

<b>Title</b>	OPTIMIZATION OF SHADING EFFECT BY USING SHADING DEVICE INTEGRATED PHOTOVOLTAIC SYSTEM
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### ABSTRACT

Shading device integrated photovoltaic system is one strategy in designing green buildings considering energy and environment conservation. It is the pattern of installation which generates electric power less than rooftop installation as a result from shading provided by buildings. Therefore, the purpose is the optimization of solar heat gain reduction and increase in daylight usability of shading device integrated photovoltaic system as well as the optimization of economic price and benefit

In this study, data collection was through the use of models in order to improve variables in coefficient of diffuse solar radiation and solar radiation reflecting from building envelope. Equation of total solar radiation on inclined plane presented by ASHRAE was used. The adjustment of Daylight Factor (DF) of daylight usability and the study of diffuse solar heat gain reduction in the pattern of Shading Coefficient ( $SC_d$ ) used in calculating energy value of energy generating system, air conditioning system and lighting system

The variables used in design for calculation were such as directions of installation, incline angle of solar module, room sizes and lighting control technique with condition of minimum lighting level need at 300 lux and the use of air conditioning system containing Coefficient of Performance: COP of 3.22 according to the suggestion declared by law for energy conservation. 3 patterns of utilization

strategy were also considered as follows: the utilization from energy generation only, the utilization from energy generation and heat load reduction, and the utilization from energy generation, heat load reduction and lighting energy saving.

From analyzing and evaluating to create optimization in design according to specific purposes, it is found that installation in the south side with the incline angle of 30 degrees will be able to produce maximum amount of energy for the whole year. The depth of the rooms which is not too much will be suitable for heat reduction and appropriate use of daylight. To do the economic analysis during 30 years of project at system cost of 70 THB/W<sub>p</sub> and 86 THB/W<sub>p</sub>, cost of electricity at 4 Baht per unit and MRR loan rate at 8% as well as the decrease in efficiency of energy generation down to 20% in 25 years, there were conclusions as follows: the installation should be in the south side with the incline angle of 30 degrees in rooms with less distance from the windows suitable for the use of lighting control system and in rooms with long distance from the windows suitable for dimming technique in order to gain most benefit towards investment up to 2.57 times and receive faster payback within 5.48 years