

# Home Builders Association of St. Louis and Eastern Missouri

## Green Building Initiative-St. Louis Program

### Model Green Home Building Basics

Based on the NAHB Green Building Guidelines – Version 1

(Prepared by Laclede Gas Company for the St. Louis HBA; Revised February 15, 2007)

Section		Bronze	Silver	Gold
1	Lot Design, Preparation, and Development	8	10	12
2	Resource Efficiency	44	60	77
3	Energy Efficiency	37	62	100
4	Water Efficiency	6	13	19
5	Indoor Environmental Quality	32	54	72
6	Operation, Maintenance, and Homeowner Education	7	7	9
7	Global Impact	3	5	6
	Additional Points from Sections of your choice	100	100	100
	<b>TOTALS</b>	<b>237</b>	<b>311</b>	<b>395</b>

### Section 1: Lot Design, Preparation, and Development

1.1 Select the site: Select the site to minimize environmental impact.

- \_\_\_ 1.1.1. Avoid environmentally sensitive areas; identified through site foot-printing process (7 pts)
- \_\_\_ 1.1.2 Choose an infill site (9 points)
- \_\_\_ 1.1.3 Choose a Greyfield site (7 points)
- \_\_\_ 1.1.4 Choose an EPA-recognized Brownfield (7 points)

1.2 Identify goals with your team.

- \_\_\_ 1.2.1 Establish a knowledgeable team. ( 6 points)
  - A. Identify team member roles ( how they relate to various phases)
  - B. Create a written mission statement that includes the project’s goals and objectives.

1.3 Design the site: Minimize environmental impacts; protect, restore, and enhance the natural features and environmental quality of the site (points for each guideline are only rewarded upon implementation)

- \_\_\_ 1.3.1 Conserve natural resources. (6 points)
- \_\_\_ 1.3.2 Site the home and other built features to optimize solar resource (6 points)
- \_\_\_ 1.3.3 Minimize slope disturbance. (5 points)
- \_\_\_ 1.3.4 Minimize soil disturbance and erosion. (6 points)
- \_\_\_ 1.3.5 Manage storm water using low impact development. (8 points)
- \_\_\_ 1.3.6 Devise landscape plans to limit water and energy demand (8 points)
- \_\_\_ 1.3.7 Maintain wildlife habitat. (5 points)

1.4 Develop the site. (Minimize environmental intrusion during onsite construction.)

- \_\_\_ 1.4.1 Provide onsite supervision and coordination during clearing, grading, trenching, paving, to ensure targeted green development practices are implemented. (5 points)
- \_\_\_ 1.4.2 Conserve existing onsite vegetation. (5 points)
- \_\_\_ 1.4.3 Minimize onsite soil disturbance and erosion. (6 points)

1.5 Innovative options (Seek to obtain waivers/variances from local regulations to enhance green building.)

- \_\_\_ 1.5.1 Share driveways or parking. (6 points)
- \_\_\_ 1.5.2 Other (specify).

## Section 2: Resource Efficiency

2.1 Reduce quantity of materials and waste

- \_\_\_ 2.1.1 Create an efficient home floor plan that maintain home's functionality. (9 pts. possible)
- \_\_\_ 2.1.2 Advanced framing techniques: reduce building materials + maintain structural integrity; (8 pts)
- \_\_\_ 2.1.3 Use building layouts that maximize resources and minimize material cuts. (6 points)
- \_\_\_ 2.1.4 Create a detailed framing plan and detailed material takeoffs. (7 points)
- \_\_\_ 2.1.5 Use materials requiring no additional finish resources to complete application onsite. (4 pts)
- \_\_\_ 2.1.6 Use pre-cut or pre-assembled building systems or methods as outlined below:
  - \_\_\_ A. Provide pre-cut joist or pre-manufactured floor truss (3 points per system; 9 pts possible)
  - \_\_\_ B. Provide panelized wall framing system (6 pts)
  - \_\_\_ C. Provide panelized roof framing system (6 pts)
  - \_\_\_ D. Provide modular construction for entire house (7 pts)
- \_\_\_ 2.1.7 Use a frost-protected shallow foundation (4 pts)

