

## A New Look at Manufactured Housing

by Nathan Doxsey, Conservation Specialist

Can manufactured housing be green? Over the past couple years I have casually come across articles in various trade publications praising the energy efficiency improvements being implemented in manufactured homes. Like most other green building enthusiasts, I never considered manufactured homes, or the industry that produces them, to be very environmentally friendly. Affordable - yes, but green? Earlier this year, one of the affordable housing developers working with the Green Building Program asked if it would be possible to use manufactured homes and still meet our green building requirements. Suddenly my knowledge of manufactured housing seemed insufficient and with a newly discovered interest in factory built housing, I began to do some research. There are three basic types of factory built homes:

- **Manufactured Housing** is built to the HUD code which is quite different from the International Residential Code (IRC) used for site-built homes.
- **Modular Housing** is factory built housing modules assembled on a site that must meet the IRC.
- **Production Housing** is site built housing produced in a systematic manner such as log cabin kits.

Several national factory built housing companies have teamed up with the U. S. Department of Energy to improve energy and material efficiency in a program called [Building America Industrialized Housing Partnership \(BAIHP\)](#). Several home manufacturers were even able to qualify their models under the [Energy Star® Homes](#) Program.

### Manufactured Homes in Austin

[Palm Harbor Homes \(PHH\)](#) participates in BAIHP and has been building homes in Austin for over 20 years. PHH is a leading manufacturer of HUD-code homes with 16 factories in 8 states producing more than 15,000 homes annually. They also produce some modular housing units. About five years ago [Florida Solar Energy Center](#) began collaborating with PHH through the BAIHP at one of their plants in Florida by conducting diagnostic tests and infrared camera inspection, and by offering building science advice. The project team worked with engineers and managers to develop production processes for building substantially leak-free ducts systems, a testing protocol, and the incorporation of return air transfer ducts to minimize pressure imbalances in the conditioned space. These improvements are crucial components in achieving Energy Star status and insuring good indoor air quality. As a result, Palm Harbor Homes has adopted these building practices at all their factories and in 1998 they were awarded the Energy Star Homes Program Manufactured Homebuilder of the Year Award.

In light of all this information, I was prompted to visit the Palm Harbor Homes Plant #7 to see for myself the result of this public/private collaboration. The factory tour is amazing; it is possible to see every stage of production in under an hour. The efficiency is stunning; entire homes are

moved along as if on a conveyer belt. Large equipment moves whole roof systems into place as specialized workers perform their tasks with near choreographed efficiency... Henry Ford would have been proud to see his assembly line model applied in such a manner.

I was able to easily identify numerous green aspects of production process and the factory itself. For example, most materials are ordered to exact dimensions so they don't have to be cut before assembly. Sawdust from any wood that was cut was collected using a central vacuum system and used by one of the employees for floor covering and bedding in a horse stable. All cardboard, metals, wood scraps, cans and plastic beverage containers were sorted neatly for recycling, reuse, or proper disposal. The work environment was clean, safe, and comfortable within the day-lit warehouse where the homes are assembled. Construction adhesives that have no VOC's and super-low VOC paints (under 100 gpl) help maintain a healthy indoor environment.

### **So How Green Are The Homes?**

There are many standard green features; enough to rate even a basic home from this factory at the 2-Star level using our Green Building Checklist. With a few options such as radiant barrier roof decking, careful orientation on the site, and water efficient landscaping, these homes can easily hit the 3-Star mark.

### **Notable Green Features**

Energy:

- Design created by design team, including designer, builder and mechanical contractor
- Blower door testing
- Low-e windows
- Programmable thermostat
- Cross-over vents
- Graduated air delivery system that balances air flow from room to room
- Direct duct pressure test with "duct blaster"

Materials:

- Lots of engineered materials i.e. trim, roof trusses
- Extensive reuse and recycling of materials

Health and Safety:

- Exhaust fans installed and vented to outside for cooktop/stove and any room with tub or shower
- Construction adhesives have no VOC's
- Super-low VOC paint
- Organized house ventilation procedure/commissioning

My final impressions from this research and factory tour are that some factory built home manufacturers like Palm Harbor **are** producing green homes. I believe this is a very sophisticated industry that is taking the team approach to new heights. These homes are assembled with better quality control and less waste than almost any site-built home. In addition, choosing a

manufactured home with a high energy efficiency package (such as an Energy Star Home-labeled model) in conjunction with low maintenance materials can help sustain long term affordability.

### Green Building Program Says Goodbye to Jill Mayfield

After more than ten years with the Green Building Program, Jill Mayfield has decided it's time for a change. "I love my work at the Green Building Program but I think it's time for me to go out on my own," says Jill. "I want to set my own hours and arrange my schedule around my girls." Jill has two girls, one of whom is a pre-teen, and feels that being home when they get out of school provides a great window for communication.

Assisting the Green Building Program from the very beginning in 1992, Jill joined the group full-time in 1995. As Marketing Director for the program, she made many major contributions including keeping the program in the public eye and garnering several major awards. The program was awarded City of Austin Environmental Board Environmental Awareness Award in 1994; the Renew America Award for Environmental Sustainability in 1995, 1996, 1997; the Governor's Excellence Award in 1996; a Citation of Honor from the Texas Society of Architects in 1999; Citation of Honor for Marketing Materials from the Texas Public Relations Association in 2002; and most recently, Green Building Program of the Year from the National Association of Homebuilders, in 2002.

Jill worked on getting local, regional, and national attention for the green building industry and the Green Building Program was seen on nationally syndicated television shows like "Our House" and "Your New Home" on the Discovery channel. Her articles were featured in nationally-known newspapers and magazines such as *Architectural Record*, *Southern Living*, and *Environmental Building News*. Jill's work on the Green By Design Workshops have made them one of the program's biggest success stories.

In June, Jill started her own company, Jill Mayfield Communications. She will continue to consult with the program about the USGBC Conference to be held here in Austin in November. The Green Building Program would like to thank Jill for all her hard work over the years and we wish her the best of luck with her new endeavors!

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### Member Bulletin Board

#### Size Matters: Manual J Can Help You Get It Right

Properly sizing the air conditioning system is one of the most important aspects of Green Building. It is imperative to specify such things as low-E windows, increased insulation, and light colored roofing materials early in the design process if you want to reap the best energy efficient

benefits. The importance of these measures is manifest in the form of a smaller air conditioning system, which decreases first cost as well as reducing future operating cost.

### **Casa Verde Has Five-Star Home**

A large crowd of local dignitaries and supporters gathered on April 22 to witness and participate in the unveiling of Casa Verde Builders' first 5-star rated home. Casa Verde typically builds four homes a year at the three or four-star rated level. This five-star home (pictured right) is located in East Austin. Casa Verde's first five-star home contains a number of outstanding green features, including:



- Cabinetry made with formaldehyde-free MDF
- On-demand gas hot water heater
- Compressed straw interior wall partitions
- Autoclaved aerated concrete exterior walls
- Ductwork located inside the conditioned space
- Stained concrete floors
- Composite wood-plastic exterior trim
- No-VOC paints and adhesive

Casa Verde Builders is an American Youthworks program whose mission is to assist at-risk youth in achieving their high school diplomas while educating them in construction and life skills through the process of building affordable green homes. The Green Building Program encourages it's members to learn more about Casa Verde's construction program by contacting Chester Steinhauser of American Youthworks at 472-8220.