

SUMMER 2007

# bgbj

BOULDER GREEN BUILDING JOURNAL

FREE

GREEN REMODELING

BOULDER POP-TOPS

FALLING IN LOVE AGAIN





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The Duckham/Merten home will be featured on the The Boulder Tour of Solar and Green Built Homes on Sunday, September 30, 2007. The Center for Resource Conservation is the local organizer for the tour. For more information, visit [www.conservationcenter.org/e\\_solarhometour.htm#Tour](http://www.conservationcenter.org/e_solarhometour.htm#Tour).

*(Left) The entry to the Duckham/Merten home greets visitors with playful shapes, vivid colors, and jaunty angles. Note the rain chains that collect rainwater for use on the xeriscaped yards.*

*(Below) Energy Star appliances, caramelized bamboo flooring, polished concrete countertops, and a breakfast table made from reclaimed beetle-kill pine are just a few of the green features in the beautiful, functional kitchen.*

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## High Performance, Live-In Art

A couple successfully blends art and science in "The Treehouse," an innovative, green built, high performance remodel and addition in an established Boulder neighborhood. **BY BRAD DUCKHAM**

In *Living Philosophies*, Albert Einstein writes, “The most beautiful experience we can have is the mysterious—the fundamental emotion which stands at the cradle of true art and true science.” Green built, high performance homes are tailor-made for both the aesthete and the scientist, and Boulder is tailor-made for their design and construction.

Boulder’s latest showcase of residential green building is located in the Martin Acres subdivision. With green features including reclaimed wood, natural plasters, geothermal heating and cooling, a solar electric (photovoltaic or PV) system, bamboo plywood cabinets and a monolithic interior aspen that extends from the living room through the second floor, “The Treehouse” boldly illustrates the seamless synthesis of exceptional architecture with road-tested technology. Furthermore, an anticipated \$0 monthly energy bill is not a mystery—it’s beautiful science.

My wife, Donna Merten, President of Merten Homes, and I wanted to engage our unquenchable appreciation for art and architecture within the ever-improving realm of energy-efficient materials and technologies. To accomplish this, we converted a 955 square foot (ft<sup>2</sup>) ranch-style home into a 2,800 ft<sup>2</sup> Modern-style showpiece that simply defies categorization. The result is a beautiful, comfortable, livable home for us and a functional demonstration of green building products and strategies for others interested in “greening” their homes or businesses.

But it didn’t happen overnight. It took thinking, planning, and ten months of construction to complete this project, and we applied our green sensibilities from the start.

“First and foremost, we channeled all of our ideas through four primary filters,” explains Donna. “The filters were innovative design and materials, energy efficiency, resource conservation, and environmental air quality and overall satisfaction.”

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## INNOVATIVE DESIGN AND MATERIALS

The last thing we wanted was a house that looked like a solar array. Too often, technologies like solar thermal and/or PV panels dominate the exterior of a home, and we wanted the technology of our home to function more as a silent salesman than a solicitor.

As Donna put it, “We wanted the architecture to function more as jazz fusion than elevator music.”

The result is a compelling architectural form in which roof-flush and roof-discreet PV panels, geothermal heating/cooling, new and reclaimed corrugated metal siding, brightly-colored stucco, and slate tile accents all coalesce into

*The inviting living room features natural plaster walls and bamboo flooring. All the lights are compact fluorescents.*



The master bedroom's polished concrete floor, natural plaster walls, earth tones, and indirect lighting create a soothing space for unwinding at the end of the day. Note the reclaimed plastic resin insets in the bedroom doors.



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a field of jutting planes, sharp angles, and shifting vantage points. Moreover, with a blue metal pitched roof, the structure elevates your pulse and excites your mind.

And if the exterior doesn't grab your attention, the interior definitely will.

Merten Homes researched and developed its own unique natural plasters and applied them instead of paint to the interior walls and ceilings throughout the house. As a result, the home has an exceptionally warm and natural ambiance. The only paint we used was for doors and exterior windows.

Speaking of doors, we reclaimed many of them from the demolition of a turn-of-the-century Chautauqua bungalow. Solid-core five panels were stripped and painted. We stripped the doors with glass inserts and replaced the glass with a variety of reclaimed plastic resins, courtesy of 3form. Imagine master bedroom doors inset with ginkgo leaves and thatch. Imagine kitchen cabinets inset with grape vines.

