Green Homes
Logically Mandated
Avoiding the Hype by Learning the Facts

David Edwards PhD - Owner
Randy Potter, VP

Earth Bound Homes
Earth Bound Homes

- Founded in 2002 by Dr. David Edwards
  - Manages all projects personally
  - Crews are full time long term employees
- Focused on high-end custom sustainable green construction, new homes, renovations & Remodels
- Practice an “Collaborative”” approach to projects
  - Architects/Designers
  - Engineers
  - Sub trades
  - Consultants
  - Raters
Earth Bound Homes

- Green project resume
  - The highest Green Point Rated home ever built (309)
  - The first zero energy/zero carbon LEED Platinum home
  - The highest rated LEED Platinum home (in construction)
  - <$125k zero energy/zero carbon whole house renovation
Green Point Rated vs. LEED

- **Green Point Rated**
  - New and existing homes
  - ~$2,500 (fees & rater cost)
  - Greater variety of less stringent requirements
  - Lower minimum requirement thresholds

- **LEED for Homes**
  - New homes only
  - ~$10,000 and up (total cost)
  - Only 17 stringent requirements
  - Much harder to certify
Cal Green
Mandatory Building Code Measures
(effective 1/1/11)

- 20 percent mandatory reduction in indoor water use.
- Requiring diversion of 50 percent of construction waste from landfills.
- Mandatory inspections of energy systems (HVAC) & performance testing.
- Requiring low-pollutant emitting interior finish materials such as paints, carpet, adhesives, finishes, etc.
- Requires mechanical ventilation in all new homes.
All new homes built after 2020 and all new commercial buildings after 2030 shall be Zero Energy.

Inside a ‘zero-energy’ home
A San Francisco company is planning to build multifamily townhomes, lofts and apartments that create as much energy as they use. Here is a look at some of the net zero energy methods and materials.

- Solar panels: Convert energy from the sun into electricity
- Heat recovery ventilator (HRV): Provides controlled and natural ventilation for airtight building envelope
- Energy Star appliances
- Wastewater heat recovery system: Preheats shower water
- High-efficiency heat pump: Uses indoor heat to warm incoming air
- High thermal performance windows: Four times more efficient than coated double-pane windows
- Natural day-lighting: Solar orientation
- Insulation: Walls, floors, roof, and basement
- Automated controlling and monitoring system: Manages heating, cooling, ventilation and thermal storage
- Thermal storage basement: High flyash concrete stores daytime heat and provides nighttime cooling

Note: Diagram represents an example of one type of net zero energy building.

Source: Zeta Communities
Bluebird Residence

- Built 2005
- 309pts GPR – #1 in CA, Highest ever rated
- Cost $375/sq. ft.
- 3100 sq. ft.- $159/year utility bills
- Existing house deconstructed
- 94% Recycled/Reused
- No net electricity used (US ave. ~ 19,000kwh, CA ~ 6,576)
- $159 gas bill/year (198 therms, US ave. ~ 2000)
- 84g/d year round water use
- No landscaping irrigation
- Grey water system
- Rain Water cistern
- Photovoltaic system
- Solar Hot water
- Highly Durable ext. and int. finishes
Green Building Benefits

■ Homeowner
  ■ Healthier
  ■ More comfortable
  ■ More durable
  ■ More energy Efficient
  ■ More environmentally responsible
  ■ Cheaper to live in
  ■ Morality

■ Contractor/Builder
  ■ Fewer Call Back
  ■ Increased Customer Satisfaction
  ■ Increased Referrals
  ■ Higher sales prices
  ■ Faster sales
  ■ Higher Profits
  ■ More Educated Clients
What is Green Building:

Elements

1. Intelligent Design
2. Energy Efficiency
3. Water Conservation
4. Sustainable Materials
5. Resource Conservation
   1. Recycling/Reuse
   2. Recycled Materials
   3. Durable Materials and Details
   4. Value Engineering
6. Interior Air Quality/Healthy Homes
Resource Conservation

- Using only what you need
- Using most renewable first, if equal in character
- Cut offs are waste
- What is size of starting material
- CAD programs determine least waste
- Most durable always better and often most cost effective (LT) though rarely cheapest (ST)
- Quality construction and manufacturing
Durable Materials

1. ROI maybe long term (+20 yrs)
2. Material more expensive - Perpetuates stereotype
3. Material may be more energy or resource intensive to procure than less durable materials
4. Different aesthetic
5. May be more difficult to work with (heavier, specialized tools required, different installation method, more time consuming installation)
Recycle/Reuse

