GREENNEST uses many certified products and fundamentally meets several GREEN standards BUT is not using third party certification

SCS CERTIFIED Minimum 20% Recycled Content Post-consumer

CERTIFIED BY inspecta

PEFC CHAIN OF CUSTODY

SUSTAINABLE FORESTRY INITIATIVE

WaterSense Meets EPA Criteria

The MicroPro Treated Wood Process is certified under SCS's Environmentally Preferable Product (EPP) program based on Life-Cycle Assessment.

FSC

GREEN SEAL

GREENGUARD Indoor Air Quality Certified

ADA

EARTH CRAFT HOUSE Virginia

ENVIRONMENTAL STEWARDSHIP PROGRAM KCMA

ENERGY STAR

FINANCING

BANK-FUND STAFF FEDERAL CREDIT UNION

BANK ANNAPOLIS BankEasy. BankLocal.

How Do You Know Your Home Is Green?©

A GREENHOME GUIDE

Developed by SusDev Tech Based on Planning and Building GREENNEST

August 2010

Building GREENNEST

From the outset, Ken desired to create a nurturing, non-toxic, free of chemicals living environment that is also minimizing waste, and utilizing sustainable and alternative energy. The lessons learned through managing the design, permitting and building of **GREENNEST,** a waterfront home in the Annapolis area, are highlighted here.

Working within local building codes, **GREENNEST** maximizes alternative construction approaches that features harmony with the natural setting and life cycle analysis. The goal has been to balance cost and materials to create an affordable environmentally friendly dwelling.

The principles in **Green** building techniques followed by Ken focused on sensitivity to site development, reducing energy and water use, having a healthy indoor air quality, and incorporating environmentally friendly building materials as much as possible. The project is also expected to reduce utility bills, decrease maintenance costs, and enhance the health and well-being of the home occupants.

Anne Arundel County building regulations on the water are based on stringent physical land use planning codes that focus on the Maryland Critical Area legislation. At its inception in 1985, this legislation was an innovative and progressive set of guidelines to control development in the entire shoreline of the State. Today, these old regulations were road blocks in incorporating technologies to reduce septic impacts, minimize water consumption, and reduce the carbon footprint. New thinking with innovative incentives are required to reduce the carbon footprint and improve the local environment and Bay health.

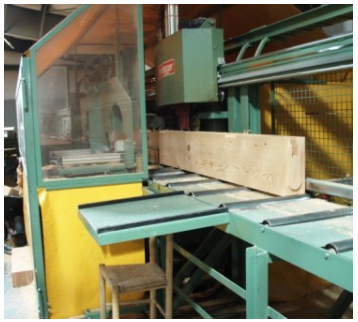
The research undertaken to build **GREENNEST** shows that there are many competing promotions and standards - it's a confusing world out there - BUT you can achieve GREEN on your own

Design and Production
Dr. Kenneth Green

SusDev Tech LLC
www.susdevtech.net

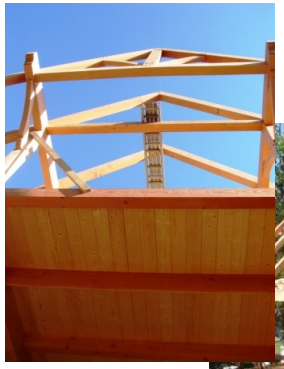
A Commitment to Design, Build and Demonstrate Practical Green Construction for the Homeowner

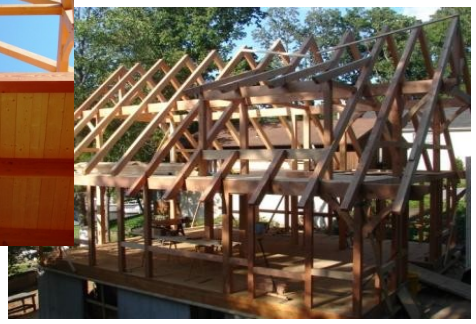
Timberpeg milling and production uses computer engineering for precision cuts and minimizes lumber waste



