



KEYSTONE GREEN BUILDING INITIATIVE

Design and Construction Criteria for
Building and Assessing Green Homes

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KEYSTONE GREEN BUILDING INITIATIVE DESIGN CRITERIA

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Keystone Green Building Initiative Final Version

Section 1 Select The Site

1.1 Select The Site

1.1.1 Avoid environmentally sensitive areas: (up to) 2 pts

- Elevation lower than 100 year flood plan (FEMA) 0.5 pts
- Habitat area (fed or state threatened or endangered list) 0.5 pts
- Within 100 feet of water (includes wetlands) 0.5 pts
- Prime farmland 0.5pts

1.1.2 Choose an environmental & community friendly site: (up to) 3 pts

- Infill site (1 pt)
- Grey field site (1 pt)
- Pedestrian-oriented (1 pt)
- (Or)
- EPA-recognized Brown field site (3 pts)

1.1.3 Urban-oriented site: (up to) 3 pts

- Density 7 per acre 1 pt
- 10 per acre 2 pts
- 20 per acre 3 pts

1.1.4 Open Space / Increased Density (Over Ordinance) 1, 3 or 5 pts

- Create or contribute public parkland (10%, 25%, 50%) of site

1.2 Identify Goals with Team (Written Description) Required

1.3 Design the Site

1.3.1 Conserve natural resources (up to) 3 pts

- Protect stock piled topsoil (NAHB 1.4.3 D) 0.5 pt
- Stabilize disturbed soils 0.5 pt
- Silt fencing & runoff design (NAHB 1.4.3 C) 0.5 pt
- Protect runoff from steep slopes 0.5 pt
- Protect inlets w/ straw bales, fencing etc. 0.5 pt
- Participate in local wildlife protection program 1 pt

1.3.2 Optimal solar-oriented site planning

Single Homes: (up to) 4pts or

- A. Façade within 10 degrees of due south to be longest Façade (by 25% minimum) 1 pt
- B. Fenestration area along façade within 10 degrees of due south to be 10% to 25% of total floor area 1 pt
- C. Fenestration along façade within 10 degrees

of due south to be shaded (using F factor = 2.0)	1 pt
D. Fenestration along façade within 10 degrees of due south to be shaded using deciduous trees/vegetation	1 pt
For Communities (20+ homes):	(up to) 12 pts
A. Façade within 10 degrees of due south to be longest façade (by 25% minimum) 90% of overall homes.	(Add) 3 pts
B. Fenestration area along façade within 10 degrees of due south to be 10% to 25% of total floor area 90% of overall homes.	(Add) 3 pts
C. Fenestration along façade within 10 degrees of due south to be shaded (using F factor = 2.0) 90% of overall homes.	(Add) 3 pts
D. Fenestration along façade within 10 degrees of due south to be shaded using deciduous trees/vegetation (90% of overall homes.)	(Add) 3 pts
1.3.3 Minimize slope disturbance	(up to) 1 pt
• Steep slope disturbance (25% maximum)	0.5 pt
• Long term erosion control	0.5 pt
• Road/driveway design (minimize cut/fill)	0.5 pt
1.3.4 Minimize soil disturbance	(up to) 1 pt
• Site disturbance plan (limit to 35% of site, if over ¼ Acre)	0.5 pt
• Alternate utility installation	0.5 pt
• Stabilized disturbed areas (per EPA)	0.5 pt
1.3.5 Storm water management	(up to) 6 pts
• Permanent storm water control (swales, terracing, rain barrels, rain gardens)	1 pt
• Limit impervious surface to 50% of site	1 pt
• Tree & vegetation planting	1 pt
• Share driveways	1 pt
• Use pervious paving material for min. 50% of paved surfaces	2 pts
1.3.6 Water and energy efficient landscaping	(up to) 3 pts
• Install native drought-tolerant vegetation	1 pt
• Limit turf to sunny areas only	1 pt
• Design trees to shade 50% of hardscaping	1 pt
• Vegetative windbreakers	0.5 pt
• Non-toxic pest control	0.5 pt
1.3.7 Maintain wildlife habitat (Written Plan)	1 pt

1.4 Develop The Site

- 1.4.1 Tree/vegetation protection (up to) 4 pts**
- Construction fencing/demarcation 0.5 pt
 - Trimmings to be recycled 0.5 pt
 - Improve soil w/organic amendments 0.5 pt
 - Compaction protection using mulch 0.5 pt
 - Clearing, trenching, coordination 0.5 pt
 - Movement of trees / large shrubbery 0.5 pt (up to 2 pts)

