



National Solar Tour
October 2, 2010

Energy Solutions **TOUR** magazine



www.HeartlandRenewable.org

Published by ^{Kansas City} Eco. Connect



2x4 - 2x2 Wall insulation system



Greenhouse mass wall collects sun's energy

Brewer Residence

- Passive solar • Earth Contact
- Super insulated with 2x4, 2x2 wall system and extremely low air infiltration
- Thermal storage in mass wall and tile floor for solar heat storage
- Due to low energy requirements, baseboard electric heat and window unit AC heat and cool home
- Air-to-Air heat exchanger for fresh air

The Brewer Residence is a passive solar super insulated home designed and built in the early 1980's by Craig Wolfe Solar Design & Construction. Craig Wolfe is the current President of the Heartland Renewable Energy Society. "The 80's started out as an exciting decade that ended in disappointment," says Wolfe. "We thought that this new energy ship was never going to sink, but the Reagan administration pulled the plug on all energy incentives. We would be in a completely different energy world today if the priorities of the early 80's had remained in place."

Wolfe's The Energy 1 Concept Home referred to a priority in building and not to any particular model. The concept relied on a thorough understanding of passive solar principles as well as a complete knowledge of the true nature of heat loss in today's homes. The exceptional energy performance of The Energy 1 Concept Homes always resulted from revolutionary energy conserving construction techniques and often used simple heating and cooling strategies rather than the more expensive HVAC systems.

The Performance

Because the home's heating requirements were so low, the Brewer Residence used four small localized electric baseboard units and one window AC unit for backup heat and summer cooling, drastically reducing the cost of the HVAC equipment. The Brewer Residence was cloned after the Staggs Residence, which was used as a test case by KCP&L. In this test, the Staggs were required to not use their wood burning equipment. The total electric heating bill for the time period between December 1, 1981 and March 1, 1982 was \$110. It should be noted that the cost of heat delivered from electric baseboard resistance heat is more than twice that of natural gas. This means that the total auxiliary heating requirement for the record-breaking severe weather between December 1, 1981 and March 1, 1982 is equivalent to only \$51 of natural gas!

The Approach

In simplest terms, there are three elements in a passive solar home. They are the home's shell, the glazing, and its thermal mass or heat storage.

The Shell >> The home's shell is responsible for its thermal protection. By using the approach referred to as "super insulation", the Energy 1 Concept Home has greatly minimized its energy losses. Super insulation, of course, implies a substantial insulation package. But even more important is the "Super infiltration" package that attacks the movement of air through cracks in the home's walls and ceilings. This was accomplished by the use of true "double wall construction" using an outer 2 x 4 wall and an inner 2 x 2 wall with a 6 mil polyethylene vapor barrier sandwiched between the two. Both walls were filled with fiberglass batts with one inch of rigid Thermax insulation on the outside of the outer 2 x 4 wall. Since all wiring and plumbing is located in the inner wall, the vapor barrier is never penetrated. This vapor barrier



is continuous, enveloping the entire house from the foundation to, and including, the ceilings. Every seam of the poly was caulked with butyl caulk.

The Glazing >> The second element of a passive solar home is its glazing system through which the Sun's rays enter the structure. What sets the Energy 1 Concept Home apart from other solar homes was the standard use of Window Quilt insulation on all glass surfaces. The effect is threefold. First, the Window Quilt insulation system has a major impact in reducing conduction losses on winter nights and cloudy days. Second, it is equally effective in reducing conduction losses and in blocking unwanted direct and reflected sunlight on hot summer days. Third, in winter our bodies will experience greater comfort in the room with Window Quilt insulated glass when compared with the room without insulated glass, even though equal temperatures are maintained in both rooms. Simply put, our bodies give off radiant heat which will literally be "sucked" away by the uninsulated glass. The elimination of east and west glass and the use of properly designed overhangs on south glass add to the Energy 1 Concept Home's excellent summer performance.

Thermal Mass >> The thermal mass is responsible for the storing of the Sun's energy. It can be brick, concrete, stone, tile, adobe, or even water in containers. Without thermal mass, even on a cold sunny winter day, a passive solar home would overheat and would also require more auxiliary heat at night. Thus, thermal mass acts as a heat sponge, absorbing excess solar heat during the day and releasing its radiant heat at night as temperatures decline. Since the Energy 1 Concept Home surrounds our bodies in this radiant heat, we will be able to feel comfortable at lower room air temperatures which would cause discomfort in the home without adequate thermal mass. In the Brewer Residence there are over fifty tons of mass in the brick and concrete slab floors, the 16-inch thick concrete mass wall, and the perimeter mass walls exposed to the living spaces. We will also be able to utilize this thermal mass in the summer by cooling it with cool night air and storing this "coolth" for use during the day.

Earth Contact.

