CHAPTER 1

INTRODUCTION

Background

Water is one of the primary resources necessary to support life. Even in regions where the rainfall does not fluctuate so severely, access to a clean and reliable water supply can make a vital difference to the health and quality of life of a rural community. In many of these areas, water exists below the ground, and throughout the developing world the most widespread way of raising it to the surface is still by hand pumping or with the assistance of animals. The principal mechanized power source is the diesel engine, but this is often beyond the means or technical capability of small communities.

Solar photovoltaic pumping can be more appropriate than these technologies in many applications. As communities expand, hand pumping may not be sufficient to supply all daily needs, even if the well capacity is great enough. Diesel pumps tend to be unreliable and require regular maintenance. Spare parts, and fuel can be difficult or expensive to obtain and the quality of fuel is often poor due to adulteration, which leads to shorter maintenance periods.

Photovoltaic pumping offers a reliable, low-maintenance water supply, which has zero fuel costs and does not require an attendant to be present during operation. In addition, because the time of maximum insulation often coincides with the time of greatest water demand, the supply and demand is well matched.

Solar pumping was first introduced into the field in the late nineteen-seventies, and since then manufacturers have refined their products to give considerable improvements in performance and reliability. The steady fall in prices of photovoltaic systems means that solar pumping is becoming economic for an increasingly wide range of applications.

Statement of the problem

The demand for energy has been increasing day by day in Thailand due to various reasons such as increasing population, aspirations for improving living standards, and industrial growth. In order to reduce fuel consumption and environmental pollution, renewable energy systems have been included in new energy and energy conversion technology programs.

Through these programs a number of PV water-pumping systems have been installed in rural Thailand during the last three years for irrigation and village water supply.

Pumping water in remote and isolated areas, is today one of the most promising fields of PV applications. Many PV water-pumping systems are installed and tested in rural and remote areas. So the most of PV pumping applications are village drinking water supply. However, some remote areas have good land and good conditions for planting. In order to increase agriculture production what is needed is the provision of the necessary power for pumping water to support it. PV water pumping for agriculture is one alternative to help people in remote areas to increase their agriculture production and reduce rural poverty.

Objectives of the study

1.3.1 To study the I-V characteristic of PV-modules.

1.3.2 To study of the efficiency of each part of the PV-water pumping system for agriculture and general consumption at the Energy Park, Naresuan University.

1.3.3 To study the overall efficiency of the PV-water pumping system.

1.3.4 To assess the economics of the PV-water pumping system.

Scope of the study

1.4.1 The water pumping system being investigated consists of three parallel connected groups of eight 55 Wp PV panels connected in series for a total of 24 panels and 1.32 kWp.

1.4.2 Study the daily operating behavior by collecting data on panel current, voltage, cell temperature and solar radiation every 10 minutes for 7 days.

1.4.3 Determine the correlation between solar radiation and panel current, panel voltage and water flow rate.