

FIGURE 2.1

Blackbody radiation spectra for temperatures of 3000, 5000, and 5800 K.

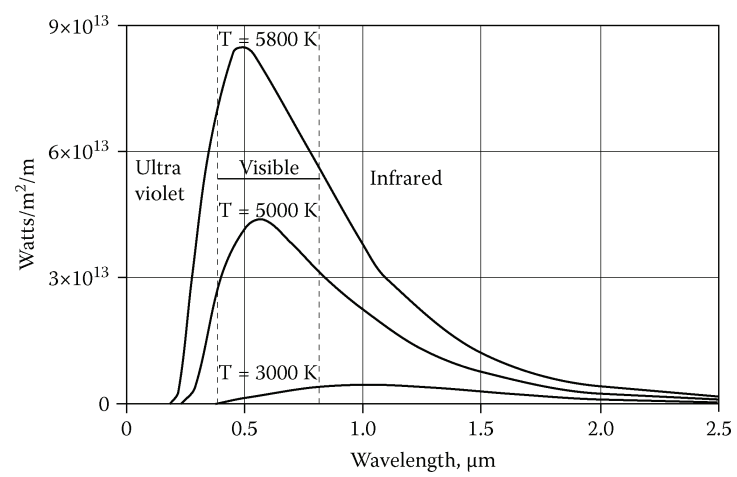


FIGURE 2.2

AM 1 solar spectrum after atmospheric absorption effects, including plots of extraterrestrial blackbody spectrum plus cumulative incident energy versus wavelength.

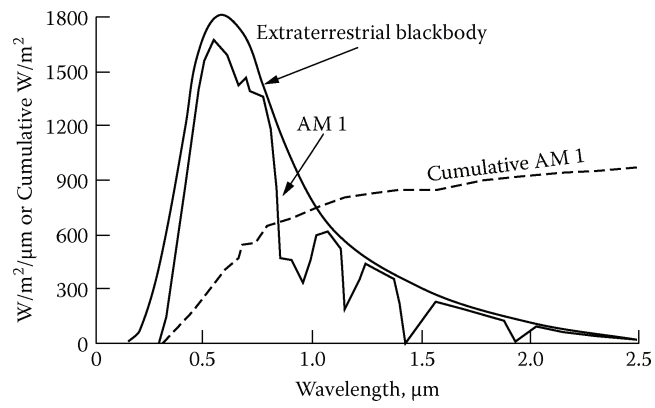


FIGURE 2.3

Determination of peak sun hours (irradiation) through integration of irradiance.

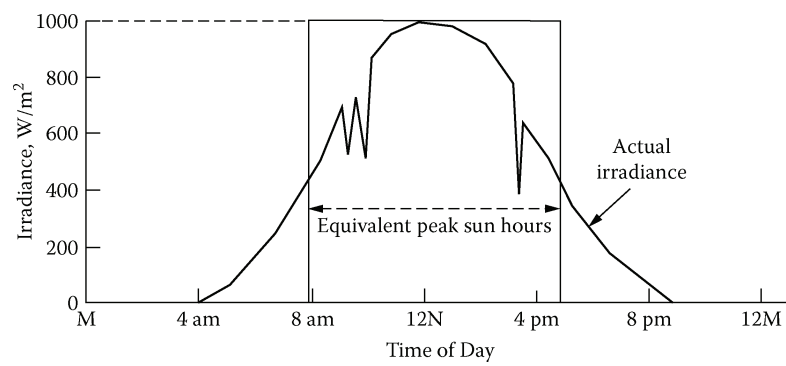


FIGURE 2.4

The orbit of the earth and the declination at different times of the year.

