THE FEASIBILITY STUDY REPORT ON CITY GAS DISTRIBUTION SYSTEMS IN THE KLANG VALLEY AREA OF MALAYSIA

MAY, 1987

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO, JAPAN

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PREFACE

In response to the request of the Government of Malaysia, the Government of Japan has decided to conduct a feasibility study on the City Gas Distribution Project in the Klang Valley Area of Malaysia and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Malaysia a study team headed by Mr. Kazutsura Cho, Tokyo Gas Engineering Co., Ltd. twice in the period of from May to October, 1986.

The team had discussions with the officials concerned of the Government of Malaysia and conducted a field survey in the Project-related areas. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of Malaysia for their close cooperation extended to the team.

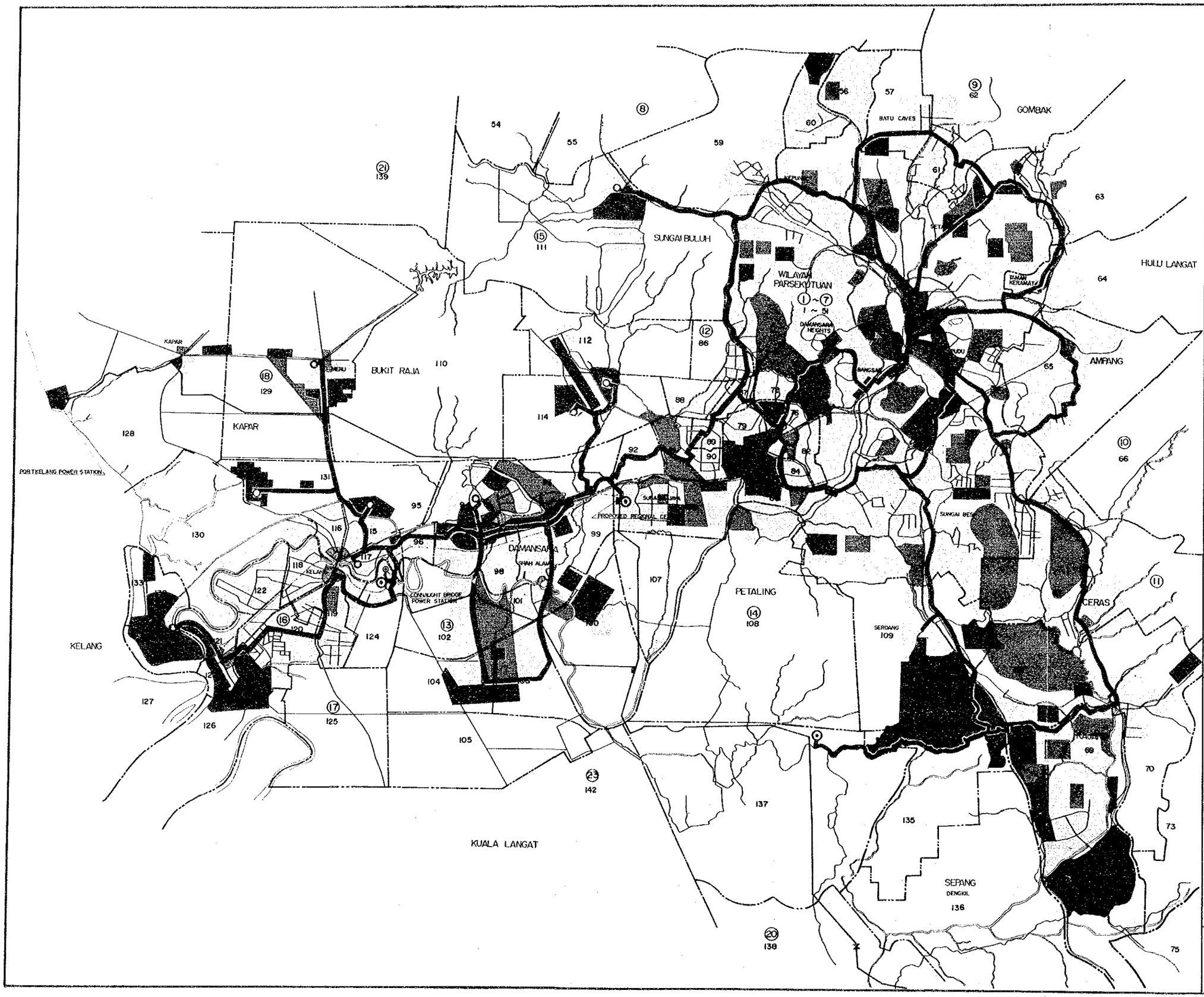
Tokyo, May 1987

Keisuke Arita

Keisuke Arita
President

CITY GAS SUPPLY AREA AND TRANSMISSION PIPELINE ROUTE (in 2005)

FIGⅢ-1



ABBREVIATION

Organization and Project

ADB	Asian Development Bank
ASEAN	Association of South East Asian Nations
BP	BP Malaysia Sdn Bhd
Consultant	Tokyo Gas Engineering, UNICO International Corporation
DID	Drainage and Irrigation Department
EPMI	Esso Production Malaysia Inc
EPU	Economic Planning Unit
EIA	Environmental Impact Assessment
ESSO	Esso Malaysia Bhd
FAO	Food and Agricultural Organization of the United Nations
FELCRA	Federal Land Consolidation and Rehabilitation Authority
FELDA	Federal Land Development Authority
F.T of K.L	Federal Territory of Kuara Lumpur
GDP	Gross Domestic Product
GDPC	Gross Domestic Originated from Commercial Sector
GDPM	Gross Domestic Originated from Manufacturing Sector
GDPR	Real Gross Domestic Products
GNP	Gross National Product
GNPR	Real Gross National Products
GRP	Gross Regional Product
GPS	Gas Pricing Study
HAM	Highway Authority Malaysia
HICOM	Heavy Industries Corporation of Malaysia
HPU	Highway Planning Unit
ICU	Implementation Coordination Unit
JACTIM	The Japan Chamber of Trade & Industry, Malaysia
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KL	Kuala Lumpur
KVPS	Klang Valley Planning Secretariate
KVRPC	Klang Valley Regional Planning Council
KVTS	Klang Valley Transportation Study
MA	Ministry of Agriculture

METP	Ministry of Energy, Telecommunication and Posts
MIDA	Malaysian Industrial development Authority
MFT	Ministry of Federal Territory
MHLG	Ministry of Housing and Local Government
MLRD	Ministry of Land and Regional Development
MPW	Ministry of Public Works and Public Utilities
MRA	Malayan Railway Administration
NEB	National Electricity Board
NUP	National Urbanization Policy
OECF	Overseas Economic Cooperation Fund, Japan
PERNAS	Perbadanan Nasional Berhad
PETRONAS	Petroliam Nasional Berhad
PDSB	PETRONAS Dagangan Sdn Bhd
PJ	Petaling Jaya
PGSB	PETRONAS Gas Sdn Bhd
PGUP	Peninsular Gas Utilization Project
PMD	Prime Minister's Department
Project	Overall project including planning, design, construction, operation, etc. related to the natural gas based city gas supply system to be located in the Klang Valley area of Malaysia
PWD	Public Works Department
SERU	The Social Economic Research Unit
SHELL	Shell Malaysia Berhad
SIRIM	Standards and Industrial Research Institute of Malaysia
SSB	Sarawak Shell Bhd
SSS	Selangar State Secretariate
SEPU	State Economic Planning Unit
S/W	"Scope of work" which is a written scope of feasibility study on the project contained in the agreement between EPU and JICA
TCD	Telecommunication Department, Malaysia
TPGPP	Trans Peninsular Gas Pipeline Project
UDA	Urban Development Authority
UNDP	United Nations Development Programme
WHO	World Health Organization

