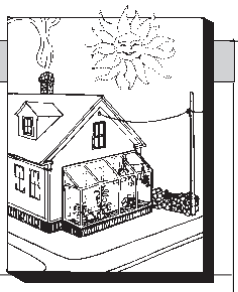
Site Planning for Saving Energy

by Alex Wilson



Take a close look at a house built in Colonial times. Chances are, it incorporates energy-conserving features in its orientation, plantings, and other site characteristics.

Our ancestors knew that by properly situating a house and protecting it from cold winter winds, they would have to cut and split less firewood. That kind of forethought makes just as much sense today.

This column will review the three most important energy considerations in site planning: slope, orientation, and plantings. Following simple guidelines usually costs very little but provides greater comfort and lower energy bills for the home buyer. And for you, that means satisfied customers and favorable leads.

Slope

Look for building sites with south- or southeast-facing slopes. A 10 percent slope receives as much sunlight as a level site *six degrees farther* south in latitude-—the difference between Boston and Raleigh, N.C. This effectively means a two-week-earlier spring. A 20 percent south slope brings spring three weeks earlier.

A north slope, on the other hand, will be colder, with shorter day length and a delayed spring. General characteristics of different slopes are shown in Table 1.

Also, make sure you grade away from the house on all sides for drainage. A grade of at least one-half inch per foot, for six feet out from all sides of the house, is recommended.

Orientation

If possible, orient houses so that more windows face south—up to about 7 percent of the floor area in a well-insulated house. (Beyond that, a house will begin to overheat unless thermal mass is added.) Shifting a window to a south wall from any other wall will save energy during both winter and summer. In winter, south-facing windows provide more passive-solar gain than those facing other directions. This heat gain will significantly offset daytime heating requirements.

In the summer, south-facing windows transmit less sunlight than most other windows, and therefore contribute less to the cooling load (see Table 2). On June 21, the summer solstice, only north-facing windows transmit less sunlight, and the difference is very small.

Try to avoid large areas of north- and west-facing windows. North windows are the biggest energy losers in the winter, while those on the west contribute most to overheating during the summer. East-facing windows are not as bad in the summer because air temperatures are cooler in the morning when sunlight penetrates them.

Of course, energy cannot solely determine where you put windows. You need to take into account views, noise levels (windows transmit more sound than walls), and the overall house design and appearance.

Table 1. *Relative Desirability of Different Slopes*

Slope	Desirability	Characteristics
South or southeast slope	Most desirable	• Warm winter • Early spring • Late fall
East slope	Acceptable	• Warm winter mornings • Cool summer evenings
West slope	Undesirable	• Hottest summer
North slope	Least desirable	• Coldest winter • Shortest day length

Plantings

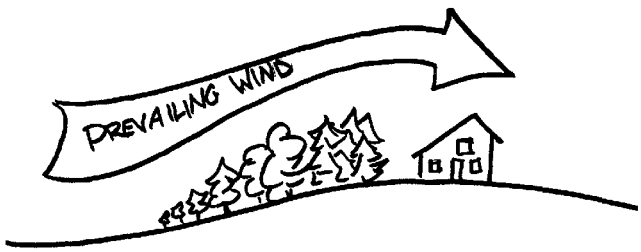
Plantings around a house, in addition to looking nice, have several energy benefits: shade, evaporative cooling, and protection from the wind. If the prevailing winter winds are predictable—as they are in much of the Northeast—trees and shrubs can be a big help in reducing heat loss and increasing comfort.

Most of our winter winds, especially during the coldest weather, are from the west or northwest, so plant (or leave) a windbreak to the north and west of the house. Avoid a wall of trees; rather, have a gradual layering of lower bushes and trees upwind, with taller trees closer to the house. This will channel the wind up and over the house.

Trees can also play an important role in shading a house from unwanted summer sun. As you can see from Table 2, shade is most important on the west and east sides of a house—not the south. This works out well: sunlight on the south is most welcome in the winter, so you don't want to block it.

Plant a fairly dense barrier of trees to the west of the house and a somewhat less dense barrier on the east (again, overheating is not as big a problem on the east side).

On the south, either have no shade trees or plant just a few close to the house. The ideal on the south is tall trees with few lower branches. These allow most of the desirable winter sun to enter the house, but shade out the high summer sun. (Black locust, for example, is a good choice.) Unfortunately, shade trees on the south will do more harm than good until they are quite tall and most branches are above the house's eaves. Even with the leaves off, the branches block out a lot of the desirable winter sunlight.



A gradual layering of plantings, with the tallest toward the house, will channel the wind over the building.

Table 2. *Solar Heat Gain Through Vertical Double Glazing at 40° North Latitude at Various Orientations (Figures in Btu/ft²/day on clear days)*

Month	N	NE	E	SE	S	SW	W	NW
JAN 21	101	109	455	915	1273	915	455	109
FEB 21	141	192	643	1025	1280	1025	643	192
MAR 21	192	348	830	1054	1055	1054	830	348
APR 21	261	560	969	984	702	984	969	560
MAY 21	348	711	1027	886	503	886	1027	711
JUN 21	406	779	1046	836	450	836	1046	779
JUL 21	361	712	1011	866	495	866	1011	712
AUG 21	278	561	941	946	676	946	941	561
SEP 21	201	341	787	1001	1009	1001	787	341
OCT 21	146	194	618	979	1222	979	618	194
NOV 21	103	111	447	895	1243	895	447	111
DEC 21	85	88	376	843	1202	843	376	88

One large tree can get rid of as much heat as five 10,000-Btu air conditioners.

Finally, the lawn and other plantings right around the house will contribute to summer cooling. Like evaporative coolers, plants cool the surrounding air by evaporation of moisture. One large tree can get rid of as much heat as five 10,000-Btu air conditioners. A lawn generally feels cool to the touch, even on the hottest summer day, while the bare ground does not. In landscape design, keep concrete patios, paved driveways, and gravel walks to a minimum in areas to be used in the summer.

Conclusions

Proper site design relative to energy is largely a matter of common sense. If you understand how the sun moves through the sky and how the seasons vary, you can incorporate features into your site planning to reduce energy consumption. This is passive-solar design at its simplest.

Builders would do well to take a lesson from our ancestors and benefit from a well-planned building site. ■

Alex Wilson is a technical writer based in Brattleboro, Vt.