

## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

This chapter discusses the development of the Malaysian gas industry. It explains the establishment of the Peninsular Gas Utilization (PGU) transmission pipeline which made it possible to implement the Natural Gas Distribution System (NGDS) to supply natural gas to the domestic energy market. The literature review discusses the economic issues of the topic such as energy diversification from oil to natural gas, the market potential of gas, the privatization of energy infrastructure industry and the need for regulation. The chapter then explains the methodology used in writing the paper and finally the organization of the study.

3.9% per annum. Further, the increase in oil price over the period 1973-1982 pushed up the production costs of many industries, resulting in a lower profitability and a higher rate of business failures.

In response to the oil crisis, the industrialization program and also the rising energy consumption associated with economic growth, the Malaysian government decided on a structural change in the energy supply. Here, energy diversification became the key word and the path was set for a four-fuel diversification i.e. the shift from being oil dependent to use other indigenous resources. The emphasis was given to the development of gas resources.

Gas which had been the second most important energy after oil all this while, had developed significantly, spearheading the start of a "Gas Era" in Malaysia. In the 1970s and early 1980s, most of the gas produced in association with oil production was flared or reinjected. Even though gas had been

## 1.2 Malaysia's Gas Industry

Malaysia's energy situation was influenced by the Industrial Master Plan and the world oil crises. The Industrial Master Plan (IMP), formulated in 1986 to transform the Malaysian economy from agriculture-based to an industrialized economy, had created an increasing demand for energy. Therefore, the development of the industrial sector would have significant impact on the development of the energy resources.

Also, the world oil crisis in the mid 1970s and 1980s had a significant impact on energy development in Malaysia. The wide fluctuations in the crude oil prices over the period 1970-1985 had adverse effects on the Malaysian economy. Inflation shot up from less than 1% per annum in the period of 1973-1975 to about 8% per annum in the period 1976-1980, mainly on account of the increase in crude oil price in 1973 and again in 1978. By 1985, due to the decline in the price of crude oil, inflation stabilized to

utilized as fuel for domestic and small industrial consumption in Miri, Sarawak for the last thirty years, large scale development of natural gas industry commenced only in the 1980s. The development of natural gas resources in Malaysia can be divided into three areas i.e. Sarawak, Sabah and Peninsular Malaysia.

The first indication of the massive reserves of natural gas was discovered in 1969 at offshore Sarawak at the Central Luconia fields. In 1976, negotiation for the sale of Liquefied Natural Gas (LNG) to Japan began. This led to the development of the mammoth Malaysian LNG Sdn Bhd (MLNG) gas liquefaction project in Bintulu. The year 1983 marked Malaysia's entry in the international gas business when the first shipment of LNG cargo left for Tokyo. Since then, gas flaring has been reduced/decreased sharply from 80% in 1974 to 10% in 1991. Also, the availability of gas at offshore Central Luconia fields made it feasible to establish the ASEAN Bintulu Fertilizer (ABF) plant and Shell Middle Distillate Synthesis plant in Bintulu,

Sarawak. In Sabah, a gas gathering system was implemented in 1984, capturing flared gas for the end-users on the island of Labuan.

The discovery of gas in the east coast of Peninsular Malaysia in the 1970s, had led to the development of the Peninsular Gas Utilization (PGU) project. The project was planned to be developed in three stages i.e. PGU I, PGU II and PGU III. Currently, PGU I and II have been completed. As for the PGU III, it is still in the developing stage. The natural gas from the Peninsular Malaysia will be utilized for domestic consumption, especially in the power sector where gas is expected to substitute fuel oil consumption in line with the government's energy diversification policy.

The gas penetration on the domestic sector will depend on the implementation of the **Natural Gas Distribution System (NGDS)** in Peninsular Malaysia. Natural gas is delivered to industrial, commercial, residential and transport sectors.

This paper will examine the economics of the Natural Gas Distribution System in Peninsular Malaysia. The topics discussed include the development of natural gas, the natural gas distribution system, the potential market for gas in Peninsular Malaysia and the structure and regulation of the gas distribution industry in Peninsular Malaysia. Because the gas distribution industry is a relatively new sector, the papers, articles or data published on the Peninsular distribution sector are limited. Consequently, the information provided in this paper is restricted by the data constraints.

### **1.3 Literature Review**

In the 1970s the oil crisis drastically changed the energy market, especially in the developing countries. These countries reviewed their energy policy due to its strong influence on future economic development of their countries. It was time for an energy transition, i.e. from oil to an alternative source. One alternative energy is

natural gas which is, as yet, idle in most developing countries.