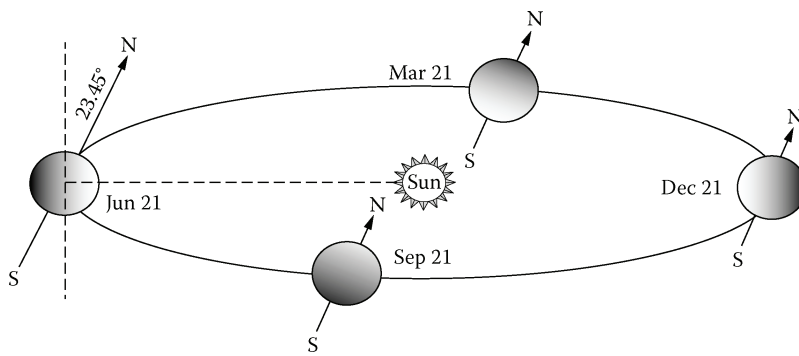


FIGURE 2.5

Daily variation of solar noon versus clock time in Boca Raton, Florida.

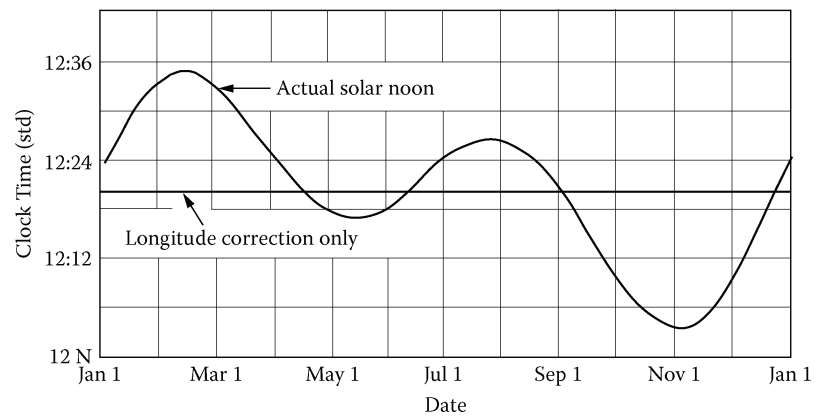


FIGURE 2.6

Sun angles, showing altitude, azimuth, and hour angle.

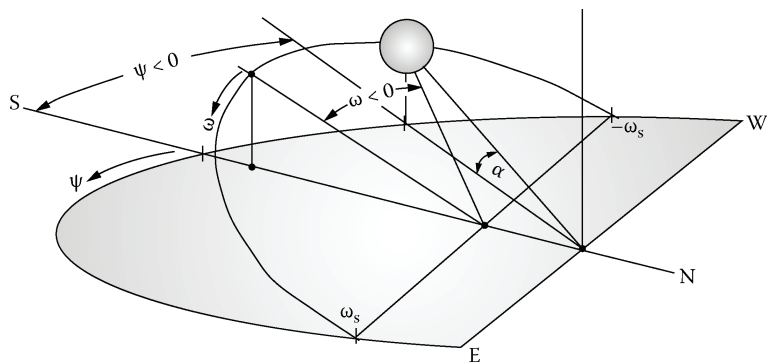


FIGURE 2.7

Relationships among zenith angle, latitude, and declination at solar noon in winter and summer.

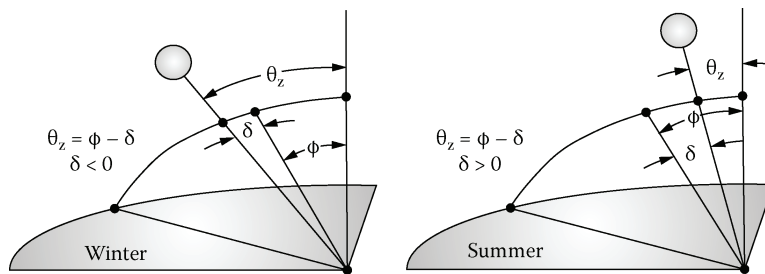


FIGURE 2.8

Plot of solar altitude versus azimuth for different months of the year at a latitude of 30° N.