Possible total: 44 pts

Section 2 Resource Efficiency

2.1 Reduce Quantity & Waste Of materials

- 2.1.1 Create an efficient sized home -10 to + 10 pts (max)**
- -200 sq ft = +1 pt
 - 3000 sq ft = 0 pts
 - +200 sq ft = -1
- 2.1.2 Advanced framing techniques 5 pts(max)**
(OVE: Optimal Value Engineered)
- 2 stud corners (with drywall clips) 1 pt
 - Ladder style connections 1 pt
 - 24" O.C. spacing 1 pt
 - Actual-sized headers 1 pt
 - No headers @ non load bearing openings 1 pt
- 2.1.3 12"/24" overall dimensions of building 1 pt**
- 2.1.4 Framing plan: Material take-offs, pre-cuts 1 pt**
- 2.1.5 Efficient building systems (SIP'S, ICF'S) 2 pts**
(In lieu of 2.1.2 / 2.1.4)
- 2.1.6 Pre-assembled / engineered framing buildings or components 5 pts (max)**
- I – Joists (pre-cut) floor systems 1 pt
 - I – Joists roof system 1 pt
 - Panelized wall framing 1 pt
 - Panelized roof framing 1 pt
 - Precast Concrete Foundation system 1 pt
- OR**
- Modular home 4 pts
- 2.1.7 Frost-protected shallow foundation 1 pt**

2.2	Enhance Durability & Reduce maintenance	
2.2.1	Covered entries (all entries 24”+)	1 pt
2.2.2	Region-specific overhangs (south, all openings)	2 pts
2.2.3	Moisture protection	(up to) 5 pts
	• Perimeter drain	Required
	• Water Resistant Barrier	0.5 pt
	• Drip edge (roof overhangs)	0.5 pt
	• Slide backfill 6”/10’	0.5 pt
	• Enhanced FDN waterproof	0.5 pt
	• Ice flashing @ roof edge	0.5 pt
	• Gutter/downspout (5 feet from foundation)	0.5 pt
	• Flashing at wall openings	0.5 pt
	• Flashing roof at all valleys	0.5 pt
	• Flashing at decks	0.5 pt
	• Drip cap (windows, doors, etc)	
2.2.4	Insect resistance	(up to) 1 pt
	• Physical termite barrier (2.2.7)	0.5 pt
	• Termite resistant (2.2.8)	0.5 pt
	• Plantings 24” min from wood (framing, siding, etc.)	0.5 pt
2.3	Material Re-Use	
2.3.1	Disassemble existing building (25% + salvaged)	1 pt
2.3.2	Re-use salvaged materials (50%+ of component)	(up to) 5 pts
	(1 pt per component)	
	• Windows	1 pt
	• Masonry	1 pt
	• Plumbing/ Fixtures	1 pt
	• Framing	1 pt
	• Ornaments	1 pt
2.3.3	Bin collection system (for scrap re-use)	1 pt
2.4	Recycled Materials	
2.4.1	Recycled materials (20% per component)	(up to) 3 pts
	• Framing	1 pt
	• Foundation	1 pt
	• Finishes (flooring, drywall, carpet)	1 pt
	(1 pt per component)	
2.5	Waste Reduction	

- | | |
|---|--------------------------|
| 2.5.1 Waste management | (up to) 4 pts |
| • 2lbs/1000 | 1 pt |
| • 1.5lbs/1000 | 2 pts |
| • 1lb/1000 | 3 pts |
| • 0.5lb/1000 | 4 pts |
|
2.5.2 On-site recycling, grinder |
1 pt |
|
2.5.3 Off-site recycling |
(up to) 5 pts |
| • Gypsum wall board recycling | 1 pt |
| • Corrugated cardboard recycling | 1 pt |
| • Metals recycling | 1 pt |
| • Masonry | 1 pt |
| • Wood | 1 pt |
|
2.6 Renewable Materials | |
| 2.6.1 Use materials manufactured from renewable resources
(Bamboo, soy-based insulation, etc.) (See Table)
2.0 pts per component / system
(Must be at least 75% of component) | (up to) 12 pts |
| 2.6.2 Use certified wood products
(FSC, PEFC, CAN/CSA Z809, ATFA, SFIP)
(See Table)
Framing, sheathing: wall, roof, and cabinets
1.0 pts per component (75% of component) | (up to) 12 pts |
|
2.7 Optional Solutions | |
| 2.7.1 Use locally available, indigenous material
1.0 pts per component (75% of component)
(See Table) | (up to) 12 pts |
|
2.8 Alternative Technologies | |
| 2.8.1 Use products that contain fewer resources
1 pt per component | (up to) 2 pts |
| 2.8.2 Use LCA (Life Cycle Assessment) tool to compare
Environmental burden of chosen products | 1 pt |

