Energy Conservation in the Home

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

SECO FACT SHEET **NO. 9**

HIGHLIGHTS

- **Heating and cooling are the biggest portion of your energy bill**
- **Insulation and high performance windows save energy and money**
- **Air leaks waste energy**
- **Overhangs are effective solar load reducers**
- **Choose high efficiency appliances**
- **Venting the attic saves cooling energy**

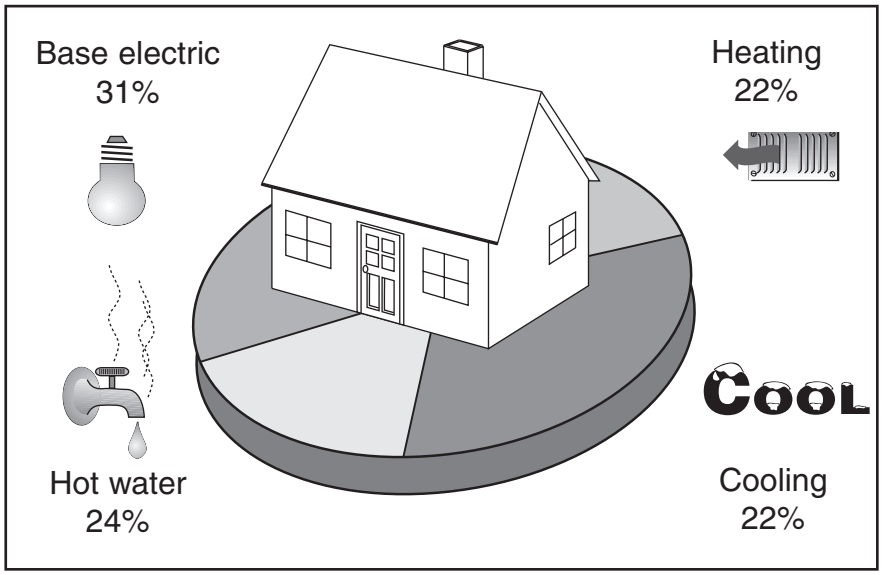

Fig. 1. *Energy Distribution in Typical Texas Home: 45% for heating and cooling, 24% for heating water, 31% for base electric use (fridge 10%, cooking 5%, clothes dryer 5%, other 11%)*

SUMMARY

Heating and cooling a home in Texas accounts for about 45% of all annual energy expense (See Fig. 1). Saving energy is far easier and often cheaper than producing it. Install energy efficient appliances, high performance windows, seal openings and add the proper insulation.

INSULATION

Whether it is made of fiberglass, shredded newspapers or foam, insulation is one of the best investments a homeowner can make. By installing proper insulation – at least R-30 in the ceilings, R-13 in the walls and R-11 in the floor – homeowners can reduce the transfer of hot or cool air from inside the home to the outside. Insulation is most easily installed when a home is being built. For existing homes, the easiest and most effective place to add extra insulation is in the attic. If your home has less than 3 inches of insulation in the attic, extra fiberglass batts can be laid on top of the existing insulation or additional material can be blown into the attic. (See Table 1 for specific R-values in different Texas climate zones.) Don't forget to put insulation around the attic ducts and hot water pipes. This will save heating and cooling energy in the ducts and could help prevent pipes from freezing and bursting in the winter.

SEALING

Whether the season is winter or summer, air leaks waste energy and can account for nearly half of all heating and cooling costs. Outside air can enter the home wherever different materials meet, such as the junction between the door and the door jamb. Fortunately, sealing air

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OPTIMUM INSULATION VALUES FOR NEW HOMES	
Location	**Walls / Ceilings**
Dallas and Fort Worth	R13 / R38
Amarillo	R13 / R38
San Antonio	R11 / R30
Corpus Christi	R11 / R30
Brownsville	R11 / R30

