

Gilman Guidelli's Green Top Ten

These measures are top priority green initiatives for the contractor's role in a project; it assumes that most of the design-parameters are already set by the architect & landscape architect.

I. Integrated Project Team, Homeowner Education & Certification Programs

- A. Integrated design process to assure team achieves all Environmental Goals for project. Monthly meetings w/ all parties to review of Green Agenda and progress-tracking.
- B. Homeowner Education
 1. Operations, Maintenance & Green Features Manual / Binder
 2. Walk-Through & Training Session
- C. Energy Rating & Certification Options
 1. Energy Star w/ 3rd Party Testing:
 - a) Note - in our opinion, these are bare minimum energy-efficiency guidelines.
 - b) To earn the ENERGY STAR, a home must meet guidelines for energy efficiency set by the U.S. Environmental Protection Agency. These homes are at least 15% more energy efficient than homes built to the 2004 International Residential Code (IRC), and include additional energy-saving features that typically make them 20–30% more efficient than standard homes.
 - c) Third-Party Verification is required to be performed by independent Home Energy Raters. They help choose the most appropriate energy-saving features and conduct onsite testing and inspections to verify the energy efficiency measures, as well as insulation, air tightness, and duct sealing details. The cost of 3rd-party services are often covered by utility rebates.
 2. National Association of Home Builders (NAHB) Green Building Program
 - a) Note - this is a very lax green rating system that easily allows green-washing. Running a test-project on the NAHBGreen website quickly shows how easily one may achieve the highest rating.
 - b) Covers broader range of green-building categories than just energy (i.e. Energy-Star), including: Lot Design, Resource Efficiency, Energy Efficiency, Water Efficiency, Indoor Environmental Quality, Homeowner Education, and Global Impact.
 3. Leadership in Energy and Environmental Design (LEED) Certification
 - a) Most robust widely used green rating system.
 - b) Also covers broad range of green-building categories, including: Innovation and Design Process, Location and Linkages, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Awareness and Education.
 - c) Can be a little more expensive than Energy-Star because it requires a LEED Provider, who reviews your LEED project, in addition to the 3rd-party Energy-Rater.
 4. Home Energy Rating System (HERS) w/ Certified HERS Provider
 - a) System for determining energy rating of home (through energy modeling and field-testing) in comparison to code-compliant baseline. This rating is one of the most widely accepted, and is typically used in the Certification Programs listed above.

II. **Energy Efficiency - Air Infiltration**

- A. Aim for goal of <1.5 ACH 50 tested by blower-door. Typically more difficult to achieve in renovations or homes w/ a large surface-area to volume ratio and complex geometry.

III. **Energy Efficiency - High-Performance Insulation Package**

- A. Basement Slab: R-8 to R-10
 - 1. 2 layers of 1" Expanded or Extruded Polystyrene (EPS or XPS) w/ staggered & wide-foil-taped seams (w/ thermal-break at slab/fndn wall intersection)
- B. Basement Walls: R-16 to R-20
 - 1. 2 layers 2" Expanded or Extruded Polystyrene (EPS or XPS) w/ staggered & wide-foil-taped seams (may do exterior or interior face of walls)
- C. Exterior Walls: R-24 to R-38
 - 1. Exterior Insulation Option: R-24 to R-38
 - a) 2x6 stud walls with High-Density Closed-Cell Spray Polyurethane Foam or Low-Density Open-Cell Spray Polyurethane Foam or Dense-Pack Blown Cellulose
 - b) *PLUS:* 2 layers 1" Plyiso, EPS or XPS w/ taped-seams, continuous over exterior sheathing
 - 2. Double-Wall Insulation Option: R-30 to R-36
 - a) Double 2x4 exterior walls w/ min 1" space between plates, min 3" High-Density Closed-Cell Spray-Polyurethane Foam applied first, then may apply Low-Density Open-Cell Spray Polyurethane Foam or Dense-Pack Blown Cellulose for remainder
- D. Roof: R-45 to R-60
 - 1. Non-vented 'hot-roof' w/ Wood I-Joist or Truss Framing, & min 5" High-Density Closed-Cell Spray Polyurethane Foam applied first, then may apply Low-Density Open-Cell Spray Polyurethane Foam or Dense-Pack Blown Cellulose for remaining 5" to 9"

IV. **Energy Efficiency - Fiberglass-Frame Super-Windows & Doors**

- A. Windows:
 - 1. Fibertec, Thermotech, or Alpen/Duxton
 - a) min unit value of R-3 (U-0.33) to the South and R-5 (U 0.2) to the North, East, West
 - b) min Solar Heat-Gain Coefficient (SHGC) of 0.55 to the South, max SHGC 0.45 to the East & West
 - c) min Visible Transmittance Coefficient (VTC) of 0.55
- B. Fiberglass-Frame Insulated Doors:
 - 1. Therma-Tru, Pella, or Jeld-Wen
 - 2. min unit value of R-3 for glazed doors and R-5 for unglazed
 - 3. fully weatherstripped for tight seal