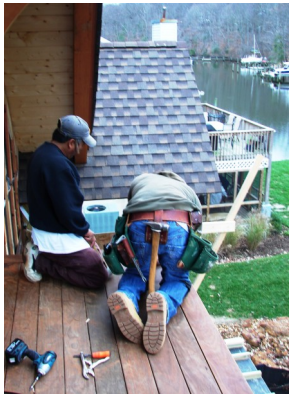
Site engineering design for stormwater capture with multiple intercept structures and an outfall infiltration and sediment reduction system

Forest Stewardship Council certification of all the Douglas Fir framing from the Hoopa Indian reservation in Northern California with chain of custody through the harvesting and milling process



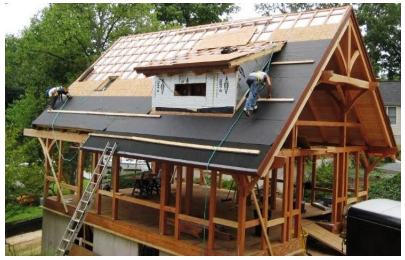


Construction of septic system piping drilled under county road to pump wastewater to upper lot for protecting waterfront groundwater from contamination

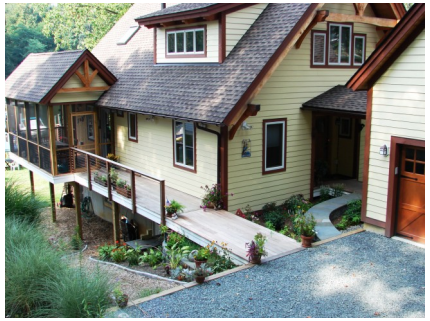


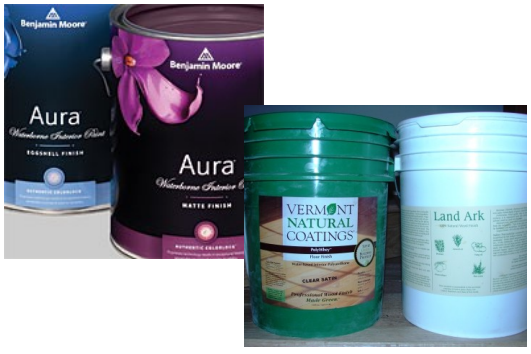
Certification for other wood products including pressure treated joists, western red cedar from British Columbia, spruce from Finland and ipe from Brazil

A FAST (Fixed Activated Sludge Treatment) septic system to reduce nitrogen through multiple biological, bio-chemical, and physical processes



High R value ISO insulation with long lasting and energy efficient Hardiplank and Energy Star rated windows and doors





Use of low VOC interior Benjamin Moore Aura GreenGuard paints, wood floor finish from Vermont Natural Coatings and low toxic Land Ark sealer on post, beams and trim

What makes GREENNEST Green?

Stormwater capture and diversion to a stormwater conveyance outfall to eliminate erosion and siltation

Detailed life cycle assessment (LCA) for sustainable products

Timberpeg FSC certified Douglas Fir (Northern California) and PEFC - Inspecta certified spruce (Finland) for Post and Beam Frame

Certified or sustainable wood products for framing, decking and trim

Exterior siding with energy efficient and long lasting Hardiplank

High R-value ISO hardcore insulation and added roof insulation

Energy Star windows and doors (primarily Anderson Low-e)

Climate control with highly efficient (SEER 16) Sanyo minisplit HVAC system and six zoned indoor air handlers

Propane fireplaces instead of wood burning to improve energy efficiency and eliminate polluting wood burning emissions