The kitchen features many unique materials. The cabinets are built with Plyboo and strawboard, and the strawboard cabinets are wrapped with a dazzling red binder. We chose caramelized bamboo flooring for the main kitchen area, and inset a nebulous-looking slab of petrified wood into the polished concrete countertop for a cutting board. Our breakfast

## PROJECT DETAILS

**Project Description:** Green built/high performance remodel/addition  
**Owners:** Brad Duckham and Donna Merten  
**Designer/Architect:** Donna Merten  
**Builder:** Merten Homes, Inc.  
**Size:** 2,800 ft<sup>2</sup>  
**Construction cost:** \$400,000  
**Date completed:** March 2007

## SUPPLIERS

**Photovoltaic Panels:** SunPower  
**Photovoltaic Consultants/Installers:** SolSource  
**Geothermal Consultants/Installers:** Blue Sky  
**Kitchen Design:** Merten Homes and Red Pepper Kitchen + Bath  
**Bath Design:** Red Pepper Kitchen + Bath and Merten Homes  
**Lighting:** Inlighten Studios  
**Plumbing:** Bernie's Plumbing  
**Electrical:** Excel Electric  
**Construction Waste Recycling:** Waste-Not Recycling  
**Kitchen & Bath Cabinets:** Sourced by Red Pepper Kitchen + Bath and manufactured by American Loft  
**Low-e Hurd Windows:** SolarGlass Window & Door  
**FSC-Certified Lumber:** Boulder Lumber

## GREEN FEATURES

- FSC-certified lumber
- Reclaimed hardwoods
- Reclaimed doors
- Reclaimed metal for soffits
- Reclaimed aspen and beetle-kill pine
- Bathroom tile with recycled auto glass content
- Merten Homes Natural Plasters
- AFM Safecoat paints and stains
- Recycled over 9,000 pounds of construction waste
- Dual-flush toilets

## RENEWABLE/ENERGY-EFFICIENT FEATURES

- 5.66 kW grid-tied PV system
- Geothermal heating/cooling
- Heat recovery ventilator
- Ultratouch cotton insulation
- Soyfoam insulation
- Structural insulated panels (SIPs)
- Insulating concrete forms (ICFs)
- Energy Star appliances
- Compact fluorescent lights (CFLs)

*The dining room's natural plaster walls and polished concrete floor colored with a soy-based stain create a comfortable, welcoming space for eating and entertaining.*



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**The materials and the architectural style represent an attractive fusion of texture, space, and function.**

table is reclaimed and refinished beetle-kill pine from a nearby lumberyard.

Donna and I also wanted to “rescue” other materials. We installed cork flooring salvaged from an old church in our project room, inset stair treads with Karri (eucalyptus) wood that was once part of an old sheep shed, and used Trestlewood reclaimed wood that once rested on the bottom of the Great Salt Lake for flooring in the loft. (Don’t get me started on the Trestlewood. I can talk for hours about its “uplifting” aesthetics.). The floors in the living room and three bedrooms are natural bamboo.

#### ENERGY EFFICIENCY

The Modern architectural style is not only set off with vibrant colors and materials, it is also grounded in the art of today’s building science. We used insulating concrete forms

(ICFs) for the two new additions on the main level, and structural insulated panels (SIPs) for the second story walls and roof. We had a soy-based foam insulation sprayed into the main level exterior wall cavities, and recycled denim insulates the second level interior walls.

A geothermal system provides both heating and cooling. According to many experts, geothermal systems are two to four times more efficient than any other mechanical system available today.

We also added a heat recovery ventilator (HRV) to our geothermal heating/cooling unit, which constantly circulates fresh air and ensures frequent air changes. We

hope that the HRV will mitigate Donna’s autumn allergies and enhance our overall comfort.

To minimize electrical loads without compromising performance, we chose Energy Star Bosch appliances, and the entire house is lit with compact fluorescent lighting (CFL). In addition, we included a 5.66-kilowatt (kW) photovoltaic system to generate electricity. An eighteen-panel array rests on the south-facing slope of the roof, and an eight-panel rack-mounted array rests on the flat section of the roof.

The house was completed in March 2007 and we don’t have enough data yet to know for sure, but we expect that it will require zero net energy to operate. We also estimate the payback periods for the technologies we used to be eight to ten years for the geothermal unit, and five to seven years for the photovoltaic system, based on houses of similar size with roughly the same energy requirements.