V. **Energy Efficiency - Mechanical Systems**

- A. Ducts
 - 1. no ducts installed in exterior walls or uninsulated spaces
 - 2. duct leakage less than 1.0 CFM 25 per 100 SF of conditioned space
- B. Outdoor Reset & Programmable Thermostat (w/ Energy-Star Label)
- C. Heating
 - 1. min 94 AFUE furnace or 90 AFUE boiler / 9.0 HSPF Air-Source Heat-Pump / 4.0 COP Closed-Loop Ground-Source Heat Pump
 - 2. Test refrigerant charge
- D. Cooling
 - 1. min 15 SEER Air-Source Heat Pump / 17 EER Closed-Loop Ground-Source Heat Pump
 - 2. Test Refrigerant Charge
- E. Water Heating / Plumbing
 - 1. Compact plumbing layout: either conventional or manifold system w/ home-runs
 - 2. On Demand Hot-Water Circulator (Structured Plumbing System w/ <10 l.f. 1/2" dia. branches off H/W loop)
 - 3. Pipe Insulation min R-4
 - 4. Gas-Fired Water Heaters: min EF 0.8 or CAE (Combined Annual Efficiency) 0.8 for Combination Water/Space Heaters
 - 5. Electric Water Heaters (only when powered by PV's or Supplemented by Combination Heat/H/W system and/or Solar H/W system: min EF 0.93)
 - 6. Super-Insulated Indirect H/W Storage Tank
 - 7. Refrigerant Management
 - a) HVAC with non-HCFC refrigerant installed

VI. **Energy Efficiency - Electrical**

- A. Lighting (Look for Energy-Star Label)
 - 1. Compact Fluorescents, LED's, Low-Voltage
 - 2. Occupant Sensor Controls
 - 3. Photovoltaic-powered landscape lighting
- B. Appliances
 - 1. Refrigerators, Dishwashers, Clothes Washers, Ceiling Fans = Energy Star
 - 2. Clothes washers w/ Modified Energy Factor (MEF) >2.0 and Water Factor (WF) < 5.5

VII. Indoor Air Quality

- A. Heat & H/W sealed-combustion
- B. Carbon Monoxide detectors installed w 10ppm sensitivity near all combustion sources & in vicinity of all bedrooms
- C. humidification / dehumidification system(s) installed per moisture-load analysis
- D. Energy Recovery Ventilation System w/ ducts sized to supply each appropriate area
 - 1. Exhaust bathrooms & kitchens per ASHRAE 62.2 (bathrooms to have occupancy/humidistat sensor or timer)
- E. Supply Air Filtration
 - 1. MERV 13 or greater
- F. Contaminant Control
 - 1. Seal-Off Ducts During Construction
 - 2. Central Vacuum w/ exhaust to outdoors
 - 3. Flush home for 1 week with windows open, prior to Occupancy
- G. Radon Protection
 - 1. Install Radon Resistant Construction & Venting
- H. Garage
 - 1. no Air-Handling Equipment or Ductwork in Garage
 - 2. detached garage or Seal-off garage from conditioned spaces (include in blower-door test)
- I. Materials
 - 1. Carpet (low V.O.C.)
- J. Adhesives / Sealants / Finishes (low V.O.C.)
- K. Indoor Air Quality Certification
 - 1. Energy Star w/ Indoor Air Package (IAP)

VIII. Water Efficiency

- A. Indoor Water Use (can easily save 40+ gals/day/household, nearly half of which may be hot-water, thereby also saving energy)
 - 1. Lav faucets < 1.5 GPM
 - 2. Shower < 1.5 GPM
 - 3. Toilet < 1.1 GPF (dual-flush and/or power-assist)

IX. Waste Management

- A. Reduction of Waste Generation
- B. Diversion of Waste from Landfills (recycling)

X. Materials

- A. FSC Wood
 - 1. especially for any exotic species
- B. Recycled Materials
- C. Rapidly Renewable Materials
- D. Local Materials

XI. Renewable Energy (note - doesn't make top-ten)

- A. Solar H/W
 - 1. cash-flow positive for homes on propane / oil
- B. Cogeneration
 - 1. Honda
- C. Photovoltaics
 - 1. only viable w/ tax incentives and/or utility rebates
- D. Purchase Renewable Energy Certificates through your Electric Company