

### **GHNE** Checklist

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|    | CATEGORY | STRATEGY | APPROACH  | PTS/REQUIRED | ACHIEVED |
|----|----------|----------|---|--------------|----------|
| 1. | Sľ       | TIN      | G AND LAND USE  |              |          |
|    | 1.       | Choc     | ose location to reduce the dependence on automobiles.   |              |          |
|    |          | a.       | Proximity to four (within <sup>1</sup> / <sub>4</sub> mile) or seven (within <sup>1</sup> / <sub>2</sub> mile) basic community resources, including: bank, grocery, school, convenience store, etc., OR proximity to public transportation (within 1/4 mile for bus; 1/2 mile for train or ferry).  | 3            |          |
|    |          | b.       | Proximity to (within $1/2$ mile) green spaces by foot.  | 1            |          |
|    |          | c.       | Provision for pedestrians, including pathways and bicycle to the along roads around home's perimeter.   | 2            |          |
|    |          | d.       | In-fill development: locate housing in empty lots in an exist g net borhood (established at least 15 years).  | 3            |          |
|    |          | e.       | Dedicated business office in home with separate entrar  | 1            |          |
|    | 2.       | Optin    | mize land use to minimize damage to the environmen an, w re possible, improve the environment.  |              |          |
|    |          | a.       | <ul> <li>For sites 1 acre or larger, submit a site plan that so wis the opposed layout and design of the parcel, including:</li> <li>Soil delineations;</li> <li>Hydrological/soil stability study for stop slop (slopes greater than 25%), and use this study to guide the design of all structures on site;</li> <li>Natural resources inventory used to drive/create the site plan; and</li> <li>Protection and maintenance plan for priority natural resources/areas during construction.</li> </ul>  | 3            |          |
|    |          | b.       | Do not develop buildings, roads or parking areas on portions of prime farmland defined by the United States<br>Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to<br>699, Section 657.5 (citation 7CFR657.5)   | 3            |          |
| -  |          | с.       | Do not develop buildings, roads or parking areas on portions of land which are specifically identified as 1) habitat for any species on Federal or State threatened or endangered lists, 2) within 100 feet of any water including wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within distances given in applicable state or local regulations, whichever is more stringent, or 3) on portions of land whose elevation is lower than the 100-year flood as defined by FEMA. | 1            |          |
|    |          | d.       | No disturbance to 40% of a previously undeveloped lot.  | 3            |          |
|    |          | e.       | Share driveways or parking.   | 1            |          |
|    |          | f.       | Build on a brownfield site or previously built-on site. (Brownfield: previously occupied site where ecosystems are damaged, requiring at least some landscape restoration)  | 3            |          |
|    |          | g.       | Creation of conservation and property sale restrictions to preserve sustainable intent on parcels up to 1 acre.   | 3            |          |
|    | 3.       | Mini     | mize soil disturbance and erosion during construction.  |              |          |
|    |          | a.       | Demarcate limits of clearing, grading and "no disturbance" zones using fencing or flagging to protect vegeta-<br>tion and sensitive areas from construction vehicles, material storage, and washout. Prepare designated existing<br>trees and vegetation for the impacts of construction through pruning, root pruning, fertilizing, and watering.  | REQ          |          |



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|    | h     | Install and maintain addiment and arosion controls, stocknile and protect avisting tonsail from arosion (for  |          |  |
|----|-------|---|----------|--|
|    | υ.    | reuse) stabilize soils that have been disturbed and provide swales to divert surface water from hillsides:    |          |  |
|    |       | control the path and velocity of runoff with silt fencing: protect on site storm sewers inlets with straw     | REQ      |  |
|    |       | bales, or silt fencing.   |          |  |
|    | c.    | Reduce long term erosion effects through use of terracing and retaining walls.                                | 1        |  |
|    | d.    | Plant one tree per 500 square feet of disturbed construction area (including home site), or four large,       | 1        |  |
|    |       | 5-gallon shrubs are equivalent to one tree.   | 1        |  |
|    | e.    | Reduce soil compaction from construction equipment through laying mulch, chipped wood, or plywood             | 1        |  |
|    |       | sheets.   | 1        |  |
|    | f.    | Use alternative means to install utilities, such as tunneling instead of trenching, use of smaller equipment, | 2        |  |
|    |       | shared trenches or easements, and placement of utilities under streets instead of yards.                      | 2        |  |
|    | g.    | Improve the soil with organic amendments and apply mulch 3-4 inches deep around plants.                       | 1        |  |
| 4. | Mana  | age storm water to protect water quality post-construction.   |          |  |
|    | a.    | Develop and implement stormwater management plan that vinm. es concentrated flows and seek to                 | 2        |  |
|    |       | mimic natural hydrology.  |          |  |
|    | b.    | Install permeable material for at least 65% of building of a not including home's footprint or retain run-    | 2        |  |
|    |       | off water on site. (Exemption, if building lot is $, ac e).$  | 2        |  |
|    | c.    | Install permanent storm water treatment (i.e. veg. )ted swes, on-site pond, etc.)                             | 2        |  |
| 5. | Insta | Il plants and vegetation to reduce energy and wate use while preserving or enhancing the natural environmen   | ronment. |  |
|    | a.    | If site is larger than 1/3 acre, develop a tree / plan preservation plan and implement plan.                  | REQ      |  |
|    | b.    | No invasive plant species, as justified by local Agriculture Coop Extension.                                  | 1        |  |
|    | c.    | Plant only drought tolerant turf in sunny areas and no turf in densely shaded areas.                          | 3        |  |
|    | d.    | Landscaping that requires no irrigation system once mature.   | 1        |  |
|    | e.    | Group plants with similar watering needs (hydrozoning).   | 1        |  |
|    | f     | Design and install trees to shade at least 50% of sidewalks, patios, and driveway within 50 feet of house (at | 1        |  |
|    | 1.    | 5 years growth).  | 1        |  |
|    | g.    | Planted (or building sited with) windbreak on north or northwest.   | 1        |  |
|    | h.    | Preserve or plant new shade trees and vegetation for shading east and west sides of building.                 | 1        |  |
|    | i.    | Establish an integrated pest management plan to minimize chemical use of pesticides and fertilizers.          | 1        |  |
|    | j.    | Landscape with at least 75% native species. One additional point for 100%.                                    | 2        |  |
|    | k.    | Limit turf to less than 50% of landscape (1 point) / 25% (2 points) / 0% (3 points).                          | 1        |  |
| 6. | Prom  | note community through site and building design (applicable to 3 or more units).                              |          |  |
|    | a.    | Complete the requirements of the LEED for Neighborhood Developments (LEED-ND) program OR                      | 20       |  |
|    |       | choose individual approaches below.   | 20       |  |
|    | b.    | Minimize front yard to include mandatory set-back and up to 20 feet of additional depth.                      | 2        |  |
|    | c.    | Build homes with average housing density is greater than 7 dwellings units per acre of buildable land.        |          |  |
|    |       | Buildable land shall not include public streets and other public rights of way, land occupied by nonresi-     | 1        |  |
|    |       | dential structures, or land excluded from residential development by law with municipal sewer. (As greater    | 1        |  |
|    |       | density per acre is achieved, points from previous measures are additive for Approaches below.)               |          |  |
|    | d     | Build homes with average housing is greater 10 dwellings units per acre of buildable land.                    | 2        |  |



