

## CHAPTER I

### INTRODUCTION



#### General

Energy conservation has become an element of energy policy in most countries since the occurrence of energy crisis of 1973. The oil embargo led to the introduction of several emergency measures which were intended to produce a reduction in energy demand.

Over the last two decades, Thailand has been almost totally dependent on imported petroleum for its primary energy requirements. In 1980, imported petroleum accounted for about 70% of the country's total energy needs. The availability of increasing quantities of natural gas since 1981, as well as the rise in the use of lignite in the power and cement sectors, is already having a major structural impact on the energy supply mix and use patterns in the country. Natural gas use has already lowered the share of primary energy supplied by petroleum from 82% in 1970 to 56% in 1983. This declining trend should continue over the short to medium term as gas and lignite production increase during the rest of this decade. Despite this progress, however, the cost associated with importing some 210,000 bbls/day of petroleum amounted in 1984 to approximately US \$ 2.5 billion and remains a significant drain on the economy as it amounts to over one-third of the country's export earnings.

The industrial sector, which includes manufacturing, mining, and construction, made up about 30% of total energy consumption in 1983, two-thirds in the form of commercial energy. In the same year, oil

made up 47% of the commercial energy used in industry, followed by diesel with 24%, and electricity most of the remainder. Within industry, most of the fuel oil is consumed in cement, iron and steel, and textiles, cement alone accounted for about 25% of national fuel oil consumption in 1983.

Increases in petroleum and electricity prices between 1979-1982 have encouraged the Thai manufacturing sector to undertake important initiatives to use energy more efficiently.

The energy conservation implementation program was set up in the Fifth National Economic and Social Development Plan (1982-1986) which covered the industrial and transportation sectors. The National Energy Administration (NEA) has been entrusted by the government to perform the following activities:

1. Study the energy conservation potential.
2. Formulate energy conservation measures and regulations.
3. Study the incentive for energy conservation.
4. Provide energy conservation technical information by means of pamphlets, posters, booklets, seminars, conferences, etc.
5. Provide consultancy services on energy conservation for industries.
6. Organize training courses or symposiums on energy conservation.

In the fiscal year of 1981, the government allocated a budget of 3.5 million baht to the NEA to encourage the program.

The need to save energy is now accepted country-wide. For many sectors of industry and commerce, conserving energy helps contain the escalating costs and maintain financial viability. With suitable energy management, energy requirements can be reduced by 10-30% without major capital investment (Sant, 1982).

This study was proposed to investigate the energy usage in a textile plant with the purposes of energy saving. Emphasis was placed on textile industry as it appears to be one of the largest energy consumer. The technology employed by most of the textile manufacturers is similar and was developed before the energy crisis of 1973. Therefore, this group of industries has been found to possess a significant potential to save energy.

#### Objectives of the Study

This study was carried out with the following objectives:

1. To determine the energy consumption in various systems of the textile industry.
2. To identify energy conservation opportunities applicable to each operation area throughout the factory.

#### Scope and Limitation of the Study

The study was taken within a selected textile plant. The scope of this investigation emphasized the energy utilization and energy saving in the following main energy-consuming systems:

1. Electrical load distribution system.
2. Lighting system.
3. Air-conditioning system.
4. Steam production and utilization system.

#### Stage of the Study

The research was conducted in the following stages:

1. Familiarize the manufacturing process of the Nylon-6 filament.

2. Investigate the historical data related to production and energy requirement.
3. Consider energy management of the factory.
4. Investigate the electricity consumption throughout the plant:
  - 4.1 Breakdown the electric energy used.
  - 4.2 Identify energy conservation opportunities by improvement of load factor and lighting control.
5. Investigate the air-conditioning system.
6. Investigate the thermal (steam) system.
7. Write down the conclusion of the research and recommendation for the future studies.

#### Benefit of the Study

The need to save energy and to use it efficiently is now widely accepted by all industries. This study provides the beginning step of energy conservation program that may be organized by the factory himself.