Unit and Conversion

mm	Millimeter
cm	Centimeter
m	Meter
km	Kilometer
in	Inch (1 in = 2.54cm)
ft	Foot (pl. feet)(1 ft = 0.305m)
cm^2	Square centimeter
m^2	Square meter
ha	Hectare (1 ha = 10,000m^2 = 2.471acres)
ft^2	Square foot (1 ft^2 = 0.0929m^2)
m^3	Cubic meter
Nm^3	Normal cubic meter at 0°C and 760 mm Hg
MMm^3	Million cubic meters
SCF, cu ft, cft	Standard cubic foot (1 ft^2 = 0.0283m^3)
MMSCF	Million standard cubic feet
l	Liter
kl	Kiloliter
gal	Gallon (1 British gallon = 4.546litters, 1 U.S. gallon = 3.785litters)
bbl	Barrel (1 barrel = 42 U.S. gallons)
g	Gram
kg	Kilogram
t, T, ton, Ton	Metric ton
lb	Pound (1 lb = 0.454kg)
LMT	Liquid metric ton (50% aques solution of caustic soda)
sec	Second
min	Minute
h, hr, Hr	Hour
d, D	Day
m, M	Month
y, Y	Year
°C	Degree centigrade
°F	Degree Fahrenheit
cal	Calorie
Kcal, K cal	Kilo calorie
BTU, Btu	British thermal unit (1 BTU = 0.252 K cal)

KBOE	Kilo barrel Oil Eqivalent
KTOE	Kilo ton Oil Equivalent
MMBTU, MMBtu	Million British thermal units
LHV	Low heating value
HHV	High heating value
PJ	Petajoule A Ampere
V	Volt
W	Watt
kW	Kilowatt
mW	Megawatt
kVA	Kilo-volt ampere
mVA	Mega-volt ampere
kWH, kWh	Kilowatt-hour
mWH, mWh	Megawatt-hour
HP	Horsepower
%	Percent
ppm	Parts per million
g/Nm^3	Gram per normal cubic meter
pH, PH	Hydrogen ion concentration
kg/cm^2	Kilogram per square centimeter
lb/in^2	pounds per square inch
mmAq	mm aqua (= water)
t/d, T/D	Metric tons per day
t/y, ton/y, MTA, MT/Y, T/Y	Metric tons per year
MMSCFD, MMscfd	Million standard cubic feet per day
BPCD	Barrels per calendar day
BPSD	Barrels per stream day
TPCD	Tons per calendar day
TPSD	Tons per stream day
MD	Man days
F/Ton, F/T	Freight tons

Technical Terms

ATF	Aviation Turbine Fuel
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
NG	Natural Gas
CNG	Compressed Natural Gas
BFW	Boiler Feed Water
CTW	Cooling Tower Water
FO	Fuel Oil
MFO	Medium Fuel Oil
MTBE	Methyl Tertiary Butyl Ether
E.P.C.	Engineering, Procurement and Construction
Flash Point (COC)	Flash Point (Cleveland Open Cup)
MM	Millions or Man-Months

Financial and Economic Terms

DCF	Discounted cash flow
IRR, IRROI	Internal rate of return on investment
EIRR, EIRROI	Economic internal rate of return on investment
FIRR, FIRROI	Financial internal rate of return on investment
IRROE	Internal rate of return on equity
C & F	Cost and freight
CIF	Cost, insurance and freight
FOB	Free on board
EMP	Energy Master Plan

Exchange Rate

M$, MD	Malaysian Ringgit (1 U.S. Dollar = M$2.65)
$, U.S.$	U.S. dollar
Yen	Japanese Yen (1 U.S. Dollar = 167 Yen)

ENERGY CONVERSION TABLE

Energy	Carolific Value in MMBTU	Carolific Value in kcal	Carolific Value as Natural Gas
LPG	47.23 MMBTU/Ton	11,902 kcal/kg	1 kg = 1.2051 Nm^3
Kerosene	43.97 MMBTU/Ton (S.G. 0.8)	8,864 kcal/liter	1 liter = 0.8975 Nm^3
Diesel	43.33 MMBTU/Ton (S.G. 0.85)	9,281 kcal/liter	1 liter = 0.9398 Nm^3
M.F.O.	41.03 MMBTU/Ton (S.G. 0.95)	9,823 kcal/liter	1 liter = 0.9946 Nm^3
Coal Bitumunous	11,000 BTU/lb	6,111 kcal/kg	1 kg = 0.6188 Nm^3
Wood		3,000 kcal/kg	1 kg = 0.3038 Nm^3
Charcoal		7,000 kcal/kg	1 kg = 0.7088 Nm^3
Electricity		860 kcal/kwh	1 kwh = 0.0871 Nm^3
Natural Gas	1,050 BTU/SCF	9,876 kcal/Nm^3	-

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PART I THE BACKGROUND AND RELEVANT CONDITIONS

Chapter 1 GENERAL ECONOMIC SITUATION OF MALAYSIA

1.1 Economic Growth (Historical)

1.1.1 Gross Domestic Products (GDP)

The gross domestic product (GDP), after having growth of at 6% per annum during 1960's, recorded a rate of growth of 7.8% per annum during 1970 - 80, resulting in rising per capital income and major structural shifts in the economy. During the period 1981 - 1985 GDP grew at an average rate of 5.8% per annum in real terms as shown Table I.1.

The high growth of GDP during the Fourth Plan period was sustained by the expansion in the tertiary and secondary sectors. Significant structural changes in composition of output occurred among and within sectors.

The manufacturing sector became the largest sector in the economy 1984. However, in 1985, its contribution for total output was lower than that of agriculture due to significant decline of output in electronics, iron and steel, and non-ferrous metal and petroleum product as shown in Table I.1. The GDP by industrial origin during 1970 - 1980 are shown in Table I.2. The GDP by industrial origin and GRP of Selangor state and F.T of K.L are mentioned in Table I.3 and I.4.

1.1.2 Population

The population of Malaysia increased at an annual rate of 2.6% from 10.78 million in 1970 to 13.9 million in 1980 and at an annual rate of 2.6% to 15.8 million in 1985 as shown in Table I.5.

The population growth of F.T of K.L. and Selangor is highest among regions, therefore, the ratio of population in Federal Territory and Selangor to Malaysia total rose from 15.1% in 1970 to 18.8% in 1985 as shown in Table I.5.

No. of Household Size

Total household in Malaysia in 1970, 1975 and 1980 are 1.61 million, 1.90 million and 2.27 million respectively. In spite of rapid economic growth, still poor household remain in rural area. Table I.6 shows the incidence of poverty by state and rural-urban strata 1970, 1975 and 1980.

The average household size in Malaysia shows a declining trend resulting from 5.5 persons in 1970 to 5.2 persons in 1980.

In Fourth Malaysia Plan, average household size in 1985 was estimated to be 5.0 persons. Table I.7 shows number and average size of household by ethnic group in Peninsular Malaysia.

Household Income

The Social Economic Research Unit (SERU) conducted household well-being Survey in 1982. The survey indicates that middle income states of Pulau Pinang, Johor and Melaka had per capital income close to the average per capital household income of Peninsular Malaysia of $128 per month, while the Federal Territory, Selangor and Negri Sembilan recorded monthly per capital income of $308, $171 and $130, respectively. Table I.8 shows per capita monthly household income by state.

1.1.3 Employment

Total Employment grew at annual rate of 2.6% during the period 1981 - 1985 compared with 3.0% expected by the Fourth Five Year Plan as shown in Table I.9. While 808,200 people entered as the labour force during the period, the economy generated only about 651,600 new jobs due to slower rate of job creation, particularly in manufacturing, mining and agriculture. Accordingly, unemployment rate is increased from 5.7% to 7.6% during 1981 to 1985.

1.1.4 Regional Development

Regional development is aimed at reducing disparities among regions. Malaysia can be disaggregated into six regions, namely, Northern, Central, Eastern, Southern, Sabah and Sarawak.

The development of a region can be assessed through quantative indicators of growth and through changes in the structure of the regional economies. Physical inputs in terms natural as well as manpower resources are also important to the development of a region since their availability and exploitation partly determine the level of development in the various regions.

The progress of development in each region during the period 1980 -1985 can be clarified by the selected key regional indicators as shown in Table I.10.

1.1.5 Urban Development

Urban development complements the strategy for reducing the imbalances among regions and areas. Urbanization in Malaysia progressed by guidance of National Urbanization Policy (NUP) due to the rapid growth in the industrial sector, rural-urban migration and the expansion of administrative boundaries of intermediate-sized urban centres. Urban population of Malaysia increased from 4.75 million (34.2%) in 1980 to 5.91 million (37.4%) in 1985 as shown in Table I.11.