2.2 Enhance durability and reduce maintenance

- \_\_\_ 2.2.1 Provide covered entry (awning, covered porch) at exterior doors (6 points; partials allowed)
- \_\_\_ 2.2.2 Use recommended-sized roof overhangs for the climate (7 points)
- \_\_\_ 2.2.3 Install perimeter drain for all basement footings sloped to discharge to daylight, sump pit (7 pts)
- \_\_\_ 2.2.4 Install drip edge at eave and gable roof edges (6 points)
- \_\_\_ 2.2.5 Install gutter and downspout system to divert water 5' away from foundation (6 points)
- \_\_\_ 2.2.6 Divert surface water from all sides of building. (7 points)
- \_\_\_ 2.2.7 Install continuous and physical foundation termite barrier in areas locally problematic. (7 points)
- \_\_\_ 2.2.8 Use termite-resistant materials for walls, floor joists, trusses, exterior decks, etc (7 points)
- \_\_\_ 2.2.9 Provide a water-resistive barrier behind the exterior veneer or exterior siding. (8 points)
- \_\_\_ 2.2.10 Install ice flashing at roof's edge (5 points)
- \_\_\_ 2.2.11 Install enhanced foundation waterproofing (7 points)
- \_\_\_ 2.2.12 Employ and show on plans all flashing details: (9 pts)

2.3 Reuse materials

- \_\_\_ 2.3.1 Disassemble existing buildings (deconstruction) instead of demolishing (6 points)
- \_\_\_ 2.3.2 Reuse salvaged materials, where possible. (5 points)
- \_\_\_ 2.3.3 Dedicate and provide onsite bins and/or space to facilitate sorting of scrap materials. (6 points)

Recycled content materials

\_\_\_ 2.4.1 Use recycled-content building materials. List components used. (3 pts)

2.5 Recycle waste materials during construction

\_\_\_ 2.5.1 Develop and implement a construction and demolition waste management plan (7 points)

\_\_\_ 2.5.2 Conduct onsite recycling efforts, (5 points)

\_\_\_ 2.5.3 Recycle construction waste offsite, (6 points)

2.6 Use renewable materials

\_\_\_ 2.6.1 Use materials manufactured from renewable resources ( soy-based insulation; bamboo) (3 pts)

\_\_\_ 2.6.2 Use certified wood for wood and woodbased materials from certified sources: (4 pts/component)

2.7 Use resource-efficient materials

\_\_\_ 2.7.1 Use products that contain fewer resources to meet same end-use as traditional products (3 pts)

2.8 Innovative options

\_\_\_ 2.8.1 Use locally available, indigenous materials. Must list components (5 pts)

\_\_\_ 2.8.2 Use a life cycle assessment (LCA) tool to compare the environmental burden of building materials (Based on analysis, use the most environmentally preferable product for that component. (8 pts)

**Section 3: Energy Efficiency**

3.1 Implement integrated and comprehensive approach to energy efficient design:

REQUIREMENTS - The home must meet the following conditions listed in 3.1.1 through 3.1.3 below. The home must also achieve the equivalent of at least 37 Points (Bronze Level) from the optional guidelines in the Performance Path (Section 3.2) or the Prescriptive Path (Section 3.3).

\_\_\_ 3.1.1 Home is equivalent to the IECC 2003 or local energy code whichever is more stringent. Required

\_\_\_ 3.1.2 Size space heating and cooling system/equipment according to building heating and cooling loads calculated using ANSI/ACCA Manual J 8th Edition or equivalent. Required.

\_\_\_ 3.1.3 Conduct third party plan review to verify design/compliance with Energy Efficiency section. Required.

3.2 Performance path

An energy efficiency line item with a “(PP)” preceding it is a line item likely to be used to calculate X% above IECC 2003.

3.2.1 Home is X% above IECC 2003

\_\_\_ A. 15% (Bronze) 37 points

\_\_\_ B. 30% (Silver) 62 points

\_\_\_ C. 40% (Gold) 100 points

### 3.3 Prescriptive path

#### 3.3.1 Building envelope

(PP)A. Increase effective R-value of building envelope using advanced framing techniques, continuous insulation, and/or, integrated structural insulating system. Measures may include but are not limited to:

- \_\_\_ • SIPS\*, or (8 points)
- \_\_\_ • ICFS\*, or (8 points)
- \_\_\_ • Advanced Framing, or Insulated corners /intersections /headers (6 points)
- \_\_\_ • Raised heel trusses (2 points)
- \_\_\_ • Continuous insulation on exterior wall (4 points)
- \_\_\_ • Continuous insulation on cathedral ceiling (4 points)

\_\_\_ (PP)B. Incorporate air sealing package to reduce infiltration. (10 points)

\_\_\_ (PP)C. Use ENERGY STAR® - rated windows appropriate for local climate. (8 points)