Table 1. *Optimum insulation values for new homes based on climatic factors*

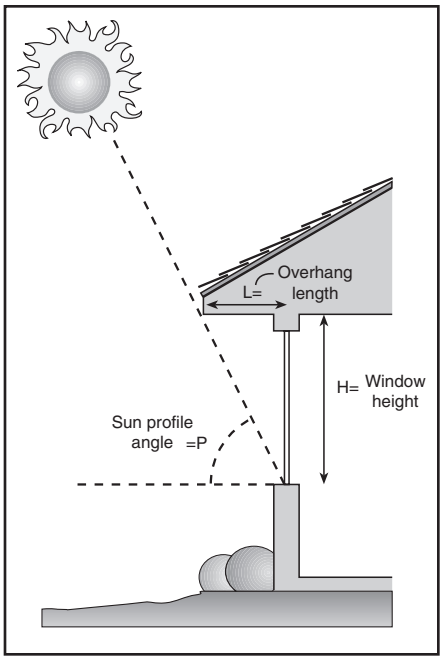

Fig. 2. *Sun profile angle used to size overhang*

leaks is an easy and inexpensive task that requires little or no special equipment. Caulk is one of the cheapest and most effective materials for saving energy and should be applied around every window and door frame. Seal all electrical and plumbing connections that enter the home and fill any gaps in electrical outlets with foam insulation. Your duct system is a potential network of leaks. Insulating and sealing ducts can be one of the most cost-effective means to save energy.

WINDOWS, RADIANT BARRIERS AND SOLAR SHADING

Preventing the hot summer sun from entering the home during the summer isn't easy. But by installing high performance windows, radiant barriers and solar shades, homeowners can reduce the amount of sun-generated heat that enters the home.

Approximately 40% of the unwanted heat that enters your home comes in through your windows. In recent years, low-E coatings and glazing materials have greatly improved window performance and reduced solar heat gain. Select high performance windows for your home that have been certified by the National Fenestration Rating Council (NFRC) and have an ENERGY STAR label. If your home has single-pane windows consider replacing them with double pane glass. In climates with both heating and cooling seasons, select windows with both low U-values and low solar heat gain coefficiency (SHGC). The larger your heating bill, the more important is the U-value. In mostly cooling climates, the SHGC becomes more critical as it allows sunlight to enter but reduces heat gain.

A radiant barrier is a layer of metallic foil usually applied to the underside of the roof. When installed correctly, a radiant barrier can reduce heat gains through your ceiling up to 25%.

On south-facing walls, properly designed roof overhangs are an effective means to keep out sun in the summer while admitting it in the winter. (See Fig. 2) On east and west walls, solar screens are more effective, blocking up to 70 percent of the sunlight that would otherwise go into a building.

ENERGY EFFICIENT APPLIANCES

Appliances, particularly refrigerators, consume a great deal of energy over their lifetimes. By selecting the most

efficient air conditioners, refrigerators, washing machines, lights and other appliances, homeowners can dramatically reduce their energy costs. Of course, higher efficiency appliances are initially more expensive than less efficient models, but they can quickly pay for themselves. Remember refrigerators last 15 to 20 years, air conditioners about 10 to 12 years, so you will pay to operate the appliance every month for the next 10 to 20 years.

When you consider that heating and cooling often account for 45 percent of the average homeowner's annual utility bill, an investment in high efficiency equipment may be the best move a homeowner can take. (See Table 2 for reference values.) Other investments in things like compact fluorescent light bulbs, which use a fraction of the electricity required by incandescent bulbs while providing the same amount of light, reduce energy consumption. Achieve further energy savings without losses in comfort by using a programmable thermostat to reduce your heating or cooling loads at night and when you are away. Finally, install ceiling fans. A ceiling fan makes you feel cooler, and its effect is equivalent to lowering the temperature by about 4 degrees F. Just be sure to turn them off when you're not in the room.