1.1.6 Housing

During the period 1981 - 1985, about 406,070 housing units were constructed, representing 44.0% of the target of the Fourth Five Year Plan as shown in Table I.12. The overall shortfall in the construction of housing units during the Fourth Plan period was 56.0%. In the case of low-cost housing programmes, the shortfall was 66.0% while that for medium and highcost programmes 50.3%.

The percentage of housing units constructed is 57.8% by private sector and 42.2% by public sector.

1.1.7 Manufacturing Industry

The manufacturing sector (GDPM) grew at annual rate 12.5% during the period 1970-1980 and 4.9% during the period 1981-1985 as shown in Table I.13.

During the period 1982 - 1985 in Peninsular Malaysia the electrical industry achieved the highest growth (average annual growth rate 12.8%) followed oil and fats (9.1%), petroleum refineries (8.2%), iron and steel (7.2%) and fabricated metal products as shown in Table I.14.

1.1.8 Commercial Sector

The commercial sector (GDPC) grew at an annual growth rate 7.46% during the period 1971 - 1980 and 6.88% during the period 1981 -1985 as shown in Table I.15.

Wholesale and retail trade, hotels and restaurants sector grew at an annual growth rate 7.3% during the period 1971 - 1980 and 7.0% during the period 1981 - 1985 as shown in Table I.16.

1.2 Fifth Five Year Plan

The study team has summarized the data which will effect on the city gas supply system in the following tables from the Fifth Five Year Plan.

(1) Selected key regional indicators 1980, 1985 and 1990 (Table I.17(1))

(2) Population and housing performance and programmes (Table I.17(2))

(3) Distribution of urban population by region (Table I.17(3))

(4) Manufacturing industry and commercial sector (Table I.18)

These data are used for estimation of future population, GRP and employment in Klang Valley Area and also for demand forecast of energy in manufacturing industry as coefficient of energy demand per employment.

1.2.1 Population

The annual population growth rates from 1985 to 1990 in Malaysia, Selangor and F.T. of K.L. are 2.5, 3.4 and 3.4% which show the population growth rates in Selangor and F.T. of K.L are higher than others due to high net migrant from Northern and Southern Area. (Table I.17(1)).

The population in Selangor and F.T. of K.L. are increased only in urban area but not in rural area, accordingly urbanization rate (%) are increased in Selangor Area from 45.7 to 55.3% during 1985-1994 (Table I.17(3)).

1.2.2 Per Capita GDP

Ratio of per capita GDP to Malaysia average, in Selangor and F.T. of K.L. in 1985 and 1990 are 1.32/2.07 and 1.24/2.09 which show that per Capita GDP in K.L. is very high in comparison with others and is estimated to reach M$8,855 in 1990. (Table I.17(1))

1.2.3 Industry

Growth rate of manufacturing industry and whole sale/retail/hotel /restaurant (tertiary sector) in Malaysia, Selangor and F.T. of K.L. from 1986 to 1990 are 6.4/6.3/6.0 and 6.3/6.8/6.9 which show that manufacturing industry in Selangor and tertiary sector in F.T. of K.L. are expected to be grown with higher rate in comparison with others. (Table I.17(1)) GDPM per employment in 1980, 1985 and 1990 are M$11.82, M$13.72 and M$16.48 which show the sifting of industrial structure. (Table I.18)

Energy consumption per employment of manufacturing in 1980, 1985 and 1990 is 0.145, 0.196 and 0.258 PJ which show also sifting of industrial structure.

1.2.4 Employment

Employment increase rate in manufacturing industry and Tertial Sector in Malaysia from 1985 to 1990 are 2.6% and 4.3% which are higher than growth rate of population of 2.4%.

1.2.5 Housing

The construction of houses during 1981-1985 is 406,070 in Malaysia which is 44% of the Fourth Plan and 701,500 is planned to be constructed during Fifth Five Year Plan in Malaysia and the estimated unit needs in Malaysia, Selangor, F.T. of K.L. are 647,700, 124,000 and 63,800. (Table I.17(2))

1.3 Current Economic Situation of Malaysia

The economic situation in Malaysia has worsened recently mainly due to adverse developments in the world economy and to substantial decline of the Commodity Prices.

Table I.19 shows the key data and forecasts of Malaysia mentioned in the Economic Report 1986/1987.

From this table, the followings are observed.

(1) GDP growth rate during 1985-86 is very low and of 1987 is estimated also low and the main factor of low growth is minus growth of the construction sector.

(2) Reduction of revenue of federal government finance is estimated in 1986 and 1987.

(3) Commodity prices (rubber, tin, palm oil and crude oil) were dropped during 1985 and 1986 and are estimated to be low in 1987.

(4) Total export amount is slightly higher than total import amount in 1986/87.

(5) Consumer prices index in 1985 and 86 are low and in 1987 is expected as 1%.

(6) Unemployment rates in 1985, 1986 and 1987 are 7.6%, 8.7% and 9.5%.

(7) Exchange rate to 1 US$ in end August 1986 is 2.61 Malaysia Ringgit.

To meet the above situation, the government announced the cost cutting budget of 1987. (M$27,412 million which is about 11% less than original allocation for 1986)

And the Government proposed the voluntary three-year wage freeze.

In consideration of the above situation, EPU proposed the following conditions to the Study Team as the alternative case in October 1986 when the Study Team was K.L.

1) GDP Growth Rate

	1985 - 1990	1991 onwards (%)
Base Case	5	5
Medium Case	3	5
Low Case	1	3

2) Escalation Factor

	1985 - 1990	1991 onwards (%)
Local	1.4	3.5
Foreign	3.2	5.0

3) Exchange Rate: M$/US$ 2.65

4) Construction schedule (start of construction) for medium and low case should be delayed 3 years from 1990 for base case.

After that, EPU has sent to JICA, the following information in November in addition to the above.

(1) Gross Domestic Product by kind of economic activity 1985-1990 based on GDP growth rate about 1% and 3%.(Table I.20(1) and (2))

(2) Employment Estimate (Table I.20(3))

The share of GDP of F.T of K.L and Selangor state to Malaysia estimated by Study Team is very close with the calculated figures based on GDP of Malaysia using growth rate of 1% and 3% and GRP informed by EPU in November as mentioned below.

SHARE TO MALAYSIA (%)

		F.T of K.L	Selangor	Total
Our Estimation	1985	15.1	15.2	30.3
	1990	15.9	15.0	30.9
New Calculation	1985	14.8	15.2	30.0
	1990	15.4	15.4	30.8

The unemployment rate for low case is estimated as 12% in 1990 and 10% after 1990 at the meeting on 27th October, however, it becomes to 17% in 1990 if new information is used. No time to discuss about this matter, therefore, 12% in 1990 and 10% after 1990 are adopted for low growth case.

The growth rate by sector for base case and for medium and low cases informed newly are mentioned in the Table I.24. As the city gas user in industry, manufacturing industry and restaurant are most important. The growth rates of manufacturing industry between base case, medium and low case seems in reasonable ratio.

The future GRP by sector for medium and low cases is estimated on the assumption that some years will be delayed from base case due to lower growth rate than base case.

Chapter 2 DEVELOPMENT PLAN IN KLANG VALLEY REGION

2.1 Development Plan in Klang Valley Region

2.1.1 The Study Area of the City Gas Project

The Study area of city gas project is Klang Valley Region consisting of F.T of K.L. and 4 districts; Gombak, Petaling, Klang and Hulu Langat (Figure I.1).

2.1.2 Study Reports on the Development of the Region

The study team obtained the following reports concerning the development of Klang Valley Region.

(1) Klang Valley Perspective Plan
(2) Kuala Lumpur Structure Plan
(3) Shah Alam Extension Plan
(4) Bangi Structure Plan
(5) Klang Structure Plan (draft)
(6) Gombak Structure Plan (in Malay)
(7) Klang Valley Transportation Plan (Progress Report)

With the consent of EPU and Klang Valley Planning Secretariat, the Study team had the opportunity to study the analysing method and information which are used for the study on transportation, and found that Transportation Study are going on the base of the above study reports (1) - (6) and Questionnaire Survey which has been conducted by Transportation Study team in 1985 to supplement of census in 1970 and 1980.

