CHAPTER I

INTRODUCTION

General Remarks

We have been warned for years that the world's proven resources of fossil fuels have been dwindling rapidly since 1960's. The oil embargo imposed on the rest of the world by the OPEC countries in the year 1973 hit the message home. When these countries suddenly cut down their shipments of crude oil, it made us realize that oil was a precious commodity and that it would not last long.

We are now in an era of high-price energy and dwindling supplies; hardly a solid base on which to build our future. This forces us to develop our renewable energy sources. Two most promising renewable sources are alcohols and solar energy. The latter is clean and inexhaustible.

Many countries are actively developing their technology in solar energy utilization, notably Australia, South Africa, Israel, France, Japan, the Soviet Union and the United States. Nowadays many Australian schools and public buildings are equipped with solar heating systems, and their number is growing. Solar energy was widely utilized by Israel right after its founding. As that

country developed, utility companies started to produce cheap electricity. The current turmoils involving Iran, Iraq and other Middle-East oil producers have changed the whole picture, and Israeli solar-energy firms are again thriving, especially in the manufacture of solar water heaters.

Japan is a leader not only in the field of solar water heaters, but also in the field of solar cells. That country is well into a multi-billion-dollar 25-year-long program known as "The Sunshine Project".

Russia has applied solar cells to her spacecraft program and has been conducting an extensive solar energy research and development program in Tashkent for years. They are experimenting with large-scale electricity generation, and some general applications such as solar refrigeration.

One of the biggest research and development areas in the United States has been on solar cells for use in spacecraft and satellites. Rapid progress has been made since the Bell system manufactured the first workable solar cells in the mid-1950's. Most artificial satellites now circling the earth are powered by solar energy, which is also used to recharge their batteries.

For a developing country like Thailand, solar energy is a new light at the end of a tunnel. Any successful utilization of her solar energy, would mean a sizable saving in her oil bills, which are currently one of the roots of her economic woes. Thus

this study was carried out as a first small step toward the utilization of solar energy in Bangkok.

Objectives of Research

The main objectives of this work are:

1. To simulate the dynamic performance of a proposed solar house in Bangkok based on actual meteorological data.

2. To reveal the effect of such design variables as the area of a flat-plate solar collector.

3. To evaluate the economic feasibility of the proposed solar house.

Scope of Research

The scope of this thesis encompasses the following:

1. Survey the literature.

2. Convert MOSTPROSIT[1] (abbrev iation for a Modularized Solar Thermal Processes Simulator), a simulation program coded in FORTRAN IV on a Control Data Corporation (CDC) Series 6000 computer system so that the program can be executed correctly on an IBM 370/138 computer.

MOSTPROSIT is composed of 19 modules or subroutines that represent the components of a solar system, such as the flat-plate solar collector, hot liquid storage tank, heat exchanger, pump, on/off differential controller, etc..

3. After checking the validity of the converted version of MOSTPROSIT, study of the performance of the proposed solar house by using actual past meteorological data for Bangkok.

4. Study the effect of some of the design variables with respect to system performance.

5. Analyze the performance data to evaluate the economic feasibility of the proposed solar house for Bangkok.