#### 3.3.2 HVAC design, equipment, and installation

- \_\_\_ A. Size, design, and install duct system using ANSI/ACCA Manual D® or equivalent. (8 pts)
- \_\_\_ B. Design radiant /hydronic space heating systems using industry approved Guidelines (8 pts)
- \_\_\_ C. Use ANSI/ACCA Manual S® or equivalent to select heating/cooling equipment. (8 pts)
- \_\_\_ D. Verify performance of the heating/cooling system. (8 pts)
- \_\_\_ E. Use HVAC installer/tech certified by national/regional recognized program (6 pts)

(PP)F. Fuel-fired space heating equipment efficiency (AFUE):

- \_\_\_ Gas Furnace greater than or equal to 81% (4 points)
- \_\_\_ Gas Furnace greater than or equal to 88% (ENERGY STAR) (6 points)
- \_\_\_ Gas Furnace greater than or equal to 94% (8 points)
- \_\_\_ Gas or Oil Boiler greater than or equal to 85% (ENERGY STAR) (2 points)
- \_\_\_ Gas or Oil Boiler greater than or equal to 90% (6 points)

(PP)G. Heat pump efficiency (cooling mode)

- \_\_\_ 1. SEER 13-14 (6 points)
- \_\_\_ 2. SEER 15-18 (6 points)
- \_\_\_ 3. SEER 19+ (7 points)
- \_\_\_ 4. Staged air conditioning equipment (9 points)

(PP)H. Heat pump efficiency (heating mode)

- \_\_\_ 1. 7.2 - 7.9 HSPF (6 points)
- \_\_\_ 2. 8.0 - 8.9 HSPF (7 points)
- \_\_\_ 3. 9.0 - 10.5 HSPF (9 points)
- \_\_\_ 4. > 10.5 HSPF (10 points)

(PP)I. Ground source heat pump installed by a Certified Geothermal Service Contractor. (cooling mode)

- \_\_\_ 1. EER = 13-14 (5 points)
- \_\_\_ 2. EER = 15-18 (6 points)
- \_\_\_ 3. EER = 19-24 (8 points)
- \_\_\_ 4. EER = >25 (10 points)

J. (PP)Ground source heat pump installed by a Certified Geothermal Service Contractor. (heating mode)

- \_\_\_ 1. COP 2.4 - 2.6 (6 points)
- \_\_\_ 2. COP 2.7 - 2.9 (8 points)
- \_\_\_ 3. COP =3.0 (10 points)

\_\_\_ K. Seal ducts, plenums, equipment to reduce leakage. Use UL 181 foil tapes and/or mastic. (6 pts)

\_\_\_ L. When installing ductwork: (8 points)

1. No building cavities used as ductwork, e.g., panning joist or stud cavities.
2. Install all heating and cooling ducts and mechanical equipment within conditioned envelope.
3. No ductwork installed in exterior walls.

\_\_\_ M. Install return ducts / transfer grilles in rooms w/door (except baths, kitch, closets, laun) (6 pts)

\_\_\_ N. Install ENERGY STAR ceiling fans. (1 point per fan)

\_\_\_ O. Install whole-house fan with insulated louvers (4 points)

\_\_\_ P. Install ENERGY STAR labeled mechanical exhaust for every bathroom ducted to outside. (8 pts)

### 3.3.3 Water heating design, equipment, and installation

\_\_\_ A. Water heater Energy Factor (EF) equal to or greater than those listed (4 points):

<u>Natural Gas:</u>	<u>Size (gallons)</u>	<u>Energy Factor</u>
	<u>30</u>	<u>0.64</u>
	<u>40</u>	<u>0.62</u>
	<u>50</u>	<u>0.60</u>
	<u>65</u>	<u>0.58</u>
	<u>75</u>	<u>0.56</u>
<u>Electric:</u>	<u>Size (gallons)</u>	<u>Energy Factor</u>
	<u>30</u>	<u>0.95</u>
	<u>40</u>	<u>0.94</u>
	<u>50</u>	<u>0.92</u>
	<u>65</u>	<u>0.90</u>
	<u>80</u>	<u>0.88</u>
	<u>100</u>	<u>0.86</u>

- \_\_\_ B. Install whole house instantaneous (tankless) water heater. (4 points)
- \_\_\_ C. Insulate all hot water lines with a minimum of 1" insulation. (4 points)
- \_\_\_ D. Install heat trap on cold and hot water lines to and from the water heater (3 points)
- \_\_\_ E. Install manifold plumbing system (parallel piping configuration stacking plumbing) (5 pts)

