventive measures to assure air distribution systems are not a source of indoor contaminants.</p>	<p>Indoor Environmental Quality During Construction: www.ehs.uci.edu/programs/ih/IEQinConstruction.html</p>

	Item	Pt	Intent	Resources
8	<p>Filters rated MERV 8 or greater installed on forced air systems; system static pressure must be designed and calculated to perform with the higher efficiency filter installed (credit available for ONE of the following):</p> <p>MERV 8</p> <p>MERV 9</p> <p>MERV 11</p> <p>MERV 13 or greater (includes HEPA or "HEPA-like" filters)</p> <p>DOCUMENTATION:</p> <p>Final Walkthrough (must be accessible)</p> <p>Signature of Responsible Party indicating system pressure has been adjusted to perform with the MERV 8 or greater filter installed.</p> <p>INFORMATION:</p> <p>MERV stands for Minimum Efficiency Reporting Value, and is an industry standard which rates how well a filter performs. The higher the MERV rating, the more efficient the filter, and the more particulates it can remove. However, MERV 8 or higher creates greater resistance to air flow than other filters. In order to achieve proper performance with a high MERV filter, the air handler must be adjusted to provide adequate pressure to maintain the designed air flows.</p> <p>To trap a reasonable range of household pollutants, filters should block particles as small as 0.3 microns. High Efficiency Particle Arresting (HEPA) filters, by definition, will trap 99.97% of all particles down to 0.3 microns in size. Particles under the 5 micron size are the most troubling for asthmatics since that is the ideal size to penetrate deep into the lungs.</p> <p>The chart on the right, from Oikos Green Building Source (http://oikos.com/esb/31/airfilters.html), demonstrates filter effectiveness for pollutants of various particle sizes. The filter types represented include: Furnace Filter, Passive Electrostatic filters, Pleated filters, Electronic filters, and HEPA filters. Red indicates that more than 95% of particles are being removed, pink indicates less than 95% of particles are being removed, and white indicates that particles of that size are passing through (not trapped by the filter).</p>	1		
		2		
		3		
		5	<p><i>Intended to give credit for using high efficiency air filtration to reduce the potential for air pollutants.</i></p>	<p>Choosing an air filter (details effectiveness for different particle sizes): http://oikos.com/esb/31/airfilters.html</p>
				<p>The chart displays the effectiveness of different filter types across a range of particle sizes. The x-axis represents particle size in microns on a logarithmic scale from 0.01 to 100.0. The y-axis lists filter types: Furnace Filter, Passive Electrostatic, Pleated Filter (40% DS efficiency), Electronic, and HEPA Filter. Horizontal bars indicate the range of particle sizes that a filter effectively captures. Red bars indicate removal of more than 95% of particles, while pink bars indicate removal of less than 95%. Various pollutants are plotted along the x-axis, including Viruses, Combustion Gases, Tobacco Smoke, Face Powder, Wood Smoke, Bacteria, Dust Mite Feces, Cooking Particles, Sneezed Droplets, Spores/Mold, Pollen, Human Hair, Spray Paint, Lint, and Sawdust.</p>

	Item	Pt	Intent	Resources
9	<p>Interior relative humidity monitored and controlled (credit available for ALL of the following):</p> <p>Install humidity monitoring system (both indoor & outdoor sensors)</p> <p>Central dehumidification system installed</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> A humidity monitoring system is installed with a mobile base unit that displays a reading of temperature and relative humidity at the base unit and at least two remote units. One remote unit is placed permanently inside the conditioned space in a central location, excluding attachment to exterior walls, and another remote unit is placed permanently outdoors.</p> <p>A vapor compression, desiccant, or similar system shall be installed to remove moisture from all conditioned areas and be designed to maintain interior relative humidity at or below 50% at 75 degrees Fahrenheit. Maintaining a relative humidity below 60% will help inhibit the mobility of dust mites as well as reduce the occurrence of mold. Dehumidification by a ventilation and purification system is most useful when outdoor humidity is high, but temperatures are low enough to preclude cooling.</p>	1 3	Intended to give credit for providing a system that monitors and/or manages the latent heating load (i.e. humidity) in a home.	<p>Central Air Purification/Ventilation/Dehumidification Systems tech sheet: www.toolbase.org/techinv/techDetails.aspx?technologyID=155</p>
10	<p>Bath exhaust fan controls (ALL baths with showers) (credit available for ONE of the following):</p> <p>Fans controlled by timer</p> <p>Fans controlled by humidistat</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Controls such as timers or humidistats are important to ensure that fans are left on long enough to remove sufficient moisture. They also prevent fans from being inadvertently left on for long periods of time due to their quiet operation. A humidistat is an advanced control that operates the fan based on humidity levels.</p>	1 2	Intended to give credit for controls that support owner use of effective spot ventilation.	<p>Spot Ventilation fact sheet: www.nrel.gov/docs/fy03osti/26466.pdf</p>

	Item	Pt	Intent	Resources
11	<p>Bath exhaust fan upgrades (credit available for ALL of the following) :</p> <p>Install ENERGY STAR labeled fans in all baths with showers</p> <p>Field test ALL exhaust fans to meet ASHRAE 62.2 standards: Bath - 50 CFM (min.); Kitchen -100 CFM (min.)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Cut sheet or make & model number must be available Test results</p> <p><u>INFORMATION:</u> ENERGY STAR fans are more energy efficient than non-labeled fans, and require a low sone rating (low noise level). A fan with a low sone rating operates at nearly undetectable noise levels, reducing the amount of "white noise" in a household and increasing the likelihood the fan will be used when needed. Since installation can affect the actual CFM a fan will pull, fans must be tested after installation to demonstrate they are exhausting the minimum required CFM. Factory ratings alone are not sufficient. To receive credit for field testing, all exhaust fans must be tested with equipment that demonstrates that they meet the ASHRAE 62.2 standards.</p>	1 3	Intended to give credit for providing effective spot ventilation with minimal noise pollution.	<p>ENERGY STAR rated bath fans factsheet: www.energystar.gov/ia/products/heat_cool/vent_fans/Arverne_case_study.pdf</p> <p>List of ENERGY STAR rated fans: www.energystar.gov/index.cfm?c=vent_fans.pr_ve nt_fans</p>
12	<p>Exhaust fan in attached garage controlled by timer (100 CFM min.)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Install a fan capable of fully exchanging the garage air with the outside air in 15 minutes or less. A typical 20ft x 20ft x 8ft garage would require a 220 CFM fan. The fan must be programmed to run for a sufficient amount of time to fully exhaust carbon monoxide and other pollutants from automobiles. Ideally, the timer should be activated by the operation of the garage door.</p>	2	Intended to give credit for using effective exhaust ventilation to reduce air pollutants from combustion engines.	<p>Spot Ventilation Fact Sheet: www.toolbase.org/Home-Building-Topics/Indoor-Air-Quality/spot-ventilation</p>
13	<p>Carbon monoxide (CO) detector upgrade (credit available for ALL of the following) :</p> <p>Install CO detector in mechanical equipment area</p> <p>Install CO detectors that display both high and low levels of CO; at least one detector must be installed on each floor</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> In addition to the requirement stated in Prerequisite 6, a carbon monoxide detector is installed in the area of any major gas burning appliances such as a furnace or water heater, and on the living area side of the garage entrance door (if applicable). Installation in these areas ensures rapid detection of any potential problems. Detectors should not be placed within five feet of gas fueled appliances or near cooking or bathing areas. Leading brands of carbon monoxide detector technologies suggest mounting the detector high since CO often rises with the warm air of combustion exhaust. Low-level CO exposure is also of concern, especially for the young, elderly, and those with health problems. Detectors that display both high and low CO levels provide greater accuracy and more information.</p>	1 2	Intended to give credit for increasing the safety of occupants by providing monitoring of a potentially dangerous indoor air pollutant.	<p>Carbon Monoxide detectors—UL standard: www.homesafe.com/coalert/detect.htm</p> <p>Features To Look for When Purchasing a CO Detector: www.cmhc-chl.gc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_002.cfm</p>

	Item	Pt	Intent	Resources
14	<p>Radon detection and mitigation (credit available for ALL of the following):</p> <p>EPA Indoor airPLUS guidelines used to test for radon</p> <p>Radon-resistant gas vent system installed (does not require activation)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating test kits and instructions will be provided to the homeowner Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> The home can be tested once it is finished using a charcoal canister that is sent to a lab for analysis. A radon test must comply with EPA guidelines. Please note that indoor radon levels vary from home to home. Do not rely on radon test results taken in other homes in the neighborhood - even ones next door - to estimate the radon level in your home.</p> <p>It is more cost-effective to include radon-resistant techniques while building a home, rather than installing a radon reduction system in an existing home. A radon gas vent system can be effectively and inexpensively constructed out of common construction materials. Such a system can be converted to an active radon reduction system (including the installation of a fan) if high levels of radon are detected. The EPA provides details of radon gas vent systems on the EPA Radon website.</p>	2 3	Intended to give credit for using effective radon mitigation strategies.	<p>EPA Indoor airPLUS Program: www.epa.gov/indoorairplus/index.html</p> <p>EPA Radon website: www.epa.gov/radon/index.html</p> <p>How to Test Your Home: www.epa.gov/radon/pubs/citguide.html#howtotest</p> <p>Radon information, test kits and construction details: www.ncradon.org</p>
15	<p>Alternative termite treatment that uses low toxicity chemicals or eliminates chemical termite treatments (see <u>INFORMATION</u>)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> For a list of approved termite treatments contact the NC Dept. of Agriculture (see "Resources"). Many of these treatments are conventional and will not receive credit for this item. However, only treatments that are both low toxicity AND included on this list will meet the requirements.</p> <p>Alternative termite treatments use low toxic chemicals or do not use a chemical treatment at all to prevent or control termites. The NC Dept. of Agriculture approves the effectiveness of a product to kill termites, including both traditional and alternative strategies. Alternative treatments currently approved by the NC DOA include but are not limited to:</p> <ul style="list-style-type: none"> • Impasse • Bora-Care Termiticide, Insecticide, Fungicide • Sentricon Termite Colony Elimination System • EXTERRA Termite Interception and Baiting System <p>Bait systems do not attract termites to the property, but act as traps to deter termites from the home. They come with various monitoring programs, and some bait systems are non-toxic. Many alternative termite treatments are combined with other strategies as part of an integrated pest management system. Note that a "sole source" product is one that can be used as the only termiticide on a project.</p>	4	Intended to give credit for minimizing the use of pesticides while adhering to NC State regulations focused on durability and safety of structures.	<p>List of termite treatments approved by the NC Dept. of Agriculture (only some approved treatments are considered alternative, see <u>INFORMATION to the left</u>): www.agr.state.nc.us/SPCAP/structural/Termiticide_List.html</p> <p>Examples of chemical and non-chemical strategies: www.ces.ncsu.edu/depts/ent/notes/Urban/termites/pre-con.htm</p> <p>A list of prohibited pesticides can be found at this resource in Section 2.1: www.wbdg.org/design/greenspec_msl.php?s=108150</p>

