SOLAR ENERGY INTERACTION AND TRANSFORMATION

Janki A Vyas

Solar energy emitted by the sun is measured in three ways, which are related as follows:

Global Horizontal Irradiance (GHI)	=	Direct Normal Irradiance (DNI)	+	Diffuse Horizontal Irradiance (DIF)	x	cos (z) [solar zenith angle]

GLOBAL HORIZONTAL IRRADIANCE

As indicated by the equation above, GHI is a measure of the total amount of total shortwave radiation (UV, visible and solar infrared) that penetrates the earth's atmoshphere. Since it is a measure of the amount of radiation normal to a horizontal surface on the earths surface It is measured on a surface horizontal to the ground.

DIRECT NORMAL IRRADIANCE

DNI is the component of solar radiation that reaches the earth surface without passing through atmospheric interferences like clouds, fog, etc. As the name suggests, it is typically represented as a straight line from the sun based on its position in the sky.

DIFFUSE HORIZONTAL IRRADIANCE

DIF represents the component of solar radiation that passes through atmospheric interferences which then causes it to be scattered as it reaches the earth's surface. As the name suggests, this is the diffused light quality we see on an overcast or cloudy day.

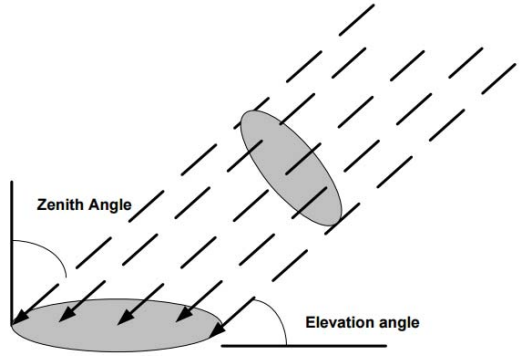
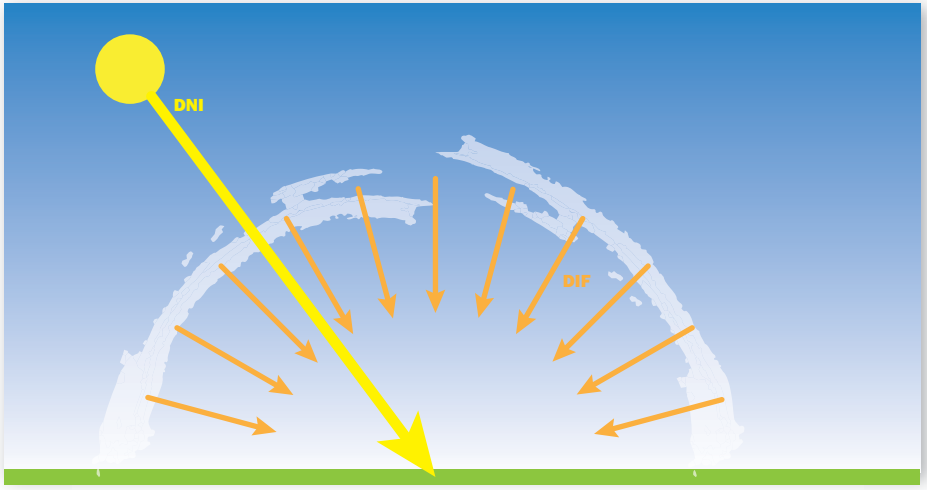


Figure 1Definition of zenith and elevation angles and the projection of area normal to incident rays on a flat surface.



Sources

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