

TECHNO-ECONOMIC ANALYSIS OF A ONE MEGAWATT SOLAR
PHOTOVOLTAIC PLANT IN MALAYSIA

By

KARTINA HASIM

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① Photovoltaic power generation

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Kartina Hasim

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ABSTRACT

The Malaysian government is actively encouraging and promoting the implementation of renewable energy in order to overcome the problems of over dependency to the fossil fuels and the energy security issues in Malaysia. Under the Tenth Malaysia Plan (2011-2015), Malaysia targeted to achieve 985 MW and 2,080 MW by 2015 and 2020 respectively from various types of renewable energy resources such as biomass, mini-hydro and solar. Solar energy is seen as a viable option for Malaysia due to its location in the equatorial region with abundant amount of solar irradiation. The introduction of the Feed-In-Tariff (FiT) in 2011 is expected to increase solar energy generation by the public, commercial and industrial sectors. In this project report, the techno-economic analysis of a proposed One Megawatt_{peak} (1 MWp) grid-connected solar photovoltaic generation system situated in Selangor, Malaysia was conducted. The photovoltaic (PV) power plant will export a maximum of 1 MWp to the distribution network at Standard Test Condition (STC) of 1000W/m² global solar radiation and cell temperature of 25°C. The factors affecting the annual revenue and the investment costs are explored. The optimal design of the PV power plant was also discussed in particular the most suitable components such as PV modules, inverter, balance of system (BoS) and whether it is suitable to choose ground mounted or roof-top design. The financing options for this PV power plant were also examined. In the economic analysis of the PV power plant, the payback period, the cumulative cash flow, the return on investment (ROI) and the net present value (NPV) were calculated. The payback period varies from 6.9 years to 10.8 years, the ROI varies from 9.3% to 14.5% and the NPV have positive values. Results of the study indicate that the connection of the proposed 1 MWp PV power plant to the grid network via 11 kV system is technically and economically feasible.

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