Item	Pt	Intent	Resources
IAQ Material Use			
<p>16 Low or zero formaldehyde insulation throughout house (credit available for ONE of the following):</p> <p>Insulation is Greenguard certified</p> <p>Insulation is 100% formaldehyde-free</p> <p>DOCUMENTATION: Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: Formaldehyde has no thermal or acoustical value and therefore does not affect the insulating quality of a product. All insulation applications in the house must be formaldehyde-free in order to receive points for this item.</p>	<p>1</p> <p>2</p>	<p>Intended to give credit for utilizing building materials that contribute minimal or no pollutants associated with poor indoor air quality.</p>	<p>IAQ and Formaldehyde, Texas Cooperative Extension: http://fcs.tamu.edu/housing/healthy_homes/indoor_air_quality/formaldehyde/formaldehyde.php</p>
<p>17 Reduce formaldehyde used in bio-based materials -- add 1 additional point for each product that is formaldehyde-free (credit available for ALL of the following):</p> <p>All sheathing is free of added urea formaldehyde (exterior & interior)</p> <p>All subfloor is free of added urea formaldehyde</p> <p>All kitchen/bath cabinetry/casework is free of added urea formaldehyde</p> <p>All countertops are free of added urea formaldehyde</p> <p>All closet shelving is free of added urea formaldehyde</p> <p>DOCUMENTATION: Signature of Responsible Party</p> <p>INFORMATION: Formaldehyde is a colorless, pungent-smelling gas that can cause watery eyes, burning sensations in the eyes and throat, nausea, and difficulty in breathing in some humans exposed at elevated levels (above 0.1 parts per million). High concentrations may trigger attacks in people with asthma. There is evidence that some people can develop a sensitivity to formaldehyde. It has also been shown to cause cancer in animals and may cause cancer in humans.</p> <p>Most OSB contains resins with formaldehyde binders and will continue to off gas for several months after installation. OSB with phenol formaldehyde (PF) binders omits less VOC's than urea formaldehyde (UF) binders.</p> <p>Medium density fiberboard (MDF), used for drawer fronts, cabinets, and furniture tops, contains a higher resin-to-wood ratio than any other UF pressed wood product and is generally recognized as being the highest formaldehyde-emitting pressed wood product.</p>	<p>1-2</p> <p>2-3</p> <p>2-3</p> <p>2-3</p> <p>2-3</p>	<p>Intended to give credit for utilizing building materials that contribute minimal or no pollutants associated with poor indoor air quality.</p>	<p>Sources of Indoor Air Pollution – Formaldehyde: www.epa.gov/iaq/formalde.html</p>

	Item	Pt	Intent	Resources																
18	<p>Low toxicity adhesives meet or exceed the Green Seal Standard for Commercial Adhesives (GS-36) (credit available for ONE of the following):</p> <p>Use low toxicity adhesives and plasticizer-free grout on all ceramic tile</p> <p>Use low toxicity adhesives throughout the home (see Chart in "Resources")</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> When set in cement (thin-set) without additives, <u>ceramic tiles</u> can have very low VOC off-gassing emissions. If using an adhesive to set the tile, specify for a low VOC (130g/l or less) adhesive as well as a plasticizer-free grout. Plasticizers in grout are additives, most commonly phthalates, that soften the final product, increasing its flexibility. Plasticizers can evaporate or emit VOC's while curing, which tend to concentrate in an enclosed space and potentially be inhaled by the occupants.</p> <p>Water based <u>adhesives</u> typically qualify. A "non-solvent" based product in this case is a product that does not use a volatile organic compound (such as ethanol, acetone, hexane or toluene) as its solvent and therefore is less toxic and produces fewer to zero VOC's. Using water as a base solvent instead of a carbon-based chemical is one way to achieve low VOC ratings. To access the complete list of VOC content limitations as required by the Green Seal Standard refer to the (GS-36) link listed under "Resources."</p>	1 3	<p>Intended to give credit for utilizing building materials that contribute minimal or no pollutants associated with poor indoor air quality.</p>	<table border="1"> <thead> <tr> <th data-bbox="1488 118 1814 142">Adhesive Type</th> <th data-bbox="1814 118 1986 142">VOC's in g/l minus water</th> </tr> </thead> <tbody> <tr> <td data-bbox="1488 151 1814 175">Carpet Pad Installation</td> <td data-bbox="1814 151 1986 175">150</td> </tr> <tr> <td data-bbox="1488 175 1814 199">Ceramic Tile Installation</td> <td data-bbox="1814 175 1986 199">130</td> </tr> <tr> <td data-bbox="1488 199 1814 224">Contact Bond</td> <td data-bbox="1814 199 1986 224">250</td> </tr> <tr> <td data-bbox="1488 224 1814 248">Indoor Floor Covering Installation</td> <td data-bbox="1814 224 1986 248">150</td> </tr> <tr> <td data-bbox="1488 248 1814 272">Multipurpose Construction</td> <td data-bbox="1814 248 1986 272">200</td> </tr> <tr> <td data-bbox="1488 272 1814 297">Waterproof Resorcinol Glue</td> <td data-bbox="1814 272 1986 297">170</td> </tr> <tr> <td data-bbox="1488 297 1814 321">Wood Flooring Adhesive</td> <td data-bbox="1814 297 1986 321">150</td> </tr> </tbody> </table> <p>Source: Green Seal Standard for Commercial Adhesives (GS-36) www.greenseal.org/certification/standards/commercial_adhesives_GS_36.cfm</p> <p>Air Pollution and Health: www.arb.ca.gov/research/health/fs/fs1/fs1.htm</p>	Adhesive Type	VOC's in g/l minus water	Carpet Pad Installation	150	Ceramic Tile Installation	130	Contact Bond	250	Indoor Floor Covering Installation	150	Multipurpose Construction	200	Waterproof Resorcinol Glue	170	Wood Flooring Adhesive	150
Adhesive Type	VOC's in g/l minus water																			
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Wood Flooring Adhesive	150																			
19	<p>All architectural sealants and sealant primers meet the SCAQMD Rule 1168 guidelines:</p> <p>Architectural Sealants: VOC limit: 250 g/L Architectural Sealant Primers (Non Porous): VOC limit: 250 g/L Architectural Sealant Primers (Porous): VOC limit: 775 g/L</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> DEFINITIONS from SCAQMD Rule 1168: - A SEALANT is any material with adhesive properties that is formulated primarily to fill, seal, or waterproof gaps or joints between two surfaces. Sealants include sealant primers and caulks. - A SEALANT PRIMER is any product applied to a substrate, prior to the application of a sealant, to enhance the bonding surface. - ARCHITECTURAL SEALANT OR SEALANT PRIMER is any sealant or sealant primer applied to stationary structures, ... and their appurtenances [i.e., homes and their accessories].</p>	2	<p>Intended to give credit for utilizing building materials that contribute minimal or no pollutants associated with poor indoor air quality.</p>	<p>South Coast Air Quality Management District (SCAQMD) Rule 1168: http://aqmd.gov/rules/reg/reg11/r1168.pdf</p>																