ANNUAL SAVINGS RESULTING FROM INCREASED ENERGY EFFICIENCY RATIOS
($/ton of air conditioning*)

EER		Savings for (¢/kwh)		
From	To	7¢	8¢	9¢
6	7	$40	$46	$51
7	8	$30	$34	$39
8	9	$23	$26	$30
9	10	$19	$22	$24
10	11	$15	$17	$20
11	12	$13	$15	$16
12	13	$11	$12	$14
13	14	$9	$11	$12
14	15	$8	$9	$10
15	16	$7	$8	$9

* 1 ton = 12,000 Btu per hour.
Note: The values are based on 2000 hours of cooling per season, which would be typical of the Corpus Shristi climate. To calculate the approximate annual savings in your area multiply the values by the multiplier for the city nearest your location. Multipliers for several Texas cities are: Amarillo 0.3, Brownsville 1.1, Dallas 0.8, El Paso 0.5, Houston 0.8, San Angelo 0.7, and San Antonio 0.8. This chart is based on an analysis of cooling patterns in Texas climate areas done by Larry O. Degelman, professor, Department of Architecture, Texas A&M University.
Savings in this table are cumulative. For example, to derive the savings when upgrading from an EER of 7 to an EER of 10 (and the electric rate is 8¢ per kilowatt-hour), you would add $34 + $26 + $22, for a total of $82 per ton. If this were for a 5-ton air conditioner in San Angelo, you would then multiply $82 x 5 tons x 0.7. The result would be overall annual savings of $287.

Table 2. *Annual savings from more efficient air conditioners*

ATTIC VENTILATION

Texas attics need to have effective summer ventilation to reduce heat gains and to avoid moisture build-up. The most effective attic ventilation occurs when air is allowed to enter under the soffits and exit at or near the ridge. Consider continuous ridge and soffit vents (see Fig. 3), large gable vents, or power ventilators for hip roofs.

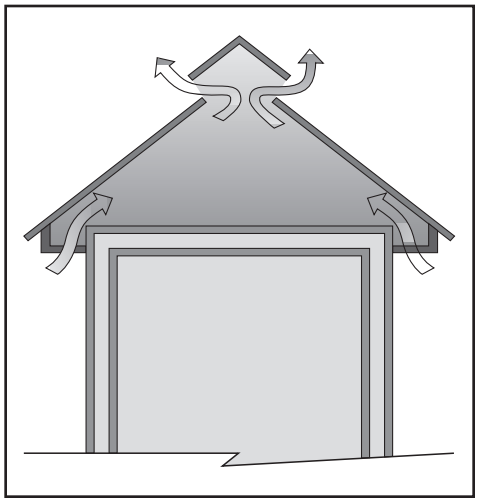

Fig. 3. *Continuous ridge and soffit vents*

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ORGANIZATIONS

Alliance to Save Energy
1200 18th Street N.W. Suite 900
Washington DC 20036
(202) 857-0666
www.ase.org

Energy Center
University of Texas at El Paso
P. O. Box Box 645
El Paso, Texas 79968
(888) 879-2887
energycenter.utep.edu

National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO. 80401
(303) 275-3000
www.nrel.gov

Passive Solar Industries Council
1511 K Street, Suite 600
Washington, DC 20005
(202) 628-7400
www.sbicouncil.org

Texas Solar Energy Society
P. O. Box 1447
Austin, TX 78767-1447
(512) 326-3391
e-mail: info@txses.org
www.txses.org

Texas Renewable Energy Industries Association
P. O. Box 16469
Austin, TX 78761
(512) 345-5446
www.treia.org

RESOURCES

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ON THE WORLD WIDE WEB:

The US Department of Energy's Building America, a program to reduce energy consumption in new homes by 50%.
www.eren.doe.gov
www.eren.doe.gov/buildings/building_america

Efficient windows Web site:
www.efficientwindows.org

ENERGY STAR Program
www.energystar.gov

BOOKS:

Energy Efficient Building Association Builder's Guide: Hot and Humid Climates. Joseph Lstiburek and Betsy Pettit, Building Science Corporation, 2000.

The New Natural House Book. David Pearson, Simon & Schuster, 1998

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

STATE ENERGY CONSERVATION OFFICE
111 EAST 17TH STREET, ROOM 1114
AUSTIN, TEXAS 78774
PH. 800.531.5441 ext 31796
www.InfinitePower.org