5-8-84 500 Copies

L-1763

Decorating for Energy Efficiency

Pat Bradshaw Seaman*

The decreasing supply and increasing cost of fuel to heat and cool the house, heat water, light the house and operate other support systems is affecting home environments. To increase energy efficiency, consider:

- Adequate Attic Ventilation
- Careful Maintenance of Heating and Cooling Systems
- Caulking and Weatherstripping
- Efficient Heating and Cooling Systems
- Efficient Water-Heating Systems
- Exterior Protection of Glass Areas
- House Design and Orientation
- Insulation of Walls, Ceilings and Floors
- Moisture Control
- Seasonal Thermostat Adjustment
- Window Location, Design and Placement

Certain decorating practices and home furnishings also will help decrease energy consumption while increasing comfort and personal satisfaction. Consider energy efficiency when planning color selection, floors, wall and ceiling coverings, window treatments, furniture selection and arrangement, lighting and accessories.

There are two key factors to consider when decorating for energy efficiency. One is the reduction of heat gain in the summer and heat loss in the winter. The other is R value, the term used to indicate the resistance something has to heat moving through it. The higher the R value, the more resistance the item has. Both factors should influence home decorating decisions.

*Area Extension housing and home furnishings specialist, The Texas A&M University System.

Color Selection

Color is a psychological force and can be one of the most useful tools in decorating for energy efficiency. Some colors create a feeling of warmth and others create a feeling of coolness. Cool colors include purple, blue purple, blue, blue green and green. Warm colors include yellow green, yellow, yellow orange, orange, red orange, red and red purple.

Colors are warm or cool, depending on how dyes are mixed. For example, green can be "cooled" by adding blue or "warmed" by adding yellow. The value or lightness and darkness of a color also affects its "temperature." A light red is not as warm looking as a dark red, and dark blue may seem warmer than a lighter blue.

Texture also affects color temperatures. A tightly woven fabric with little texture reflects more light and appears lighter than a fabric with a pile or a looser weave. Highly textured fabric absorbs light and appears darker. Shiny surfaces reflect light while rough textures absorb light.

Light colors seem to recede and dark colors advance; therefore, light walls, floors, ceilings and other furnishings create a feeling of lightness and more space while darker surroundings create a feeling of warmth and coziness.

Color also affects scale, proportion, pattern, line, rhythm, balance and other colors. Color is an important consideration when selecting woods, walls, floors, furniture coverings or accessories. To improve energy efficiency, follow these energy-conscious color suggestions:

1. Consider how and when the area is to be used.

Texas Agricultural Extension Service • The Texas A&M University System • Daniel C. Pfannstiel, Director • College Station, Texas

2. Remember that large expanses of dark colors may require more artificial illumination. Light colors require less.
3. Ceilings should always be a light color.
4. Use warm colors during cold weather and for darker and colder north-facing areas.
5. Use cool colors during warm weather and for lighter and warmer east- and west-facing areas.

Floor Coverings

Fiber floor coverings help insulate and visually warm or cool specific areas. The coverings can be wall-to-wall, room-size or area rug installations. Fiber and style are important selection factors, but insulative value is more directly related to the covering's thickness and pile density.

Pile construction determines the insulating potential of the carpet. Air spaces around and within fibers help reduce movement of heat to cold. Carpet padding also increases the insulative value of carpet, as well as its comfort and wearability. The more air spaces between the fibers, rubber or plastic, the better the insulative benefits. A recent study reported that carpet combined with carpet padding reduces heat loss through a concrete slab by as much as 72 percent and 54 percent through an uninsulated wood floor over a crawl space.

Floor coverings also affect the psychological atmosphere of a room. Area rugs can be used to visually pull together a furniture grouping. The rug's color makes the grouping appear warm and cozy, or cool, light and airy. Texture also creates a feeling of warmth or coolness.

For areas that need to be visually and physically cooler, such as sun porches, a glossy, cool, light-colored paint can be used. Other floor coverings, such as tiles and sheet vinyl, also create a cool effect. A room-size or area rug can be used to warm the area during cold weather.

Floor covering selection depends on the type of floors, climate, personal preference, area use and energy efficiency considerations. Some floor covering R values to consider include:

Hardwood finish flooring — 25/32 inches	R - 0.68
Asphalt, linoleum, vinyl or rubber floor tile	R - 0.05
Carpet and fibrous pad	R - 2.08
Carpet and foam rubber pad	R - 1.23

Wall and Ceiling Coverings

Coverings selected for interior walls and ceilings can increase the R value and decrease infiltration, the movement of unwanted outside air into the house through cracks, holes and other openings.