- Take what is garbage and make something useful with it
- Usually better sources (old growth, no longer avail.)
- Recycling very good but rarely sustainable
  - Biodiesel - Palm Trees
  - Exceptions - flyash, gypsum, plastic, glass, metal
- Maintain Quality, Durability, Diminished Toxicity
- Catch-22 - some end products are no longer recyclable
Health/Indoor Air Quality

Sources of Indoor Pollutants:
- Outdoor Air Pollutants
- Molds & Bacteria
- Chemicals from Cleaning Products
- Cigarette Smoke contains some 4,000 Chemicals
- Animal Hair & Dander
- Carbon Monoxide Fumes from attached garage
- Gases including Radon seeping through foundation
- Chemical Fumes from Paints & Solvents
- Combustion Gases from Fireplaces & Woodburning Stoves
- Chemicals Released from Modern Building & Furnishing Materials
Sources of IAQ Contamination

- **Permanent Sources**
  - Building Components
  - Building Finishes

- **Transient Sources**
  - Cleaning Supplies
  - Deodorants/Perfumes
  - Work Equipment
  - Mold/Mildews
  - Tobacco Smoke
  - HVAC failures - CO/CO₂
  - Outdoor Pollutants
  - Other Transportables
Wood Products

- Plywood/OSB - interior
- MDF/Particle Board
  - Non wood trim
  - Cabinets
  - Countertops
  - Flooring Underlayments
  - Roofing Underlayments
- Engineered Woods

Learn more about PureBond.
The formaldehyde-free hardwood plywood innovation
Naturally Occurring

- Mold
- Mildew
- Allergens
- Dust
- Danders
- Particulates
- Smog
- Bacteria
- Viruses
- Radon
- Asbestos
Ways to Lower IAQ Contamination

- Don’t put them in
- Vent during/before install
- Flush after install
- Segregate/Ventilate
- Filter
- Kill
- Maintain proper and sufficient moisture controls measures
- Neutralize/Deodorize
Remediation - Filtration

- **Particulate filtration**
    - Merv. 5-8(3-10um)
    - Merv. 13-16 (0.30-1.0um)
    - Merv. 17-20(0.30um(300nm))

- **Activated Carbon**
  - Extremely high surface area, highly reactive(VdW forces-gecko feet)
  - Can remove gasses, VOC, fumes, odors
  - $50-100/filter; 1-7lbs/filter; 49 lbs/year/1000cfm; $1,300-$14,000=~1900cfm
Kill

- You can’t kill what isn’t alive
- UV or Ozone
- \( \text{NO}_x + \text{VOC} + \text{UV} = \text{O}_3 \)
- Oxidizing agent, unstable
- Causes Respiratory damage (free-radicals), atherosclerosis, crop yield reductions
Energy Efficiency

- Items that use energy in the house
  - Refrigerator - 450Kwh vs. 900Kwh.
  - Lights - 100 w vs. 8.5w
  - Cooktop or Range - 40% vs. 90%)
  - Washing Machine – 35g/l + $250 vs. 11g/l + $11
  - Dishwasher(25g/l vs. 5.5g/l)
  - Clothes Dryer(parity)
  - Furnace - 60% vs 96%(<6% vs. 35% leakage)
  - Air Conditioner(SEER-17, 3x)
The Prius Effect

- If you give people feedback on usage, they will use less
  - Especially when it’s something that costs $s (fuel/power)
Simple Energy Monitoring
Plug Load

- **Kill A Watt**
  - Plugs directly to appliance
  - Very simple to use
- **Very Inexpensive**
  - ~$25-$30
- **No automated operation**
Whole House Energy Monitoring

- TED
  - The Energy Detective
- Integrated
  - Whole house use
  - Can monitor production
- Diagnostics
- Hard to isolate
- Still low cost
  - $119-$450

www.theenergydetective.com
Resources

- [www.energyurgradecalifornia.org](http://www.energyurgradecalifornia.org)
- [www.cee1.org](http://www.cee1.org)
- [www.pge.com](http://www.pge.com)
- [www.builditgreen.org](http://www.builditgreen.org)
- [www.energystar.com](http://www.energystar.com)
- [www.usgbc.org](http://www.usgbc.org)
- [www.greenhomeguide.com](http://www.greenhomeguide.com)