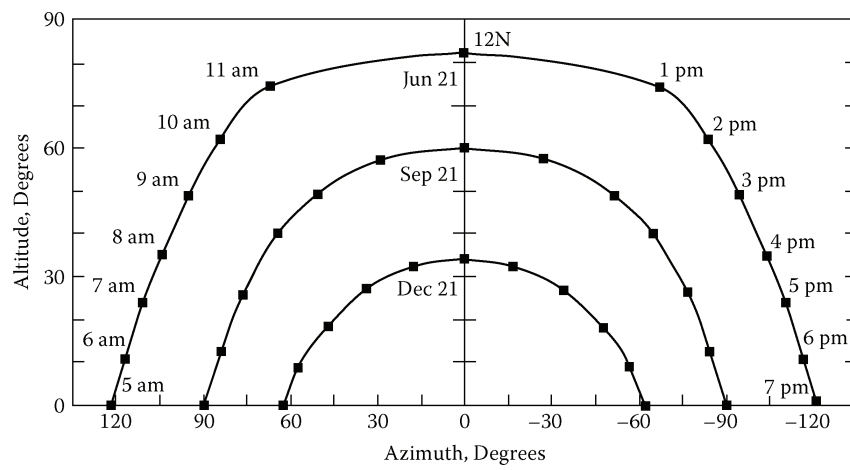


FIGURE 2.9a

Worldwide average daily irradiation (kWh/m^2) for summer. (Courtesy National Renewable Energy Laboratory, 30-Year Average of Monthly Solar Radiation, 1961–1990, Spreadsheet Portable Data Files. http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/sum2/)