Wood board paneling and shingles can increase the R value of walls. Soft wood has an approximate R value of 1.25 per inch. Soft wood board, ¾-inch thick, has an R value of 0.94. Soft wood paneling, ¾-inch thick added to ½-inch or ⅝-inch gypsum board, increases the R value to 1.39 and 1.50 respectively.

Cork paneling with an R value of 1.68 to 2.56 on gypsum board also increases the R value. Carpet and other woven coverings like tapestries are also effective wall coverings. Vinyl wall coverings help reduce air infiltration. Fabric over fiber filling material adds insulative protection.

Shiny surfaces such as mirrors can be used to increase light and to reflect attractive scenes. These shiny surfaces do not accept radiant heat, thus keeping heat at its source. In addition, shiny surfaces suggest coolness.

Glass Area Treatments

Since glass is a poor insulator, glass areas in homes should not exceed the equivalent of 8 to 10 percent of the home's floor space. Glass areas in many older houses may equal as much as 15 to 30 percent of the floor space. For example, a 2,000-square-foot house should have no more than 200-square-foot of wall space in glass, which would be approximately 11 3-foot by 6-foot windows.

Glass areas should be designed to:

1. Utilize solar heat gain in the fall and spring (between peak heating and cooling seasons).
2. Reduce solar heat gain during hot days.
3. Retain interior heat during cold, overcast days and on cold nights.
4. Permit illumination when needed.

Interior mounted shades and blinds reduce solar heat gain. The amount of reduction depends on the type used. For example:

White Opaque Roller Shade	50%
White Translucent Roller Shade	44%
Venetian Blinds (Closed)	29%
Venetian Blinds (45° Slats)	18%

Insulating window shades made of vinyl and fiberglass are also available.

Shades should be mounted inside the window frame to block heat from the room's interior, since too much heat causes the air conditioning to operate excessively. Interior mounted shades also prevent warm air at the ceiling from moving cold air at the window into the room. Such movement causes the heating equipment to operate excessively.

Draperies also reduce solar heat gain. They are most effective if they have a white (or light colored) or reflective backing, which can reduce heat gain by approximately 33 percent.

A separate lining also improves the insulating ability of draperies. Air trapped between the drapery and the lining helps control the movement of heat to cold, and linings provide an additional barrier to the sun's rays in the summer. However, some separate linings are more effective than others. For example, insulative value increases when plain weave linings are thermal coated, and acetate fibers have better insulative value than polyester fibers in plain weave livings. Insulative linings are also available in: (1) plastic or vinyl, which may be either clear or opaque and serve mainly as a barrier to air and moisture; (2) fabric coated with vinyl; (3) silver-backed fabric, which is particularly valuable in reflecting the sun's rays as well as serving as a barrier to air and moisture; and (4) a foam-backed fabric that has the added benefit of increased thermal performance and acoustical insulation. Linings can be purchased from major home furnishings sources.

Certain drapery fibers also can increase insulative value. Fibers are thread-like filaments, which are twisted together to form yarn for weaving or knitting. Natural fibers that are soft and bulky, like cotton, linen and wool, provide the dead air spaces needed for good insulation. Some man-made fibers such as acetate and rayon have fiber shapes, which also create dead air spaces. Natural and man-made fibers can be blended to improve appearance and use.

Tightly woven fabrics insulate better than loosely woven fabrics. Those fabrics woven with a pile (yarns that stand up from flat-lying warp and filling) contain more dead air spaces with which to insulate. Velvet is an example of a pile fabric.

Draperies with insulative or foam backing are also energy efficient. An acrylic fiber drapery with a foam backing compares favorably with a drapery and separate lining combination.

Draperies should fit tightly at the center, sides and bottom of the glass to prevent air leakage. Loose draperies can be sealed by attaching them to side walls with tape, tacks, staples or flexible fabric fasteners. The center can be sealed with the flexible fabric fasteners.

A closed-top cornice or lambrequin can be used to trap window air and to prevent it from moving into the room or draperies can be installed at the ceiling and hang to the window sill, apron or floor. Figure 1 shows how a cornice and tightly-closed draperies help insulate.