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| e. | Build homes with average housing density is greater than 20 dwellings units per acre of buildable land.                                 | 3   |  |
|----|---|-----|--|
| f. | Build homes with average housing density is greater than 40 dwellings units per acre of buildable land.                                 | 3   |  |
| g. | Indoor community room space is available to multiple units.   | 2   |  |
| h. | 50% of green space is common.   | 2   |  |
| i. | Creation of deed-protected affordable housing.  | 2   |  |
| j. | Unit in multifamily or co-housing development.  | 3   |  |
| k. | Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee). | TBD |  |

#### 2. BUILDING DESIGN

| 1. | Esta | blish knowledgeab  | le team to incorpor  | rate optimal green  | n building design   | and approach   | ies.   |   |   |
|----|------|--|--|---|---|--|--|---|---|
|    | a.   | Implement an int statement, goals,   | egrated design app<br>and team member  | roach by workin<br>roles.   | g with a way to in  | ncorporate a   | written project mission  | 3   |   |
| 2. | Des  | ign for efficient use  | of space and mate  | erials.   |   |  |  |   |   |
|    |      | Construct building<br>while still meeting<br>bedrooms. House<br>HOUSE SIZE IN<br>2 Bedrooms<br>2732<br>2582<br>2432<br>2282<br>2132<br>1982<br>1832<br>1682<br>1532<br>1432<br>1382<br>1332<br>1232<br>1132<br>1032<br>932<br>832<br>732<br>Source: NAHB Green | g that optimizes the<br>g occupants' needs.<br>as larger than those I<br>SQUARE FEET BY<br>3 Bedrooms<br>3820<br>3613<br>3406<br>3199<br>2992<br>2785<br>2578<br>2371<br>2164<br>1957<br>1890<br>1823<br>1688<br>1551<br>1414<br>1277<br>1140<br>1003<br>ren Home Building Guideli | use of interior spa<br>Determine points<br>listed ear, zero, or<br>NUME :R OF FE<br>4 B, rooms<br>53,<br>5045<br>4757<br>4469<br>4181<br>3893<br>3605<br>3317<br>3029<br>2741<br>2648<br>2555<br>2363<br>2171<br>1979<br>1788<br>1596<br>1404<br>nes v.1 12-13-04 | 5, sc n. * overall         usin g Hc use Sizing         ints. Anways round         5+Bedrooms         6869         6500         6131         5762         5393         5024         4655         4286         3917         3548         3424         3296         3048         2801         2553         2306         2059         1812 | building size i<br>g Chart below<br>d square foota<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>12<br>14<br>16<br>18<br>20<br>22<br>24 | is kept to a minimum<br>based on number of<br>age up to next house size.<br>Bedroom: A room or s<br>square feet or greater,<br>window and closet, us<br>intended to be used fo<br>"den," "library" or "h<br>with a closet, egress v<br>70 square feet or grea<br>similar rooms shall co<br>bedroom, but living ro<br>foyers shall not. | REQ<br>space 70<br>with eg<br>sed or<br>r sleepin<br>ome offi<br>vindow,<br>ter or ot<br>punt as a<br>poms an | )<br>ress<br>ng. A<br>ice"<br>and<br>her<br>d |
|    | b.   | Remodel for mix  | ed-use, adaptive re  | use, and historic   | preservation.   |  |  | 2   |   |
|    | c.   | Efficient circulati  | on design (circulat  | tion areas less that  | an 10% of gross so  | quare footage  |  | 2   |   |
| 3. | Des  | ign using OVE (Op  | timal Value Engine   | eering) framing d   | letails to reduce m   | aterial use.   |  |   |   |
|    | a.   | Optimize materia increments.   | l use by designing   | for standard ceil   | ing heights, wall l   | lengths and b  | uilding dimensions in 2'   | 3   |   |