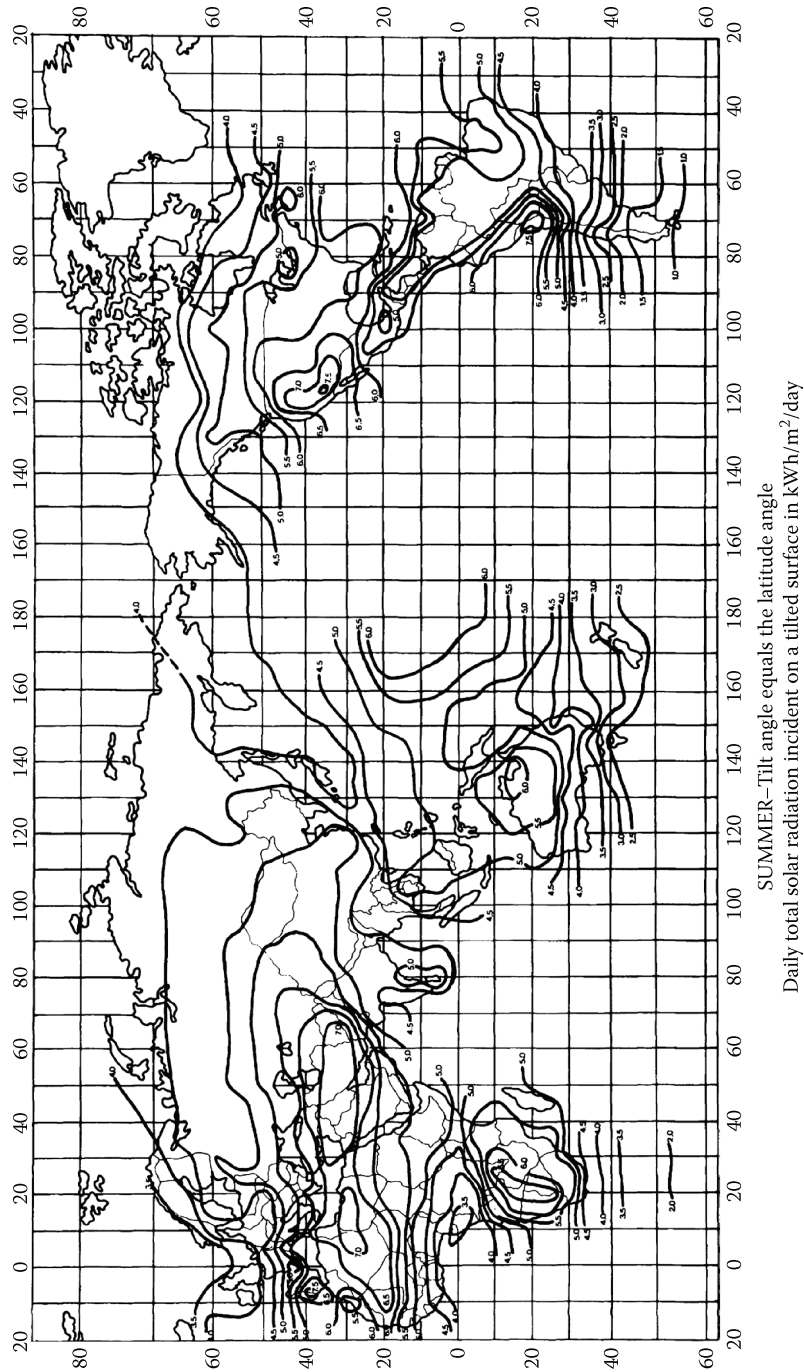


FIGURE 2.9b

Worldwide average daily irradiation (kWh/m^2) for winter. (Courtesy National Renewable Energy Laboratory, 30-Year Average of Monthly Solar Radiation, 1961–1990, Spreadsheet Portable Data Files. http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/sum2/)