	Item	Pt	Intent	Resources																							
20	<p>All paints & coatings meet these VOC guidelines and/or toxicity guidelines (credit available for ALL of the following):</p> <p>All paint is Green Seal certified (Standard GS-11 for Paints and Coatings)</p> <hr/> <p>All paints and coatings have low to zero VOC content: Flat Coatings: VOC limit: < 50 g/L Non-flat Coatings: VOC limit: < 50 g/L</p> <hr/> <p>All paint is non-toxic (see Chart in INFORMATION)</p>	1 2 2																									
	<p>DOCUMENTATION: Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: Most major paint manufacturers now offer a low to zero VOC paint product. Be sure to check the actual VOC content printed on the paint label to verify the paint meets the low VOC standards identified in this item. Just the title "low-VOC" does not ensure that the actual VOC content meets the referenced standard. The VOC limits above are from the current SCAQMD Rule 1113 (see "Resources").</p> <p>Non-toxic paints do not carry chemical residuals and/or use only very highly refined raw materials that have either eliminated or reduced toxic residuals to minimal levels. While non-toxic paints are typically low-VOC, low-VOC paints are not always non-toxic. Toxic chemicals should be listed on the Material Safety Data Sheet (MSDS) for the product. A comprehensive list of toxic chemicals is provided in the chart below. The first column lists chemicals that are specifically prohibited by Green Seal standard GS-11 for Paints and Coatings (see "Resources"). The chemicals listed below should not be included in low toxicity paint.</p> <table border="0" data-bbox="163 846 1161 1065"> <thead> <tr> <th data-bbox="163 846 468 870">Specific GS-11 Prohibitions</th> <th colspan="2" data-bbox="510 846 793 870">Additional Toxic Chemicals</th> </tr> </thead> <tbody> <tr> <td data-bbox="163 873 468 898">1,2-dichlorobenzene</td> <td data-bbox="510 873 793 898">Benzene, Ethylbenzene</td> <td data-bbox="835 873 1161 898">Ethylene Glycol</td> </tr> <tr> <td data-bbox="163 901 468 925">Alkylphenol ethoxylates (APES)</td> <td data-bbox="510 901 793 925">Naphthalene</td> <td data-bbox="835 901 1161 925">n-Hexane</td> </tr> <tr> <td data-bbox="163 928 468 953">Formaldehyde donors</td> <td data-bbox="510 928 793 953">Toluene</td> <td data-bbox="835 928 1161 953">MTBE (methyl tert-Butyl ether)</td> </tr> <tr> <td data-bbox="163 956 468 980">Heavy metals</td> <td data-bbox="510 956 793 980">Crystalline silica</td> <td data-bbox="835 956 1161 980">Aromatic hydrocarbon compounds</td> </tr> <tr> <td data-bbox="163 984 468 1008">Phthalates</td> <td data-bbox="510 984 793 1008">Chloroform</td> <td data-bbox="835 984 1161 1008">Tetrachloroethylene</td> </tr> <tr> <td data-bbox="163 1011 468 1036">Triphenyl tins (TPT)</td> <td data-bbox="510 1011 793 1036">Isopropanol</td> <td data-bbox="835 1011 1161 1036" rowspan="2">& trichloroethylene</td> </tr> <tr> <td data-bbox="163 1039 468 1063">& tributyl tins (TBT)</td> <td data-bbox="510 1039 793 1063">Phenols</td> </tr> </tbody> </table>	Specific GS-11 Prohibitions	Additional Toxic Chemicals		1,2-dichlorobenzene	Benzene, Ethylbenzene	Ethylene Glycol	Alkylphenol ethoxylates (APES)	Naphthalene	n-Hexane	Formaldehyde donors	Toluene	MTBE (methyl tert-Butyl ether)	Heavy metals	Crystalline silica	Aromatic hydrocarbon compounds	Phthalates	Chloroform	Tetrachloroethylene	Triphenyl tins (TPT)	Isopropanol	& trichloroethylene	& tributyl tins (TBT)	Phenols		<p><i>Intended to give credit for utilizing paints and coatings that minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>Green Seal standard GS-11 for Paints and Coatings: www.greenseal.org/certification/standards/paints_and_coatings.pdf</p> <p>South Coast Air Quality Management District (SCAQMD) Rule 1113: http://aqmd.gov/rules/reg/reg11/r1113.pdf</p> <p>Low and No-VOC Paint factsheet, City of Austin: www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Resources/Fact%20Sheets/paint.pdf</p> <p>Health Concerns related to paint: www.co.thurston.wa.us/health/ehhm/paint.html</p>
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Triphenyl tins (TPT)	Isopropanol	& trichloroethylene																									
& tributyl tins (TBT)	Phenols																										

	Item	Pt	Intent	Resources
21	<p>Low emission stains and finishes on wood surfaces and flooring (credit available for ONE of the following):</p> <p>Use <u>stains</u> with VOC content <100 g/L (SCAQMD Rule 1113) on all wood floors and wood work</p> <p>Use <u>clear wood finishes</u> with VOC content <275 g/L (SCAQMD Rule 1113) on all wood floors</p> <p>Use <u>pre-finished flooring</u> that is GreenGuard certified</p> <p>DOCUMENTATION: Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: Low VOC stains and varnishes can use water as a carrier instead of petroleum-based solvents, resulting in lower levels of harmful emissions than solvent borne coatings. Water-based urethane finishes result in lower levels of harmful emissions than petroleum solvent borne coatings. A water-based urethane finish can also, in some cases, be used as a seal to prevent offgassing from flooring materials. SCAQMD (see "Resources") specifies VOC limits that are referenced by a number of green building standards.</p> <p>Factory applied finishes generally contribute less VOC's than finishes applied in the field. Depending upon the process, a pre-finished floor might qualify for this item. Visit the GreenGuard Product Guide (see "Resources") for qualifying products.</p>	2 2 2	Intended to give credit for utilizing stains and finishes that minimize off gassing of pollutants associated with poor indoor air quality.	<p>List of low-VOC wood floor finishes: http://oikos.com/green_products/category.php?category_id=480</p> <p>Finishes and IAQ: www.aiasdrg.org/sdrg.aspx?Page=26</p> <p>South Coast Air Quality Management District (SCAQMD) Rule 1113: http://aqmd.gov/rules/reg/reg11/r11113.pdf</p> <p>GREENGUARD ENVIRONMENTAL INSTITUTE PRODUCT GUIDE: www.greenguard.org/Default.aspx?tabid=139</p>
22	<p>All surfaces of any particle board product are sealed/coated with low to no VOC sealants to prevent off gassing of the base materials (credit available for ALL of the following):</p> <p>All kitchen cabinetry/casework</p> <p>All bath cabinetry/casework</p> <p>All closet shelving</p> <p>DOCUMENTATION: Signature of Responsible Party or inspection by approved HBH inspector</p> <p>INFORMATION: If urea formaldehyde materials are used in conditioned spaces, all 6 sides inside the cabinets must be coated with a water-based polyurethane sealant or a specialty formaldehyde sealant, as well as the underside of countertops, shelving, and top and bottom of stair treads. Sealant shall have a maximum VOC (Volatile Organic Compounds) content of 100 g/l.</p>	1 1 1	Intended to give credit for utilizing low VOC sealants to reduce off gassing of pollutants associated with poor indoor air quality.	<p>Sources of Indoor Air Pollution – Formaldehyde: www.epa.gov/iaq/formalde.html</p>
23	<p>ALL carpet is low-VOC and certified by the Carpet & Rug Institute; NO carpet in bathrooms or kitchens</p> <p>DOCUMENTATION: Final Walkthrough Signature of responsible party indicating carpet installed has the CRI Green Label.</p> <p>INFORMATION: Builder shall provide carpet manufacturer name and product number if requested. To identify carpet products that are truly low-VOC, look for the Carpet and Rug Institute (CRI) Green Label on the product or displayed on carpet samples in showrooms. The CRI Green Label identifies that the product type has been tested by an independent laboratory and has met the criteria for very low emissions.</p>	1	Intended to give credit for utilizing building materials that contribute minimal or no pollutants associated with poor indoor air quality.	<p>The Carpet and Rug Institute (CRI): www.carpet-rug.org</p>

	Item	Pt	Intent	Resources
24	<p>No carpeting in the home</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> New carpet, and products that accompany carpet installation such as adhesives and padding, can be a source of chemical emissions. Carpet can also act as a "sink" for chemical and biological pollutants including pesticides, dust mites, and fungi. Carpet can contribute to poor IAQ by trapping pollutants and moisture, providing a substrate for biological contamination, and by releasing VOC's and fire-retardant chemicals. Carpeting laid over concrete floors tends to have more dust mites because of increased humidity. Replace carpeted floors with hardwood or linoleum. Wash scatter rugs and furniture covers regularly.</p>	1	<p><i>Intended to give credit for utilizing building materials that contribute minimal or no pollutants associated with poor indoor air quality.</i></p>	<p>EPA factsheet on Indoor Air Pollution (see FAQ section) www.epa.gov/iaq/pubs/hpguide.html#faq6</p> <p>Carpeting, Indoor Air Quality, and the Environment www.buildinggreen.com/auth/article.cfm?fileName=030601a.xml</p>
25	<p>VOC dissipation prior to dwelling occupancy; make-up air (see Prereq. 7) should be exhausted to outside for one week minimum</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> If low VOC paints are not used, another method to mitigate exposure to VOC's is to allow the paint and materials to off-gas for a minimum of one week prior to occupation of dwelling. Continuous airflow exhausted to the outside must be supplied for effective VOC dissipation.</p>	2	<p><i>Intended to give credit for reducing human exposure to construction related air pollutants.</i></p>	<p>Health Concerns related to paint: http://www.co.thurston.wa.us/health/ehhm/paint.html</p>
<i>Innovation Points</i>				
26	<p>Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Materials Opportunities (Minimum Points: 18)

[Back](#)

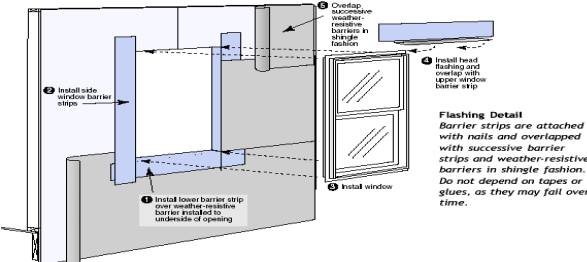
Item	Pt	Intent	Resources						
<p>1 Home size: conditioned area is less than 2500 square feet (excluding crawl space) <i>(credit available for ONE of the following):</i></p> <table border="1"> <tr> <td data-bbox="218 224 411 253">2500 square feet</td> <td data-bbox="1209 224 1241 253">4</td> </tr> <tr> <td data-bbox="218 261 411 290">2000 square feet</td> <td data-bbox="1209 261 1241 290">16</td> </tr> <tr> <td data-bbox="218 298 411 328">1500 square feet</td> <td data-bbox="1209 298 1241 328">28</td> </tr> </table> <p>DOCUMENTATION: Final Walkthrough</p> <p>INFORMATION: Conditioned area includes all heated and/or cooled living spaces. Unconditioned spaces such as porches, sunspaces, decks and crawl spaces (conditioned sealed crawlspaces included) are not included in the square footage total. Small homes use less material for construction. They usually use less energy for heating and cooling and occupy a smaller footprint (less impervious area).</p>	2500 square feet	4	2000 square feet	16	1500 square feet	28		<p><i>Intended to give credit for homes that are built smaller than the average sized home in NC.</i></p>	<p>Characteristics of New Housing (census): www.census.gov/const/www/charindex.html</p> <p>Average House size comparison: www.eia.doe.gov/emeu/recs/sqft-measure.html</p>
2500 square feet	4								
2000 square feet	16								
1500 square feet	28								
<i>Construction Material Waste</i>									
<p>2 Construction Waste Management Plan</p> <p>DOCUMENTATION: Provide copy of Construction Waste Management Plan</p> <p>INFORMATION: The <u>Construction Waste Management Plan</u> is a written plan that consists of:</p> <ul style="list-style-type: none"> • Estimated costs of hauling and disposal, recycling, and revenues from reuse and recycling. • Goals for waste diversion by amount (weight/volume or percentage) and material type. 	2	<p>Intended to give credit for a plan to minimize the amount of construction waste.</p>	<p>Sample waste management plan: www.epa.gov/region09/waste/solid/pdf/cd5.pdf</p> <p>"Develop a construction and demolition waste management plan:" www.floridagreenbuilding.org/db/standards/homes/HomeRefGuide5.pdf</p>						