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|    | b.   | Avoid waste from structural over-design. (Points for submitting engineer's calculations showing beam and header sizing.)                                     | 2   |  |
|----|------|--|-----|--|
|    | c.   | Space joists & studs greater than 16" OC   | 2   |  |
|    | d.   | Eliminate jack studs in rough openings.  | 2   |  |
|    | e.   | Single top plate with stacked framing  | 2   |  |
|    | f.   | Use two-stud corners and ladder blocking / drywall clips   | 2   |  |
|    | g.   | Job-site framing plan in architectural plans   | 2   |  |
|    | h.   | Cut list on site   | 2   |  |
| 4. | Desi | gn to reduce energy use.   |     |  |
|    | a.   | Inclusion of completed GHNE checklist with project construction document drawings and/or specifications  | REQ |  |
|    | b.   | Inclusion of green and energy conserving details and assembly instructions in project construction docu-<br>ment drawings and/or specifications.             | 1   |  |
|    | c.   | Building oriented within 15 degrees of true south, with the long, vis of the building east to west.  | 3   |  |
|    | d.   | Incorporate passive solar heating. (Percentage of passive sola, heating incorporated will be determined on site by the inspector; up to 3 points available.) |     |  |
|    | e.   | Design for natural cooling (i.e., no air conditionir ) inst ded .  | 3   |  |
|    | f.   | Location of unheated garage on the north a. 1 wh. er wind ward sides to shelter house.   | 1   |  |
|    | g.   | Location of above-grade mechanical roor on up no. h and winter windward sides.   | 1   |  |
|    | h.   | Awnings, pergolas, trellises or overhangs signer to shade east and west glass and reduce summer heat gain.   | 1   |  |
|    | i.   | Chimney within building envelope.  | 1   |  |
|    | j.   | Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee).                      | TBD |  |

#### 3. QUALITY/DURABILITY

| 1. | 1. Choose quality roofing materials and details to increase durability and reduce maintenance. |  |     |  |  |
|----|--|--|-----|--|--|
|    | a.   | Reduced air leakage and ice dams: No non-airtight recessed light fixtures in insulated flat or cathedral ceilings.                           | REQ |  |  |
|    | b.   | Roof insulation thermal resistance (depth) at truss heel (roof perimeter) should be equal or greater to thermal resistance of exterior wall. | REQ |  |  |
|    | c.   | Best practices flashing along roof-wall junctures with all siding cut at least 1" above roofing.   | REQ |  |  |
|    | d.   | Reduced ice dams: R-38 attic/roof-slope insulation R-value extending over outside of exterior walls.   | 1   |  |  |
|    | e.   | Minimum 12" eave and gable roof overhangs over wall siding.  | 1   |  |  |
|    | f.   | Install a self-adhered roofing underlayment along the first four feet of the eave's edge.  | 1   |  |  |
|    | g.   | Install a fire resistant roofing material.   | 1   |  |  |
| 2. | 2. Choose quality wall materials and details to increase durability and reduce maintenance.    |  |     |  |  |
|    | a.   | Install drainage plane under siding. (e.g., house wrap, felt paper)  | REQ |  |  |



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|    | b.  | Backprime exterior siding materials (paint back, front, edges and ends of wood siding, cement siding and wood trim).   | 2   |  |
|----|-----|--|-----|--|
|    | c.  | Install gutter and downspout system to divert water 5' away from foundation and from there into the overall on site drainage area OR rushed stone or other material below roof drip line to minimize splash on siding in high snow area. | 1   |  |
|    | d.  | Stainless steel fasteners for siding and trim.   | 1   |  |
|    | e.  | 50 year siding warranty or expected life time.   | 2   |  |
|    | f.  | Brick or stone siding 90% (or more) with properly detailed 1" air space behind.  | 3   |  |
|    | g.  | Exterior siding/veneer built over drainage plane with rainscreen (e.g., strapping over Tyvek/Typar).   | 3   |  |
|    | h.  | Plant shrubs or very small trees so that mature plantings' trunks are five feet from the house.  | 1   |  |
| 3. | Cho | ose quality window and door materials and details to increase durability and reduce maintenance.   | °   |  |
|    | a.  | Best practices flashing on all rough openings, including drip cap above and flashing on bottom of all rough openings for windows and doors.  | REQ |  |
|    | b.  | Install a storm door on all exterior wood doors.   | 1   |  |
|    | c.  | Fiberglass composite framed windows.   | 1   |  |
|    | d.  | Install all insulated, non-wood exterior doors.  | 1   |  |
| 4. | Cho | ose quality deck/porch materials and details to increase du binty and reduce maintenance.  |     |  |
|    | a.  | Best practices flashing on all deck/porch-hor , nctu. s ensures no moisture intrusion.   | REQ |  |
|    | b.  | Stainless steel screws for decking.  | 1   |  |
| 5. | Emp | ploy approaches for pest control to minimize adverse environmental impacts.  | •   |  |
|    | a.  | Any wood used (i.e., siding, trim, structure) is at least 12" above soil (code requires 8") and adjacent ground slopes at least 1" per foot away from foundation.  | 2   |  |
|    | b.  | Any exterior wood to concrete connections are separated by metal or plastic fasteners / dividers (e.g., posts, deck supports, stair stringers OR there are no wood to concrete connections.  | 1   |  |
|    | c.  | All wood framing is treated with a borate product to a minimum of 3' above the foundation OR wall structure is not made of wood.   | 2   |  |
|    | d.  | Construct solid concrete foundation walls (or masonry wall with top course of solid block bond beam or concrete filled block).   | 1   |  |
|    | e.  | A complete termite barrier system including all penetrations and foundation perimeter.   | 1   |  |
| 6. | Emp | ploy approaches to ensure durability in interior spaces.   |     |  |
|    | a.  | Install hot water heater and washing machine in rooms with drains or catch pans, floor coverings that are not water sensitive and install easy to use shut off valves.   | 1   |  |
|    | b.  | Install an "ABC" type fire extinguisher in master bedroom, kitchen, mechanical room and garage.  | 1   |  |
|    | c.  | Do not install water heaters or air handlers in attic.   | 1   |  |
|    | d.  | Mudroom  | 1   |  |
|    | e.  | Step all decking down at least 6" from exterior doors.   | 1   |  |
|    | f.  | Plumb for easy accessible water shut-off for entire house.   | 1   |  |