The Study Team found that the method applied in the Transportation Study to divide district area into zone and to distribute population and employment to each zone and to plan land use is adequate and found also, between both studies (Transportation and City Gas), there are the common bases. Therefore, the Study team has decided to use the data which has been formulated in the Study of Transportation.

One of our study team has worked in the office of Klang Valley Secretariate to study and cooperate for the modification work of Progress Report of Transportation Study.

Supplemental informations in addition to the Transportation Study for the study of City Gas were collected also from the above study reports.

2.1.3 Gross Regional Product (GRP)

For the future projected growth rate of GDP of Malaysia, the steering committee of Malaysia and the Study Team has agreed to use the following figures.

(1) GDP Growth Rate

	1985 - 1990	1991 onwards (%)
Base Case	5	5
Medium Case	3	5
Low Case	1	3

The projected GDP is mentioned in Table I.22.

Figure I.2 shows the process of GRP projection in Klang Valley.

The Gross Regional Product (GRP) of Selangor State and the Federal Territory of Kuala Lumpur in 1980 and 1985 are shown in Table I.23.

The growth rate of GRP of Kuala Lumpur was higher than that of the GDP, but that of Selangor State was lower. (Table I.23)

Share of GDP of Kuala Lumpur is projected to increase at the same pattern in future and that of Selangor State is also projected to increase slowly taking into account several development plans. The projected GRP of Federal Territory and Selangor State up to 2005 is mentioned in Table I.24.

Future GRP of Klang Valley Region is arrived at by taking into account the existing share of the number of employment and the industrial structure

changes in Selangor State and Kuala Lumpur. The projected GRP of Klang Valley Region is mentioned in Table I.25.

Future GRP of Klang Valley by industry for base case is broken down by taking into account the past trend of each industry in Selangor State and Kuala Lumpur as reported in the Fifth Malaysia Plan and the GRP of Klang Valley and the results are mentioned in Table I.26.

Future GRP of Klang Valley by industry for medium and low cases is estimated on the assumption that some years delay from base case due to lower growth rate.

2.1.4 Population

The future population in the Study Area for 1995 and 2005 are projected by taking into account the national and regional development goals and strategies. Consequently, the population in the Study Area is expected to grow from 2,534,000 in 1985 to 3,940,000 in 1995 and 5,550,000 in 2005, including Bukit Tinggi which is to be developed as a twin city of Kuala Lumpur and is assumed to have 100,000 population in 2005.

The population is initially broken down into districts and major towns based on the proposed population distribution pattern in the Klang Valley Perspective Plan and targets in the Structure Plans.

A summary chart for population projection by districts is shown in Figure I.3 and the results are shown in Table I.27.

2.1.5 Employment

The number of future employment is projected based on the GRP and population estimates. A summary sheet for the employment projection is shown in Figure I.4.

As an assumption for the projection, it is considered that the participation rate will grow slowly while the unemployment rate will decrease in future for base and medium cases.

Consequently, the total employment in the Study Area is expected to grow from 950,000 in 1985 to 2,190,000 in 2005, including 40,000 in Bukit Tinggi for base case and medium case and to 2,075,000 in 2005 for low case based on unemployment rate of 12% in 1990 and of 10% after 1990.

Employment by industry is projected based on the value added (Table I.29) and the total employment.

The primary industry is expected to decline slowly, the secondary industry is expected to grow to 2.8 times from 1985 to 2005, and the tertiary industry is also expected to grow to 3.4 times for the same period for base case. The value added per employment and employment by industry are shown in Table I.29 and I.30.

Employment by industry by districts is derived based on the ratio of employment in the working and the residential location and the census population figure in 1980.

Future values of this ratio for Kuala Lumpur and Petaling district are assumed to decrease judging from the effects of development promoted in the other districts as mentioned in Table I.31.

Consequently, the employment by industry by districts as expected is shown in Table I.32.

2.1.6 Future Land Use

The future land use plan is prepared based on the analysis of the Structure Plans. The past development trend and the committed development plan by PKNS is reported in the Klang Valley Transportation Study.

Although the Klang Valley Transportation Study is still on going, the results of the analytical review indicate that the proposed future land use plan is realistic and hence acceptable for this Study.

The proposed Development Strategy in Klang Valley Transportation Study is as follows (Extract from Klang Valley Transportation Study Progress Report II, March 1986 JICA).

(1) Development Strategy up to 1995

In Kuala Lumpur, Wangsa Maju New Centre where plans for a large portion has already been approved, Segambut areas and Bandar Tun Razak will be given preference to develop. In view of the present economic slow down, it is also important for Kuala Lumpur to phase out the approved commercial development and hence give a better chance for the other centres to catch up.

In Shah Alam, besides implementing the on-going development at the present town centre, areas in the HICOM and next to Taman Sri Muda will be given preference to develop.

Selayang Town Centre should also be given priority to develop by 1990 in order for this new township to take shape and provide the basic urban services.

Up to 1985, the development areas by PKNS for the Bangi Town Centre area and the Klang North Port areas will be given priority.

For Klang, some development at Meru will be encouraged and Phase I of the Pulau Lumut Port should be implemented.

Some development is also to be allowed at Sungai Buloh, Rawang, Kuang and Semenyih.

(2) Development Strategy by 2005

The southern Bukit Jalil are in Kuala Lumpur and the south of Petaling Jaya area will be the new development areas for the Kuala Lumpur Conurbation. Any further extension is not encouraged.

The development of Shah Alam will further extend towards the south with the development of the southern town centre and additional housing and industry. Shah Alam is to achieve a target population of 430,000 people.

Further development around the central core area in Bangi will be implemented and the Bangi Newtown would have become fully developed

with its self-contained services, employment for a population of about 200,000 people.

For Klang, the Malay Reserve Areas to the north of the existing urban area is to be developed with further expansion of Meru and Kapar townships. With these development, Klang will accommodate a total urban population of some 460,000 people by 2005.

Bukit Tinggi Twin City will be developed through encouraging the development of governmental institutions, housing, basic commercial and industry.

The maps of the land use in urban area of study area in 1985, 1990 and 2005 are shown in Figure I.5, I.6 and I.7.

2.1.7 Supplementary Data from the Study Reports

(1) Income distribution

The Study Team obtained the following data and decided to use the last one by the recommendation of Klang Valley Secretariat in consideration of that one is newest and is concerned to urban area.

1) Estimation of future income distribution in Kuala Lumpur, Shah Alam and Klang from the respective Structure Plan.
2) Household Income Distribution in Peninsular Malaysia, Federal Territory of K.L. and Selangor, 1976.
3) Income Distribution studied by Transportation Study Team (Table I.33).

Income Distribution of the last one was estimated by the Transportation Study Team by using questionnaire survey in 1985.

The future income distribution will be estimated taking into account of GDP Growth, Change of household size and of household size per dwelling unit.

(2) Ethnic distribution

The Study Team will use the table of SCENARIO OF TARGET IN KLANG VALLEY BY DISTRICT AND ETHNIC GROUP and SCENARIO OF POPULATION IN KLANG VALLEY IN MAJOR GROWTH CENTER mentioned in the Klang Valley Perspective Plan for Ethnic distribution. (Table I.34 and I.35)

(3) Size of household

The Study Team obtained the following information from the Study Reports about size of household.

1) Estimation of household size in the extension plan of Shah Alam and Report of Survey of Bangi Structure Plan (Table I.36 and I.37)
2) Estimation of future household size in the Progress Report of Transportation Study.

The Study Team will take the estimation of (2), however, number of household per dwelling and occupancy rate mentioned in the Reports of (1) will be used.

(4) Housing need by district

Housing need is described in all reports, the Study Team will use the table of "TOTAL HOUSING NEEDS BY DISTRICT, FOR URBAN AND RURAL IN KLANG VALLEY BETWEEN 1980-1990" and also the "HOUSING DEMAND BY URBAN INCOME GROUP IN KLANG VALLEY, 1990" which are mentioned in the Klang Valley Perspective Plan. (Table I.39/40)

The need of housing after 1990 will be estimated based on population increase mainly.

(5) Squatter's housing

About number of persons in squatter area and of their house are described in the Study Reports. The Table I.41 is made from the data mentioned in the Klang Valley Perspective Plan. The Study Team will assume the followings about squtter.