#### RESOURCE CONSERVATION

We chose many of the materials and technologies used in The Treehouse because they made it through the built green/high performance filters we established early in the process. One might reasonably ask, however, whether the time and labor involved in the procurement and refinishing of the reclaimed doors was less than, say, purchasing and painting FSC doors from Home Depot? Probably not. In fact, both Donna and I have said that if we had to do it again, we would

forego the reclaimed doors, especially in light of our tight building and finishing schedule.

On the other side of the equation, using solar energy—both for domestic electricity and to supply the energy needs of the geothermal unit—to reduce our dependency on fossil fuels only makes sense. Discussions about using solar energy to generate electricity are turning up everywhere—in the media, in diverse disciplines, and in everyday discourse.

Especially in the arid West, water is a particularly precious resource. The Treehouse uses dual-flush toilets that reduce water consumption by at least 30 percent. We also used rain chains and specialized grading that will allow rainwater and snow/snowmelt to nourish our xeriscaped yards.

Using reclaimed materials reduces the need to procure and manufacture raw material. But what about construction waste? The Treehouse successfully recycled over 9,600 pounds of drywall, metal, cardboard, and wood with the help of Waste-Not Recycling.

## ENVIRONMENTAL AIR QUALITY AND OVERALL SATISFACTION

What little paint we used was AFM Safecoat, which contains no volatile organic compounds (VOCs), and we used a soy-based stain for the polished concrete floors.

“We wanted to reduce the amount of off-gassing from building and finishing materials as much as possible,” says Donna, “So instead of an acid wash, we used a more environmentally-friendly agent.”

Are we satisfied with The Treehouse?

“We absolutely love our home,” says Donna. “It works. It’s that simple.”

All in all, the materials and the architectural style represent an attractive fusion of texture, space, and function. By designing a home from the conceptual stages with resource conservation, energy savings, and striking architecture in mind...by reducing or eliminating off-gassing chemicals and finishes...by recycling construction waste...by including a solar electric system...by creating our own natural plasters...by using dual-pane, low-e Hurd windows...by working with talented and passionate green building professionals...we have created a home that not only fits deep within Boulder’s Green Points program, but also deep within our own ethos and worldview.

We attended a straw bale convention in Carbondale last year, and Congressman Mark Udall’s brother Randy said it

best, “We build all these new homes, and the first thing we do is plug them into life support.”

Now is the time to adopt building technologies that require less—or no—fossil fuels to operate and to continue refining these emerging clean and green technologies. The 21st century will be the century of harnessing renewable energies for the benefit of all of us. If we can get our politics in line with the thinking underlying this green built/high performance philosophy, it could be the beginning of an unprecedented era of economic and environmental health and prosperity for our fellow humans and our planet.

*Brad Duckham (bduckham@merteshomes.com, 720.284.2416), EcoBroker, is a Broker Associate with Keller Williams Front Range Properties, and a long-time resident of Boulder.*

## RESOURCES

### 3form reclaimed plastic resins

Local Contact: Lisa Larson  
303.679.0090  
llarson@3-form.com  
www.3-form.com

### AFM Safecoat Paint

Local Contact: Paul Acker  
303.449.1876

### EcoProducts

www.ecoproducts.com  
www.afmsafecoat.com

### Insulating Concrete Forms

ThermoFormed  
www.thermoformed.net

### Kitchen and Bath Cabinets

Local Contact: Margie McCullough  
303.413.9400  
Red Pepper Kitchen + Bath  
www.redpepdesign.com

Local Contact: Marla Shapiro

303.442.2798  
American Loft Cabinetry  
www.amloft.com

### Low-e Hurd Windows

Local Contact: Jon Becker  
303.442.4277  
SolarGlass Window & Door  
sales@solarglass.com  
www.solarglass.com

### Plyboo Bamboo Plywood

Local Contact: Steve Schmidt  
Blue River Hardwood  
303.307.8555  
sschmidt@blueriverhardwood.com  
www.blueriverhardwood.com

### Structural Insulated Panels

Local Contact: Jeff Machado  
Premier Building Systems  
720.979.8952  
jmachado@premier-industries.com  
www.premier-industries.com/pbs/

### Trestlewood Reclaimed Wood

www.trestlewood.com

### Ultratouch Insulation

www.bondedlogic.com  
Local Contact: Paul Acker  
Eco-Products  
303.449.1876  
www.ecoproducts.com

### For more information...

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