

Sustainable Houses for the Southern Climatic Region

A Southern Climatic Housing interdepartmental research team at Mississippi State University (MSU) is planning to construct a research/demonstration house. Our unique approach couples (1) designs to affect energy efficiency and (2) biological and structural durability to address the challenges of decay fungi, subterranean termites, and high wind events while improving indoor air quality for houses built in the southern climatic region. We are convinced that housing research must be regionalized rather than trying to develop a single structure suitable for all regions. Our research team includes a forest products biologist, architect, civil engineer, mechanical engineer, and landscape architect. We feel that all these disciplines must interact at each phase of building design, construction, and maintenance.

Background

Our concept of integrating durability issues into the design, engineering, and landscape phases of the house was justified in a February 2003 report issued by the U.S. Department of Energy (DOE) (NREL/SR-550-33100) entitled *BSC Final Report: Lessons Learned From Building America Participation—February 1995–December 2002*. The section “The Last Hurdle—Capturing the Durability Advantage” (pp. 27–28) discusses the fact that durability and energy efficiency are two distinct issues that must be addressed. This

section concludes by stating, “The market barrier of capturing the advantage of more durable homes remains and requires further exploration.” We are attempting to address this issue for the southern climatic region.



A research/demonstration house planned for the southern climatic region at Mississippi State University.

Objective

The overall objective of studies encompassed in this research plan is to develop and demonstrate design, engineering, construction, landscaping, and applied biology techniques that will increase both the durability and livability of housing in the southern climatic region.

Approach

First and foremost, our approach is to design and construct a research and demonstration facility that addresses durability issues affecting wood frame structures for the southeastern United States. Durability issues will be addressed through research and development of mitigation strategies in a number of areas:

- Preventing biodegradation, including moisture control of foundations, walls, and windows, along with construction and chemical strategies for termite infestation
- Structural responses to high-force lateral wind loads, including tie-down systems for foundations, walls, and roofs

- Low-energy and power-producing systems for residences
- Incorporation of hydroscopic materials
- Low-velocity ventilation for maintaining air quality
- Regenerative processing characteristics of a surrounding ecological system

Personnel from five departments at MSU are cooperating in this study: Dr. Terry L. Amburgey, Department of Forest Products; Dr. David Lewis, Department of Architecture; Dr. Pete Melby, Department of Landscape Architecture; Dr. Chris Eamon, Department of Civil Engineering; and Dr. Carl James, Department of Mechanical Engineering. Dr. Amburgey serves as project coordinator and the Mississippi State University representative to the Coalition for Advanced Housing and Forest Products Research (CAHFPR).

Expected Outcomes

One goal is to develop a house that requires only 25% of the energy needs of a typical single-family house. Aesthetically and functionally, it will maintain a conventional appearance. We hope to illustrate to the public that durability, energy efficiency, and good indoor air quality do not require dramatic changes to lifestyle, spatial needs, or the looks of a house. This phase may require assistance from personnel in the MSU Department of Sociology.

This structure will be dynamic, rather than static, and will be altered as new data are generated and additional research is initiated. It will serve as a teaching facility for MSU students, faculty and students from other universities, and non-academic visitors. We anticipate that the project will continue to foster interdepartmental cooperation in housing-related research at MSU and will stimulate the development of an interdepartmental curriculum on building construction.

Timeline

- Final house design will be completed by May 2004.
- All construction drawings and study plans for initial research projects will be completed by September 2004.
- If funds are available, construction will begin October 2004.
- The research demonstration house should be completed and research projects begun by June 2005.

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