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g. Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee).

TBD

| 1. | Envelope and Systems: Implement a comprehensive approach to improve energy-efficiency.   |     |
|----|--|-----|
|    | a. Certified as ENERGY STAR® home (Home Energy Rating System [HERS] Index of 85 points or less)<br>for new construction; HERS Index of 90 points or less for existing buildings.   | REQ |
|    | b. Install insulation to meet at least Grade II specifications (per RESNET National Home Energy Rating Standards); Provider's third party rater to verify by performing pre-drywall inspection of installation.  | REQ |
|    | c. Design and install windows that at least meet requirements for ENERGY STAR labeled windows.   | REQ |
|    | d. Points per added Home Energy Rating System (HERS) point above 5-Star (86 point) rating for new and above 83 points for existing homes (use conventional rounding up or down to nearest whole rating point).   | 2   |
|    | e. Have third party perform pre-drywall inspection of install for . d verify that installed insulation is at least "Grade 1."  | 2   |
|    | f. Mechanical equipment must be accessible for service, <i>i</i> ding <i>C</i> condensate drain pan and trap.  | 2   |
|    | g. Low-solar admittance glass on east and west, whole $v_{\rm inc}$ is $GC < .40$ .  | 2   |
|    | h. Whole house cooling/'night flushing' fan w. h tig insur. a winter closure system.   | 2   |
| 2. | Ducted Heating and/or Cooling Systems: Impler ent rom, rehensive approach to maximize system efficiency.   |     |
|    | a. Third-party testing of duct leakage to $< 6$ ct. to ov uoors / 100 sq. ft. of conditioned floor area.   | REQ |
|    | b. If necessary, any ducts that run in outside walls, ventilated attics or unconditioned crawlspace/basement must have at least R-7.5 between ducts and outside.   | REQ |
|    | <ul> <li>Perform ACCA Manual D duct design calculations and install ducts accordingly OR install ductless space<br/>conditioning system.</li> </ul>  | REQ |
|    | d. Install ENERGY STAR labeled programmable thermostat.  | REQ |
|    | e. Install returns OR transfer grill in each room with closeable door excluding laundry, kitchen and bathrooms<br>AND ensure that every room has adequate return air flow.   | 2   |
|    | <ul> <li>f. "When installing ductwork:</li> <li>1. No building cavities used as ductwork (e.g., panning joist or stud cavities).</li> <li>2. Install all ducts and mechanical equipment within the conditioned building envelope.</li> <li>3. No ductwork installed in exterior envelope (i.e., walls, floors or ceilings).</li> <li>4. Air seal ducts with mastic only."</li> </ul> | 2   |
|    | g. Use only Non-CFC AND Non-HCFC refrigerants.   | 1   |
|    | h Ducted distribution system designed and sized to match room-by-room loads (submit sizing plan)   | 2   |



