CHAPTER I

INTRODUCTION

Introduction

In many countries, air conditioning is the dominant energy consuming service in buildings. And in many regions of the world, the demand for cooling and dehumidification of indoor air is growing due to the increases in cooling loads and people's needs for indoor comfort. Conventional cooling technologies are handling these increases, but in doing so, their weaknesses are being exacerbated. The main problems, aside from their high energy consumption, are that these technologies cause high electricity peak loads and use refrigerants which have negative environmental impacts.

In Thailand, almost peak demand electricity is appeared in summer (see figure 1). This shows that the increased temperature and GDP affected the electrical consumption. By the increment of temperature 1°C affect electrical demand, up 200 - 300MW, that which mean that gross electrical consumption increases (Energy Policy and Planning Office, Thailand, 2004. Website)

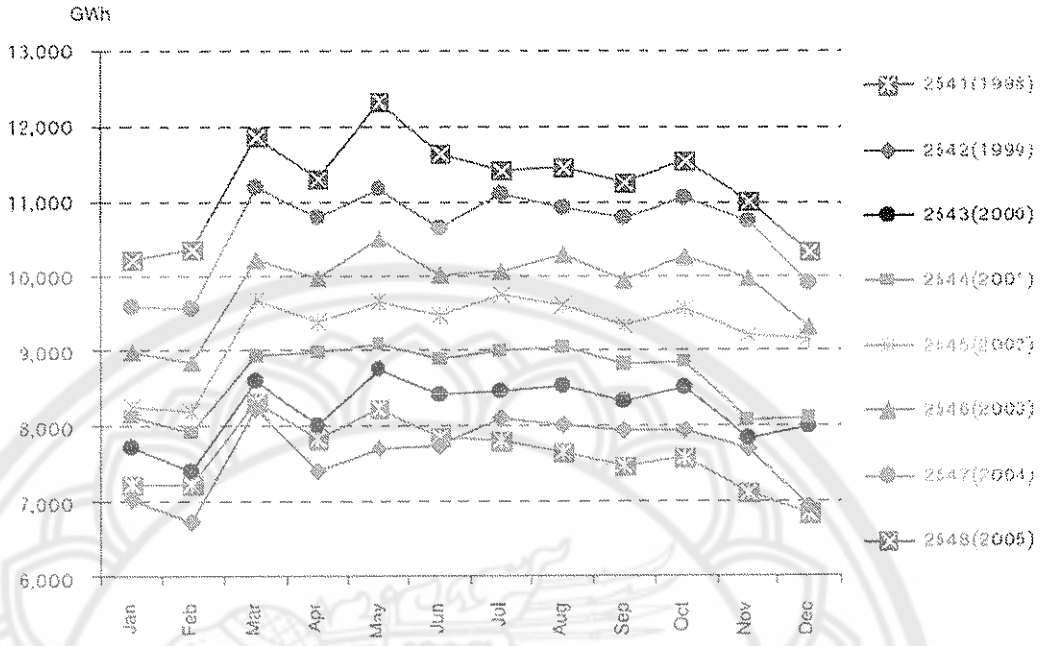

Figure 1 Energy demand of EGAT

The raise of energy demand, in every year, has caused the growing global temperature due to Global Warming and growth of GDP of the country. As those are caused air conditioning over 400,000 units which are sold in Thailand every year (Energy Policy and Planning Office, Thailand, 2004. Website). That means an incensement of energy demand about 600MW per year.

Although the government had plans for the incensement electricity demand by finding new power plants and still to have backup power of 15% predict demand until 2015 but energy conservation and saving of electricity should be seriously considered. That can slow down the build of new expensive power plant in the country which cost 30 million baht per megawatt (Energy Policy and Planning Office, Thailand, 2004. Website).

Under these conditions, solar and solar-assisted air conditioning systems or solar cooling system can be reasonable alternatives to conventional air conditioning systems. Such systems have advantages over those that use problematic coolants (CFCs), not to mention the incidental CO_2 emissions that are taking on increasingly critical values and decrease lack energy that is the most important problem in present.