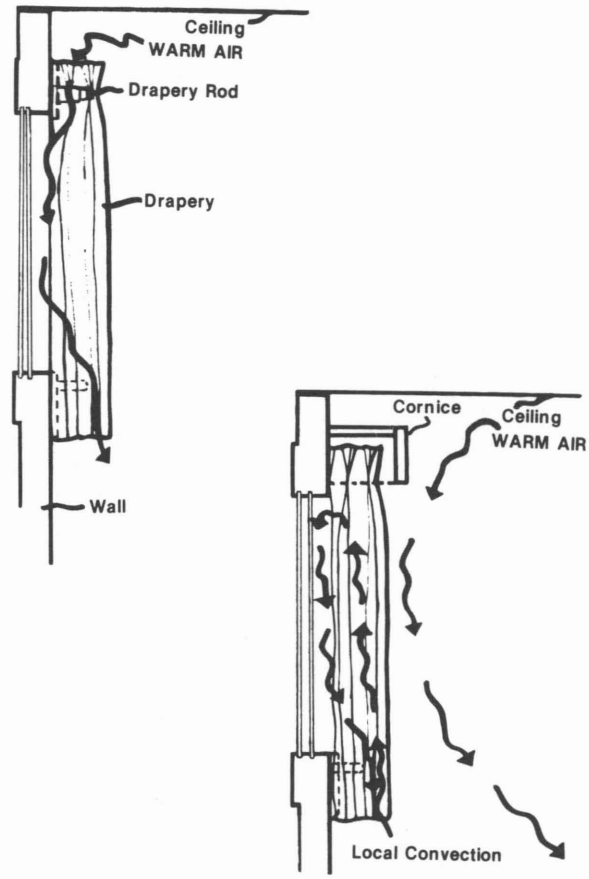

Figure 1

The R values for different glass treatments provide a basis for comparing insulative ability.

Type	R Value
Single glass, bare	0.89
Double glass, bare	1.81
Storm window, 1- to 4-inch air space	1.78 to 1.85
Double glass, loose drapery	1.90
Double glass, loose drapery to floor with closed top cornice	2.03
Double glass, tightly draped window with closed top cornice	2.35

Furniture Selection and Arrangement

Furniture selection is related to energy efficiency. Consider the difference in appearance of a room furnished with white wicker and light, cool-colored upholstery and one furnished in darkly stained woods and dark, warm-colored, highly-textured upholstery.

Furniture which is light in scale gives an airy, cool feeling while heavy-scaled, dark furniture gives a warm look. Large, heavy pieces such as wingback chairs reduce air movement around the occupant, which protects from cold winter drafts, but prevents the circulation of cooled summer air. Highly textured fabrics feel warmer than slick, smooth fabrics.

Furniture arrangement depends primarily on room activities and traffic patterns, but it should never block or cover thermostats, air outlets or return air openings. Also, furniture should not increase interior space partitioning. Walls, furniture, free-standing shelves, room dividers, fabric hangings and cabinets all interfere with air circulation. This interference creates uneven heating and cooling which strains the equipment. Arrange for as much open space as possible.

Storage units and bookshelves can be placed against outside walls to add insulative protection. When planning a new home or remodeling, consider placing cabinetry, closets and seldom-used spaces on exterior walls.

Seating pieces can be grouped for warmth and protection from drafts during the cold season. During the warm season, they can be spaced to allow for air movement.

Beds with canopies and curtains provide needed warmth when thermostats are set back. Comforters and quilts can take the place of electric blankets.

Lighting

Lighting should be located where needed for work, study, safety and beauty. Fixtures and bulbs should be appropriate for the area to be lighted. Regular maintenance and careful operation improve energy efficiency.

By concentrating light where it is needed, energy consumption can be reduced. When general lighting is needed, dimmer switches can be used to reduce light and save energy. Switches at every room entry and exit encourage turning off general lighting when no one is in the area.

Light bulbs are rated in lumens (light output) and watts (the rate of electricity consumption). Many bulbs are rated with an average life figure in hours. The efficiency of a bulb is the number of lumens or amount of light used per watt.

When higher illumination is needed, consider using one high wattage incandescent bulb rather than several low wattage bulbs. One 100-watt bulb provides the same or more lumens of light than two 60-watt bulbs. However, two 60-watt bulbs will use 20 watts more than one 100-watt bulb.

Three-way bulbs can be used at the highest setting for reading and working and at the lowest setting for energy conservation. Long-life bulbs give off less light per watt than standard bulbs and are not energy efficient. Never use a higher watt bulb than specified for a fixture. Increased wattage may cause the fixture to overheat and shorten bulb life. Also, fill empty sockets with burned out bulbs as a safety precaution.

Fluorescent lights are three to five times more efficient than incandescent bulbs and last seven to twelve times longer. They produce three to four times more light than incandescent bulbs and generate less heat, which can reduce air conditioning costs. Fluorescent lighting can be used in every area of the home. New fluorescent lights that fit incandescent fixtures are available. As a result, lamps and other fixtures can be changed to fluorescent.