Rinnai on demand Energy Star propane tankless hot water heater

Water saving faucets and toilets

Majority of light fixtures use energy efficient CFL bulbs

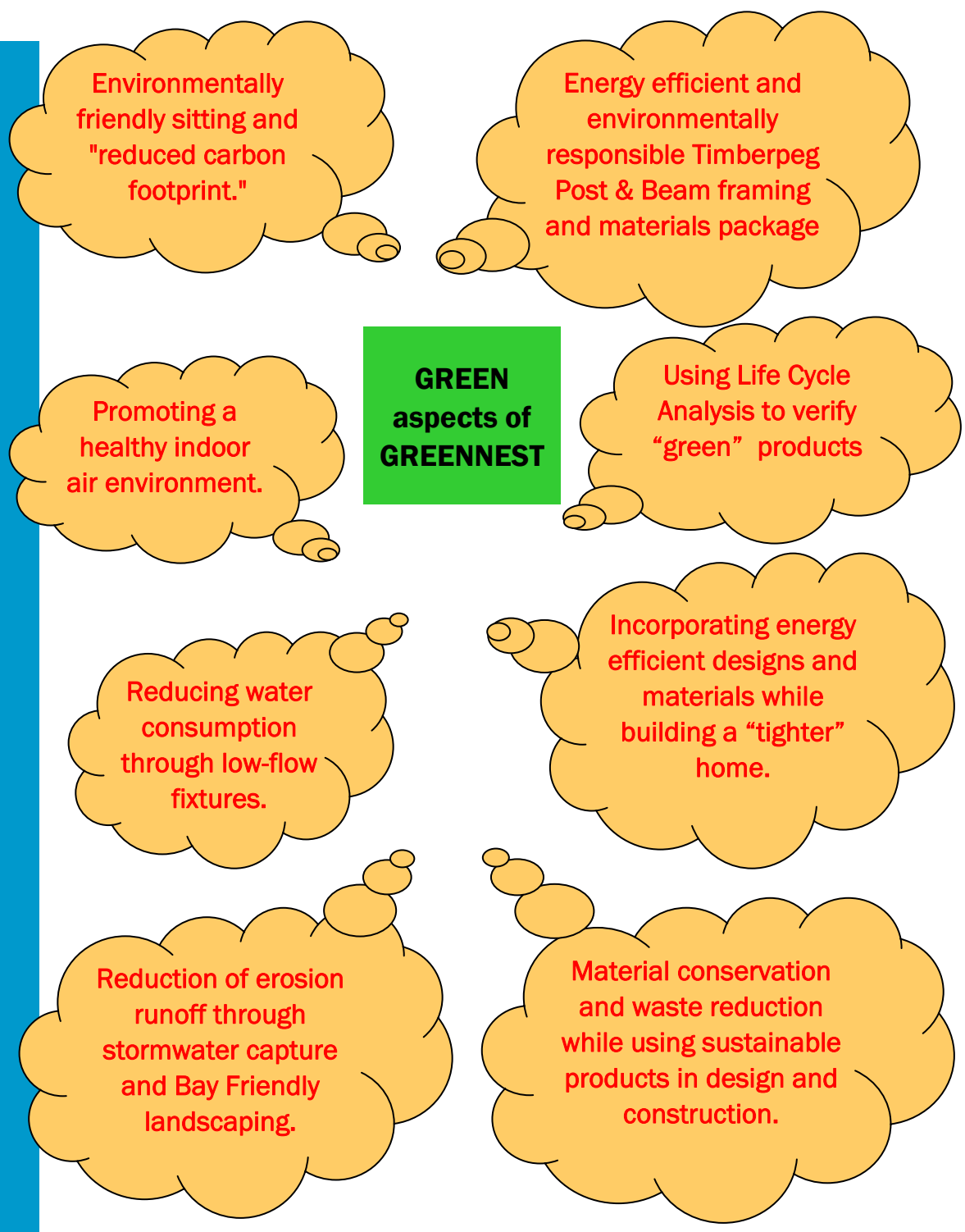
All Energy Star rated appliances

Wilsonart countertops consisting of FSC certified wood, recycled paper content and low VOC materials

Low VOC Land Ark sealer on all interior Fir post, beams. trim, baseboard & doors

Use of interior Benjamin Moore low VOC Aura GreenGuard paints

Low VOC wood floor finish from Vermont Natural Coatings that uses renewable cow cheese whey polymer proteins



Lessons Learned

from the experience of building **GREEN** to ensure Sustainable Design and reduce the Carbon Footprint on the Chesapeake Bay

Many **GREEN** Building features were investigated with many compromises made to settle on a sustainable site plan and building package

Implementing proven alternative technologies to minimize the waste stream are handicapped by local codes in Anne Arundel County.