The Brewer Residence also takes advantage of its earth contact design. Heat which passes through the insulated earth contact walls creates a warm cushion of earth around the home, while heat which passes through above grade walls is immediately lost to the winds. The "lag time" associated with earth contact is of further benefit since ground temperatures at a depth of 8 feet don't reach their coldest until April and don't reach their warmest until October.

Air-To-Air Heat Exchanger.

Because the Energy 1 Concept Home is so extremely airtight, the air-to-air heat exchanger is used to bring in fresh air. In a "normal" home we get plenty of cold fresh air in the form of infiltration. The air-to-air heat exchanger controls the amount of fresh air and preheats it with the warm stale air it is exhausting. ■



Since 1978.

STITT
ENERGY SYSTEMS, INC.

Call or visit us today
913-636-7374
stittenergy.com

There is simply no better choice for designing, building or remodeling your energy efficient home.



SIERRA CLUB
FOUNDED 1892

We are fighting for a clean, renewable, and sustainable energy future.

Join the Sierra Club.

You can make a difference.

You are the only one who can.

Your Grassroots Environmental Organization...

Protecting and Enjoying this Remarkable Planet

www.kansas.sierraclub.org



Distribution

We will be distributing at the following locations.

*Add your energy behind ours.
Make a difference.*

Architects • Audubon
Bridging The Gap Events
Builders and Remodelers
Colleges • Discovery Center
Earth Fairs • Farmers Markets
Green Churches • Green Drinks
Habitat ReStore • Home Shows
HRES Business Members and Advertisers
Kansas City Regional Association of Realtors
Metropolitan Energy Center
Mid-America Regional Council
Sierra Club • Sustainable Sanctuary
Trade Shows
US Green Building Council



KC Green Team
eco realtors

Free Energy Audits
Market Homes Creative & Green
Full Service Realtor
Steward of the Environment
Green Home Consultant & Speaker



Franny Knight, Eco Broker International
c 816-686-7499
greenfranny@kcgreenteam.com
www.kcgreenteam.com



KELLER WILLIAMS
REALTY

Energy Solutions RESOURCEGUIDE

Energy Efficiency Construction/Installation

Awnings by Hass Inc
913-499-1896 • awningsbyhaas.com

Home Performance Services LLC
816-746-0002 • hps-kc.com

Habitat Restore KCMO
816-231-6889 • restorekc.org

Metzler Remodeling
816-561-1453 • mmcikc.com

Stitt Energy Systems
913-636-7374 • StittEnergy.com

Straw Bale Association of Nebraska
402-483-5135 • strawhomes.com

Tech Power Systems
816-756-2555 • tech-powersystems.com

Heartland Habitat Restore KCK
913-342-3047 • heartlandhabitat.org

Lyon Construction & Design LLC
913-236-5966 • lyonbuilt.com

The Hayes Company
816-444-6352 • thehayesco.com

House of Rocks
913-432-5990 • thehouseofrocks.com

Green Cat Services LLC
816-206-2191 • greencatservices.com

Insul-Cat - Owens Corning
816-673-9364 • insul-cat.com

CE3 Solutions
816-807-4104 • CE3Solutions.com

Sunlite Science & Technology Inc.
785-832-8818 • sunlitest.com

Pro Energy Consultants
913-660-0700 • proenergyconsultants.com

Lorimer Energy
913-710-0265 • NA

Butterfly Energy Works
314-961.8418
butterflyenergyworks.com

Energy Efficiency & Training

Metropolitan Energy Center
816-531-7283 • kcenergy.org

Hathmore Technologies LLC
816-224-5550 • hathmore.com

Energy Technology
913-371-8800 • eetck.com

Bridging The Gap
816-561-1087 • BridgingTheGap.org

Sierra Club - Kanza Group
913-299-4474 • kansas.sierraclub.org

Sierra Club - Thomas Hart Benton Group
816-517-5244 • missouri.sierraclub.org

HUEE c/o Rob Buell
816-325-7494 • huee.org

Energy Information

General Environmental Info

Burroughs Audubon
816-333-3293 • burroughs.org

Greenability Magazine
816-931-3646
greenabilitymagazine.com

Discovery Center
816-587-0431
mdc.mo.gov/areas/kcmetro/discovery/

Greenability Magazine
816-931-3646
greenabilitymagazine.com

Discovery Center
816-587-0431
mdc.mo.gov/areas/kcmetro/discovery/

Solar & Wind Construction/Installation

The Energy Savings Store
913-495-9434 • theenergysavingsstore.com

Microgrid Energy
314-265-6143 • microgrid-energy.com

Solar Construction/Installation

Cromwell Environmental
785-749-6020 • PowerTomorrow.com

Decent Energy Inc.
Solar Construction / Installation
913-440-0744 • decentenergy.com

Missouri Solar Living LLC
314-218-2663 • missourisolarliving.com

Solar Training Construction/Installation

Show Me Solar
314-324-5250 • showmesolar.org