3	Item	Pt	Intent	Resources																																							
	<p>Construction Waste Reduction (credit available for ONE of the following):</p> <ol style="list-style-type: none"> 1. Reduce construction waste (see TABLE in INFORMATION) 2. Increase construction waste diversion (see TABLE in INFORMATION) 3. Reuse of existing structure; 1 point per 10% reuse (credit for renovations only) 	<p>1-6 1-6 1-10</p>																																									
	<p>DOCUMENTATION: Provide documentation from waste hauler indicating total waste diverted and total hauled to landfill; Provide calculation used for determining points based on TABLE provided in INFORMATION. Final Walkthrough and Signature of Responsible Party; provide calculations of reuse percentage</p>																																										
	<p>INFORMATION: The Table provided below is consistent with Table 27 from the LEED for Homes Standard. (see "Resources"). <u>Option 1.</u> Calculation of construction waste reduction is based upon the following: • Generate 3.0 lb. or less of waste per square ft. of conditioned space. Less waste = more pts. • Do not include reclaimed or recycled jobsite materials. <u>Option 2.</u> Calculation of construction waste diversion is based upon the following: • Divert 25% or more of the total waste material from landfills. More waste diverted = more pts. • The percentage can be calculated by weight or volume.</p>		<p>Intended to give credit for reducing the amount of construction waste generated and/or landfilled.</p>	<p>NAHB Research Center's "Builder's Field Guide to Residential Construction Waste Management:" www.nahbrc.org/bookstore/cw0503w.aspx</p> <p>EPA Construction and Demolition Debris: www.epa.gov/epaoswer/non-hw/debris-new/index.htm</p> <p>NCSU Cooperative Extension-Managing Construction and Demolition Debris: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag473_19.html</p> <p>Building Reuse and Adaptive Reuse: www.state.nj.us/dep/opsc/docs/Adaptive_Reuse.pdf</p>																																							
	<p>For reuse of existing structure, the percentage of the building reused is calculated by dividing the total square footage of the project (new construction as well as reused spaces) by the square footage of the reused spaces.</p>			<p>LEED for Homes Rating System (free download): www.usgbc.org/DisplayPage.aspx?CMSPageID=147</p>																																							
	<p>The reuse of an existing building structure can have the greatest overall consequences on environmental impact. Reuse not only eliminates the waste that would be sent to a landfill, but also eliminates the need to manufacture new building materials and ship them to the site. Thus, energy is saved by avoiding new construction. Also, for remodels and renovations, some of the materials from the existing house may be reused in the project.</p>																																										
	<p>Construction Waste Reduction TABLE</p> <table border="1" data-bbox="485 979 1052 1344"> <thead> <tr> <th colspan="2">Option 1 Waste Reduction</th> <th colspan="2">Option 2 Waste Diversion</th> <th rowspan="2">Points Earned</th> </tr> <tr> <th>Pounds per s.f.</th> <th>Yd.³ per 1,000 s.f.</th> <th>% not Diverted</th> <th>% Diverted</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>19</td> <td>75%</td> <td>25%</td> <td>1</td> </tr> <tr> <td>2.5</td> <td>16</td> <td>63%</td> <td>38%</td> <td>2</td> </tr> <tr> <td>2</td> <td>12.8</td> <td>50%</td> <td>50%</td> <td>3</td> </tr> <tr> <td>1.5</td> <td>9.6</td> <td>38%</td> <td>63%</td> <td>4</td> </tr> <tr> <td>1</td> <td>6.4</td> <td>25%</td> <td>75%</td> <td>5</td> </tr> <tr> <td>0.5</td> <td>3.2</td> <td>13%</td> <td>88%</td> <td>6</td> </tr> </tbody> </table>	Option 1 Waste Reduction		Option 2 Waste Diversion		Points Earned	Pounds per s.f.	Yd. ³ per 1,000 s.f.	% not Diverted	% Diverted	3	19	75%	25%	1	2.5	16	63%	38%	2	2	12.8	50%	50%	3	1.5	9.6	38%	63%	4	1	6.4	25%	75%	5	0.5	3.2	13%	88%	6			
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	<p>Portions of this table were borrowed from the LEED for Homes Rating System (see "Resources").</p>																																										
	<p>Note: Jobsite waste does not include land clearing. All hazardous waste shall be properly disposed of. No points shall be awarded for hazardous waste removal.</p>																																										

	Item	Pt	Intent	Resources
4	<p>Prohibit burying construction waste on site</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Construction waste that has been planned and declared to be used as appropriate fill or drainage material (such as rock encountered during site excavation and turned into drainable fill or ground up drywall used as a soil amendment) is not included. All other waste shall be disposed of through recycling or other appropriate method. Burning of waste is not allowed as an acceptable method of disposal when receiving credit for this item.</p>	1	<p><i>Intended to give credit for reducing hidden land use issues.</i></p>	<p>Sample waste management plan: www.epa.gov/region09/waste/solid/pdf/cd5.pdf</p>
5	<p>Donation of excess materials or re-use of materials (min \$500/job)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Avoid disposal of excess construction materials by donating excess to a nonprofit 501c(3) organization, K-12 art/wood shop program, university craft center or shop, other appropriate entity or by re-using the construction materials for another project. The value of donated or re-used materials must be a minimum of \$500.</p>	3	<p><i>Intended to give credit for reducing landfilled waste.</i></p>	<p>Listing of NC Schools: www.schoolclearinghouse.org</p>
6	<p>Central, organized cutting area for project site</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Locate the cutting area for cutting lumber and wood panel products in one area. Store cutoffs and panel pieces with other similar sized cuttings for ease of use when small pieces are needed. The goal is to use leftover pieces in lieu of full sized lumber when appropriate.</p>	2	<p><i>Intended to give credit for maximizing the full use of lumber and minimizing waste.</i></p>	<p>Pages 11-13 in the Builder's Guide to Reducing, Reusing and Recycling Residential Construction Waste (1993): www.p2pays.org/ref/24/23678.pdf</p>
7	<p>Framing plan with locations of wall studs, joists, and roof structure with cut list (applies to site-built and modular framing systems; modular units automatically receive these points)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector Builder may be requested to provide a copy of the framing plan to NC HBH.</p> <p><u>INFORMATION:</u> Create a written plan that designates the location and size of all structural framing for the roof, walls, and floors. Review plan with the framing crew to ensure minimization of unnecessary framing.</p>	3	<p><i>Intended to give credit for maximizing the efficient use of building structure.</i></p>	<p>A complex example of a framing plan and cut list: www.vhdesign.com/framing.htm</p>

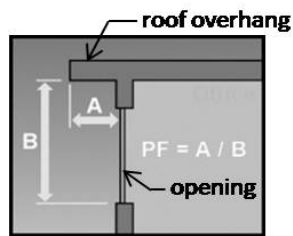
	Item	Pt	Intent	Resources
<i>Exterior/Structural System Materials</i>				
8	Concrete with fly ash or slag (min 30%) (credit available for ALL of the following):			
	Exterior concrete wall structure	1	Intended to give credit for recycling waste products from manufacturing.	PATH program-Fly Ash Concrete: www.toolbase.org/techinv/techDetails.aspx?technologyID=217 EPA recommendations for concrete containing recycled content: www.epa.gov/epawaste/conserva/tools/cpg/products/cement.htm
	Foundation (including slab floor)	1		
<u>DOCUMENTATION:</u> Signature of Responsible Party; name of supplier Builder may be requested to provide a copy of the concrete composition report to NC HBH. <u>INFORMATION:</u> All concrete used in foundations and/or exterior walls shall have a minimum of 30% of the total cement composed of recycled fly ash or blast furnace slag.				
9	Recycled concrete or glass cullet used for aggregate in concrete	2	Intended to give credit for using building materials recycled from demolition or other processes.	Portland Cement Association: www.cement.org/tech/cct_aggregates_recycled.asp
10	Use of third-party certified sustainably harvested wood (credit available for ALL of the following):			
	Wood siding (50% or more of exterior wall area)	2	Intended to give credit for utilizing wood products that support sustainable harvesting and encourage forest diversity.	Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx Forest Stewardship Council: www.fsc-info.org Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm
	Dimensional or engineered lumber:			
	Wall framing members (90%)	3		
	Floor framing members (90%)	3		
	Roof framing members (90%)	4		
<u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector Documentation of the third party certification must be available <u>INFORMATION:</u> Siding and/or framing system is composed predominantly of certified lumber. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult without third-party verification.				