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|    | a.              | Design and install space heating and cooling system equipment according to ACCA Manuals J and S or<br>equivalent. Calculate per ENERGY STAR Homes National Performance Path Notes for oversizing limits,<br>indoor and outdoor temperatures and infiltration rate.<br>(See www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/PerfPathFinal_012006.pdf) | REQ      |       |
|----|-----------------|--|----------|-------|
| 4. | Con<br>perf     | <i>missioning Ducted Heating and/or Cooling Systems:</i> Commission the system prior to occupancy to ensure material ormance specs.  | nufactu  | rers' |
|    | a.              | Confirm heating and cooling systems are installed and operating per manufacturers specifications, including:<br>i. Provide proof of proper refrigerant charge verified by super-heat and/or sub-cooling method to  |          |       |
|    |                 | manufacturer's specifications.   |          |       |
|    |                 | ii. Burner set to fire at nameplate input.   | REQ      |       |
|    |                 | 11. Air handler setting/fan speed set to operate within manufacturer's specifications.   |          |       |
|    |                 | iv. Total air flow calibrated to operate within 10% of design flow.  |          |       |
| _  |                 | v. Total external system static pressure set to not exceed equilibrium capability at rated annow.  |          |       |
| 5. | Hyd             | ronic Heating Systems: Implement a comprehensive approa. (15 n. ximize hydronic system efficiency.   |          |       |
|    | a.              | Install ENERGY STAR labeled programmable thermostat 1 * each 2 one except those with radiant-floor heating.  | REQ      |       |
|    | b.              | Modulating aquastat/outdoor temperature sensi g cor .ols o adjust circulating boiler water.  | 2        |       |
|    | c.              | Hydronic distribution system designed an 'size to match room-by-room loads (submit sizing plan).   | 2        |       |
| 6. | <i>Con</i> form | missioning Hydronic Heating Systems: Cor mission the hydronic system prior to occupancy to ensure manufation and especifications.  | cturers' | per-  |
|    | a.              | Implement the start-up procedure according to instructions.  | REQ      |       |
|    | b.              | Burner set to fire at nameplate input.   | REQ      |       |
| 7. | Don             | nestic Hot Water Systems: Implement a comprehensive approach to maximize domestic hot water system effici  | ency.    |       |
|    | a.              | On-demand hot water recirculating system (not applicable with home-run systems).   | 2        |       |
|    | b.              | High-efficiency circulating pump scheduled by timer in multifamily buildings.  | 2        |       |
|    | c.              | Water heater is located within a 20 foot line-run to all fixtures.   | 2        |       |
|    | d.              | Insulate hot and cold water pipes.   | 1        |       |
|    | e.              | Grey water heat recovery system (e.g., GFX system).  | 2        |       |
|    | f.              | Install heat trap on cold and hot water lines to and from the water heater (if not integral to the water heater).  | 1        |       |
| 8. | Effic           | ient Lighting: Implement a comprehensive approach to maximize lighting energy efficiency.  | -        | •     |
|    | a.              | Points per four (4) fixtures of high-use ENERGY STAR® fixtures.  | 1        |       |
|    | b.              | Points per ten (10) hard-wired incandescent fixture with ENERGY STAR® screw-in bulbs installed.  | 1        |       |
|    | c.              | Install ENERGY STAR Advanced Lighting Package (ALP).   | 3        |       |
|    | d.              | Light pollution minimized through avoiding no direct beam illumination beyond visible property lines.  | 1        |       |
|    | e.              | Common spaces such as hallways that would otherwise require 24 hour lighting (e.g., multi-family) utilize day lighting and automatic lighting controls or continuous dimming daylight controls.  | 2        |       |



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| 9.  | Efficient Appliances: Implement a comprehensive approach to maximize appliance energy efficiency. |  |          |      |  |  |
|-----|---|--|----------|------|--|--|
|     | a.  | ENERGY STAR® refrigerator, if refrigerator installed. (See www.energystar.gov.)  | REQ      |      |  |  |
|     | b.  | ENERGY STAR® dishwasher, if dishwasher installed. (See www.energystar.gov.)  | REQ      |      |  |  |
|     | c.  | ENERGY STAR® or equivalent clothes washing machine, if machine installed. (See www.energystar.gov.)  | REQ      |      |  |  |
|     | d.  | Other ENERGY STAR® appliances (See www.energystar.gov.)  | 1        |      |  |  |
| 10. | <i>Rene</i><br>energ  | <i>wable Energy:</i> Install a renewable generation system (or purchase green electricity) to reduce demand for non gy sources.  | i-renewa | able |  |  |
|     | a.  | No electric resistance space heat (except as backup for solar, ground source heat pump and wood heating: consumption cannot exceed 25% of total space heating annual usage, and if electric resistance space heat is fully powered by an active solar system). | REQ      |      |  |  |
|     | b.  | No electric resistance domestic hot water systems except as solar back-up (electric back-up consumption may not exceed 2,000 kWh/yr).  | REQ      |      |  |  |
|     | c.  | Rough-in of plumbing and wiring and roof orientation for f 'ur's s. 'ar hot water or photovoltaics.  | 1        |      |  |  |
|     | d.  | Solar water heating system, designed to meet at least 40% of an val D11W load.   | 2        |      |  |  |
|     | e.  | Solar water heating system, designed to meet at least 7 % c nuar DHW load (not additive to previous approach).   | 3        |      |  |  |
|     | f.  | Design and install a renewable electricity gen ratio system. (1 point for each 6 % of annual electrical load met by system; maximum 5 points.)   | 1        |      |  |  |
|     | g.  | Contract for at least two years with a "Gree 'E" ce thied electricity supplier.  | 2        |      |  |  |
| 11. | Wood  | d: Install clean wood burning equipment to reduce conventional energy use.   |          |      |  |  |
|     | a.  | EPA, Canadian or MHA certified wood burning appliance as a primary heat source with an output capacity greater than 50% of Manual J or IBR heat load.  | 1        |      |  |  |
|     | b.  | Install an EPA certified wood stoves/insert with damper and airtight doors or a sealed combustion gas insert.  | 1        |      |  |  |
|     | с.  | Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee).  | TBD      |      |  |  |