### 3.3.4 Lighting and appliances

- \_\_\_ A. Use an ENERGY STAR Advanced Lighting Package (ALP) in home. (7 points)
- \_\_\_ B. Install all recessed fixtures within the conditioned envelope (7 pts)
- \_\_\_ C. Install motion sensors on outdoor lighting (7 points)
- \_\_\_ D. Install tubular skylights in rooms without windows. (2 points)
  
- E. Install ENERGY STAR-labeled appliance:
  - \_\_\_ • Refrigerator (3 points)
  - \_\_\_ • Dishwasher (3 points)
  - \_\_\_ • Washing machine. (5 points)

### 3.3.5 Renewable energy/solar heating and cooling

#### 3.3.5.1 Solar space heating and cooling

- \_\_\_ A. Use sun-tempered design: building orientation, sizing of glazing, design of overhangs to provide shading are in accordance with certain guidelines (see User Guide) (10 points)
- \_\_\_ B. Use passive solar design: sun-tempered design as above plus additional southfacing glazing, appropriately designed thermal mass to prevent overheating (see User Guide) (10 points)
- \_\_\_ C. Use passive cooling. (User Guide) ext. shading, overhangs, window cross ventilation (8 pts)

#### 3.3.5.2 Solar water heating

- A. Install solar water heating system. Must use SRCC rated system.
  - \_\_\_ Solar fraction: 0.3 (8 points)
  - \_\_\_ Solar fraction: 0.5 (10 points)

#### 3.3.5.3 Additional renewable energy options (see User Guide for description and additional points)

- \_\_\_ 3.3.6 Verification / Inspection may be performed (8 points)
  - 3.3.6.1 Conduct onsite third party inspection to verify energy related features (see User Guide)
  - \_\_\_ 3.3.6.2 Conduct third party testing to verify performance; blower door, duct leakage, (8 pts per test)

#### 3.3.7 Innovative options

- \_\_\_ A. Install drain water heat-recovery system. (2 points)
- \_\_\_ B. Install desuperheater in conjunction with ground source heat pump. (6 points)
- \_\_\_ C. Install heat pump water heater. (6 points)
- \_\_\_ D. Install occupancy sensors for lighting control. (4 Points per sensor.)

## **Section 4: Water Efficiency**

### **4.1 Indoor/Outdoor Water Use**

- \_\_\_ 4.1.1 Hot water delivery to remote locations aided by installation of: (6 points per unit installed)
  - A. On-demand water heater at point of use served by cold water only
  - B. Control-activated recirculation system.
- \_\_\_ 4.1.2 Water heater located within 30 feet pipe run of all bathrooms and kitchen. (9 points)
- \_\_\_ 4.1.3 ENERGY STAR® water-conserving appliances, e.g., dishwasher, wash. machine (7 pts/appl)
- \_\_\_ 4.1.4 Water efficient showerhead using aerator/venturi with flow rate < 2.5 gpm (2 pts per fixture)
- \_\_\_ 4.1.5 Water-efficient sink faucets/aerators < 2.2 gpm (2 points per fixture)
- \_\_\_ 4.1.6 Ultra low flow (< 1.6 gpm/flush) toilets: (Power-assist: 4 points; Dual flush: 6 points )
- \_\_\_ 4.1.7 Low-volume, non-spray irrigation system installed, e.g., drip irrigation, bubblers (7 points)
- \_\_\_ 4.1.8 Irrigation system zoned separately for turf and bedding areas. (6 points)
- \_\_\_ 4.1.9 Weather-based irrigation controllers, e.g., computer-based weather record. (7 points)
- \_\_\_ 4.1.10 Collect and use rainwater as permitted by local code. (9 points)
- \_\_\_ 4.1.11 Innovative wastewater technology as permitted by local code (7 points)

### **4.2 Innovative options (See User Guide for options/points)**

## **Section 5: Indoor Environmental Quality**

### **5.1 Minimize potential sources of pollutants**

- \_\_\_ 5.1.1 For vented space heating and water heating equipment: (8 points)
  - A. Install direct vent equipment.
  - B. Install induced/mechanical draft combustion equipment.
- \_\_\_ 5.1.2 Install space heating and water heating equipment in isolated mechanical room or closet with an outdoor source of combustion and ventilation air. (6 points)
- \_\_\_ 5.1.3 Install direct-vent, sealed-combustion gas fireplace, sealed wood fireplace, or sealed woodstove or No fireplace or woodstove installed. (6 points)
- \_\_\_ 5.1.4 Ensure a tightly-sealed door in between the garage and living area and provide continuous air barrier between garage and living areas including air sealing penetrations. (9 points)
- \_\_\_ 5.1.5 Ensure particleboard, medium density fiberboard (MDF) and hardwood plywood substrates are certified to low formaldehyde emission standards. (6 points)
- \_\_\_ 5.1.6 Install carpet, carpet pad, and floor covering adhesives that hold “Green Label” from Carpet and Rug Institute’s indoor air quality testing program or equivalent. (6 points)
- \_\_\_ 5.1.7 Mask HVAC outlets during construction and vacuum all ducts, boots, and grilles (5 points)
- \_\_\_ 5.1.8 Use low-VOC emitting wallpaper. (3 points)