The population in squatter area will decrease by removing to the low cost housing which is under construction for low income household below 750 Malaysian Dollar step by step according to the construction schedule, however, 50% of population will be estimated to remain as the squatters by 2005.

(6) Manufacturing Industries

In the Klang Valley Perspective Plan, the desirable and undesirable industries are classified as follows.

1) Desirable industries

- High technology industries because skilled labour is available in Klang Valley Region
- Supporting industries for the above
- Export oriented industries

2) Undesirable industries

- Industries to bring environmental pollution
- Labour intensive industries
- Industries consuming raw material obtained outside of Klang Valley

In the Klang Valley Region, the share of manufacturing industries in Kuala Lumpur is low but in Shah Alam is very high.
Selangor industry Estate is mentioned in Table I.42 and 43.

Manufacturing Industry in Shah Alam and Klang has speciality. In Shah Alam, high technology industry has developed including a national car manufacturing factory and several assembling factories of car and motor cycle and some factories manufacturing parts and equipments for the above products. The list of HICOM project and map of industrial zone of Shah Alam are mentioned in Table I.44 and Figure I.8.

Klang is located at sea side and has a big port, therefore there is a possibility to develop of heavy industries and also export oriented industries. The existing and planned industrial estates and map of location of industries are mentioned in Figure I.9.

2.2 Population and Development in Each Zone

2.2.1 Zoning

The zones have been delineated generally on the basis of the following criteria and the process of zoning is mentioned in Figure I.10.

(1) The boundary of the zone shall conform to the enumeration blocks or groups of enumeration blocks of the 1980 housing and population census. The boundary of a group of zones shall also conform to the boundary of the district, mukim or municipality. This will facilitate the collection of available data on landuse and socio-economic data.

(2) The boundary of a zone shall follow natural and man-made physical features such as rivers, railways and roads.

(3) The area covered by a zone shall define the area served by roads or public transport routes to reflect the intensity of the transpot networks.

(4) The size of the zones shall be variable, generally increasing with distance from town centre, to reflect the intensity of the transport network.

As a result, the Study Area is divided into the following number of zones as mentioned in Figure I.11, 12 and 13.

Kuala Lumpur	:	51 zones
Gombak	:	13 zones
Klang	:	19 zones
Petaling	:	39 zones
Hulu Langat	:	11 zones

2.2.2 Population

The residential population calculated for future by zones are based on the land use plan by the Klang Valley Transportation Study.

The result of the 1980 National Census was used as a base of residential population by zone.

Population in 1980 by zone was calculated by summing up the Enumeration Blocks (E.B) population of each zone.

The future population of zone i in 2005 is calculated as follows:

Pi = A x (Residential area of zone i) +
B x (Commercial and Business area of zone i) +
C x (Industrial area of zone i)

Where:

A = Density of residential area
B = Density of residential population in commercial and business area
C = Density of residential population in industrial area

The value in 1995 is obtained by interpolating between 1985 and 2005 considering the progress of development in each zone.

Future population allocation is proposed by planning zone in the Kuala Lumpur Structure Plan, Shah Alam Structure Plan, Bangi Structure Plan and Gombak Development Plan. These values are referred to in this calculation.

2.2.3 Employment

The employment calculated for future by zones are also based on the land use plan by the Klang Valley Transportation Study.

The employment by sector is calculated for each zone. Classification by sector is as follows:

Sector I : Agriculture, Forestry and Fishery
Sector II : Mining, Manufacturing and Construction
Sector III : Transport, Utilities, Commercial and Services

The result of the Home Interview Survey by the Klang Valley Transport Study was used as a base for the existing employment by zone for 1985.

From the 1980 national census, the number of workers by residential location was 7.6% in Sector I, 30.7% in Sector II and 61.7% in Sector III in the Klang Valley Area.

Within the Klang Valley Area, the total number of workers by residential location is almost the same as the number of workers by employment location.

The future employment is calculated based on the future land use in 2005.

Primary Employment of Working Location

PEi = A x AAi + B x CAi

PEi	: Primary employment in zone
A, B	: Density of primary employment in agricultural area and commercial area
AAi, CAi	: Agricultural and commercial area in zone i

Secondary Employment of Working Location

SEi = A x IAi + B x CAi + C x RAi

SEi	: Secondary employment in zone i
A, B, C	: Density of secondary employment in industrial area, commercial area and residential area
IAi, CAi, RAi	: Industrial, commercial and residential area in zone i

Tertiary Employment of Working Location

TEi = A x CAi + B x RAi

TEi	: Tertiary employment in zone i
A, B	: Density of tertiary employment in commercial and residential area
CAi, RAi	: Commercial area and residential area in zone i

The value in 1995 is interpolated between 1985 and 2005 considering the progress of development in each zone.

In several Structure Plan, future employment allocation is decided by planning zone. The values are referred to in this calculation.

At present, these values are projected by the Klang Valley Transportation Study.

Chapter 3 ENERGY

3.1 Energy Demand in Malaysia and Klang Valley

3.1.1 Energy Demand in Malaysia

(1) Energy Policy

Malaysian Government formulated an overall energy policy which established the broad guidelines on long-term energy objectives and strategies. Specific policies were formulated for oil sector to guide the petroleum industry in line with national development objectives.

During the Fourth Malaysia Plan period, the emphasis was placed on reducing the dependence on oil for power generation, diversifying energy resources, increasing the coverage of electricity supply to rural area as well as promoting efficiency in energy use and conservation.

The four-fuel diversification strategy was formulated as an focus of energy diversification policy, namely, hydropower, oil, gas and coal, which aimed at ensuring reliability and security supply, while reducing the dependence on oil in energy consumption. The objective of this strategy was to utilize non-oil domestic energy, particularly gas and hydropower, which resulted in increasing self reliance with respect to energy supply and savings in foreign exchange.

Under the Fifth Malaysia Plan, these strategies will continue to be pursued.

Attention will also to be directed to integrated energy planning with a view to ensuring systematic and optimal development objectives.

Malaysia government has initiated the National Energy Planning Study conducted mainly by Economic Planning Unit from November 1983. This study supported by the World Bank's Loan was completed in April 1985.

In the Fifth Malaysia Plan, analysis on actual energy demand and forecast on energy demand were performed on the basis of the results of this study.

Table I.45 shows actual results and forecast of primary supply of energy in Malaysia. Primary supply of energy grew at 8.7% per annum from 447.8 petajoule (PJ) in 1980 to 769.6 PJ in 1985. After 1985, an average annual growth rate is estimated to decrease at 4.9 percent per annum, then primary supply of energy in 1990 is estimated to be 863.1 PJ. After 1985, in contrast with moderate increase of average annual growth rate 4.9% of oil and petroleum products, primary supply of natural gas and coal/coke are projected to increase conspicuously.

The share of crude oil in total primary supply is estimated to be 55.1% in 1980, 53.0% in 1985, 41.7% in 1990. In contrast with decline of share of crude oil, the share of natural gas and coal/coke are expected to rise conspicuously. The share of natural gas and coal/coke are estimated to be 0.5% and 0.5% in 1980, 18.1% and 2.8% in 1985, 20.8% and 8.7% in 1995, respectively.

The increase of share of natural gas in total primary supply of energy was primarily attributed to the timely development of the gas resources as part of Four-fuel diversification strategies. The share of coal/coke grew due to the increase of consumption in cement plants and foundries.

The change of electricity generation by source is shown in Table I.46. The share by source in 1980, oil was 87.2%, hydropower 12.5%, natural gas 0.3%, respectively.

By 1985, the share of oil in the electricity generation is declined to 65.8%, while hydropower and natural gas increased to 24.9% and 9.3%, respectively. This is in line with the strategy of the sector to diversify away from high cost fuel oil to cheaper domestic gas and hydro resources. The conversion from oil to natural gas will proceed rapidly, therefore the of natural gas in the electricity generation is estimated to increase to 50.6% in 1990.