The incentive structure for sustainable design including energy efficiency and reducing the carbon footprint is too restrictive and needs innovative approaches at both the State of Maryland and county level.

Several renewable energy technologies were not used because they were not affordable based on the allocated construction budget. Even with allocating potential energy credits from the Federal, State and local jurisdictions.

Green Building Today

Green building applies principles of resource and energy efficiency, environmentally friendly materials for a healthy building , and ecologically and socially sensitive land-use.

Green building also requires an integrated, multi-disciplinary design and building process.

With proper planning and decisions, these actions can optimize building cost and performance. **GREENNEST** also targeted reducing the carbon footprint of the project as an important parallel goal.

The challenge in building **GREENNEST** was to balance cost and benefits. Its more than incorporating a component because its better for the environment or it reduces the carbon footprint. Its about trade off and compromise. The bottom line is that I have invested my own funds (A big construction loan that has an upper limit) and I can not invest in everything I would want (e.g., solar, geothermal etc.).

However, the promotion and selling of green building today is confusing with a growing universe of products using alternative standards and sometimes questionable claims.

Green Certification and Standards

More than half a dozen GREEN residential building standards from around the country were extensively reviewed and analyzed to evaluate ease of use, cost of third party certification, key components, and scoring methods . These included **Virginia Earth Craft** homes, **Built Green** from King Snohomish Counties, WA , **Green Point**—Alameda County, California , **Green Globes System** from Portland, Oregon , **LEED** residential, **Energy Star** and **North Carolina Healthy Built Homes.**

Emphasizing material conservation and waste reduction while using sustainable products in design and construction.. The Timberpeg post and beam production process uses computer engineering for precision cuts and minimizing lumber waste.. The Timberpeg mill minimizes site waste through recycling - left over sawmill waste is collected for animal bedding and unused Douglas Fir pieces are given away as woodfuel. On the GREENNEST worksite: attempts were made to minimize product and material waste by sorting waste into recyclable and non-recyclable bins. The wood waste was originally collected to turn into woodchips, but the chipping process proved inefficient and impractical and was quickly abandoned. Temporary parking pads and driveway fill used recycled road mill material and the stormwater intercept fill was recycled concrete.

Incorporating energy efficient design and materials while building a "tighter" home. The Timberpeg design for GREENNEST used a wrap and strap system with very high R – value rated ISO hardcore insulation sheeting. Additional roof insulation was added to exceed local building standards. The tight seal was finished with Hardieplank siding. Energy efficiency products include CFL bulbs throughout the house and Energy Star appliances. All windows and doors are Anderson Low E thermal efficient products. Gas fireplaces that blow heat into the rooms were installed instead of less efficient wood burning fireplaces. Two exterior high SEER (16plus) Sanyo mini-split heat pumps with individually controlled interior air handling units were selected for efficient zone heating and cooling

Opting for alternative renewable energy in the house planning. GREENNEST was originally designed to use a solar system for hot water and a photovoltaic system for electricity or a Geothermal heating and cooling system. The photovoltaic system was to be grid-tied, meaning that electricity generated by the system could flow out into the BGE utility lines as the panels generate surplus electricity. The panels were to produce 3-4 kilowatt-hours of electricity a year, or about 75 percent of what the house needs in the summer and half of what it needs in the winter. A rigorous cost-benefit analysis was applied and the numbers did not make sense- ***it would take a 20+ year timeframe to break even if the additional financing would have been available***. The costs of such products are highlighted:

Costs and Specs

Solar Hot Water - Labor , materials and installation but only piping to connect to interior plumbing system and expected to cover only 65% of hot water needs—**$10,000.00**

Selected Rinnai on demand Energy Star propane tankless hot water heater- **$2,300.00—supplies all hot water needs**

Solar PVC System—18 Evergreen panels and Sunwize backup battery system - **$39,000**

Geothermal Heating and Air Conditioning System with two closed well loops, all piping and ducts, pump station and thermostatically controlled zones - **$50,000**

Selected Sanyo minisplit with 6 air handlers and all line sets—no ducts nor vents—**$16,000.00**