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## Spatial factors consideration in site selection of ground-mounted PV power plants

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### Abstract

Typically, the demand of electricity is normally high in urban areas and it will be increasing sharply when there are some events attracting visitors to the urban area. Thailand, an example of this situation, has announced five mega-cities as the places for Meeting, Incentives, Conferences, and Exhibitions (MICE) since 2002. Definitely, Thai government and electricity organizations have supported the solar energy as the alternative energy due to the clean renewable energy and sustainability. Various factors, generally, social-economic and environmental factors have been intensively studied in order to improve the efficiency and sustainability of the PV system. According to a requirement of large area to construct a ground-mounted PV system, it is extremely crucial to carefully determine all related spatial factors for investigating the potential areas. This study aims to identify all those spatial factors considered in finding a potential area for PV power plant. This study applied the documentary analysis to explore the spatial factors from successful PV power plants. The real situations, impacts, and issues in term of spatial factors were compiled and designed as spatial database applicable to implement with the Geographic Information System. The result of this study shows the structured spatial database acquired in a ground-mounted PV system construction. This study is useful for governments, developers, and investors to investigate potential areas for PV power plants.

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**Keywords:** Spatial factors; Spatial database; Site selection; Geographic Information System; MICE cities; Ground-mounted PV power plants

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### 1. Introduction

A photovoltaic power station is a large scale photovoltaic system (PV system) designed for the supply of merchant power into the electricity grid at utility level. It has been promoted to invest this kind of renewable energy in several countries over the world. Lessons learned from the site selection of PV power plants shows some crucial information essentially considered prior to the construction. For instance, the case of Montalto Di Castro PV Plant, this plant was constructed in central Italy and occupied over 345 acres as the largest PV farms in Europe [1]. With the prime purpose of leaving the fossil-nuclear age, Germany is heading to be a leader in sustainable power production, in particular PV power [2]. Not only consider the utility-scale solar generation capacity, but the solar power plant organizers in United States also concern about large-scale deployment of solar energy and its potentially significant land use [3]. Considering the spatial aspect, in particular land-use, this summary provides several comprehensive information of direct land-use result for PV power plant, total area corresponds to all land enclosed by the site boundary, infrastructure and facility installed in the solar plant [3].

Focusing on a developing country like Thailand, renewal energy, e.g. biomass, hydroelectric, geothermal, solar, wind, is intensively studied to replace the non-renewable energy, e.g. coal, diesel, fuel oil, natural gas. Fortunately, Thailand has great solar potential, which the daily solar exposure of around 19-20 MJ/m<sup>2</sup>/day [4].

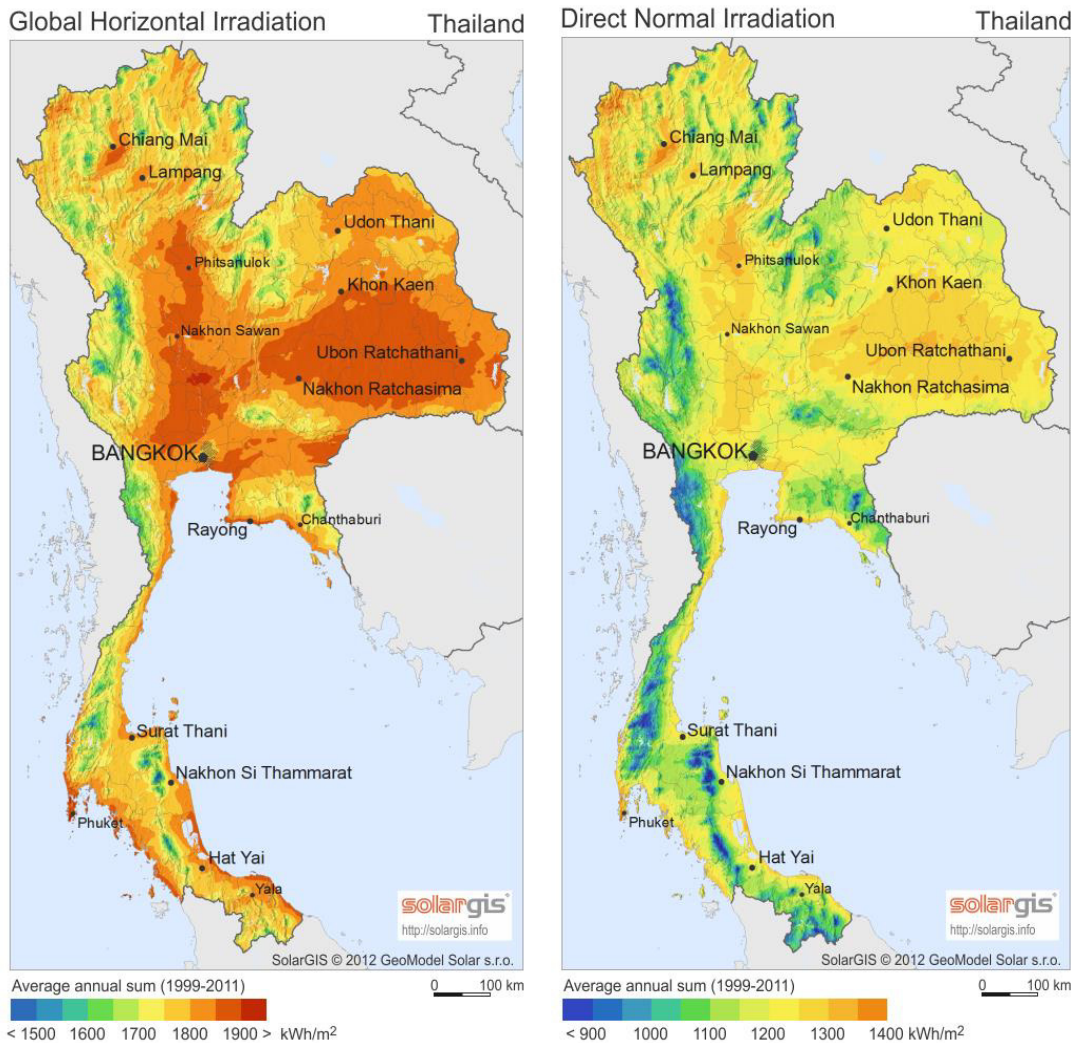


Fig 1. (a) Global Horizontal Irradiation of Thailand [5];

(b) Direct Normal Irradiation of Thailand [5]

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