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GREEN BUILDING: Home sunlight can affect energy bills, health

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Not only can having enough light in your home reduce your energy bills, but it may also affect your health. Studies have shown that under natural light there is less human fatigue, stress and better visual acuity and production.

Energy performance ratings of windows, doors and skylights tell their potential for gaining and losing heat, as well as transmitting sunlight into the home. Windows and skylights can be great at gaining and retaining heat or can be a great drafty energy drain.

Heat gain and loss

Windows, doors and skylights can gain and lose heat in the following ways:

- Direct conduction through the glass or glazing, frame and/or door.
- The radiation of heat into a house (typically from the sun) and out of a house from room-temperature objects, such as people, furniture and interior walls.
- Air leakage through and around them.

These properties can be measured and rated according to the following energy performance characteristics:

U-factor, which is the rate at which a window, door or skylight conducts nonsolar heat flow. It's usually shown in units of Btu/hr-ft²-°F. For windows, skylights and glass doors, a U-factor may refer to just the glass or glazing alone. The lower the U-factor, the more energy-efficient the window, door, or skylight.

Solar heat gain coefficient (SHGC). A fraction of solar radiation admitted through a window, door or skylight is either transmitted directly and/or absorbed, and is subsequently released as heat inside a home. The lower the SHGC, the less solar heat it transmits and the greater its shading ability. A product with a high SHGC rating is more effective at collecting solar heat gain during the winter. A product with a low SHGC rating is more effective at reducing cooling loads during the summer by blocking heat gained from the sun. Therefore, what SHGC you need for a window, door or skylight should be determined by varying factors of your climate, orientation and external shading.

Low-E. Low-emissivity (Low-E) coatings on glazing or glass control heat transfer through windows with insulated glazing. Windows manufactured with Low-E coatings typically cost about 10 percent to 15 percent more than regular windows, but they reduce energy loss by as much as 30 percent to 50 percent. A Low-E coating is a microscopically thin, virtually invisible, metal or metallic oxide layer deposited directly on the surface of one or more of the panes of glass. The Low-E coating reduces the infrared radiation from a warm pane of glass to a cooler pane, thereby lowering the U-factor of the window. Different types of Low-E coatings

have been designed to allow for high solar gain, moderate solar gain or low solar gain.

To keep the sun's heat out of the house (for hot climates, east- and west-facing windows and unshaded south-facing windows), the Low-E coating should be applied to the outside pane of glass. If the windows are designed to provide heat energy in the winter and keep heat inside the house (typical of cold climates), the Low-E coating should be applied to the inside pane of glass.

Window manufacturers apply Low-E coatings in either soft or hard coats. Soft Low-E coatings degrade when exposed to air and moisture, are easily damaged and have a limited shelf life. Therefore, manufacturers carefully apply them in insulated multiple-pane windows. Hard Low-E coatings, on the other hand, are more durable and can be used in add-on (retrofit) applications. The energy performance of hard-coat, Low-E films is slightly poorer than that of soft-coat films.

Although Low-E coatings are usually applied during manufacturing, some are available for do-it-yourselfers. These films are inexpensive compared to total window replacements, last 10 to 15 years without peeling, save energy, reduce fabric fading and increase comfort.

Window films improve comfort by controlling heat, fade, glare and privacy problems related to residential windows without blocking the view, in addition to improving window performance. Window films are safe for use with many types of standard, clear residential windows including single-pane, dual-pane and removable storm panes. On average, window films will last 10 years depending on climate, film type, window coverage and exposure. Consumer-friendly product construction makes do-it-yourself application easy. In fact, the average window can be filmed in 30 minutes or less.

Check with your local window manufacturer or retailer for costs.

This is the opinion of Sara Emerick, intern with the Western North Carolina Green Building Council. Call 232-5080 or e-mail info@wncgbc.org.

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