Table I.47 shows actual results and the forecast of energy final demand in the national energy planning study. The energy final demand grew at 7.4% per annum from 333.4 PJ in 1980 to 476.7 PJ in 1985. After 1985, the annual average growth rate is estimated to decrease at 0.4 point, so the energy final demand is estimated to be 668.9 PJ in 1990. The energy which grew conspicuously are coal/coke and natural gas. The average annual growth rate of them are 82.3% and 66.7% respectively. In contrast with sharp increase of share of coal/coke and natural gas, the average annual growth rate of petroleum products was 6.5% resulting decrease of share from 69.6% in 1980 to 66.8% in 1985. The share of natural gas and coal/coke increased from 0.3% and 0.3% in 1980 to 2.4% and 3.8% in 1985, respectively.

This tendency will continue after 1985, the share of by kind is projected as follows, oil 64.7% (2.1 point decrease), natural gas 2.8% (0.4 point increase), coal/coke 5.8% (2.0 point increase).

Main sector of energy demand in 5th Malaysia Plan are manufacturing industry, household and transportation as shown in Table I.48 which show actual results and the forecast of energy final demand by sector. The share of manufacturing industry, household and transportation are 34.0%, 25.0% and 17.5% in 1985, respectively. The total share of three sectors above is estimated to increase slightly from 76.5% in 1985 to 78.7% in 1990.

(2) *Actual energy demand*

The Ministry of Energy, Telecommunications and Posts published National Energy Balance Malaysia as shown Annex Table I.1 - I.7.

Table I.49 shows the comparison of energy balance in 1979 and 1984.

The production of primary energy grew at 13.5% per annum from 16,935 KTOE in 1979 to 31,868 KTOE in 1984. The share in total primary energy production by kind changed during the period 1979-1984 as follows. The share of crude oil, natural gas and hydropower changed from 83.4%, 14.9% and 1.7% in 1979 to 69.8%,

27.3% and 2.9% in 1984, respectively. In contrast 13.6 point decrease of share of crude oil, natural gas and hydropower increase 12.4 point and 1.2 point respectively.

Imports of energy decreased slightly from 6,438 KTOE in 1979 to 6,382 KTOE in 1984 compared with increase of energy exports. Exports of energy grew at 13.2% per annum from 12,641 KTOE in 1979 to 23,525 KTOE in 1984, especially the exports of LNG which was initiated from 1983 contributed the growth of exports of energy.

Energy primary supply which integrated production, imports and exports, bunkers, stock change and statistical discrepancy grew at 6.5% per annum from 10,535 KTOE in 1979 to 14,453 KTOE in 1984. Crude oil charged for refining increased from 6,065 KTOE in 1979 to 7,638 KTOE in 1984. Petroleum products was produced 5,891 KTOE in 1979 and 7,600 KTOE in 1984.

Energy consumption for electricity generation increased from 2475.4 KTOE in 1979 of which Petroleum products 2,177 KTOE, hydropower 296 KTOE and natural gas 2.4 KTOE to 3,666 KTOE of which Petroleum products 2,672 KTOE in 1984, hydropower 913 KTOE and natural gas 81 KTOE.

The share of petroleum products in total energy consumption for electricity generation decreased from 87.9% in 1979 to 72.9% in 1984 compared with increase of the share of natural gas and hydropower. The share of natural gas and hydropower increased from 0.1% and 12.0% in 1979 to 2.2% and 24.9% in 1984, respectively.

The secondary energy conversion which integrated LNG production, refining, electricity generation, losses and own use and statistical discrepancy grew at 6.2% per annum from 4,751 KTOE in 1979 to 6,424 KTOE in 1984.

Energy domestic final demand in Malaysia grew at 6.8% per annum from 5,784 KTOE in 1979 to 8,029 KTOE in 1984. Table I.50 shows the energy domestic final demand in Malaysia by year by sector by kind during the period 1979 - 1984. The average annual growth rate

of demand for transportation was 9.0% which was the highest among sectors followed by residential/commercial sector 6.5%, Industrial sector 5.1% and Non-energy sector (lubricant and asphalt) 4.4%.

Demand for residential/commercial sector grew from 793 KTOE in 1979 to 1,088 KTOE in 1984, but the share of residential/ commercial sector in total energy domestic final demand in 1979 was 13.7% and 13.6% in 1984 as shown in Table I.51. The share of Kerosene demand in residential/commercial sector energy demand was 42.3% which was the highest in the sector, followed by electricity 41.5%, LPG 12.2%, natural gas 4.0% in 1979. In 1984, the share of electricity became highest, namely 50.8%, followed by Kerosene 30.6%, LPG 14.2%, natural gas 4.3%.

Energy demand for industrial sector grew from 2,614 KTOE in 1979 to 3,355 KTOE in 1984. The share of industrial sector in total energy domestic final demand declined from 45.2% in 1979 to 41.8% in 1984. The share of diesel demand in industrial sector was 51.8% which was the highest in the sector, followed by fuel oil 30.9%, electricity 13.7%, others 3.6% in 1979. In 1984, the share of diesel grew to 56.4% at 4.6 point increase compared with sharply 15.2 point decline of share of oil which decreased to 15.7%.

Energy demand for transportation performed the highest growth among three sectors as described above grow from 2,123 KTOE in 1979 to 3,271 KTOE in 1984. Therefore, the share of transportation sector in energy domestic final demand grew from 36.7% in 1979 to 40.7% in 1984 as shown Table I.51. The share of demand by kind in 1979, gasoline was 54.6%, diesel 35.7% and aviation fuel 9.7%. In 1984, the share of gasoline rose to 57.8% namely 3.2 point increase, due to high growth rate 10.3% per annum in contrast the share of diesel decreased to 30.8% due to medium growth rate at 6.9% per annum.

(3) Crude oil supply and demand

Remaining recoverable reserve of crude oil in Malaysia was estimated to be 2.35 billion barrels as of December 31, 1984 by the Ministry of Energy, Telecommunications and Posts as shown below.

REMAINING RECOVERABLE RESERVE OF CRUDE OIL

	(Unit: 1,000 BBLS)
Peninsular Malaysia	1,544,090
Sarawak	448,920
Sabah	354,406
	2,350,000

Malaysia government formulated the National Oil Resources Utilization Plan aimed to preserve oil resource in June 1984. Malaysia government carried out the policy which primarily aimed to preserve major oil field and production in major oil field by the set up of the ceiling oil production, but changed the policy due to decline of primary commodity and increased crude oil production to cover decline of exports amount due to decline of crude oil price after 1983.

Actual crude oil supply and demand is shown in Table I.53. The crude oil production increased from 288,568 barrels per day in 1979 to 453,434 barrels per day in 1984 and crude oil consumption increased from 119,395 barrels per day in 1979 to 153,779 barrels per day in 1984. The crude oil imports decreased year by year due to increase of domestic crude oil production, resulting the imports decreased from 88,844 barrels per day in 1979 to 52,840 barrels per day in 1984.

The crude oil exports decreased from 254,523 barrels per day in 1979 to 214,600 barrels in 1981, after 1982 increased to 348,129 barrels in 1984. Crude oil produced in Malaysia is low sulphur and light, therefore Malaysia could export the domestic crude oil at higher price than middle east crude oil. Besides this, a part of refineries in Malaysia were designed to refine middle east crude oil. By these reasons, Malaysia has exported own crude oil and imported cheaper middle east oil for domestic refineries. Therefore, the share of middle east crude oil in domestic crude oil consumption reached to 74.4% by 1979 as mentioned in Table 1.49.

After 1980, proportion of domestic crude oil in total refining increased due to increase of domestic crude oil production and commission of Kerteh refinery which refines Tapis blend, hence the share of middle east crude oil in domestic oil consumption declined sharply to 33.3% in 1984.

Crude oil demand forecast in Malaysia was reported by the ASCOPE's Economic Committee in December 1985 (Table I.54).

The crude oil demand in Malaysia was forecast to grow at 1.4% per annum from 196,000 BOE per day in 1985 to 210,000 BOE per day in 1990, during the period 1990 - 1995 to grow at 2.6% per annum to 239,000 BOE per day in 1995.

(4) Natural gas supply and demand

Remaining recoverable reserve of gas in Malaysia was estimated to be 48.5 trillion SCFT as of December 31, 1984 by the Ministry of Energy, Telecommunications and Posts as shown below.

