

**International Energy Journal, Volume 9, Issue 4, December
2008**

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Determination of Optimum Angles for Solar Energy Conversions into Heat and Electricity

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Abstract

In this paper, the optimum energy conversion condition of a stationary panel is calculated. These calculations are done for 180 days at different latitudes. Various angular orientations of the sun's rays on the earth are considered. On a given day, the incident energy flux of the sun is resolved into three components, and the conversion efficiency is based on the flux normal for the panels. The efficiency of the conversion of the incident energy is measured with respect to a solar tracking process. The numbers of days in a given year are divided into two groups – between the winter solstice and the spring equinox and between the spring equinox and the summer solstice. The results show the existence of two maxima with one for each of the two periods. By setting the panels at each of these maxima, very significant improvement in energy conversion can be achieved.

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