

# **GHI CORRELATIONS WITH DHI AND DNI AND THE EFFECTS OF CLOUDINESS ON ONE-MINUTE DATA**

Frank Vignola

## **ABSTRACT**

The relationships between global, diffuse, and direct normal irradiance (GHI, DHI, and DNI respectively) have been the subject of numerous papers, and average correlations between the diffuse fraction and beam and the clearness index have been determined. This study examines the relationship by separating the cloudless periods and the cloudy periods. The relationship during cloudless skies is well defined and data points fall into a fairly narrow band. When clouds are present, the relationship becomes more complex. First, a method is developed to identify cloudy periods using only GHI data. This is done by correlating GHI with the cosine of the solar zenith angle on clear days and using the difference between the clear sky estimates and measured GHI to identify cloudy periods. Once the cloudy periods have been identified, the relationship between GHI and DNI for cloudy periods is studied.