The solar absorption cooling system (SACS) has to use the source of the high temperatures or the sun to power the chillers. Normally, a solar thermal system is most effective when the sun is shining most intensely as such as the demand for cooling at its highest. Solar energy can be used to cool buildings because the demand for cooling rises and falls almost parallel to the amount of solar energy available. The relationship between solar radiation and cooling load corresponds both during the course of a large part of the day as well as in terms of seasonal variations. Due to the inertness of the building structure, there is a time lag of several hours between when the power supply or sun reaches the building and when the building needs cooling. This time lag can be balanced by using a suitable buffer (such as a hot water storage tank) or by thermo-active building elements.

The solar absorption cooling system in Testing building School of Renewable Energy Technology (SERT) Naresuan University has an auxiliary heat from Liquefied Petroleum Gas (LPG) water heater and hot water storage tank to support this system during no sunshine and time lag of a day. Besides these reason the constraint of the roof areas, that is not enough to fix all collectors which supply an absorption chiller, can fix collector field only 72 m^2 from 80 m^2. And the shading of building effect to its field that was fixed. So the system needs auxiliary heat from LPG water heater higher normally case as enough area collector (energy supply from collector) and used auxiliary in expect terms of seasonal variations and a time lag of several hours between when the power supply or sun reaches the building and when the building needs cooling.

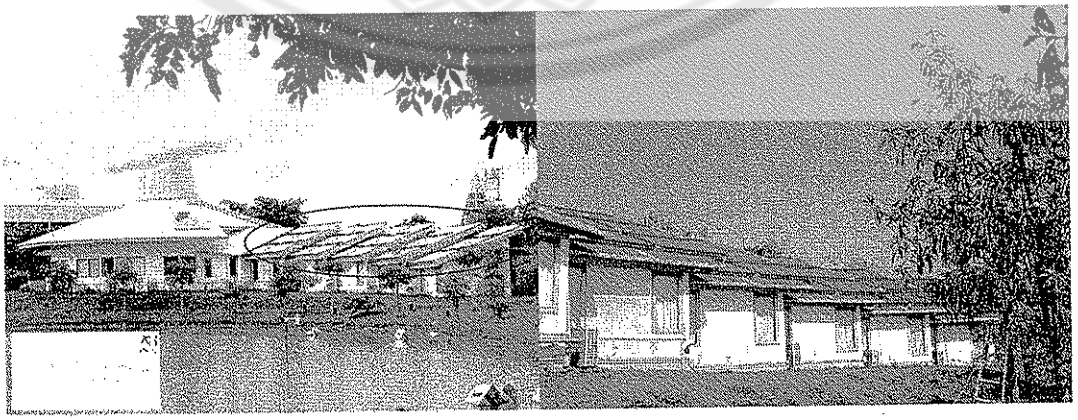

Figure 2 Attitude of the collector field

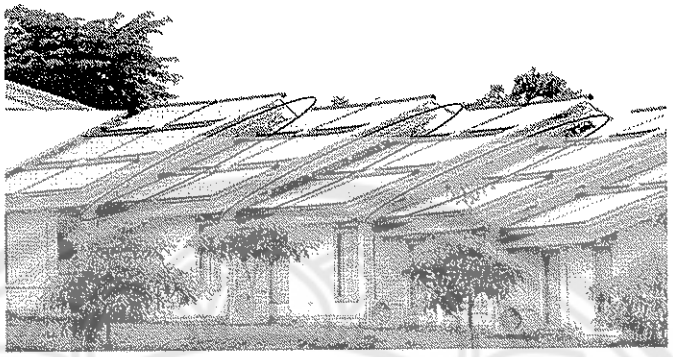

Figure 3 Shading of the building

Purpose of the Study

1. Study optimize of the auxiliary heat of solar cooling systems from auxiliary demand in designed SACS and LPG consumption in collected data.

2. Study effect of solar radiation (weather condition) to LPG consumption of SACS.

Scope of the Study

1. Study the solar absorption cooling system in Testing building of SERT Nareasuan University, Phitsanulok.

2. In depth study of the collected data during the given period.

Benefit of the Study

1. To know about the solar absorption cooling system in Testing building of SERT Nareasuan University, Phitsanulok.

2. Optimum of auxiliary heat and solar absorption cooling system for Thailand climate location.

3. To promote the usage of Solar Absorption Cooling System in Thailand.