	Item	Pt	Intent	Resources
11	<p>Steel (with thermal break), or engineered wood used in place of dimensional lumber (credit available for ALL of the following)</p> <p>Use for 95% of all headers (doors, windows, framed openings, etc.)</p> <p>Use engineered lumber for 90% or greater of exterior wall framing members. Includes finger-jointed studs and top and bottom plates</p> <p>Replace large dimension solid lumber (2x10 or greater) in 90% or more of various structural systems (i.e. trusses, joists):</p> <p>Roof structural system(s)</p> <p>Floor structural system(s)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, where visible Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Structural beams and/or headers (doors, windows, framed openings, etc.) shall be manufactured from non-solid sawn wood, such as laminated wood, or from steel beams or other shapes. Provide a thermal break (example: sill gasket material) at all steel beams and headers.</p> <p>Finger-jointed material is lumber that is made of off-cuts from manufacturing processes; it is then finger jointed and glued together to make usable lengths of lumber. Finger-jointed lumber may only be used in manufacturer approved applications; vertical stud use is the typical approved application. Engineered lumber and components shall meet or exceed the performance of solid lumber products that they replace. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products.</p>	1 2 2 2	Intended to give credit for reducing the use of solid lumber through the use of engineered building products.	<p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org</p> <p>Steel L headers: www.toolbase.org/techinv/techDetails.aspx?technologyID=113</p> <p>Insulated Headers: www.toolbase.org/techinv/techDetails.aspx?technologyID=119</p> <p>PATH-Engineered Wood Wall Framing: http://www.toolbase.org/Techinventory/TechDetails.aspx?ContentDetailID=987&BucketID=6&CategoryID=54</p> <p>Southern Pine Council-Finger Jointed Studs (shows labels): http://newstore.southernpine.com/images/ref212.pdf</p>
12	<p>Continuous foundation termite flashing</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> A continuous termite shield shall cover 100% of the foundation stem wall, piers, and other potential entry points. The termite shield can be fabricated from metal, plastic, rubberized membrane or similar material that forms a physical barrier to termites. All seams and penetrations in the termite shield shall be completely sealed to prevent termite entry and the shield should be readily visible to allow inspection.</p>	1	Intended to give credit for providing a non-toxic insect barrier.	<p>NCSU Cooperative Extension, termite shields: www.ces.ncsu.edu/depts/ent/notes/Urban/termites/shields.htm#top</p> <p>DOE Energy Efficiency and Renewable Energy Website: www.energycodes.gov/support/slab_faq.stm#e</p> <p>Durability Details: www.pathnet.org/sp.asp?id=14147</p> <p style="text-align: right;">PATH</p>

Item	Pt	Intent	Resources
<p>13 Window and door flashings installed at ALL exterior openings; install as recommended by the window manufacturer, in conjunction with the weather resistant barrier manufacturer</p> <p><i>Note: Flashing of <u>exposed</u> openings is a Prerequisite</i></p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector Photographs are strongly recommended as additional documentation.</p> <p><u>INFORMATION:</u> All windows and exterior doors shall have appropriate flashing installed a maximum of six inches above the top of the window or door. All windows and exterior doors shall have a water-resistant flashing installed on the side and base of window and door rough openings to direct water leaks out of the framing. Flashing shall be compatible with materials it touches (for example, steel and aluminum are incompatible and shall not be installed so that they touch) and shall meet manufacturers' (window, door and flashing) specifications. Flashing example below:</p> 	2	<p><i>Intended to give credit for providing an effective water management system at all exterior openings to minimize water intrusion and increase durability.</i></p>	<p>The Engineered Wood Association -- pictures of flashing at windows and doors: www.apawood.org/bbh_walls.cfm</p>
<p>14 Drainage plane integral to building envelope and behind the exterior veneer <i>(credit available for ALL of the following):</i></p> <p>Exterior wall (Min. 90%)</p> <p>Roof (Min. 90%)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> <i>Note:</i> in 2009 this became a requirement in sec. R703.1 of the NC Building Code for many wall types.</p> <p>A drainage plane is a designed location where water that penetrates exterior cladding drains away from the building envelope. This provides increased durability of the envelope. A drainage plane is part of a rain screen system, along with an air space and exterior cladding or roofing. In the case of EIFS, the drainage plane is critical to the proper installation of the product due to many failures of EIFS installations that use a barrier system instead of the drainage plane design.</p>	3 3	<p><i>Intended to give credit for providing an effective water management system which improves envelope durability.</i></p>	<p>PATH program-Rain Screen Exterior Walls: www.toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=1020&BucketID=6&CategoryID=54</p> <p>NAHB Toolbox-EIFS Drainable Systems: http://www.toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=988&BucketID=6&CategoryID=54</p>

	Item	Pt	Intent	Resources
15	<p>Indigenous stone (within 300 miles) on 50% or more of exterior wall area</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Indigenous stone is stone that is found locally, preferably in North Carolina. Due to its weight, transport of stone over a long distance uses substantial fuel resources. Stone is considered a durable material.</p>	4	Intended to give credit for utilizing a local building material that requires minimal processing and reduces transportation.	<p>Dimension stone in NC: www.geology.enr.state.nc.us/03072002buildingstones/NC%20building%20stones/Building%20stones/Dimension%20stone%20overview.htm</p>
16	<p>Durable exterior with 50-year product life warranty (credit available for ALL of the following):</p> <p>Durable cladding (min. 65%)</p> <p>Durable roofing (min. 95%)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved HBH inspector Builder may be requested to provide a copy of the warranty to NC HBH</p> <p><u>INFORMATION:</u> Examples of durable cladding are fiber cement siding, brick, and some stuccos. Warranty documentation must be provided to the homeowner.</p>	2 2	Intended to give credit for the use of durable building products.	<p>Brick 101 year warranty example: http://www.hansonbrick.com/en/global/warranty.pdf</p> <p>Hardiplank 50 year warranty example: www.jameshardie.com/builder/pdf/warranty-panelplank-can.pdf</p>
17	<p>Durable exterior trim (credit available for ALL of the following):</p> <p>Primed backs, edges, and ends of trim (including field cuts)</p> <p>Fiber cement or composite wood exterior trim (Min. 90%):</p> <p>Fascia</p> <p>Soffit</p> <p>Other exterior trims</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> All cut or unprimed sides of painted or stained exterior trim shall be primed prior to installation. Pre-primed product does not need to be re-primed, as long as no cut has been made. This includes the ends, the top and bottom edges and the front and back face. Separate incompatible trim products as required by manufacturer for corrosion resistance.</p>	2 1 1 1	Intended to give credit for utilizing building products that are durable and require less maintenance.	<p>Installation example from James Hardie Company for fiber cement (note corrosion resistant attachment requirements): www.jameshardie.com/pdf/install/install_panel_north.pdf</p> <p>Good definition of back priming: www.calredwood.org/faqs/fqbkprim.htm</p> <p>NAHB toolbase-Why House paint fails: http://www.toolbase.org/PDF/DesignGuides/FPL_Why_House_Paint_Fails.pdf</p>
18	<p>Recycled and/or recovered-content siding (minimum 50% pre- or post-consumer) on 50% or more of exterior wall area</p> <p><u>DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Pre-consumer recycled content is generally waste created during the manufacture of a product. Post-consumer waste is created when a consumer recycles an existing product. Down cycling occurs when a product is recycled to a lower use than the original material. Builder may be requested to provide a copy of the recycled content to NC HBH.</p>	1	Intended to give credit for the use of recycled building materials.	<p>Oikos article on siding options: http://oikos.com/library/vision/index.html</p>

	Item	Pt	Intent	Resources
19	<p>Recycled-content roofing material (Min. 90% of roof area)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Roofing may be made of 100% recycled rubber and plastic, 100% recycled polymer and rubber, 100% recycled wood and plastic, metal with 70% recycled content, or fiber cement with recycled content.</p>	2	Intended to give credit for the use of recycled building materials.	<p>Product Resource Guide: www.epa.gov/epawaste/conserve/tools/cpg/pdf/construct.pdf</p>
20	<p>Provide roof drip edge (metal) at ALL roof edges</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Install drip edge below flashing. Metal drip edge supports shingles which extend beyond the fascia, particularly over gutters. As with all roofing components, care should be taken to install metal drip edge using storm resistance techniques recommended for the local wind zone.</p>	1	Intended to give credit for providing an effective water management system to minimize problems associated with water intrusion.	<p>NAHB Toolbase-Drip Edge placement (PATH): www.toolbase.org/ToolbaseResources/level4DG.aspx?ContentDetailID=3179&BucketID=4&CategoryId=10</p> <p>Storm Resistant Roofing: www.pathnet.org/sp.asp?id=17310</p>
21	<p>Roof gutters/downspouts discharge water min. 5 feet from foundation (100%)</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> It is important that the downspout extensions create a positive drainage away from the building foundation. Water held in the extension may create a breeding ground for unwanted pests, for example, mosquitoes.</p>	1	Intended to give credit for providing an effective water management system to minimize problems associated with water intrusion.	<p>NAHB Toolbase-Durability Checklist: www.toolbase.org/PDF/TechSets/techset2_checklist.pdf</p> <p>NCSU Cooperative Extension-Mosquito Control: www.ces.ncsu.edu/depts/ent/notes/Urban/mosquito.htm#breed</p>
22	<p>Covered entryways for all doors opening into conditioned space; Overhang provides a projection factor of at least 0.375</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> The Projection Factor is the ratio of the overhang depth (A) to the overhang height (B) above the door threshold.</p>	2	Intended to give credit for providing an effective water management system to minimize problems associated with water intrusion.	<p>The National Green Building Standard: www.nahbrc.org/technical/standards/greenbuilding.aspx</p> <p>NAHB Toolbase-Durability Checklist: www.toolbase.org/PDF/TechSets/techset2_checklist.pdf</p>



	Item	Pt	Intent	Resources
23	Recycled-content insulation (credit available for ONE of the following):			
	Minimum 25% recycled content	1		
	Minimum 75% recycled content	2		
	<p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Examples of insulation with recycled content for several products:</p> <ul style="list-style-type: none"> • Wet spray cellulose insulation with 75% recycled content • Cotton denim insulation – recycled denim material • Mineral wool insulation – 92% recycled content--Fibrex, Inc. Aurora, IL • Perlite composite board – with 23% post consumer paper--Schuller International, Denver, CO • Cellulose – 75% post consumer recycled paper • Fiberglass – 20-50% recycled content with no formaldehyde--Johns Manville Co. 		Intended to give credit for the use of recycled building materials.	EPA Procurement Guidelines-Building Insulation: www.epa.gov/osw/conserves/tools/cpg/products/building.htm
24	HCFC-free rigid foam insulation (Min. 90% of rigid foam)	1	Intended to give credit for minimizing the use of products that have a negative impact on the atmosphere.	<p>Atlas Roofing HCFC free insulation (see label example): www.atlasroofing.com/acultra/index.asp</p> <p>EPA Blowing Agents approved for insulations: www.epa.gov/ozone/snap/foams/index.html</p>
25	Outdoor structures, decking and landscaping materials (credit available for ALL of the following):			
	Made from recycled materials (min. 40% recycled content)	2		
	Made from third-party certified sustainably harvested lumber	3		
	Made from decay resistant local wood	3		
	<p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> One example of recycled content decking/landscaping material is wood/plastic composite lumber. If using sustainably harvested lumber, Documentation of the third-party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult without third party verification. Decay resistant species of wood include juniper, black locust, and bald cypress. Southern yellow pine provides moderate decay resistance.</p>		Intended to give credit for utilizing alternative exterior materials that have a reduced environmental impact.	<p>PATH-Recycled Wood/Plastic Composite Lumber: www.toolbase.org/techinv/techDetails.aspx?technologyID=237</p> <p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council www.fsc-info.org</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>
26	Reclaimed or refurbished materials used for 10% of structural material	5	Intended to give credit for utilizing building products that reduce both the demand for new resources as well as the volume of waste.	<p>Sample Architectural Salvage Company: http://preservation-hall.com/</p> <p>Habitat ReStores: www.habitat.org/env/restores.aspx</p>
	<p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Use salvaged materials of good quality and of appropriate type for the installation. Local Habitat for Humanity affiliates and architectural salvage companies are good sources of these type of products.</p>			