#### **5. MATERIALS & RESOURCES**

| 1. | 1. Wood: Select sustainable sources and products to minimize impacts on forest resources. |  |     |  |  |
|----|---|--|-----|--|--|
|    | a.  | Use tropical hardwoods only if FSC (Forest Stewardship Council) certified. | REQ |  |  |
|    | b.  | Incorporate nothing over 2x10 to reduce old growth use.                    | 3   |  |  |
|    | c.  | At grade stone, masonry or concrete patio in place of wood.                | 1   |  |  |
|    | d.  | No garage. (House with carport earns 1 point.)                             | 2   |  |  |



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|    | P     | Points per 10% of the value (\$) of solid structural wood that is FSC certified up to 50%   | 2      |       |
|----|-------|---|--------|-------|
|    | f.    | Points per 10% of the value (\$) of non-structural wood that is ESC certified up to 50%.  | 2      |       |
|    | g.    | Greater than 90% of each wood or steel engineered product listed earns one point each: a) beams, b) head-<br>ers, c) floor framing, d) roof framing, e) wall framing.   | 1      |       |
|    | h.    | Use MDF or interior finger-jointed trim as alternative to solid wood.   | 1      |       |
| 2. | Floo  | ring & Decking: Select sustainable sources and products to minimize natural resource consumption.   |        |       |
|    | a.    | Structural Insulated Panel (SIP) construction: Points per 20% of floor construction.  | 1      |       |
|    | b.    | Non-wood outdoor decking - minimum 80% recycled content plastic. Points per 50% of total decking area.  | 1      |       |
|    | c.    | Points per 50% of the value (\$) of outdoor decking that is FSC certified.  | 1      |       |
|    | d.    | Point per 33% of total floor area finished with sustainable flooring options, (e.g., reclaimed lumber, recycled rubber, cork, wool and natural fiber carpets, natural linoleum, finished concrete, recycled content carpet and tile with up to 50% recycled content)  | 2      |       |
| 3. | Walls | s: Select sustainable sources and products to minimize nature in varce consumption.   |        |       |
|    | a.    | Insulation that meets the California Department of Health Sunce's "tandard Practice Formaldehyde Emissions criteria (Section 01350) (e.g., cellulose, cotton, rock vool, noerglass) in walls.   | 1      |       |
|    | b.    | Points per 50% spray applied or blown total fill insulat on ( $\ell_{\epsilon}$ cenulose, spray foam, fiberglass).  | 2      |       |
|    | c.    | Insulation with at least 75% recycled content (e.g. ellul se, <sup>r</sup> ockwool and cotton)  | 2      |       |
|    | d.    | Structural Insulated Panel (SIP) construction: r 20 of exterior wall construction.  | 1      |       |
|    | e.    | Cementitious product for finish siding (incl des m. onry, fiber cement, stucco).  | 2      |       |
|    | f.    | Cementitious product for finish trim (includesonry, fiber cement, stucco).  | 2      |       |
| 4. | Roof  | s & Ceilings: Select sustainable sources and products to minimize natural resource consumption.   |        |       |
|    | a.    | Structural Insulated Panel (SIP) construction: per 20% of roof construction up to 2 points.   | 1      |       |
|    | b.    | Insulation that meets the California Department of Health Service's Standard Practice Formaldehyde Emissions criteria (Section 01350) (e.g., cellulose, cotton, rock wool, fiberglass) in roofs/ceilings.   | 3      |       |
|    | c.    | Points per 50% spray applied or blown total fill insulation. (e.g., cellulose, spray foam, fiberglass)  | 2      |       |
| 5. | Susta | <i>uinable Products:</i> Select sustainable sources and products to minimize natural resource consumption.  |        |       |
|    | a.    | Non-mercury thermostats.  | REQ    |       |
|    | b.    | Points per 5% of previously used materials. Calculate based on total value of salvaged materials divided by the total value of all building materials. For example, used doors or cabinets, salvaged beams, reused countertops, etc. (Use equivalent new material value for salvaged material if item was acquired below market value.) | 1      |       |
|    | c.    | Points per 5% fly ash type "C" or type "F" in concrete.   | 1      |       |
|    | d.    | Use recycled content aggregate in concrete.   | 1      |       |
|    | e.    | Product manufacturer's operations and business practices include environmental management system concepts (the product line, plant, or company must be ISO 14001 certified), per product up to five products.   | 1      |       |
|    | f.    | Install recycled content countertops (minimum 50% of countertop area).  | 1      |       |
| 6. | Loca  | l Sources: Use local or regional materials to reduce environmental impacts of transportation and support local  | econor | nies. |
|    | a.    | Select materials that are sourced, manufactured and distributed within a 500 mile radius of the building. Points per 5% of the value of whole house's materials.  | 1      |       |



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| 7. | . <i>Reduce, Re-Use&amp; Recycle:</i> Minimize waste and encourage diversion of waste for re-use and recycling to reduce landfill material. |   |     |  |  |
|----|---|---|-----|--|--|
|    | a.  | Generate no more than half the national average of job-site waste. No more than 2.5 pounds per square foot of conditioned floor area may be sent to landfill and/or incinerators. | REQ |  |  |
|    | b.  | For each additional 0.5 pounds per square foot reduction in job-site waste.   | 0.5 |  |  |
|    | c.  | Provide composting and/or worm bins on site.  | 1   |  |  |
|    | d.  | Built-in kitchen recycling center.  | 1   |  |  |
|    | e.  | Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee).   | TBD |  |  |