According to the study conducted by Mohammed A-al Sahlawi and Roy Boyd (1987), natural gas will be successful in responding to long-term energy needs in developing countries. This is supported by Corazon Morales Siddayao (1988), that natural gas and coal will be the principal options for shifts away from oil where such substitution is feasible. Rogner (1988), also sees an increase in the role of natural gas in the future due to technological development resulting in a gradual substitution of oil by natural gas. The level of gas consumption is considered to be a function of technical advances in gas related technologies.

Policies relating to natural gas development emphasize on the importance of domestic usage/consumption because of the economic and social gains, i.e. foreign exchange savings resulting from reduced imported fuel oil and also the environmental benefits of using natural gas. The sectors that have

en targeted are the power, petrochemical (natural gas used as feedstock), industrial and transportation sector. P.Bourcier (1985) sees the future development of natural gas in the developing countries as replacing fuels and feedstocks used to meet domestic demand. He showed that the electric power sector will remain the single largest consumer, followed by industrial consumption. Indonesia is also looking into the possibility of utilizing natural gas domestically (including in the transport sector) and keeping oil for export, J.R.Wijarso (1985). Even in India, J.P. Painuly and Jyoti Parikh (1993) have shown that other than the power and fertilizer sectors, the use of natural gas in the industry and transport sectors as partial replacement for diesel and fuel oil, can bring about substantial savings in foreign exchange besides a positive impact on the environment.

Governments have always played an important role in the development of the energy market, mainly to ensure security in the supply of energy to achieve economic development and growth. Also, because the



development of the energy infrastructure requires considerable investment and this has to be overseen by the government. This is evident in the natural gas industry, where most of it is or in the recent past, was owned by the national government.

According to Corazon Morales (1988) there has been more active involvement of the public sector or government in petroleum resource development in the developing countries, following the 1973 oil crisis. Jayanta Madhab (1987), also sees Asian governments playing a significant role in the energy supply since the 1973 world oil crisis.

The 1970s oil crisis not only changed the energy policy for developing countries but brought about a need to cut government expenditure in the face of fiscal crises. Therefore, a new model which focuses on privatization emerged. Privatization was seen as the solution to relieve the financial burden of the government and at the same time, as a solution to the unsatisfactory performance of the public sector enterprises. In many Asian developing countries, the

private sector has been playing an increased role in energy-related activities, particularly in oil and gas.

According to Nicholas Van De Walle (1989) the major impetus for the divestiture of public sector to the private sector in the developing countries was the potential impact on public finance. Rogner (1989) showed, in the case of Malaysia, two factors that contributed to the privatization policy i.e. the unsatisfactory performance of the public enterprises and the aim of reducing both the level and scope of public spending.

Since energy infrastructure industries are natural monopolies due to their huge investment which is sunk, the privatization of these industries by the government is basically, to convert from public monopoly to private monopoly. This result in the government losing its total control on the industries. But due to the importance of energy supply to the economy and to the community, the government regulates these private monopolies in a

form of operating license, price regulation, safety regulation and equity ownership in the form of "golden share".

According to Catherine Price (1994) the privatized natural monopolies need to be controlled by regulation to ensure that the consumer's and the public's interests are safeguarded. Christopher Adam (1985), explains that the golden share has been a unique feature to Malaysia's privatization policy. The principles assures the government of having veto powers over fundamental decision of the company, especially in relation to meet the government objective.

The most popular form of price regulation in privately-owned monopolies, mostly in United States, is the rate-of-return regulation i.e. control of their return on capital. The Roger Sherman (1982) study showed that a rate-of return regulated monopolist will prefer a two part tariff with fixed access fee and marginal usage fee, over a single price. Averch and Johnson (1962), made it clear that

misallocation of economic resources may result from the use of the rate-of return constraint for price control. The firm sets its price to favor the use of capital over other inputs which result in over-capitalization. This identified weakness in the rate-of-return regulation and the weak incentives to cost reduction, have led to the search for more effective alternatives. Hence, Professor Littlechild (1983) recommended that the price cap regulation be adopted for the privatization of telecommunication, gas and airports in United Kingdom.

