

**DESIGN OF STAND-ALONE PHOTOVOLTAIC SYSTEM USING
EVOLUTIONARY PROGRAMMING**

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ABSTRACT

This paper presents an intelligent sizing technique for sizing stand-alone photovoltaic (SAPV) system in rural area at Selangor using Evolutionary Programming (EP). The chosen rural area was *Kampung Orang Asli Paya Lebar, Hulu Langat Selangor*. Meteorological data and electrical load data of household of considered site location are taken into account during sizing steps. The main concern for designing the SAPV system is power reliability of the system designed under whether varying weather condition. The decision variables of this optimization process are number of PV modules and batteries used. However, the objective function of this process is to maximize the technical performance of the system. In order to maximize the technical performance of this system, the indicator used is Loss of Power Supply Probability (LPSP). The LPSP results are compared with different type of EP named Classical EP (CEP) and Fast EP (FEP).

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Renewable Energy (RE) resources have gigantic potential and can meet the current world energy load demand. In addition, they can enhance diversity in energy supply market, protected long-term sustainable energy supply and diminish the local and global atmospheric emissions. They can also provide the commercially attractive opportunities to meet the specific needs for energy service (particularly in developing country and rural areas) and offer the possibilities for local manufacturing of equipment.

However, the usage of RE resources has been projected specifically in many roadmaps of developed countries. One of the best promising RE technologies is photovoltaic (PV) technology. The term ‘photovoltaic’ represents to a family of technologies that convert the sunlight directly into electricity. PV technology is an interesting alternative to fossil fuel base power generation because it is renewable, environmentally benign and domestically secured energy source. Moreover, one of the significant advantages on using this type of technology is it is modular and can be readily scaled to meet demand [1]. PV system are normally configured as stand-alone, grid-connected and hybrid system. They are rapidly developing in the world, in developed and developing nations. The performance of PV system depends upon the several factors, especially the meteorological data like solar irradiation, surrounding humidity and ambient temperature.

In PV system, there are two way of its application. First, Grid-connected PV system and

In order to size the PV system so that it can function properly, efficiently and economically to meet the desired load demand under the local meteorological