Selecting Inclination of surfaces to maximize incoming Solar Radiation

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Inclined surfaces are used in order to maximize incoming Solar Radiation. Tilt angle for the installation is a decisive factor for the energy outcome. Most common approach is selecting an angle equal to latitude, which in clear skies conditions provides the maximum intake year-round. Actual conditions differ, as cloud coverage and aerosol loads alter diffuse irradiance , thus the preffered tilt angle should be estimated regarding also the climatology. At this study we estimate the impact of clouds and aerosols by using hourly data extracted from Copernicus Atmosphere Monitoring Service (CAMS) for 21 European and 4 North African cities, for the period 2005-2019. Hay model for diffuse irradiance and Isotropic constant albedo model for reflected irradiance were used to simulate the incoming radiation on surfaces with all inclination angles in the range 1-90º with 1º step. Finally, regression equations are proposed for the simple and practical estimation of the optimum angle as a function of latitude ,CMF and AOD for this region. The proposed equations could be applied in all mid-latitude areas.