However, the appropriate price regulation for the natural gas resource is to price at opportunity cost of gas i.e. equating the demand and supply of gas. This is because opportunity cost leads to efficient resource allocation. Stanislaw H. Wellisz (1963) suggested opportunity cost pricing for the public gas utilities, instead of "fair-return" limitation on profit maximizing. P.Bourcier (1985), also sees the opportunity cost for gas as an appropriate pricing principle because gas is used to substitute

for another commodity, such as fuel oil, LPG or Diesel.

This is supported by Afsaneh Mashayekhi (1985), where the basis for pricing in all cases should be the opportunity cost of gas. This appropriate price from the point of view of economic efficiency should allow for the physical cost of gas supply as well as the value of the foregone resources. However, his study on the natural gas pricing in developing countries, showed that production and transport of gas is often carried out by the government, which decides the gas prices often through ad-hoc criteria and social and political pressure.

The establishment of an appropriate regulatory framework is important to protect consumer interest as well as monitor the private monopolies. However the appropriate regulation is difficult to attain because of what is commonly referred to as regulatory capture, where the regulators falls under the influence of either the government or regulated firm.

According to Peter M. Jackson (1994), the principal problems facing the regulator is information asymmetry. In particular, the regulator does not have accurate information about the firm's production or cost functions. Because of this, the regulator has a problem designing an appropriate regulation which would prevent the firm from using its monopoly power while maintaining incentives for the firm to produce efficiently. G.Naidu (1995) shows that although regulatory agencies exist in Malaysia, the respective Ministers still appear to have considerable influence over the policies of the privatized firms. This creates the ambiguity over independence of the regulatory agencies from Ministerial or political interference.

Overall, the 1973 world oil crisis has brought structural changes in the economy of the developing countries. These changes are not only limited to their energy policy i.e. to reduce dependence on oil by developing alternative energy resource which is natural gas to be used in domestic market. Another

change is the privatized of the infrastructure services, to reduce the financial burden of the government. Since energy infrastructure industries are natural monopolies, regulation is imposed to avoid abuse of monopoly power by the private sector. This regulation comes in the form of price regulation, safety regulation, equity ownership and license.

#### **.1.4 Objective of the Study**

The purpose of this study is to:

- i) Analyze the economy of developing natural gas as a viable and practical energy alternative for Malaysia. The study will show the factors that contributed to the development of the natural gas, its potential utilization in the domestic market and the benefits of natural gas development to the consumers, government and environment.

ii) Examine the structure of the gas distribution sector, the distribution area, market demarcation and the extent of natural gas penetration in the domestic market. The paper will also analyze the purpose for privatization of the Natural Gas Distribution System and the regulatory framework imposed on the distribution sector.

### **1.5 Data**

The information data in this study is acquired from private and government agencies; including published articles on energy policies, public utility pricing and regulation, speeches, seminars, conference papers and interviews. Information was also obtained from government and private agencies such as PETRONAS, Gas Malaysia Sdn Bhd, Tenaga Nasional Bhd, Electricity and Gas Supply Department and the Prime Minister's Department.

The data is divided into the primary and secondary data. The primary data consists of interviews with



personnel of various departments in Gas Malaysia Sdn Bhd, Petronas Gas Bhd and the Department of Electricity and Gas Supply. As for the secondary data, the source of information are journals, books, research and conference papers.

### **1.6 Methodology**

The method used is based on descriptive analysis supported by a combination of simple statistical and graphic techniques such as charts and tables. The analysis was conducted using both primary and secondary data.

### **1.7 Organization of the Study**

The study is divided into seven chapters. The introduction chapter outlines the development of the Malaysian gas industry i.e. transition from oil to natural gas. It also comprises literature review,

the study objective and the methodology employed to derive at the conclusions.

Chapter Two examines the development of the natural gas resources, from the time of the introduction of the four-fuel policy to the utilization of natural gas in the domestic market. It also shows the importance of natural gas to the nation, government, and consumers. This chapter further examines the potential and future market for natural gas utilization. Chapter Three present the structure of the gas industry in Peninsular Malaysia. It also highlights the players and their roles in the production, transmission and distribution sector.

Chapter Four discusses the privatization of the NGDS. It explains the structure of the gas distribution company, its regulatory body and the market. Chapter Five explains market demand, development plans, penetration rate and the challenges faced by natural gas in the domestic market.

Chapter Six briefly explains the need for regulation in the distribution sector as the sector is supplied by a private monopoly. It also looks into the mechanism used to regulate the private monopoly i.e. operating license, equity ownership and safety regulation. The final chapter summarizes the findings from the previous chapters. It also looks into the future scenario of the gas distribution sector in Peninsular Malaysia.