#### 6. WATER EFFICIENCY

| 1. | 1. Indoor: Select products that reduce water consumption.  |  |     |  |
|----|--|--|-----|--|
|    | a.   | Shower heads: Install shower heads (all) at 2.3 GPM or less Ado tonal point for shower heads (all) at 1.7 GPM or less.   | 1   |  |
|    | b.   | Add a flow reducer to all faucets.   | 1   |  |
|    | c.   | Install = 1.4 GPF toilets (all), includes dual flush toil ts.</td <td>2</td> <td></td>   | 2   |  |
|    | <b>d.</b> Design and pre-plumb for greywater re-use vste. (i.e., s_rtc.n with minimum of dedicated clothes washe with 2" drain to subterranean drain field). Add_iona_point for installation of greywater re-use system. |  |     |  |
|    | e. Innovative wastewater technology (constructed we land, etc.).   |  |     |  |
|    | f.   | Install composting toilet.   | 3   |  |
| 2. | Outa   | tdoor: Select products that reduce water used in irrigation.   |     |  |
|    | a.   | Install a central shut-off valve and sub-meter for the irrigation system, and third-party visual inspection of installed irrigation system. Inspection to include observation that all spray heads are operating and delivering water to intended zones. | 1   |  |
|    | b.   | Design and install rainwater harvesting system, with minimum of 50% of rain from the roof collected and stored for irrigation use.   | 2   |  |
|    | c.   | Basic irrigation system designed and installed according to a Certified Landscape Designer (CLD).  | 1   |  |
|    | d.   | Low-volume, non-spray irrigation system installed. (e.g., drip irrigation, bubblers, drip emitters, soaker hose)   | 1   |  |
|    | e.   | Irrigation system installed with rain/moisture sensors.  | 1   |  |
|    | f.   | Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee).  | TBD |  |

# 7. INDOOR ENVIRONMENTAL QUALITY 1. Foundation: Design and construct foundation to minimize water and soil gas entry to reduce mold, mildew and other source pollutants. Image: Construct foundation to minimize water and soil gas entry to reduce mold, mildew and other source pollutants. Foundation continuous footing drain covered with clean stone and filter fabric, drained to daylight or if a. necessary to drain to the interior, use a sealed sump pump system. (Drainage system not required in pure sand.) Exterior of below grade foundation damp proofed and use porous backfill material. REQ b. Vapor retarder (sheet polyethylene or rigid insulation) directly under slab. REQ c. If home is located in EPA Radon Zone 1, design and install radon mitigation system. REQ



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|    | d.    | Crawlspace is unvented using all of latest best practices.   | 2   |  |  |
|----|-------|--|-----|--|--|
|    | e.    | Provide perforated pipe at base of footing perimeter for drainage of any accumulated water under slab.   | 1   |  |  |
|    | f.    | Key footing and provide capillary break over footing with damp-proofing, low perm or elastomeric paint.  | 1   |  |  |
|    | g.    | Provide sub-slab 4" minimum crushed stone, connect sub slab drainage to footing drain.   | 1   |  |  |
|    | h.    | If home is NOT located in EPA Region 1, then design and install radon mitigation system.   | 1   |  |  |
| 2. | Vehi  | cle Emissions Protection: Design home to protect occupants from exposure to car emissions.   |     |  |  |
|    | a.    | No air handling equipment, return ducts or supply ducts in garage.   | REQ |  |  |
|    | b.    | Install a CSA 6.19 listed CO monitor on each floor of home and in any occupied rooms adjacent to and/or above the garage.  | REQ |  |  |
|    | c.    | The building enclosure surfaces shared between conditioned space and an unconditioned garage must have a continuous air barrier. See Figure www.buildingscience.com/designsthatwork/airsealing/default.htm for details in terms of using sealants and the airtight drywall approach to create a continuous air barrier between the attached garage and living space. | REQ |  |  |
|    | d.    | Install minimum 100 CFM exhaust fan rated for continuou, opera, on with automatic timer control linked to occupant sensor, light switch or garage door opening/closing chan  | 1   |  |  |
|    | e.    | No garage in contact with conditioned spaces.  | 1   |  |  |
| 3. | Livin | ag Space: Select materials to reduce indoor air polly ans.   |     |  |  |
|    | a.    | Insulate and sheath using rigid draft stop, and vir se 'bathroom exterior walls behind showers and tubs before installing showers, tubs and spas.  | REQ |  |  |
|    | b.    | No carpet in kitchens, bathrooms, laundry 1 oms, c spa areas.  | REQ |  |  |
|    | c.    | No adhesives for carpet or sheet goods unless low VOC (100 grams per liter or less).   | REQ |  |  |
|    | d.    | Use formaldehyde-free MDF or plywood.  | 2   |  |  |
|    | e.    | Use exterior grade plywood for interior uses or seal all exposed particleboard or MDF with water-based sealer.   | 1   |  |  |
|    | f.    | No carpet in house.  | 3   |  |  |
|    | g.    | If carpet is installed, must meet CRI low emission label standard.   | 1   |  |  |
|    | h.    | Install chlorine filter on shower head.  | 1   |  |  |
|    | i.    | Provide ventilated storage space sealed and isolated from the living space for toxic materials such as paint, gasoline cans, etc.  | 1   |  |  |
|    | j.    | Use cement tile backer board in wet areas such as behind tubs or showers.  | 1   |  |  |
|    | k.    | Low VOC-emission (100 grams per liter or less) paint. Points per 50% of surfaces.  | 1   |  |  |
|    | l.    | Zero VOC-emission paint. Points per 50% of surfaces.   | 1   |  |  |
|    | m.    | Low VOC-emission construction and flooring adhesives (under 30 grams per liter or less).   | 1   |  |  |
|    | n.    | Design and install permanent walk-off mats at each entry.  | 1   |  |  |
|    | 0.    | Keep plumbing supply lines out of exterior walls excluding hose bib.   | 1   |  |  |
| 4. | Heat  | ing and Cooling Equipment: Design and install mechanical equipment and systems to reduce indoor air pollutants.  |     |  |  |



