

Solar house energy analysis shows 71 percent energy savings

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(Phys.org) —The energy efficiencies of a solar house could result in significant energy savings, according to research by an undergraduate engineering student at Missouri University of Science and Technology.

Samantha Wermager, a senior in [civil engineering](#) from Hokah, Minn., co-authored "Energy Analysis of a Student-Designed Solar House" with her advisor, Dr. Stuart Baur, associate professor of civil, architectural and [environmental engineering](#) at Missouri S&T. The research was published Dec. 4 in the journal *Energies*.

The article presents findings from research she began through Missouri S&T's Opportunities for Undergraduate Research Experiences program. Wermager compared the [energy](#) efficiency, consumption and generation of a solar house to a traditional home of similar size and layout, built using traditional construction methods. The solar house she used was modeled after Missouri S&T's entry into the 2013 U.S. Department of Energy Solar Decathlon.

Wermager analyzed the [solar house](#)'s design efficiency using Energy-10 software, which provides feedback on energy performance and helps identify optimum approaches to energy efficiency. For this comparison, she created a fictional American couple and estimated their energy-use habits, which she entered into the program.

Energy-10 projected a 71 percent energy savings by adding energy conserving strategies like energy efficient appliances, lights and HVAC

system; low emissivity windows; insulation; proper HVAC controls; duct leakage; and a solar domestic hot water heater. Wermager found that when photovoltaic (PV) arrays (linked solar panels) were also installed, the energy generated could surpass the energy consumed.

"Often 'going green' is seen as an expensive, cumbersome process," says Wermager. "Yet, this research clearly shows that embracing green technologies such as a solar PV system can be not only beneficial for the environment, but also financially advantageous to the homeowner."

Wermager says that the Energy-10 results, along with a solar-estimator calculator available from Solar-Estimate.org that helps determine the financial feasibility of installing renewable energy systems, will help homeowners and designers to see beyond the high initial costs.

More information: Wermager, S.; Baur, S. Energy Analysis of a Student-Designed Solar House. *Energies* 2013, 6, 6373-6390. [DOI: 10.3390/en6126373](https://doi.org/10.3390/en6126373)

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