REMAINING RECOVERABLE RESERVE OF GAS

(Unit: Trillion SCFT)

	Associated Gas	Non-associated Gas	Total
Peninsular Malaysia	6,326	18,199	24,525
Sarawak	3,122	17,201	20,323
Sabah	1,129	2,491	3,620
Total	10,577	37,891	48,468

The natural gas utilization projects in Malaysia include following projects, namely, Phase I Penisular Gas Utilization Project in Terengganu which involved delivery of gas to the refinery at Kerteh, the integrated sponge iron, and billet plant at Chukai and gas-fired power generation station at Paka; the integrated methanol, sponge iron, and power project in Labuan; and the liquefied natural gas and ASEAN ammonia-urea plants in Bintulu.

The pipeline from offshore gas field of Terengganu to Kerteh was completed in 1984. Besides non-associated gas produced at Duyong gas field, associated gas which are produced at Tapis, Bekok, Pulai oil field are supplied to power generation station at Paka and sponge iron plant at Telok Kalong, and households in Kerteh district. Ammonia/Urea project has been started on 29th July 1986 at Bintulu.

The natural gas projects at Labuan Island is planned to recover associated gas at Erb West gas and Samarang gas field and utilize recovered gas has been completed.

Actual natural gas supply and demand in Malaysia is shown in Table I.55. The natural gas demand in electricity generation, and industrial sectors increased due to initiation of natural gas utilization projects described above.

Malaysia is proceeding natural gas exports as new export commodity in the form of LNG and LPG. LNG plant at Bintulu in Sarawak State was completed in 1982 and commercial production was started from 1983. The LNG production in Malaysia is expected to reach to 6 million ton in the near future. In 1985, the PETRONAS's natural gas processing plant at Kerteh was completed and LPG production was initiated. The expansion of LPG utilization in domestic market is proceeding, while LPG exports for Japan was initiated in July 1985.

Concerned with natural gas utilization plan in the future, conversion plan of oil-fired power stations to gas-fired power station in West coast of Peninsula Malaysia, namely, at Pasir Gudang, Port Klang, Connaught Bridge and Port Dickson, with the completion of the second stage of the Trans Peninsular gas pipeline from Terengganu to Klang Valley by 1989. The conversion plan from traditional fuel to natural gas in plants located along gas pipeline route is considered.

Thereafter, the expansion of the consumption in industrial sector with accomplishment of natural gas distribution net work is studied, and also the city gas distribution system in Klang Valley Area is studied by the Study Team at present.

Concerned with middle/long-term natural gas utilization strategies, the expansion of LPG use and the possibility of introducing compressed natural gas (CNG) in transport sector will be studied. PETRONAS will establish pilot CNG refueling stations at Kerteh in Terengganu and Bintulu in Sarawak. In chemical industry sector, the production of polyethylene, polypropylene and methyl tertiary butyl ether (MTBE) are studied.

The natural gas demand was forcasted to grow from 52 KBOE per day in 1985, to 73 KBOE per day in 1990 and 98 KBOE per day in 1995 by the ASCOPE Economic Committee's report, as shown in Table I.54. Annual growth rate during 1985-1990 is estimated as 7.0% and during 1990-1995 6.1%.

(5) Petroleum products supply and demand

1) Actual petroleum products production, imports and exports

The petroleum products production in Malaysia was reported by the Ministry of Energy, Telecommunications and Posts increased by 5.2% per annum from 5,891 KTOE in 1979 to 7,600 KTOE in 1984 as shown in Table I.56. The share of fuel oil in total petroleum products production in 1979, was the highest, namely 41.9%, followed by diesel 28.9%, motor gasoline 17.6%, Kerosene 4.0%, ATF 3.0%, non-energy products 2.1% and LPG 1.4%. In 1984, the share of diesel was changed to the highest 33.4% of total, followed by fuel oil 26.9%, motor gasoline 15.8%, Kerosene 10.7%, non-energy 5.7%, ATF 3.4% and LPG 1.9%. The fuel oil production decreased from 2,465 KTOE in 1979 to 2,044 KTOE in 1984. The decrease was caused by the decline of refining quantity of middle east crude oil which was switched to low sulfur and light domestic crude oil.

The capacity of refinery in Malaysia is insufficient for domestic petroleum products demand. Therefore, Malaysia entrusts crude oil refinery to Singapore to cover shortage of domestic petroleum products supply. Malaysia entrusts crude oil refining by 50,000 - 70,000 barrels per day to Singapore up to 1987 based on three years agreement.

The petroleum products imports increased, as shown in Table I.57 from 1,888 KTOE in 1979 to 4,002 KTOE in 1982, thereafter decreased to 3,418 KTOE in 1984.

The share of fuel oil imports in total petroleum products import was the highest, namely 44.1%, followed by diesel 26.0%, motor gasoline 19.2%. The total share of fuel oil, diesel and motor was accounted for 89.3% of total petroleum products import in 1984.

Petroleum products exports from Malaysia decreased, as shown in Table I.57, from 177 KTOE in 1979 to 123 KTOE in 1981, thereafter exports increased and from 1983 increased rapidly to 1,676 KTOE in 1984. The share of kerosene export in total petroleum products export was 34.1%, followed by fuel oil 33.5%, diesel 16.5%, others 15.9% in 1984. The total share of fuel oil and kerosene was accounted for 67.6% of total petroleum products exports in 1984. The kerosene exports increased by fifteen times growth from 38 KTOE in 1979 to 572 KTOE in 1984. This sharp increase was caused by small scale of domestic market and export the surplus production due to increase of refining quantity of light crude oil. Especially, this tendency was accelerated by the commission of Kerteh refinery. Inspite of large imports quantity, fuel oil exports increased. This increase was caused by exports of domestic low sulphur fuel oil at high price and imports of cheap high sulphur fuel oil for domestic use aimed to increase exports amount.

2) Actual petroleum products demand

Petroleum product demand in Malaysia increased from 7,281 KTOE in 1979 to 9,530 KTOE in 1983, thereafter decreased to 9,351 KTOE in 1984 due to progress of conversion from oil to natural gas, coal and hydropower, as shown in Table I.58.

The share of fuel oil demand in total petroleum products demand in 1979, as shown Table I.58, was the highest, namely 38.0%, followed by diesel 32.9%, gasoline 16.2%, kerosene 4.9%, non-energy products 3.2%, ATF 2.8%, LPG 1.6%.

In 1984, the share diesel of total demand changed to the highest 34.7%, followed by fuel oil 31.0%, gasoline 20.5%, ATF 3.9%, Kerosene 3.8%, non-energy products 3.3%, LPG 2.0%. Average annual growth rate of total petroleum products demand during the period 1979 - 1984 was 5.1% per annum. The projected average annual growth rate of ATF, LPG and gasoline was high growth rate, namely 12.7%, 10.5% and 10.3% per annum respectively, and diesel grew satisfactory by 6.4% per annum. In contrast with high growth rate of products above, the growth rate of fuel oil was only 1.0% per annum and Kerosene demand showed zero growth.

The Demand Structure of Petroleum products in Malaysia is shown in Table I.59 and I.60. As shown in Table I.60, the share of demand for transportation sector in total demand was 35.0%, followed by power generation sector 28.6%, industrial sector 27.2% and residential/commercial sector 5.2% and others 4.0% in 1984.

In Malaysia, kerosene is consumed in residential/commercial sector and diesel consumed in industrial sector and public transportation sector. The subsidies has been given to kerosene and diesel to hold cheap price until January 1984, thereafter the subsidies of kerosene and diesel were abolished. Kerosene demand has a tendency to decrease due to the abolishment of subsidy, and substitution by LPG in cooking use. Diesel demand grew by 12.8% per annum until 1982.

The demand in 1983 grew slightly by 2.9% compared with the previous year and decreased by 8% in 1984 compared with the previous year. The diesel demand decreased conspicuously in power generation sector, resulting the share of diesel in energy demand for power generation decreased from 14.5% in 1983 to

9.9% in 1984. The share of power generation sector in the total energy demand was 69.7%, followed by industrial sector 29.1% and bunkers 1.2% in 1979. In 1984, the power generation was 80.9%, industrial sector 18.1% and bunkers 1.0%. The fuel oil demand for power generation sector grew by 4.0% per annum, while fuel oil demand for industrial sector decreased by 8.1% per annum due to substitution by coal and natural gas after 1983.

