

used when it is scarce or expensive. Night flushing and photovoltaic-powered cooling are two ways to take advantage of this.

Mass can also delay and reduce peak cooling loads. For example, a west wall in Florida gets brutal sun on a summer afternoon. A high-mass wall will absorb that heat and delay its transfer indoors until the evening, when electricity is cheaper. If nights are cool, those peaks will be reduced as well as delayed.

Mass as insulation

Promoters of envelope thermal mass as insulation have fought an uphill battle. Their efforts to assign R-values or correction factors to mass have been largely unsuccessful. Their main problem is that the effects of thermal mass depend on too many factors, such as its location in the wall (inside the insulation is generally considered best) and the climate.

In general, mass in exterior walls only helps when outside temperatures swing daily above and below the comfort zone. It has the biggest effect where the swing is great and equally balanced above and below the house's setpoint. High, arid areas in the Southwest are a good example: days are hot and sunny; nights are clear and cold.

Under these conditions, mass can reduce the overall load, theoretically to zero if daytime gains equal night losses, and if the mass is thick enough to produce a half-day lag.

In very mild climates, or in swing seasons, this effect also works. But although percentage savings may be great in these periods, overall savings will be small since there's not much energy to save.

During periods when the temperature is always too high or too low, however, envelope mass has no demonstrated effect on heating or cooling loads.

For more information

Simplified guidelines for sizing thermal mass appear in the *Thermal Mass Pattern Book*, by Total Environmental Action, bound in to the April 1981 issue of *Solar Age*. Neither book nor issue is still in print.

Passive Solar Heating Analysis by Balcomb, et. al., 1984, has an especially good chapter on thermal mass. It is available from ASHRAE Publications, 1791 Tullie Circle, NE, Atlanta, Ga. 30329. The price is \$30 for members, \$60 for non-members.