Possible total: 93 pts

Section 3 Energy Efficiency

3.1 Heating and Cooling System Requirements

3.1.1	Home is equivalent to IECC 2003 or local energy code	Required
3.1.2	HVAC equipment sized according to building heating and cooling loads calculated using Manual J, (8th edition) or equivalent, and use Manual S, or equivalent to select HVAC equipment, and size design and install Ductwork using Manual D	Required
3.1.3	Conduct third party plan review to verify compliance with Energy efficiency section. (Multiple homes 15% must be reviewed.)	Required
3.2	Performance Path (Option A) • Third party certified	Required
3.2.1	Exceed requirements for Energy Star Homes • Meet requirements of Energy Star Homes • HERS score 87 • HERS score 89 • HERS score >90	5 pts 7 pts 9 pts 16 pts
3.3	Prescriptive Path (Option B)	
3.3.1	Building insulation increase effective R value to reduce thermal bypass • Advanced framing techniques • SIPS • ICF's • Spray foam in OVE framing (Can be used in combination with 2.1.5)	1 pt (1 system only)
3.3.2	Incorporate air sealing package • Insert table 1-11	3 pts
3.3.3	Energy Star rated window • U-Factor 0.35 • 10% > Energy Star U-Factor 0.32 • 20% > Energy Star U-Factor 0.30	(up to) 4 pts 1 pt 2 pts 4 pts
3.3.4	HVAC Duct system tightness use foil tape or mastic • ≤ 6.0 CFM per 100 square feet of floor area • ≤ 3.0 CFM per 100 square feet of floor area • ≤ 1.0 CFM per 100 square feet of floor area	(up to) 3 pts Required 2 pts 3 pts
3.3.5	HVAC Duct Air Quality and Performance • No duct work installed in exterior walls • Install return ducts and/or transfer grills in	(up to) 4 pts Required

<ul style="list-style-type: none"> every room having a door except baths, kitchens, closets, pantry, laundry room • All heating and cooling ducts and equipment installed in conditioned space • No wall cavities used as duct work 	<p>Required</p> <p>2 pts</p> <p>2 pts</p>
3.3.5.1 Ventilation	(up to) 6 pts
<ul style="list-style-type: none"> • Install whole house fan with insulated airtight access hatch • Install solar powered attic fan • Install energy star rated bathroom fans with timer • Controls 	<p>2 pts</p> <p>2 pts</p> <p>2 pts</p>
3.3.6 Space Heating and Cooling Equipment	
3.3.6.1 Install Energy Star labeled programmable thermostats	Required
3.3.6.2 Equipment ratings used Table EA6-A	(up to) 5 pts
<ul style="list-style-type: none"> • Energy Star • 10% > Energy Star • 20% > Energy Star 	<p>1 pt</p> <p>3 pts</p> <p>5 pts</p>
3.3.6.3 Environmentally friendly refrigerants	2 pts
<ul style="list-style-type: none"> • Install equipment with R410A refrigerant 	
3.3.7 Water Heating	1 pt
<ul style="list-style-type: none"> • Insert Table 	
3.3.7.1 Install Tankless Hot Water Heater(s)	3 pts
3.3.7.2 Insulate all hot water lines	1 pt
3.3.7.3 Install manifold plumbing system	2 pts
3.3.8 Lighting	
<ul style="list-style-type: none"> • Maximize day lighting (need to specify) • Install tubular (sun tubes) in rooms without skylights 	<p>1 pt (or)</p> <p>1 pt</p>
3.3.8.1 Install Energy Star advanced lighting package in home	3 pts or
<ul style="list-style-type: none"> • At least four Energy Star fixtures • Install compact fluorescents in 70% of fixtures • Install motion sensor controls on all outdoor fixtures 	<p>1 pt</p> <p>1 pt</p> <p>1 pt</p>
3.3.9 Install Energy Star appliances	(up to) 3 pts
<ul style="list-style-type: none"> • Refrigerator (1pt only) • Ceiling fans (all) (up to 5 fans) • Very energy efficient clothes washer (MEF>1.8) 	<p>1 pt</p> <p>1 pt</p> <p>0.5 pt</p>