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|    | a.   | Design and install HVAC and DHW combustion equipment with sealed combustion or direct or power-<br>vented exhaust if equipment is located inside the building envelope.   | REQ       |     |  |
|----|------|---|-----------|-----|--|
|    | b.   | Design and install fireplace with outside combustion air and tight-fitting doors, OR install no fireplace.  | REQ       |     |  |
|    | c.   | Provide smoke detectors per code (hardwired with battery backup recommended).   | REQ       |     |  |
|    | d.   | Install MERV 7 (or higher) air filters, and ensure that air handlers can maintain adequate pressure and air flow, OR install ductless space conditioning system.  | REQ       |     |  |
|    | e.   | With ducted system, avoid putting duct work and air handlers in attics and crawlspaces because of air leak-<br>age.   | 1         |     |  |
|    | f.   | Install humidistat with visible read-out to control whole-house humidification system.  | 1         |     |  |
| 5. | Duri | ng Construction: Protect materials to reduce moisture damage and systems to reduce dust intrusion during con  | nstructio | on. |  |
|    | a.   | Seal off ducts during construction, and clean HVAC ducts and coils before occupancy.  | REQ       |     |  |
|    | b.   | Protect unused moisture-sensitive materials from water damag, through just-in-time delivery, storing unused materials in a dry area, or tenting materials and storing on a tairca latform.  | 1         |     |  |
|    | c.   | Check moisture content of wood before it is enclosed on both s les. E. are moisture content of subfloor/<br>substrate meets the appropriate industry standard for the nn. h flowing material to be installed.   | 1         |     |  |
|    | d.   | After sheetrock is installed, vacuum house weekly.  | 1         |     |  |
| 6. | Mech | echanical Ventilation System: Provide ventilation system to remove pollutants generated in the house.   |           |     |  |
|    | a.   | Design and install local exhaust systems in a three may and kitchen per ASHRAE Standard 62.2, AND use ENERGY STAR labeled exhaust fans, except for exhaust fans ducted to multiple bathrooms OR fresh air inlet attached to return duct of HVAC (passive exhermical). | REQ       |     |  |
|    | b.   | Insulate and air seal all ventilation exchanging exhaust ductwork (minimum R-8) outside of the insulated envelope or install plastic smooth-walled ductwork pitched to outside to avoid condensed moisture from collecting in ductwork.                               | REQ       |     |  |
|    | c.   | Install dedicated outdoor air supply system that complies with ASHRAE Standard 62.2 AND provides for heat transfer between the supply air stream and exhaust air streams, AND has fully ducted supply and exhaust.  | 3         |     |  |
|    | d.   | Install power vented fans or range hoods that exhaust to the exterior when cook tops and ovens are present.   | 1         |     |  |
|    | e.   | Third-party testing of air flow rates for mechanical ventilation system.  | 1         |     |  |
|    | f.   | Install approach that meets the goal of this strategy not listed above (upon documentation and submission to GHNE Standards Committee).   | TBD       |     |  |

| 8. KEEPING IT GREEN - OCCUPANT EDUCATION AND 0&M |   |          |   |     |  |  |
|--|---|----------|---|-----|--|--|
|  | 1. Provide education for owners/occupants in the use and care of their dwellings. |          |   |     |  |  |
|  | a.  | Th<br>i. | e builder shall provide the home buyer(s) with:<br>A Homeowner's Manual / binder. | REQ |  |  |
|  |   | 11.      | A minimum 60-minute walkthrough of the home before closing.                       |     |  |  |



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| b. | <ul><li>The builder shall provide home buyer(s) with an in-home training, including:</li><li>i. Same as 8-1 a;</li><li>ii. At least two hours of education to highlight thermal and moisture control features built into home and other operational and performance aspects of the home.</li></ul> | 1 |  |
|----|--|---|--|
| c. | Provide wire and valve labeling, diagrams and descriptions of system controls and all equipment manuals adequate for future maintenance and repair by a professional.  | 1 |  |
| d. | Provide photo record of framing with wiring and utilities installed, photos taken prior to installing insulation and interior sheathing/drywall. Photos keyed to location in or around home.   | 2 |  |

#### 9. INNOVATION APPROACHES

1. Suggest an approach not listed above but which meets the intent of a green strategy.

**a.** Install approach that meets the goal of a strategy but which is not listed above (upon documentation and submission to GHNE Standards Committee).

ROUGH TOTAL POINTS 306.5

TBD

In order to achieve GHNE certification, all requirements must be vet, a. 1 a score of at least 50 points must be achieved.