	Item	Pt	Intent	Resources
27	<p>Durability Management (credit available for ONE of the following):</p> <p>Durability planning</p> <p>Durability planning, implementation, and third-party verification</p> <p><u>DOCUMENTATION:</u> Completed Durability Risk Evaluation Form (see INFORMATION) Completed Durability Inspection Checklist signed by approved HBH Inspector (see INFORMATION)</p> <p><u>INFORMATION:</u> The durability of a home can be enhanced through the use of durability planning and third-party verification. The US Green Building Council's <i>LEED for Homes Rating System</i> (LEED-H) has developed a durability management process, and provides valuable resources and forms in its LEED-H project Checklist. The forms necessary to document completion of this credit item are available in the LEED-H Checklist, which can be downloaded from the USGBC Web site (see "Resources").</p> <p>One point is awarded for completion of the <u>Durability Risk Evaluation Form</u>. Four points are awarded if measures are developed and implemented to respond to the risks identified in the Durability Risk Evaluation Form, and the <u>Durability Inspection Checklist</u> is signed-off by an approved HBH Inspector. The HBH Inspector will need to be informed of the builder's intent to utilize the durability management process at the beginning of the project.</p>	1 4	Intended to give credit for durability planning and verification	<p>LEED for Homes Rating System (PDF) and Checklist (XLS) documents: www.usgbc.org/DisplayPage.aspx?CMSPageID=147</p> <p>LEED for Homes Reference Guide: www.usgbc.org/Store/PublicationsList.aspx?CMSPageID=1518</p>
<i>Accessibility</i>				
28	<p>Accessible rooms: all habitable rooms have 34" wide doors; all hallways are 42" clear, finished</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Wider doors allow for easier access to main rooms and provide a turning space in hallways. Rooms considered habitable include bedrooms, bathrooms, living, dining and kitchen spaces, at minimum. Closets, mechanical rooms, pantries and other accessory rooms are encouraged to have wide doors but are not required.</p>	3	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu/cud/pubs_p/docs/UDinHousing.pdf</p>
29	<p>Accessible bathroom provided on the main floor with blocking for future accessory installations</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> The bathroom door must be at least 34" wide. Use broad blocking (sheet goods) rated for moisture installations in walls around the toilet, tub, and shower for custom placement and relocation of grab bars. Inform the homeowner of the location of sheet good blocking for future accessory installation.</p>	3	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu/cud/pubs_p/docs/UDinHousing.pdf</p> <p>NCSU CUD-bathroom fact sheets: http://design.ncsu.edu/cud/pubs_p/docs/qap_tech_screen.pdf</p>

	Item	Pt	Intent	Resources
30	Accessible Kitchen features (credit available for ALL of the following):			
	Cabinets and storage shelves between 18"-48" from the floor (min. 50% by volume)	1	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu/cud/pubs_p/docs/UDinHousing.pdf</p> <p>List of Potential Universal Design Features: http://ehe.osu.edu/ud/files/Potential-UD-Features.pdf</p>
	Kitchen sink with knee space, and stove top with controls at the front and knee space underneath (or removable cabinet beside or below the stove top)	1		
	<u>DOCUMENTATION:</u> Final Walkthrough			
<u>INFORMATION:</u> Pantries with height adjustable shelving can provide easily accessible storage space. They can be a walk-in unit or a reach-in unit with storage shelving on the doors. Shallow shelves keep items within easy reach. Retractable doors can be used to conceal knee space. Special hardware allows the door to be pushed back under the counter after opening.				
31	Accessible bedroom features (min. 1 bedroom) (credit available for completing ALL of the following):			
	Storage shelves between 18"-48" from the floor (min. 50% by area)	1	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu/cud/pubs_p/docs/UDinHousing.pdf</p> <p>List of Potential Universal Design Features: http://ehe.osu.edu/ud/files/Potential-UD-Features.pdf</p>
	Clothes closet with 32" clear opening (min.) and adjustable hanging rod	1		
	5' turning radius around the bed	1		
<u>DOCUMENTATION:</u> Final Walkthrough				
<u>INFORMATION:</u> Adjustable closet systems, including adjustable shelves and rods, can put clothing within reach for people of all abilities, and make closets more handicap accessible. Install hooks at usable heights for hanging belts, scarves, and other accessories. Include roll-under space if needed for wheelchairs.				
32	Universal design features for home operation (credit available for completing ALL of the following):			
	Doors and faucets use lever handles; cabinet handles are 'C' or 'D' style	1	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu/cud/pubs_p/docs/UDinHousing.pdf</p>
	Electrical panels, thermostats, breaker boxes, and any control panels are located on the main floor	1		
	Elevator planned for (if home has second floor). Vertically align one closet on the 2nd floor with one closet on the 1st floor to allow for future installation	1		
<u>DOCUMENTATION:</u> Final Walkthrough				
<u>INFORMATION:</u> Lever handles and open-loop handles are designed for easy gripping. The top of the electrical panel should be no more than 54" above the floor, and located with a minimum of 30" x 40" clear floor space in front to allow for maneuverability and easy reach for those in wheelchairs.				

	Item	Pt	Intent	Resources												
33	<p>Elevator installed for accessibility</p> <p><u>DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Elevators can benefit anyone who wants to remain in their home despite a loss of mobility, strength, or agility. As people age, investment in a home elevator can be worthwhile if it allows seniors to stay in their homes longer (often mortgage-free). Elevators increase a home's accessibility, and are a common aging in place remodeling idea.</p>	3	Intended to give credit for increasing a home's accessibility.	<p>Accessible Housing by Design — Lifts and Residential Elevators: www.cmhc-schl.gc.ca/en/co/reno/renoho/refash/refash_027.cfm</p>												
<i>Interior Materials</i>																
34	<p>Regionally obtained (within 300 miles), salvaged or reclaimed materials (credit available for ALL of the following):</p> <table border="1" data-bbox="142 483 1203 703"> <tr> <td data-bbox="142 483 1203 524">Doors (90%)</td> <td data-bbox="1203 483 1245 524">1</td> </tr> <tr> <td data-bbox="142 524 1203 565">Floors (25%)</td> <td data-bbox="1203 524 1245 565">1</td> </tr> <tr> <td data-bbox="142 565 1203 605">Floors (75%)</td> <td data-bbox="1203 565 1245 605">2</td> </tr> <tr> <td data-bbox="142 605 1203 646">Interior trim (90%)</td> <td data-bbox="1203 605 1245 646">2</td> </tr> <tr> <td data-bbox="142 646 1203 686">Kitchen Casework (90%)</td> <td data-bbox="1203 646 1245 686">2</td> </tr> <tr> <td data-bbox="142 686 1203 703">Bathroom Casework (90%)</td> <td data-bbox="1203 686 1245 703">2</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Use salvaged materials of good quality and of appropriate type for the installation. Local Habitat for Humanity affiliates and architectural salvage companies are good sources of these type of products.</p>	Doors (90%)	1	Floors (25%)	1	Floors (75%)	2	Interior trim (90%)	2	Kitchen Casework (90%)	2	Bathroom Casework (90%)	2		Intended to give credit for utilizing building products that reduce the demand for new resources, landfilling, and transportation.	<p>Architectural Salvage Company: http://preservation-hall.com/</p> <p>Habitat ReStores: http://www.habitat.org/env/restores.aspx</p>
Doors (90%)	1															
Floors (25%)	1															
Floors (75%)	2															
Interior trim (90%)	2															
Kitchen Casework (90%)	2															
Bathroom Casework (90%)	2															
35	<p>Use natural cork / 100% recycled or recovered content underlayment</p> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Use salvaged materials of good quality and of appropriate type for the installation. Local Habitat for Humanity affiliates and architectural salvage companies are good sources of these type of products.</p>	3	Intended to give credit for using a rapidly renewable or recycled building material.	<p>Oikos-Natural Cork Flooring: http://oikos.com/products/finishes/naturalcork/</p> <p>Hierarchy of Wood Use: http://www.rainforestrelief.org/What_to_Avoid_and_Alternatives/Rainforest_Wood/Hierarchies_of_Wood_Use.html</p>												
36	<p>Natural fiber carpet and/or carpet pad (credit available for ALL of the following):</p> <table border="1" data-bbox="142 1133 1203 1230"> <tr> <td data-bbox="142 1133 1203 1174">Carpet <u>pad</u> made of natural fiber or 50-100% recycled content (Min. 90% of pad)</td> <td data-bbox="1203 1133 1245 1174">1</td> </tr> <tr> <td data-bbox="142 1174 1203 1230">Carpet made of natural fiber with natural latex rather than SB latex backing (Min. 90% of carpeting)</td> <td data-bbox="1203 1174 1245 1230">2</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> Natural fiber carpet is made from 100% materials such as wool, sisal, jute, and hemp. Carpet pad must also be of a natural material such as fibrous jute plants.</p>	Carpet <u>pad</u> made of natural fiber or 50-100% recycled content (Min. 90% of pad)	1	Carpet made of natural fiber with natural latex rather than SB latex backing (Min. 90% of carpeting)	2		Intended to give credit for utilizing natural materials that are rapidly renewable.	<p>Green Sage-Natural Fiber Carpet: www.greensage.com/SLCP-FLOORING/SLCPnatrlcarpet.htm</p> <p>Green Sage-Carpet Padding Sources: www.greensage.com/09682carpetpad.html</p>								
Carpet <u>pad</u> made of natural fiber or 50-100% recycled content (Min. 90% of pad)	1															
Carpet made of natural fiber with natural latex rather than SB latex backing (Min. 90% of carpeting)	2															