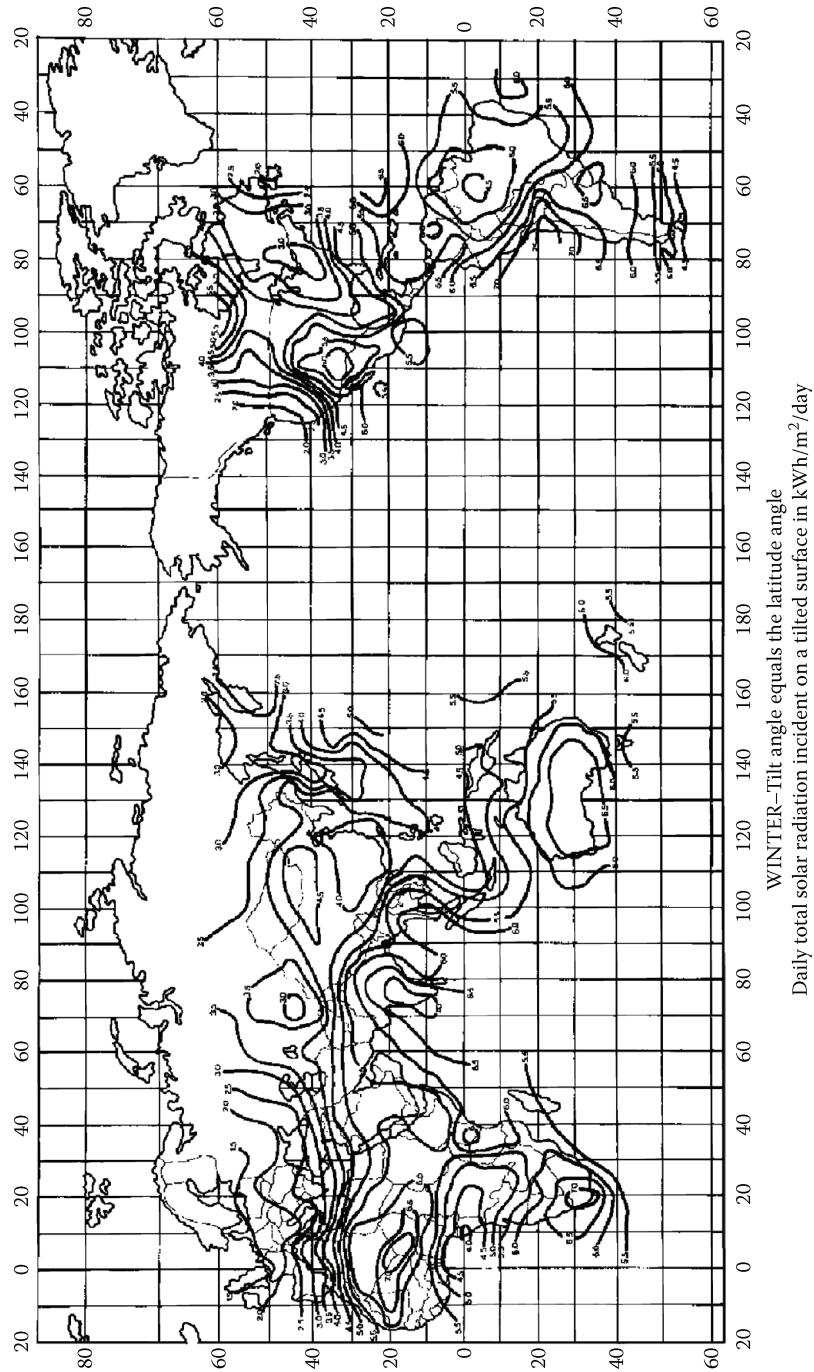


FIGURE 2.10

Two-dimensional illustration of effect of collector tilt on effective area presented to beam component of radiation.

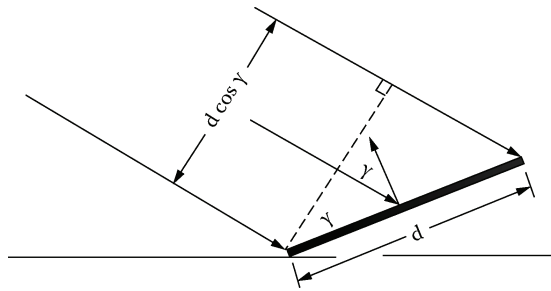


FIGURE 2.11

Cumulative daily irradiation received by fixed and tracking collectors for different seasons: direct beam contribution only.

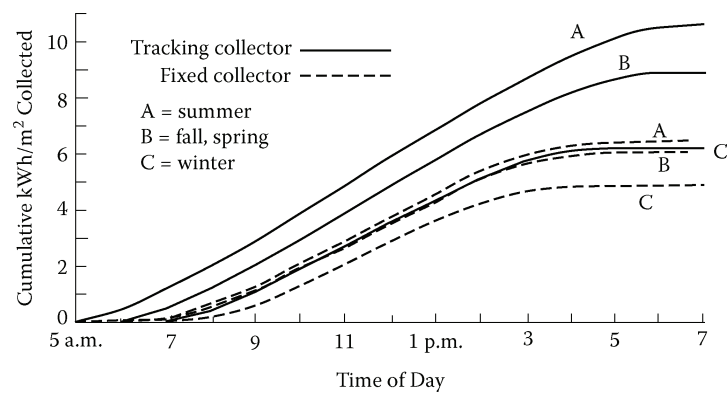


FIGURE 2.12

Optimizing the mounting angle of a fixed collector.

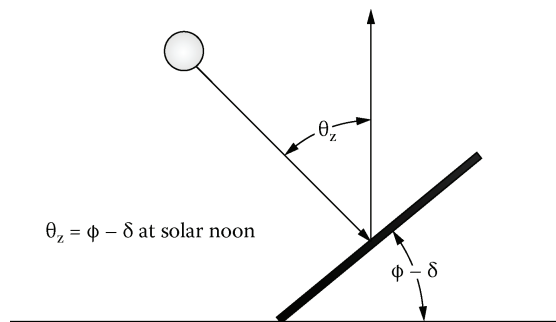


FIGURE 2.13

Monthly collector performance as a function of collector tilt angle.

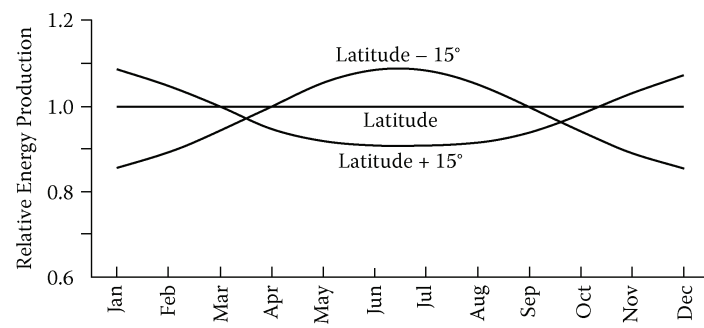


FIGURE 2.14

Solar Pathfinder showing region of shading. Shading occurs at points above the white line on the pattern. (Florida Solar Energy Center Photo.)

