half-dozen presentations starting with site feasibility (by Rick Schwalsky, who writes the Building It Right column for *Solar Age* magazine), and continuing through to pipe insulation. There was also a discussion on how to build integral collectors while the house is going up.

Business sessions were generally well attended. Experienced solar businesspeople, marketing experts and financial and investment professionals spoke on topics like how to market solar hot-water systems, how to help your customers finance them, and how to decide what to charge. There were lots of questions from the floor during these sessions. Those attending the conference seemed to feel a greater need for advice on money matters than on technical ones.

There were only two sessions on design, testing and performance. This was engineer's talk—the kind of stuff solar conferences used to be full of. It made my eyes glaze over then, and it makes my eyes glaze over now. One of the most attractive things about the solar field is that it's been liberated from the engineers. The trend toward simplicity and the increasing sophistication of non-engineers have pushed the academically technical approach off center stage. It's not redundant by a long shot, but it's no longer dominant. Thank goodness for that.

The conference was a success. It was well focused, and was scheduled so that no more than two sessions were in progress at one time. The enthusiasm of those who attended was evident during question-and-answer periods and during breaks. People got their money's worth, and NESEA fulfilled its function, providing solid basic information and a forum for exchanging ideas. —*Mark Alvarez*

Microclimate and design

Most solar designers understand that a house intended for Phoenix, Ariz., can't be the same as one in Detroit, Mich., because of obvious climatic differences. Yet they often fail to consider the wide variations in microclimate that may occur within a relatively small area.

In a one-year study in Ohio, the 0.6-sq. km. Neotoma Valley was monitored, and the data compared to statistics from major weather stations covering an area of 113,000 sq. km. across the state. The table below illustrates how variable a local climate can be.

Climatic Factor	At 109 Neotoma Valley stations	At 88 stations across Ohio
Highest temp.	75 to 113°F	91 to 102°F
January low	+14 to −26°F	−6 to −20°F
Last spring frost	3/9 to 5/24	4/11 to 5/11
First fall frost	9/25 to 11/29	9/25 to 10/28
Frost-free days	124 to 276	138 to 197

Radiation balance—Radiation is usually the most important determinant of the microclimate. Both solar radiation and the heat radiated back to the night air are very important. The radiation balance of a particular site will be determined by the sun's path (a function of latitude), the topography (slope aspect and elevation), the landscape and the color and type of the land surface. An east-facing slope will warm rapidly in the morning and then cool off in the afternoon, while a west-facing slope will be warmest in the afternoon and early evening. In fact, the west-facing slope will generally be the warmest part of the site since radiation increases as air temperature rises.

As a rule you can displace the site in latitude by the angle of its north or south slope. For example, a south-facing 10° slope at 40°N latitude would have a solar potential similar to that of a flat site at 30°N latitude. Conversely, a north-facing 10° slope at 40°N latitude would have a microclimate similar to that of a flat site at 50°N latitude.

At high elevations, the thinner atmosphere lets more heat in and out. The net effect is a cooling of between 3°F to 4°F per thousand feet. The key factors in blocking outgoing radiation are water vapor and dew, which store heat. Cold, dry nights and hot, dry days in the desert are the result of an atmosphere with very little moisture blocking.

Plants can intercept almost all the sun's energy before it reaches the ground, keeping the soil relatively cool all summer. Even leafless deciduous trees may block 40% to 70% of the sun's energy in winter, thereby increasing the chance of frozen ground. Vegetation also blocks outgoing radiation.

The color and nature of the earth's surface determine solar absorption and reflection. Some values are included below:

Surface type	Sunlight reflected (%)	Sunlight absorbed (%)
Fresh snow	75 – 95	5 – 25
Old snow	40 – 70	30 – 60
Sandy soil	15 – 70	30 – 85
Meadows, fields	12 – 30	70 – 88
Woods	5 – 20	80 – 95
Dark soil	7 – 10	90 – 93
Water	3 – 10	90 – 97

Temperature—The interrelationship of solar gain and loss, topography and wind—and their effects on temperature—are complex. The orientation of slopes influences local wind patterns, which in turn help determine temperature. Winds driven by convective currents during the day help to cool valley slopes. At night, dense colder air settles to the valley floor.

Landscaping also affects temperature. Trees shade the ground and also absorb energy for photosynthesis and transpire large quantities of water vapor. Temperature differences of 10°F or more may occur between areas with and without trees.

The reflectivity of the surface determines how much radiation is absorbed. But the type of surface and its moisture content determine what the effect of heat radiation will be. A walk around town after sunset illustrates this clearly. The parking lots and west-facing walls of concrete buildings have stored much of the sun's energy and will re-radiate it for several hours, but the west walls of wood-frame buildings are soon cool. Buildings with ivy-covered west walls will remain cooler inside, thanks to the plants.

Water, which absorbs and stores solar
liation well, helps to stabilize the
rounding microclimate. The leeward side
a lake is always milder than the windward
e. This influence is minor for small bodies
water, and even for Lake Michigan the
°F temperature reduction extends inland
s than a mile. But cool ocean breezes
ıch far inland during the summer.

nd—Topography is a major factor in
termining wind patterns in a microclimate.
house on a hillcrest is exposed to cooling
ezes in the summer, but also to winter
es. If a strong northwest wind blows across
ur region in winter, then building your
use in a northeast-southwest valley is a
od idea. Similarly, if a cooling sea breeze
proaches from the southwest, then a site
hind a northwest-southeast ridge will be
ıch more difficult to keep cool.
Landscaping can also play an important
e by channeling cooling breezes through
e house in summer, or blocking cold winter
nds. Both goals can often be achieved
cause winter and summer winds usually
proach from different directions. Such a
ıdscape plan should include fairly solid
ciduous hedges or fence rows to channel
mmer breezes through the house without
ɔcking the winter sun. For wind control,
wever, use a thicker but more porous
elter belt of evergreen trees and shrubs.
The development of a local climate profile
gins with a study of existing climatological
ta. In the United States, The National
imatic Center (Federal Building, Asheville,
C. 28801) publishes the *Climatic Atlas of*
e U.S. ($6) and *Climatology of the U.S.*
25). In Canada, contact the National
search Council (Publications Section,
ilding M-58, Ottawa, Ont. K1A 0R6) for
imatic Information for Building Design in
ınada ($7.30). The books listed below are
so helpful. As most of them are out of print,
ırd to get or expensive ($20 and up), your
st bet is to track them down at the
rary. —*David Bainbridge*

Further reading

ıe Climate Near the Ground by R. Geiger (Harvard University Press, 1965). For the determined. Poorly organized, but still the best book on the subject.

esign with Climate by V. Olgyay (Princeton University Press, 1963). The original. Lacks information on passive solar, but useful.

ı Introduction to Physical Micrometeorology by F.A. Brooks (University of California Press, 1959). A nice introduction.

icroclimate: The Biological Environment by N. Rosenburg (John Wiley, 1974). A fine introduction to microclimate and its effect on crop production.

ıysical Climatology by P. Sellers (University of Chicago Press, 1965). An excellent overview.

ınset Western Garden Book (Lane Publishing Co., 1973). A helpful guide to plant/climate relationships in the Western U.S.

atching for the Wind by J. Edinger (Doubleday-Anchor, 1967). One of the shortest and most readable books on climate study.