EPIC PROJECTS
ENERGY INNOVATION

CALIFORNIA ENERGY COMMISSION

Comparing Attic Approaches for Zero Net Energy Homes

The Issue

As homes approach zero net energy (ZNE), the energy impacts of some emerging construction strategies need investigation to determine their energy impacts. One strategy is to seal and insulate the attic that contains the home's thermal distribution system. However there are questions regarding the level of air sealing and insulation needed, the impact on attic humidity and potential for attic or roof damage, and the overall impact on annual building energy use.

Project Innovation + Advantages

The project performed field measurements of attic and HVAC system performance in two new high performance homes in California with sealed and insulated attics. One home was built to be about 30 percent better than Title 24 and the other was a ZNE home. The attics were insulated with a new lower-cost approach using glass fiber batt insulation. The results of the field tests showed that in the dry sunny Fresno and Clovis locations that there were no problems with moisture in the test attics and that the sealed and insulated attic construction technique made the attic spaces be very close to indoor conditions thereby reducing the duct system losses – as intended. Simulations showed that addressing moisture concerns in less amenable climates can be addressed by deliberately adding conditioned supply air, using a vapor retarder on the inner surface of the insulation or adding insulation to the exterior of the roof deck. These results will be used to inform future California building energy code requirements.

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Project Location: Fresno, CA & Clovis, CA
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Project Status: COMPLETE

Energy and Cost Saving Attic Approaches for Homes

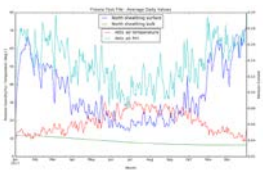
BENEFITS

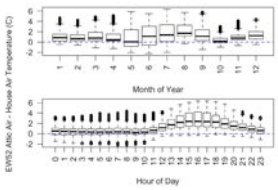
The development of lower-cost approaches to building air sealed and insulated attics will allow this approach to be used in more homes. This building construction technology is an important step towards higher performance homes because it brings the HVAC system inside the conditioned space, thereby saving about 15-20% (state-wide average) of the annual heating and cooling energy in new construction and about 30% in existing homes. In addition, comfort is also increased because homes take less time to meet indoor temperature setpoints and distribution of heating and cooling in the home is improved.

Lower Costs: The technologies and construction techniques could result in significant reduction in heating and cooling energy use. At full deployment, the annual electricity energy savings are estimated to be $245,500,000, and gas savings would be $321,000,000.

Greater Reliability: The energy and demand savings could result in summer peak reductions which cause less stress on the state's electrical grid system.

Environment Benefits: The energy savings translate directly into reductions in greenhouse gas emissions.





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