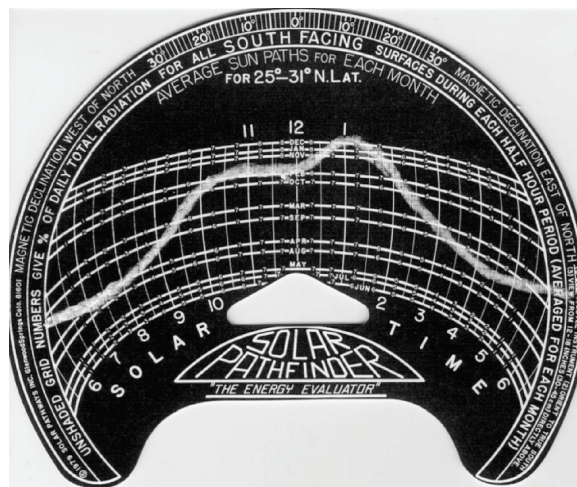


FIGURE 2.15

Determining the spacing between rows of PV modules.

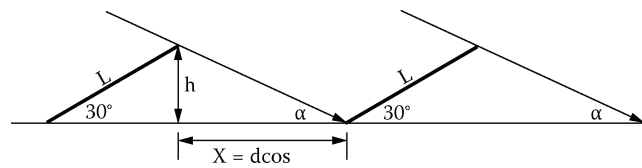


FIGURE 2.16

Comparison of power and energy output for south-facing and west-facing PV systems in Sacramento, California, in summer. The south-facing system produced 22,417 Wh and the west-facing system produced 22,192 Wh. (Courtesy of Collier, Photovoltaics in the Sacramento Municipal Utility District, Interconnecting Small Photovoltaic Systems to Florida's Utility Grid, A Technical Workshop for Florida's Utilities, Cocoa, FL, October 22, 1998.)

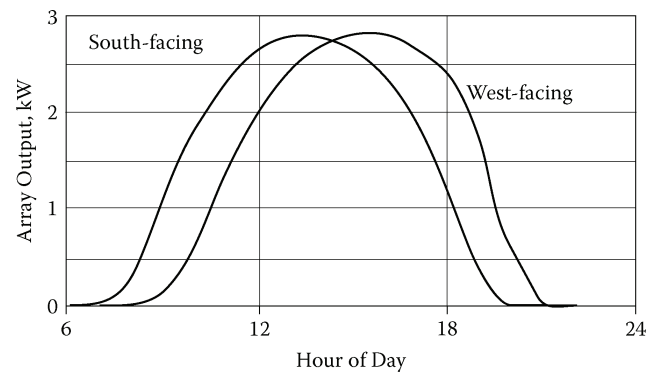


FIGURE P2.1

Rows of rack-mounted modules.

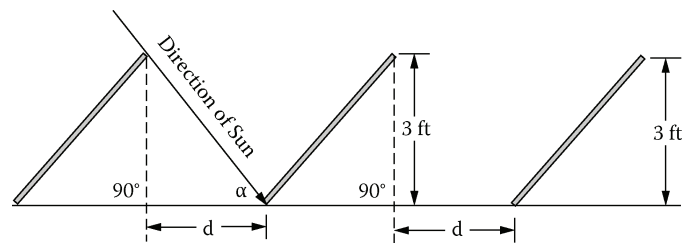


FIGURE P2.2

Rows of rack-mounted modules on a sloped roof.

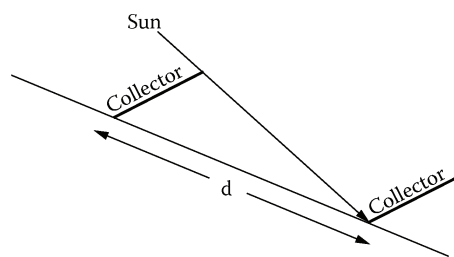


FIGURE P2.3

Roof layout for Problem 2.22.