- Very energy efficient dish washer (WF<5.5) 0.5 pt

3.3.10 Renewable Energy

3.3.10.1 Passive Solar Design (energy modeling required) (up to) 10 pts

- Passive Solar Heating 5 pts
- Passive Cooling 5 pts

3.3.10.2 Install solar hot water system 5 pts

3.3.10.3 Renewable Electricity Generation (PV, Wind, Small Hydro) (up to) 15 pts

- System installed (with no minimum kwh/yr) 2 pts (or)
- 2,000 – 3,999 KWh/year 5 pts (or)
- 4,000 – 5,000 KWh/year 10 pts (or)
- >5,000 KWh/year 15 pts

3.3.10.4 Provide clear unshaded roof area (=/- 22 degrees of south) for future solar collector or PV 1 pt

3.3.11 Verification 3rd party testing and verification of Prescriptive path options 3 pts

3.3.12 Alternative Technologies (up to) 2 pts

- Drain water heat recovery system
- Occupancy sensors on interior light 0.5 points per sensor
- Desuperheater or on demand hot water from GSHP
- Other specify

Possible total: 94 pts

Section 4.0 Water Efficiency

4.1 Indoor Water Use

4.1.1 Efficient (low-flow) fixtures (up to) 3 pts

- Lavatory faucet 2.0 GPM 1.0 pt
- Shower head 2.0 GPM 1.0 pt
- Toilet 1.3 GPM 1.0 pt

4.1.2 High efficient fixtures (up to) 3 pts

- Lavatory faucet 1.5 GPM (1 pt per type)
- Shower head 1.5 GPM
- Toilet 1.5 GPM (or dual flush)

4.1.3 Shut-off valve or medal-activated or motion sensor controls (up to) 2 pts

- Lavatory faucet (1.0 pt)

- Toilet (1.0 pt)
- 4.1.4 Composting or waterless toilets (up to) 3 pts**
(1 pt per fixture)
- 4.1.5 Energy star appliances (DW or CW) (1.0 pt each) (up to) 2 pts**
- 4.1.6 High efficiency water conditioning system 1 pt**
- 4.2 Outdoor Water Use**
 - 4.2.1 Low volume, non-spray irrigation 2 pts**
 - (Drip bubbler, stream-rotator)
 - 4.2.2 Irrigation control (up to) 3pts**
 - Zoned system 1.0 pt
 - Weathered-based control system (computer) 1.0 pt
 - Rain barrel or cistern 1.0 pt
(3/4" rain event: collect 50% of volume)
- 4.3 Waste Water management**
 - 4.3.1 Grey water re-use system 4 pts**
 - 4.3.2 Alternative waste water technology 4 pts**
 - Sand filter, aerobic, constructed wetland

Possible total: 27 pts

Section 5.0 Indoor Environmental Quality

5.1 Minimize potential Sources of pollutants

- 5.1.1 For vented space heating and water heating equipment Required**
 - Install direct vent equipment (sealed combustion)
 - Install induced/mechanical draft combustion equipment (Minimum / No Points)
- 5.1.2 Install space heating and water heating equipment Required**
 - In isolated mechanical room or closet with an outdoor source of combustion and ventilation air.
- 5.1.3 Install direct vent sealed combustion gas fireplace, sealed wood fireplace, or sealed woodstove.**
or
No fireplace or woodstove installed. 1 pt

- 5.1.4 Ensure a tightly sealed door** **1 pt**
- Between the garage and living area and provide continuous air barrier between garage and living areas including air-sealing Penetrations, walls, ceilings, and floors.
- 5.1.5 Ensure particleboard, medium density fiberboard (MDF) and hardwood Plywood substrates are certified to low Formaldehyde emission standards ANSI A208.1, ANSI A208.2 and ANSI/HPVA/ HP1, respectively. Composite wood/agrifiber panel products must either contain no added urea-formaldehyde resins or must be third part certified for low formaldehyde emissions** **(up to) 2 pts**
- Wall Sheathing (1 per component)
 - Floor Sheathing
- 5.1.6 Install carpet, carpet pad, and floor covering adhesives that hold “Green Label.”** **1 pt**
- From Carpet and Rug Institute’s indoor air quality testing program or meet equivalent thresholds verified by a third party.
- 5.1.7 Mask HVAC outlets during construction** **1 pt**
- Vacuum ducts, boots, and grilles before turning on central heating/cooling system.
- 5.1.8 Use low VOC emitting wallpaper /adhesives & finishes** **(up to) 3 pts**
- Wallpaper
 - Paint
 - Flooring / Carpet Adhesive
- 5.1.9 Install high efficiency drinking water filtration system** **1 pt**
- 5.2 Manage potential pollutants generated in the home.**
- 5.2.1 Vent kitchen range exhaust to the outside.** **Required**
- 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:** **(up to) 4 pts**
- Exhaust or supply fan(s) **Required**
 - Balanced exhaust and supply fans **Required**
 - Heat-recovery ventilator (or) **4 pts (or)**