	Item	Pt	Intent	Resources						
37	<p>Natural linoleum in place of any vinyl sheet flooring or vinyl composition tile, with low toxic adhesives or backing</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party</p> <p><u>INFORMATION:</u> Natural linoleum is composed of jute, linseed oil, wood flour, limestone, and pigments--generally rapidly renewable products. Low toxic adhesives must be used. It is recommended that no flexible vinyl wall covering or flooring should be used in the project. Vinyl acts as a moisture barrier and can trap water which can lead to mold and mildew problems in mixed humid climates.</p>	3	Intended to give credit for utilizing natural materials that are renewable.	<p>Oikos-Linoleum: http://oikos.com/green_products/category.php?category_id=414</p>						
38	<p>Rapidly renewable material (credit available for ALL of the following):</p> <table border="1" data-bbox="142 440 1203 667"> <tr><td>Doors (Min. 90%)</td></tr> <tr><td>Closet shelving (Min. 90%)</td></tr> <tr><td>Kitchen casework shelving (Min. 90%)</td></tr> <tr><td>Kitchen casework (Min. 90%)</td></tr> <tr><td>Flooring -- engineered product is acceptable (Min. 25%)</td></tr> <tr><td>Flooring -- engineered product is acceptable (Min. 75%)</td></tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Examples of flooring from renewable resource material include but are not limited to: Bamboo, Cork, Palm and other plant based materials. Low toxic adhesives must be used.</p> <p>Shelving can be made from sunflower hulls, wheat straw, post and pre-consumer wood waste and other biomass products. These products are considered rapidly renewable and can replace the use of non-renewable materials.</p> <p><u>Note:</u> credit for materials used in item #36 not available for this item.</p>	Doors (Min. 90%)	Closet shelving (Min. 90%)	Kitchen casework shelving (Min. 90%)	Kitchen casework (Min. 90%)	Flooring -- engineered product is acceptable (Min. 25%)	Flooring -- engineered product is acceptable (Min. 75%)	1 1 1 1 1 2	Intended to give credit for utilizing natural materials that are rapidly renewable.	<p>Oikos-Flooring: www.oikos.com/green_products/menu.php?sub_div=Flooring</p> <p>Oikos-Wood Cabinets: http://oikos.com/green_products/category.php?category_id=157</p>
Doors (Min. 90%)										
Closet shelving (Min. 90%)										
Kitchen casework shelving (Min. 90%)										
Kitchen casework (Min. 90%)										
Flooring -- engineered product is acceptable (Min. 25%)										
Flooring -- engineered product is acceptable (Min. 75%)										
39	<p>Use of third party certified sustainably harvested wood (credit available for ALL of the following)</p> <table border="1" data-bbox="142 1044 1203 1190"> <tr><td>Wood flooring (75% or more)</td></tr> <tr><td>Interior trim (75% or more)</td></tr> <tr><td>Doors (90% or more)</td></tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector Documentation of the third party certification must be available</p> <p><u>INFORMATION:</u> The above products are composed predominantly of certified wood. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult without third party verification.</p>	Wood flooring (75% or more)	Interior trim (75% or more)	Doors (90% or more)	3 3 2	Intended to give credit for utilizing wood products that support sustainable harvesting and encourage forest diversity.	<p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council: www.fsc-info.org/</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>			
Wood flooring (75% or more)										
Interior trim (75% or more)										
Doors (90% or more)										

	Item	Pt	Intent	Resources
40	<p>Engineered wood used in wall framing members and interior trim (credit available for ALL of the following):</p> <p>Used in wall framing: includes finger-jointed studs (Min. 90%)</p> <p>Used in interior trim: includes finger-jointed and/or MDF trim (Min. 90%)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Finger-jointed material is made of cutoffs from the manufacturing processes; it is then finger jointed and glued together to make usable lengths of lumber or trim. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products. Finger-jointed lumber may only be used in manufacturer approved applications; vertical stud use is the typical approved application. Engineered lumber and components shall meet or exceed the performance of the solid lumber products that they replace.</p>	1 1	Intended to give credit for utilizing wood products which are less dependent on larger, older growth wood resources.	<p>The Engineered Wood Association: www.apawood.org</p> <p>PATH-Engineered Wood Wall Framing: http://www.toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=987&BucketID=6&CategoryID=54</p> <p>Oikos-Finger jointed trim: http://oikos.com/green_products/category.php?category_id=148</p> <p>Southern Pine Council-Finger Jointed Studs (shows labels): http://newstore.southernpine.com/images/ref212.pdf</p>
41	<p>Limited tropical hardwood use (credit available for ONE of the following):</p> <p>No Lauan doors, underlayment, or sheathing</p> <p>Project uses no tropical hardwood</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Lauan is a tropical hardwood native to endangered rainforests.</p>	1 2	Intended to give credit for limiting wood harvested from tropical forests.	<p>Oikos-Wood Doors: www.oikos.com/green_products/category.php?category_id=356</p> <p>Hierarchy of Wood Use: http://www.rainforestrelief.org/What_to_Avoid_and_Alternatives/Rainforest_Wood/Hierarchies_of_Wood_Use.html</p>
42	<p>Recycled and/or recovered content components (credit available for ALL of the following)</p> <p>Doors (Min. 50%)</p> <p>Closet shelving (Min. 90%)</p> <p>Kitchen casework (Min. 90%)</p> <p>Flooring -- engineered product is acceptable (Min. 25%)</p> <p>Flooring -- engineered product is acceptable (Min. 75%)</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector Builder may be requested to provide a copy of the recycled content to NC HBH</p> <p><u>INFORMATION:</u> Pre-consumer recycled content is generally waste created during manufacture of a product. Post-consumer waste is created when a consumer recycles an existing product. Down cycling occurs when a product is recycled to a lower use than the original material</p>	1 1 1 1 2	Intended to give credit for utilizing building products that reduce the need for new resources and reduce waste to landfills.	<p>Product Resource Guide: www.epa.gov/epawaste/conservation/tools/cpg/pdf/construct.pdf</p> <p>Oikos-Doors has some resources: www.oikos.com/green_products/menu.php?sub_div=Doors</p>

	Item	Pt	Intent	Resources				
43	<p>All gypsum wallboard is recycled and/or recovered content</p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Gypsum is a mined product. Using recycled gypsum wallboard (sometimes referred to as "synthetic" along with other types of reclaimed products comprising gypsum wallboard) avoids habitat destruction and resource depletion. When purchasing drywall, consider whether your supplier will recycle your scrap wallboard.</p>	2	<p><i>Intended to give credit for utilizing building products that reduce the need for new resources and reduce waste to landfills.</i></p>	<p>Whole Building Design Guidelines-Gypsum Drywall: www.wbdg.org/design/092000.php</p> <p>Oikos: Gypsum Board: www.oikos.com/green_products/menu.php?sub_div=Gypsum%20Board</p>				
44	<p>Interior paints or finishes with recycled content (Min. 50%)</p> <p><i>Note: Recycled latex paint must meet the Green Seal Standard (GS-43) Guidelines.</i></p> <p><u>DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Paint recycling centers or free paint days exist in some counties. Includes: Carteret. Craven, Durham and Pamlico. Green Seal Standard 43 limits the VOC levels in recycled latex paint to 205 g/L.</p>	1	<p><i>Intended to give credit for the use of recycled building materials.</i></p>	<p>Minnesota Office of Environmental Assistance-Recycled Paint: www.moea.state.mn.us/lc/purchasing/latexpaint.cfm</p> <p>Green Seal Environmental Standard for Recycled-Content Latex Paint: www.greenseal.org/newsroom/GS-43_Recycled_Content_Latex_Paint.pdf</p>				
45	<p>Environmentally preferable countertops (Min. 75% of all countertops) <i>(credit available for ALL of the following):</i></p> <table border="1" data-bbox="142 727 1203 800"> <tr> <td data-bbox="142 727 1203 768">Kitchen</td> <td data-bbox="1203 727 1245 768">1</td> </tr> <tr> <td data-bbox="142 768 1203 800">Bath</td> <td data-bbox="1203 768 1245 800">1</td> </tr> </table> <p><u>DOCUMENTATION:</u> Final Walkthrough; Signature of Responsible Party or inspection by approved HBH inspector</p> <p><u>INFORMATION:</u> Countertops have particular performance demands because of their high use and exposure to water, especially at the seams of sink cutouts and backsplashes. A variety of suitable countertop products with environmental advantages are available. <u>Counter materials acceptable for this point include:</u></p> <ul style="list-style-type: none"> • Bamboo • Recycled-Paper • Concrete with minimum 75% recycled aggregate • Stone quarried within 500 miles of the project • Terrazzo-like countertops using min. of 75% recycled glass • Ceramic tile countertops (tile adhered with low toxicity adhesives) 	Kitchen	1	Bath	1		<p><i>Intended to give credit for utilizing counter materials that are sustainable and environmentally friendly.</i></p>	<p>Oikos-Countertops has some resources: http://oikos.com/green_products/category.php?category_id=408</p>
Kitchen	1							
Bath	1							
46	<p>No vapor barrier on interior surfaces of building envelope walls</p> <p><u>DOCUMENTATION:</u> Final Walkthrough and Signature of Responsible Party Perm rating documented for all applicable surfaces</p> <p><u>INFORMATION:</u> Vapor barriers prevent moisture that has passed through the exterior of an assembly to be removed by the HVAC system. No material with a rating of less than 1 perm is to be used on interior wall surfaces. Such materials include foil and kraft insulation facing, and vinyl wallpaper. Source: "Florida Green Home Standard Reference Guide, Version 6," H2.7</p>	1	<p><i>Intended to give credit for integrating water management strategies in order to reduce moisture related problems.</i></p>	<p>Florida Green Building Coalition: www.floridagreenbuilding.org</p>				

