

NEBRASKA

# BLUEPRINT

UNIVERSITY OF NEBRASKA-LINCOLN COLLEGE OF ENGINEERING

SPRING/SUMMER 2009

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## ZNETH: Zero Net Energy Test House

by Lindsay Smith

The next time you're in Omaha, take some time and head over to The Peter Kiewit Institute. A group of architecture and engineering students are building ZNETH: Zero Net Energy Test House.

More than 200 students have been involved in ZNETH from the beginning, and the projects spans two campuses: UNL and UNO.

This project seeks to build a house that has a platinum Leadership in Energy and Environmental Design (LEED) rating.

LEED gives points to buildings constructed to be energy efficient: a platinum rating has a score of 90 to 136 points. LEED looks into eight areas: 1) Innovation and Design, 2) Location and Linkages,

3) Sustainable Sites, 4) Water Efficiency, 5) Energy and Atmosphere, 6) Material and Resources, 7) Indoor Environmental Quality and 8) Awareness and Education.

ZNETH got its start from an idea by Dr. James Goedert, an associate professor in Construction Systems. The planning phase began in May 2008 and construction followed about a month later. They are about half finished with the house and plan on completing construction by this fall.



The outside of the Zero Net Energy Test House (ZNETH) in Omaha. Photo: Lindsay Smith

So far, the project has received most of its money from grants. They recently received another \$100,000 grant for innovative research in early February. By the end of the project, the planners expect to receive about 50 percent of necessary funds through grants and the other 50 percent through donations.

Steven Cross, a UNO graduate student and project manager, said, "The whole idea is to use off-the-shelf technology that any builder can buy and to influence the expansion of LEED into the overall building community."

Zero net means the house produces more energy than it consumes. This feat is being attempted in various ways. The house features six, 18 feet by 15.5 inch solar panels and four, 9 feet by 15.5 inch Photovoltaic Laminate (PVL) solar panels, thin wall photovoltaic solar panels and a vertical axis wind turbine. They expect to produce about four kilowatts of energy using these systems.

The house, located just off 66th and Pacific Streets, is about 2,800 square feet. It contains four bedrooms and four bathrooms on two floors and a basement. The first floor walls are made of Insulated Concrete Forms (ICF) composed of a special Styrofoam based form with six inches of concrete poured in between; these will be covered with stucco. The floor features radiant heating and is made of bamboo, the insulation is soy



Lindsay Smith stands next to Steven Cross, a UNO graduate and project manager for the ZNETH project.

based, and the sewage system is a grey water system; wastewater from washing dishes and clothes will be used to flush the toilets. The house also features a 150-foot geothermal heat pump and solar water heating, and will also possess energy star appliances.

The group is also landscaping the yard and including all natural/native vegetation, a rainwater collection system for irrigation and a green roof (when a roof or section of roof features vegetation).



Graduate students add energy efficient windows to the outside of the ZNET house. *Courtesy Photo: Engineering Communications*

The project also aims to minimize waste during construction. To date, construction waste has filled only seven 32-gallon trashcans. Everything else has been recycled. Run-off water is collected at the base of the construction site in excess soil to be used in the landscaping.

ZNETH will remain with the university for research purposes. The house will be monitored to measure water usage indoors and out, heat leakage, electricity usage and waste produced. A room in the basement will be the control room.

Three graduate students will live in the house and will monitor the total amount of energy produced and used. Excess energy will be placed into the OPPD grid for use elsewhere.

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