	• Energy-recovery ventilator	4 pts
5.2.3	Install MERV filters on central air or ventilation Systems (Minimum /No Points)	(up to) 3pts
	• MERV 8	1 pt
	• MERV 10	2 pts
	• MERV 12	3 pts
5.2.4	Install humidistat to control whole house humidification system.	Required
5.2.5	Install sub-slab de-pressurization system or infrastructure to facilitate future installation of radon mitigation system.	Required
	• The more stringent requirement between a local building code and this provision shall apply.	
5.2.6	Verify exhaust flows specifications 0.5 pt per room appliance:	(up to) 2 pts
5.3	Moisture Management (Vapor, Rainwater, Plumbing, HVAC)	
5.3.1	Control bathroom exhaust fan with a timer or humidistat. (0.5 pt per room)	(up to) 2 pts
5.3.2	Install moisture resistant backer board	Required
	• No paper-faced sheathing – under tiled surfaces in wet areas. (Cementitious board) (0.5 pt / bathroom)	(up to) 2 pts
5.3.3	Install vapor retarder directly under slab.	Required
	• (6-mil) or on crawl space floor (8-mil). In crawl spaces extend poly up wall and affix with glue and furring strips, or damp proof wall below grade. Joints lapped 12 inches.	
5.3.4	Protect unused moisture-sensitive materials from water damage.	Required
	• Through just-in-time delivery, storing unused materials in a dry area, tenting materials and storing them on a raised platform.	
5.3.5	Keep plumbing supply lines out of exterior walls.	1 pt
5.3.6	Insulate cold water pipes in unconditioned spaces	1 pt
	• With ½” insulation or other coating that comparably prevents condensation.	

- 5.37 Insulate HVAC ducts, plenums, and trunks in unconditioned basements and crawl spaces to avoid condensation.** **1 pt**
- 5.3.8 Check moisture content of wood before it is enclosed on both sides.** **1 pt**
- Ensure moisture content of sub floor/substrate meets the appropriate industry standard for the finish flooring material to be installed.
- 5.4 Alternative Technologies** **(up to) 2 pts**
- Integrated central vacuum system **1 pt**
 - Install motion-sensor controlled exhaust fan in garage (if attached to house) **1 pt**

Possible total: 29 pts

Section 6.0 Homeowner Education

- 6.1 Provide Homeowner Maintenance Manual** **2 pts**
- Sustainability Description
 - Keystone Greenbuilt initiative certificate
 - Provide homeowner with information and enrollment materials on purchasing green power
 - Warranty, operations and maintenance instructions
 - Recycling program information (Local Municipality)
 - Enrollment information for renewable energy providers
 - Description: Benefits of compact fluorescent bulbs
 - Provide list of habits / reasons to optimize water & energy use
 - Local transportation information (maps, schedules, contact info.)
 - Clearly label safety valves / controls
- (All items required)
- 6.2 Additional Information To Include In Manual** **1 pt**
- List of local service providers for maintenance items
 - Photo records of framing w/utilities installed
 - User friendly maintenance checklist
 - Contact information for local disposal of hazardous materials
 - Information on organic pest control, fertilizer, de-icers
 - Directions to maintain 30-30% room humidity in home
- (All items required)
- 6.3 Use and Care Homeowner Education** **Required**
- Physical walk-through with homeowner (1 ½ hours)
- 6.4 Solid Waste**
- Supply / install built-in recycling space and containers **1 pt**

Possible total: 4 pts

Section 7.0 Innovation In Design and Construction

7.1 Innovation (1 pt per item) (up to) 9 pts

**7.2 Additional Innovations can be submitted by builder.
and reviewed by KGI Board for additional points
pending approval.**

Possible total: 9 pts

Keystone GBI Program Point System

Possible Total Pints Combined: 300 points

**Bronze: 70 to 124 points
Silver: 125 to 179 points
Gold: 180 + points**

Category	Minimum points required			Total
	Bronze	Silver	Gold	
Select the Site	5	9	13	44
Resource Efficiency	8	14	20	93
Energy Efficiency	16	28	38	94
Water Efficiency	3	6	8	27
Indoor Environmental Quality	3	6	8	29
Homeowner Education	2	2	2	4
Innovation	N/A	N/A	N/A	9