ECONOMICS OF NATURAL GAS DISTRIBUTION SYSTEM IN
PENINSULAR MALAYSIA

by

ROHINI ALAGAPPAR

A Research Paper Submitted to The University Malaya
for the Degree of Master of Economics
in The Faculty of Economics and Administration
University of Malaya

Dimikrofiskan pada...
No. Mikrofis...
Jumlah Mikrofis...
ACKNOWLEDGEMENT

My sincere gratitude and appreciation goes to Prof. G. Naidu, whose valuable guidance, advice and reviews helped produce this study.

I am also grateful to Gas Malaysia Sdn Bhd and PETRONAS for providing the relevant information. I would also like to thank my sister, Ponmalar and my friend, Punitha who helped me produce this script, aiding me to compile my ideas and thoughts into this study. A word of thanks also goes to my mother who gave her support in many way. I hope this mention though small, reflects my deep gratitude.

Finally, I wish to express appreciation to my husband and my father who created a conducive environment which enable me to overcome the obstacles and made my effort worthwhile. This study is dedicated to my son, Naveen who in his own way, has been the inspiration for me to complete this undertakings.
CONTENTS

ACKNOWLEDGMENTS ii

CONTENTS ii

LIST OF TABLES v

LIST OF FIGURES vi

ACRONYMS AND INITIALS vii

CHAPTER 1 INTRODUCTION 1

1.1 Introduction 1
1.2 Malaysia’s Gas Industry 2
1.3 Literature Review 6
1.4 Objective of the Study 15
1.5 Data 16
1.6 Methodology 17
1.7 Organization of the Study 17

CHAPTER 2 DEVELOPMENT OF NATURAL GAS RESOURCE 20

2.1 Introduction 20
2.2 Energy Sector Policies 20
2.3 Malaysia’s Energy Sector 25
  2.3.1 Energy Supply 26
  2.3.2 Energy Demand 28
2.4 The Market for Natural Gas Utilization 30
  2.4.1 Gas In Power Sector 31
  2.4.2 Gas as Fuel in the Industrial, Commercial and Residential Sectors 34
  2.4.3 Gas as Feedstock in Petrochemical Sector 35
  2.4.4 Gas In Transportation Sector 36
2.5 Future Market for Natural Gas Utilization

CHAPTER 3 STRUCTURE OF THE GAS INDUSTRY

3.1 Introduction 39
3.2 The Exploration & Production Sector 41
3.3 The Gas Processing & Transmission Sector 45
   3.3.1 The Peninsular Gas Utilisation System 46
3.4 The Gas Distribution System 50

CHAPTER 4 GAS DISTRIBUTION SECTOR 56

4.1 Introduction 56
4.2 Privatization of the NGDS 57
4.3 Organization Structure 60
4.4 Regulatory Body 65
4.5 Competition 66
4.6 Market Demarcation 68

CHAPTER 5 GAS DISTRIBUTION MARKET 70

5.1 Introduction 70
5.2 Market Demand 71
   5.2.1 Industrial Demand 71
   5.2.2 Residential & Commercial Demand 76
   5.2.3 Transportation Demand 80
5.3 Development Plans 83
5.4 Growth Rate of Natural Gas 92
5.5 The Challenge In Natural Gas Penetration 94
CHAPTER 6 REGULATION OF THE GAS DISTRIBUTION

6.1 Introduction 96
6.2 Regulatory Framework 99
6.3 Regulatory Instrument 102
  6.3.1 Licence 103
  6.3.2 Safety Regulation 106
6.4 Price Mechanism 107
6.5 Assessment of the Gas Regulation 117

CHAPTER 7 CONCLUSION 120

NOTES 128

REFERENCES 130

APPENDIX I 138

APPENDIX II 139
LIST OF TABLES

Table 2.1 Crude Oil & Natural Gas Reserves in 1990 and 1995. 26

Table 2.2 Primary Commercial Energy Supply by Source 1985-2000, (Petagoule, PJ). 27

Table 2.3 Fuel Commercial Energy Demand by Source 1985-2000, (Petagoule, PJ). 28

Table 2.4 Fuel Commercial Energy Demand by Sector 1985-2000, (Petagoule, PJ). 30

Table 2.5 Fuel Mix in TNB Electricity Generation 1990 - 2000. 34

Table 2.6 Gas Utilisation In Peninsular Malaysia 1990-2000, mmscfd. 35

Table 3.1 Petronas Gas City Gate Station 52

Table 5.1 Fuel Energy Use by Sector, KTOE. 77

Table 5.2 Petroleum Products Consumption by Residential & Commercial Sector, KTOE. 77

Table 5.3 Potential Number of Household In Selected State Along PGU II, 1991 79

Table 5.4 Petroleum Products Consumption by Transport Sector, KTOE. 81

Table 5.5 Retail Price of Various Automotive Fuel in Malaysia. 82

Table 5.6 Fuel Price Ranking. 87

Table 6.1 GMSB Tariff Category 114
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure 5.1</th>
<th>Industrial Energy Demand.</th>
<th>74</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 5.2</td>
<td>Peninsular Gas Utilization</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Industrial Market.</td>
<td></td>
</tr>
<tr>
<td>Figure 5.3</td>
<td>Industrial Fuel Mix.</td>
<td>85</td>
</tr>
<tr>
<td>Figure 5.4</td>
<td>Potential Energy Mix Market In Selected Area.</td>
<td>88</td>
</tr>
<tr>
<td>Figure 5.5</td>
<td>Growth Rate of Natural Gas Consumption In The Industrial Sector.</td>
<td>93</td>
</tr>
<tr>
<td>Figure 6.1</td>
<td>Regulatory and Policy Framework for Gas Distribution In Peninsular Malaysia.</td>
<td>100</td>
</tr>
</tbody>
</table>
ACRONYMS AND INITIALS

BOO  Build Own and Operate
Congas  Consumer Gas of Canada
DG  Director General of Electricity & Supply
EPU  Economic Planing Unit
GMSB  Gas Malaysia Sdn Bhd
GPP  Gas Processing Plant
GSA  Gas Supply Act
GSA  Gas Supply Act 1993
JBE&G  Jabatan Bekalan Elektrik & Gas
JICA  Japan International Cooperation Agency
KTOE  1000 tonnes of oil equivalent
LNG  Liquefied Natural Gas
LPG  Liquefied Petroleum Gas
MFO  Medium Fuel Oil
mmBtu  Million British Thermal Unit
MMSC  Malaysian Mining Shapadu Consortium
mmscfd  Million Standard Cubic Feet per day
NEP  New Economic Policy
NGDS  Natural Gas Distribution System
NGV  Natural Gas for Vehicle
PDA  Petroleum Development Act 1974
PGU  Peninsular Gas Utilization
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC</td>
<td>Production Sharing Contract</td>
</tr>
<tr>
<td>TGMC</td>
<td>Tokyo Gas and Mitsui Consortium</td>
</tr>
<tr>
<td>TNB</td>
<td>Tenaga Nasional Berhad</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
</tbody>
</table>