Fluorescent bulbs are available in daylight, cool-white, deluxe cool-white and warm-white lamps. A combination of bulbs will mix well with incandescent lamps without either kind drawing attention to the other or producing unpleasant effects.

When decorating for energy efficiency, remember that lighting is affected by colors and textures around it. Light colors and shiny, smooth textures will reflect the light while darker, dull, rough textures will absorb the light. Lighting can be maximized by locating table, floor and hanging lamps where the light will reflect off two walls. Light-colored ceilings also maximize lighting.

There are some quick, easy ways to make home lighting more efficient. All fixtures and bulbs should be kept clean. Turn lights on only when and where they are needed. Use lamp shades with white or light-colored liners which are sufficiently dense to hide the bulb but still transmit soft, even light. Dark shades absorb much of the light, thus reducing efficiency. Use decorative lighting only on special occasions.

Accessories

One important accessory during both the cooling and heating seasons is the ceiling fan. Old ones and reproductions are now available at many retail stores.

During heating months, the fan can circulate warm air which gathers near the ceiling. During the cooling season, the fan circulates the colder air which settles near the floor. The blades of some fans can be set at different angles, depending on whether the warmer ceiling air needs to be pushed down or the cooler floor air needs to be pulled up. Other fans have reversing motors.

Fans do use some energy to operate. However, the movement of air, particularly during the cooling season, will increase comfort when the thermostat is set at 78 degrees or higher.

Another energy-efficient accessory is glass fireplace doors which prevent heated air from escaping up the chimney. During the cooling season, they also prevent warm air from coming into the house around a loosely fitting damper. Glass doors are available in a variety of frame finishes and designs and are made with attached fire screens.

Summary

Many decorating and design features can be used to increase interior energy efficiency. It may not be economical to change some of these features to meet different needs of the heating and cooling seasons.

To increase energy efficiency, consider these low-cost decorating ideas:

1. Furniture slipcovers in light, cool-colored fabrics are used in the cooling season or in darker, warmer-colored fabrics for the heating season.
2. Accessories such as paintings, flowers, plants and pillows can be changed with the season.
3. Wood occasional tables can be covered with round plywood tops and floor-length, cool-looking fabric for the cooling season.
4. Area rugs can be put down or taken up, depending on their color, texture, location and the season.
5. Arrange furniture to meet seasonal needs.
6. Temporarily cover dark walls with light, cool-looking fabric for the cooling season or cover light walls with warmer-looking fabric for the heating season. Temporary application can be made with staples, tacks or double-stick carpet or masking tape.
7. Use supplemental heat sources such as free-standing wood stoves when wood is an inexpensive fuel source.

When designing home interiors, consider all the decorating factors that can be used to decrease energy consumption while increasing personal comfort and personal satisfaction.

References

"Advantages of Carpets and Rugs in Energy." Carpet and Rug Institute, Dalton, Georgia, in cooperation with the Engineering Experiment Station and School of Textile Development Company, Inc.: Cambridge, Massachusetts, June 1977.

Allphin, Willard. *Lamps and Lighting*. Sylvania Electric Products, Inc.: Salem, Massachusetts, 1965.

Birdsong, Craig. "Energy Conserving Window Treatments-Draperies." Colorado State University Extension Service: Fort Collins, Colorado, April 1978.

Dix, Rollin C. and Lavan Zalman. "Window Shades and Energy Conservation." Illinois Institute of Technology: Chicago, Illinois, December 1974.

"Energy Conservation — Windows." Federal Energy Administration in cooperation with the National Bureau of Standards, FEA/D-76/142: Washington, D.C., March 1976.

Faulkner, Ray and Sarah Faulkner. *Inside Today's Home*. Holt, Rinehart and Winston, Inc.: United States of America, July 1963.

Insulation Manual — Homes, Apartments. National Association of Home Builders Research Foundation, Inc.: Rockville, Maryland, 1971.

Pizzuto, Joseph. *Fabric Science*. Revised by Arthur Paice and Allen C. Cohen, Fairchild Publications, Inc.: New York, New York, 1974.

Sivers, Cora R. and Lillian O. Lund. "The Back Side Makes A Difference." Reprint, *South Dakota Farm & Home Research*, Vol. XXVII, No. 1, March 1977.

Cooperative Extension Work in Agriculture and Home Economics, The Texas A&M University System and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.
7,500 — 4-79, New H&HF 1