

Construction Begins on Twenty-First Century Townhouses

By Kathy B. Sedgwick

Construction has begun on a group of four research townhouses, called the Twenty-First Century Townhouses, the latest addition to the NAHB National Research Home Park in Bowie, Md. The townhouses will highlight alternatives to dimensional lumber and innovative approaches to achieving advanced energy efficiency.

The National Association of Homebuilders National Research Home Park provides a showcase for new home building ideas and technologies. "We believe that the four research townhouses will give us a lot of information about lumber alternatives and advanced energy savings, based on real products and

real construction procedures," said Lisa K. Bowles, NAHB Research Center president.

Acceptance of new construction products and methods takes a long time—as much as 15 to 20 years—according to a 1989 NAHB Research Center study.¹ Yet, President Bowles is hopeful that this latest demonstration project will "hasten the arrival of successful products into the home building mainstream."

High lumber and timber prices have had a negative influence on the construction market for the past several years. Steep price increases are due to several factors. Tax subsidies that encourage logging companies to export raw logs have increased international demand, which, in turn, makes foreign markets more profitable for timber producers.

Another factor is the limitation on the public average, controlled by timber harvesters, due to pressure from environmental groups in both the United States and Canada. Currently, it does not appear that these

limitations will be relieved and the available supply of timber will continue to dwindle. Thus, it is unlikely that lumber prices will return to previous levels and it follows that wood product availability will be constrained.

Rising lumber costs have stimulated an interest in alternative products. The Twenty-First Century Townhouses will demonstrate a variety of such products, including steel framing and siding made from sawmill residue and wood scrap.

Advanced Energy Savings

Since the oil crisis of the 1970s, energy conservation has become a major concern for builders and homeowners alike. Energy efficiency is an important cost consideration. This cost is reflected in the price of thermal products and systems and, in turn, actual housing costs.

A primary goal of the new energy systems that will be installed in the Twenty-First Century Townhouses is to reduce the energy

required to heat and cool a home. A secondary goal is to reduce the energy required to manufacture, deliver and install materials.

Project Participants

John T. Stovall, president of John Stovall and Associates, Gaithersburg, Md., is the project architect. Miles Haber, president of Monument Construction, Inc., Chevy Chase, Md., is construction manager and general contractor for the project. The U.S. Department of

Energy's Advanced Housing Technology Program will support the evaluation of materials and systems used to build the houses. The DOE's involvement relates to the White House's Climate Change Actions Program for reducing emissions that can cause global climate change.

Energy Conversion Devices will provide a prototype roofing material. A photovoltaic (solar electric) material, the product is designed to integrate with metal roofing and a

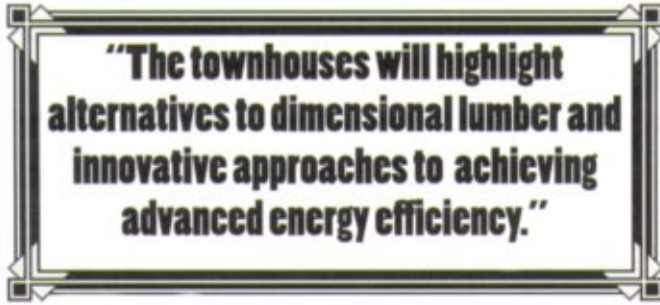
nickel hydride battery for storing electrical energy.

Baltimore Gas and Electric Company will aid in the design and integration of the photovoltaic system into the house and the utility grid.

Washington Gas will support elevated pressure gas distribution, gas convenience outlets, portable gas appliances and a natural gas vehicle refueling station.

The Maryland Energy Administration will relate the project to its Sustainable Communities Project in Prince George's County, Md., with emphasis on bio-retention, distributed energy generation and renewable energy. The Sustainable Communities Project is part of MEA's Statewide Community Energy Showcase Program.

Energy Showcase Coordinator Ann Elsen says the showcase project is "a public/private partnership intended to demonstrate energy efficiency on a community level."



provide factory-assembled panels for the exterior walls, from the first floor to the roof.

Steve Winter, SIPA's technical director, described the panels: "The [angles themselves are the load-bearing element of the house and the insulation for the house."