Item	Pt	Intent	Resources
<i>Innovation Points</i>			
<p>47 Innovation points - Builder submits specifications for innovative products or design (max. 7 innovation points awarded per category)</p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Bonus Opportunities (Minimum Points: 3)

[Back](#)

Item	Pt	Intent	Resources
<p>1 Provide a Homeowner's Binder that includes some or all of the following items (1 point awarded for every 2 items provided -- 5 points maximum):</p> <ol style="list-style-type: none"> List of high performance building features (can include the HBH checklist). Provide local recycling and household hazardous waste contacts. List of common hazardous materials often used around the home, and instructions for their proper handling and disposal. Information about native landscape materials and/or those that are drought resistant. (see additional information below). Information about organic pest control, fertilizers, de-icers, and cleaning products. Product manufacturer's manuals or product data sheet for installed major equipment, appliances, and fixtures. A diagram showing the location of safety valves and controls for major home systems. Minimum systems include HVAC and water distribution. Methods of maintaining the home's relative humidity in the range of 30-60%. A list of practices to conserve energy and water usage. A copy of the Document Signature Sheet from Prerequisite 11. <p><u>DOCUMENTATION:</u> Signature of Responsible Party indicating that the items indicated have been provided to homeowner Copy of binder inserts available on request</p> <p><u>INFORMATION:</u> Drought resistant landscaping information shall include but not be limited to: <ol style="list-style-type: none"> A list of drought resistant plants applicable to the climate zone Examples of drought resistant/xeriscaping landscaping plans A list of resources for more information on drought resistant landscaping. <p>If a builder has developed a specialized guidebook for a specific project and is not using a commercial, standard, statewide or community produced guidebook, the builder will receive one additional point for providing a copy of this book to NC HBH (point available on a one time basis per builder).</p> </p>	1-5	<p><i>Intended to give credit for providing the homeowner with information on the home's green features, use, and maintenance.</i></p>	<p>Resource for locating recycling centers: http://earth911.com/</p> <p>Carolina Recycling Association: www.cra-recycle.org</p> <p>Local NC Waste Reduction Programs and Contacts: www.p2pays.org/dmrm/start.aspx</p> <p>Wise Water Use in Landscaping, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_1.html</p> <p>Drought tolerant plants for NC Landscapes, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_3/</p> <p>IPM Information from the NC Cooperative Extension: www.ces.ncsu.edu/depts/hort/consumer/hortinternet/lpm.html</p>
<p>2 Kitchen Waste Handling (credit available for ALL of the following):</p> <p><i>Built-in kitchen waste center (two or more bins used for recycling)</i></p> <p><i>Indoor composting system, demonstrated to homeowner</i></p> <p><u>DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party indicating that homeowner has attended demonstration Name of composting system</p> <p><u>INFORMATION:</u> Kitchen recycling centers are modified kitchen cabinets or other systems that neatly conceal recycling bins. There are a number of odorless indoor composting systems available on the market. To earn these points, the builder should arrange to have such a system demonstrated to the homeowner.</p>	1 2	<p><i>Intended to give credit for promoting the recycling of domestic waste.</i></p>	<p>Kitchen Recycling Centers (PATH) www.toolbase.org/Techinventory/TechDetails.aspx?ContentDetailID=648&BucketID=6&CategoryID=1</p> <p>Home Recycling www.greenbuilder.com/sourcebook/HomeRecycling.html</p> <p>How to Compost Indoors: www.mahalo.com/How_to_Compost_Indoors</p>

	Item	Pt	Intent	Resources
3	<p>Integrated Project Management (credit available for ALL of the following):</p> <p>Project Meeting: conduct a preliminary meeting with the key members of the project team as early as practical. Complete an HBH Checklist indicating the credit items being targeted, and listing the team member responsible for providing the <u>required documentation</u> for each credit.</p> <p>"Environmental Responsibility Checklist" provided to the following subcontractors, as applicable to the project: Mechanical (and associated subs), Electrical (and associated subs), Plumbing, Controls, Solar/renewables, Landscaping, Site, Concrete/Floor System, Framing/Wall System, Siding, Masonry, Insulation, Roofing/Roof System, Drywall, Paint/Sealants, Casework, Flooring.</p> <p><u>DOCUMENTATION:</u> Copy of HBH Checklist; date and attendance list from the project meeting Copy of Environmental Responsibility Checklist</p> <p><u>INFORMATION:</u> The most successful green projects result from early communication among the key team members. Even conventional designs can benefit from planning that coordinates the different phases and components of construction. It is especially important for team members that sign off on project documentation to attend. At a minimum, these members must be in attendance to receive this pt.</p> <p>An <u>Environmental Responsibility Checklist</u> for subcontractors may include jobsite specific information and requirements regarding worker safety, waste management, hazardous/toxic materials, site management, etc.</p>	1 4	Intended to give credit for integrating the building/design team.	
4	<p>Market NC HealthyBuilt Homes program (maximum 3 points)</p> <p>HBH pamphlets provided on-site</p> <p>Company website or brochure displays HBH logo</p> <p>Ad or yard sign displays HBH logo</p> <p>Publish newspaper or magazine article on HBH-registered home</p> <p>Make presentation on NC HBH to group of 10 or more</p> <p><u>DOCUMENTATION:</u> Description of marketing activities, presentations, etc. - each to include organization, location, date, description of activity and number/names of attendees if possible</p> <p><u>INFORMATION:</u> Marketing possibilities of the NC HBH program by the builder include but are not limited to: HBA presentation (if no community program is in place), education of leasing agents/realtors/appraisers, getting financial institutions interested and knowledgeable about the program, Parade of Homes display, etc.</p>	1 1 2 2 2	Intended to give credit for promoting green building market development.	Contact: www.healthybuilt homes.org

	Item	Pt	Intent	Resources
5	<p>Builder is enrolled in Community HealthyBuilt Homes Program</p> <p><u>DOCUMENTATION:</u> Completed enrollment form indicating Community HBH program</p> <p><u>INFORMATION:</u> Chapter Partners and their associated counties are as follows:</p> <p>HealthyBuilt Homes of Western NC -- Buncombe, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Polk, Rutherford, Swain, Transylvania, Yancey</p> <p>HealthyBuilt Homes of Northwestern NC -- Alleghany, Alexander, Ashe, Avery, Burke, Caldwell, Catawba, Cleveland, Davie, Davidson, Forsyth, Mitchell, Stokes, Surry, Watauga, Wilkes, Yadkin</p>	2	<p><i>Intended to give credit for supporting HBH Community Partner Programs.</i></p>	<p>HealthyBuilt Homes of Greater Asheville http://wncgbc.org/healthybuilt/</p> <p>HealthyBuilt Homes of Northwestern NC www.energy.appstate.edu/hbh.php</p>
6	<p>Held for: Hazardous construction certification program</p> <p><u>DOCUMENTATION:</u> Copy of certificate</p> <p><u>INFORMATION:</u> Held</p>			
7	<p>Held for: Accessibility certification program</p> <p><u>DOCUMENTATION:</u> Copy of certificate</p> <p><u>INFORMATION:</u> Held</p>			
Innovation Points				
8	<p>Innovation points - Builder submits specifications for innovative products or design <i>(max. 7 innovation points awarded per category)</i></p> <p><u>DOCUMENTATION:</u> Submit completed letter template (see 'Templates' section).</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points. The innovative feature(s) and point(s) must be approved by HBH staff.</p>	1-7	<p><i>Intended to give credit for innovative green building strategies.</i></p>	

Letter Templates:

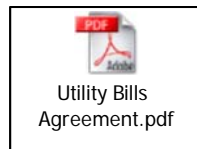
The Adobe Reader application is required to open these documents. It can be downloaded at:
<http://get.adobe.com/reader/>

Double-click on the desired PDF document below to open.

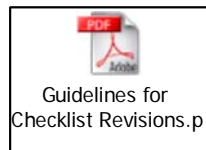
1. Innovation Request



2. Utility Bills Agreement



3. Checklist Item Revision



4. Prerequisite 11 Agreement



Statewide Partners

North Carolina Solar Center:



The **North Carolina Solar Center** serves as a clearinghouse for solar and other renewable energy programs, information, research, technical assistance, and training for the citizens of North Carolina and beyond. Visit www.ncsc.ncsu.edu

ENERGY STAR:



ENERGY STAR is a federal government-backed program helping businesses and individuals protect the environment through superior energy efficiency. For more information on how to make your home or business energy efficient. Visit www.energystar.gov

North Carolina State University:



Located in Raleigh, **North Carolina State University** is a progressive, research and extension land-grant institution. It forges unique partnerships that generate economic development, and applies its research discoveries for the benefit of people in North Carolina and across the United States. Visit www.ncsu.edu

Community Partners

HealthyBuilt Homes of Western NC:



This Community Partnership is administered by the **Western North Carolina Green Building Council**. WNCGBC was organized in 2000, and had members on the statewide task force writing guidelines for the NC HealthyBuilt Homes program. It is a non-profit organization whose mission is to promote environmentally sustainable and health conscious building practices through community education. WNCGBC became a Community Partner in 2005. Visit www.wncgbc.org/healthybuilt

HealthyBuilt Homes of Northwestern NC:



This Community Partnership is administered by **The Energy Center at Appalachian State University**. The Center was established in 2001 to conduct energy research and applied program activities in a multi-disciplinary environment. It has programs in the areas of energy efficiency, renewable energy technology, biofuels, policy analysis, forecasting, and economic development. The Energy Center became a Community Partner in 2007. Visit www.energy.appstate.edu/hbh.php

Sponsors

North Carolina Department of Administration, State Energy Office:



The **State Energy Office** is North Carolina's lead agency for energy programs and services and is the official source for energy information and assistance for consumers, businesses, government agencies, non-profit organizations, schools and policy-makers. Visit www.energync.net

US Department of Energy, Energy Efficiency and Renewable Energy:



DOE's **EERE program** is focused on creating a prosperous future where energy is clean, abundant reliable and affordable. The US Department of Energy has funded various projects for the NC HealthyBuilt Homes program, including expanded training content development for builders and a market study of the features a Zero Energy Home needs in the NC market (focused on coastal and piedmont communities). Visit www.eere.energy.gov