5.2 Manage potential pollutants generated in the home

- \_\_\_ 5.2.1 Vent kitchen range exhaust to the outside. (7 points)
- 5.2.2 Provide mechanical ventilation at a rate of 7.5 cfm per bedroom + 7.5 cfm and controlled automatically or continuous with manual override. The ventilation equipment may be:
  - \_\_\_ A. Exhaust or supply fan(s), or (7 points)
  - \_\_\_ B. Balanced exhaust and supply fans, or (9 points)
  - \_\_\_ C. Heat-recovery ventilator, or (10 points)
  - \_\_\_ D. Energy-recovery ventilator (10 points)
- \_\_\_ 5.2.3 Install MERV 9 filters on central air or ventilation systems. (3 points)
- \_\_\_ 5.2.4 Install humidistat to control whole-house humidification system. (4 points)
- \_\_\_ 5.2.5 Install sub-slab de-pressurization system to facilitate future radon mitigation system. (6 points)
- \_\_\_ 5.2.6 Verify all exhaust flows meet design specifications (9 points)

5.3 Moisture management (vapor, rainwater, plumbing, HVAC)

- \_\_\_ 5.3.1 Control bathroom exhaust fan with a timer or humidistat. (6 points)
- \_\_\_ 5.3.2 Install moisture resistant backerboard – under tiled surfaces in wet areas. (6 points)
- \_\_\_ 5.3.3 Install vapor retarder directly under slab (6-mil) or on crawl space floor (8-mil). (9 points)
- \_\_\_ 5.3.4 Protect unused moisture-sensitive materials from water damage by just-in-time delivery, storing unused materials in dry area, or tenting materials and storing on raised platform. (6 points)
- \_\_\_ 5.3.5 Keep plumbing supply lines out of exterior walls. (5 points)
- \_\_\_ 5.3.6 Insulate cold water pipes in unconditioned spaces (4 points)
- \_\_\_ 5.3.7 Insulate HVAC ducts, plenums, and trunks in unconditioned basements / crawl spaces (4 pts)
- \_\_\_ 5.3.8 Check moisture content of wood before it is enclosed on both sides. (4 points)

**Section 6: Operation, Maintenance, and Homeowner Education**

- \_\_\_ 6.1 Provide Home Manual to owners/occupants on the use and care of the home: (9 points)
  - A. Narrative detailing importance of maintenance/ operation to keep a green built home green
  - B. Local Green Building Program certificate.
  - C. Warranty, operation, and maintenance instructions for equipment and appliances
  - D. Household recycling opportunities
  - E. Info on how to enroll in program where home receives energy from renewable energy provider
  - F. Explanation of the benefits of using compact fluorescent light bulbs in high usage areas
  - G. A list of habits/actions to optimize water and energy use
  - H. Local public transportation options (if applicable)
  - I. Clearly labeled diagram showing safety valves and controls for major house systems.
- \_\_\_ 6.2 Optional information to include in the Home Manual see User Guide (2 points)

\_\_\_ 6.3 Provide education to owners/occupants in the use and care of their dwellings. (7 points)

A. Instruct homeowner/occupants about the building's goals and strategies and occupant's impacts on costs of operating the building. Provide training to owners/occupants for all control systems in the house.

\_\_\_ 6.4 Solid waste

A. Encourage homeowners/occupants to recycle by providing built-in space in the home's design (e.g., kitchen, garage, covered outdoor space) for recycling containers. (1 point)

## **Section 7: Global Impact**

### 7.1 Products

- \_\_\_ 7.1.1 Product manufacturer's operations and practices (environmental management system) 3 pts
- \_\_\_ 7.1.2 Choose low- or no-VOC indoor paints. (6 points)
- \_\_\_ 7.1.3 Use low VOC sealants. (5 points)

### 7.2 Innovative options

- \_\_\_ 7.2.1 Builder's operations and business practices include environmental management concepts (4 pts)