"The idea is to have a demonstration community in each of the energy utilities' areas within the state, that is, Washington Gas, Potomac Electric Power Company and BG&E." added Kenney.

Research Agenda

Once completed, the townhouses will be open to the public for about one year. "We will be conducting exit surveys from visitors who tour the townhomes. The surveys will help us establish consumer preferences for the various products and systems that will be demonstrated," said Tom Kenney.

The research program will attempt to measure "the impact that these approved thermal systems will have on the reduction of carbon to the atmosphere. That goes along with Clinton's Climate Change Action Program."

"We propose to measure the energy performance of each house as compared to a reference house [computer model] that meets minimum code requirements for energy. The reference house will have the identical floor plan and use conventional materials.

"We'll perform an analysis to see what energy would be consumed over a heating and a cooling season in the reference house. Then we can do the same kind of analysis using the actual systems installed, the actual performance of the products as installed in each house, then calculate a comparison."

Also, the research center is working under contract to do a field demonstration of the Photovoltaic roofing product. "We plan to install it and monitor its performance," Kenney explained.

Structural Systems

Each townhouse will feature one of the four following structural systems: factory-assembled panels, concrete forming system, steel, and aerated concrete blocks.

House #1: Factory-Assembled Panels. The Structural Insulated Panel Association will

House #2: Concrete Forming System. Foamed plastic stackable forms, filled with concrete, will be used to create footer-to-roof exterior walls. Concrete forming will be provided by I.C.E. Block of Virginia. The National Ready Mix Concrete Association and the Portland Cement Association are co-sponsors of this house (More details on this system will be provided in a future article.).

House #3: Steel. Light gage structural steel will be used for the structural framing and for framing interior partition walls, flooring, roof trusses and roofing. The American Iron and Steel Institute will provide the steel framing. American Steel Home Building Industries, Atlas Aluminum Corporation, Clark Steel Framing and MiTek Industries are co-sponsors of this house (More details on this system will be provided in a future article.).

House #4: Aerated Concrete Blocks. The house will have a precast, pre-insulated foundation system using high-density, reinforced concrete with integral insulation and treated wood nailers. This eliminates the need to form and pour concrete footings. Superior Walls will provide the system.

Lightweight blocks made of autoclaved aerated concrete will be erected in the same fashion as traditional concrete masonry block. The lightweight blocks can be cut with a handsaw and accept nails or screws



for finish attachment. Raceways or channels for wiring and plumbing can be made by routing the assembled wall. Hebel USA will provide the concrete blocks.

"This is an easy-to-use material, very workable, fire resistant, energy-efficient," van Overeem said. "Their eight-inch wall would outperform an R-30. It's a good sound insulator." (More details will be provided in a future article.)

Construction Products and Mechanical Systems

United States Gypsum will provide the EIFS that will cover the exterior of all four townhouses.

Benjamin Moore and Company will supply finish products that are low in volatile organic compounds.

Icynene Inc. will provide a spray-applied modified urethane foam designed to provide more consistent and complete cavity filling. The foam offers better adhesion to framing members, without loss of pliancy or subsequent shrinkage. The product contains no CFCs or HFCs.

International Paper Company's Masonite Division will provide siding, interior doors and moldings made from sawmill residue and wood scrap. Component facings simulate the appearance of dimension lumber.

Wilsonart will provide solid sheet and molded sinks made of a structural material that can be carved and routed like wood. The manufacturing process for these

products requires minimal energy and produces minimal waste.

The following construction products and mechanical systems will also be used on the project: plastic interior molding by Armstrong World Industries; interior gypsum moldings by United States Gypsum Company; gas engine heat pump by York Central Environmental Systems; floor systems by TrusJoist Macmillan; high-durability driveways by National Ready Mix Concrete Association; ventilation

and dehumidification by Therma-Stor Products Equipment; and drain water heat recovery system by Water Film Energy, Inc. CD

Footnote 1: Diffusion of Innovation in the Housing Industry. Upper Marlboro, Md., NAHB Research Center, Inc., November 1989.

About the Author

Kathy B. Sedgwick is a freelance writer in Laurel, Md.