(6) Petroleum products demand forecast

1) Mid-term demand forecast

Petroleum products demand in Malaysia, as shown Table I.61, is forecast from 196 KBOE per day in 1985 to 210 KBOE per day in 1990 and 239 KBOE per day in 1995 by the ASCOPE Economic Committee. The average annual growth rate is forecast to be 1.4% per annum during the period 1985 - 1990 and 2.6% per annum during the period 1990 - 1995. The forecast is seemed to be conservative. Especially, gasoline demand forecast is seemed to be conservative, because gasoline demand is forecast to grow by 4.3% per annum during the period 1985 - 1990, and by 3.2% per annum during the period 1990 - 1995. The projected growth rate of gasoline is too low compared with actual growth rate 10.2% per annum during the period 1979 -1984. Beside this, the other petroleum products demand is estimated to decrease sharply from 6,000 BLS/D in 1983 to 3,000 BLS/D in 1985 and is forecast to no increase in the future. This estimation does not meet to the actual demand, therefore this forecast is seemed to be not practical.

PETRONAS forecast independently petroleum products demand in Malaysia during the period 1985 - 1990 based on the actual petroleum products demand during the period 1979 - 1984, shown in Table I.62. By PETRONAS's demand forecast, as shown in Table I.63, petroleum products demand is forecast to grow by 2.8% per annum from 11,195,400 KL (193,000 BLS/D) in 1985 to 12,849,900 KL (213,000 BLS/D) in 1990.

Table I.64 shows the comparison PETRONAS's demand forecast with ASCOPE's demand forecast. In petroleum products demand for fuel which excludes lubricant and asphalt is estimated to be 213,000 BLS/D by PETRONAS and 207,000 BLS/D by ASCOPE. Inspite of small difference between demand forecast of PETRONAS and that of ASCOPE in the total demand, many differences are seen by product demand forecast between PETRONAS and ASCOPE. Demand forecast of PETRONAS is more practical and preferable than that of ASCOPE, because PETRONAS's forecast is based on actual demand up to 1984 and considered recent demand trend compared with ASCOPE's forecast based on actual demand up to 1983.

From the analysis on petroleum products demand forecast conducted by PETRONAS and ASCOPE, the petroleum product demand is considered to grow with following tendency.

a) LPG demand will continue favorable growth with the expansion of natural gas utilization and rise of standard of living.

b) Gasoline demand will continue steady growth with progress of motorization.

c) The decreasing tendency of kerosene demand will continue due to influence of subsidy abolishment and progress of substitution by LPG which will be accelerated by increase of supply from natural gas processing plant.

d) Jet fuel demand will continue stable growth.

e) Diesel demand will increase mainly by the growth of transportation use, but by sector the growth rate will vary. The demand for industrial sector which forms 65.3% in the total diesel demand at present will decrease due to conversion to fuel oil and expansion of natural gas consumption in manufacturing industry from 1990 by completion of peninsular natural gas pipeline.

f) The fuel oil demand for electricity generation which was 79.5% in the total demand in 1985 will decrease due to progress of conversion to natural gas after 1990 by completion of peninsula natural gas pipeline and progress of construction of hydropower station.

2) Long-term demand forecast

The Study Team use the PETRONAS's actual petroleum products demand during the period 1979-1984 and demand forecast during the period 1985-1990 as the basis of long-term demand forecast.

Concerned with methodology of long-term demand forecast of petroleum products, the Study Team made the demand forecast models by using time series analysis on petroleum products demand and correlation analysis between petroleum products demand and GDP, then forecast future demand during the period 1990-2005 by using the demand forecast models. The year projected are 1990, 1995, 2000 and 2005. In case of demand forecast by the GDP correlation analysis petroleum products demand are forecast in three cases which include base, medium and low case.

a) Long-term demand forecast used time series model

The petroleum products demand forecast used time series model is shown Table I.65. The demand for fuel use including power generation use in projected petroleum products demand is forecast to grow from 10,802 thousand KL (KKL) in 1985 to 12,388 KKL in 1990, 13,962 KKL in 1995, 15,536 KKL in 2000, and 17,110 KKL in 2005. The projected average annual growth rate is 2.8% during the period 1985 - 1990, 2.4% during the period 1990-1995, 2.2% during the period 1995-2000 and 1.8% during the period 2000-2005. In case of excluding power generation use, demand for fuel use is forecast to grow from 7,989 KKL in 1985 to 10,015 KKL in 1990, 11,897 KKL in 1995, 13,780 KKL in 2000 and 15,661 KKL in 2005. The projected average annual growth rate of petroleum products

demand total is 4.6% during the period 1985-1990, 3.5% during the period 1990-1995, 3.0% during the period 1995-2000 and 2.6% during the period 2000-2005.

LPG demand is forecast to grow 364 KKL in 1985 to 619 KKL in 1990, 842 KKL in 1995, 1,066 KKL in 2000 and 1,289 KKL in 2005. The projected average annual growth rate is 11.2% during the period 1985-1990, 6.4% during the period 1990-1995, 4.8% during the period 1995-2000 and 3.9% during the period 2000-2005.

Kerosene demand is forecast to decrease by 1.0% per annum from 450.6 KKL in 1985 to 405.9 KKL in 1995 and decrease by 0.9% per annum to 372 KKL in 2005.

Diesel demand is forecast to increase by 1.5% per annum from 3,847 KKL in 1985 to 4,472 KKL in 1995 and increase by 1.6% per annum to 5,264 KKL in 2005.

Fuel oil demand is forecast to decrease by 0.3% per annum from 2,973 KKL in 1985 to 2,863 KKL in 1995 and decrease by 0.7% per annum to 2,580 KKL in 2005. The decrease of projected fuel oil demand is caused by the decrease of demand for power generation. The demand for power generation is forecast to decrease by 2.6% per annum from 2,387 KKL in 1985 to 1,858 KKL in 1995 and decrease by 3.0% per annum to 1,295 KKL in 2005.

Gasoline demand is forecast to increase by 5.9% per annum from 2,740 KKL in 1985 to 4,839 KKL in 1995 and increase by 3.7% per annum to 6,956 KKL in 2005.

The time series models and calculation formula used for long-term petroleum products demand forecast are shown in Table I.66.

b) Long-term demand forecast used correlation models in Base case

The petroleum products demands forecast used correlation analysis model between petroleum products demand and GDP is shown in Table I.67(1). GDP used in Base case for demand forecast is GDP in 1978 constant prices as shown in Table I.68.

Demand for fuel use in total projected petroleum products, in case of including demand for power generation is forecast to grow from 10,802 KKL in 1985 to 12,388 KKL in 1990, 14,653 KKL in 1995, 17,499 KKL in 2000 and 21,188 KKL in 2005. The projected average annual growth rate is 2.8% during the period 1985-1990, 3.4% during the period 1990-1995, 3.6% during the period 1995-2000 and 3.9% during the period 2000-2005.

In case of excluding demand for power generation, demand for fuel use is forecast to grow from 7,989 KKL in 1985 to 10,015 KKL in 1990, 12,553 KKL in 1995, 15,742 KKL in 2000 and 19,894 KKL in 2005. The projected average annual growth rate is 4.6% during the period 1985-1990, 4.6% during the period 1990-1995, 4.6% during the period 1995-2000 and 4.8% during the period 1995-2005.

LPG demand is forecast to grow from 364 KKL in 1985 to 619 KKL in 1990, 901 KKL in 1995, 1,256 KKL in 2000 and 1,716 KKL in 2005. The projected average annual growth rate is 11.2% during the period 1985-1990, 7.8% during the period 1990-1995, 6.9% during period 1995-2000 and 6.4% during the period 2000-2005.

Kerosene demand is forecast to decrease by 1.3% per annum from 451 KKL in 1985 to 423 KKL in 1990 and grow by 1.6% per annum to 457 KKL in 1995, by 1.5% per annum to 491 KKL in 2000 and by 2.1% per annum to 545 KKL in 2005.

Diesel demand is forecast to grow by 1.3% per annum in 3,847 KKL in 1985 to 4,106 KKL in 1990, by 1.3% per annum to 4,377 KKL in 1995, by 1.3% per annum to 4,667 KKL in 2000 and by 1.6% per annum to 5,045 KKL in 2005.

Fuel oil demand is forecast to grow by 0.6% per annum from 2,973 KKL in 1985 to 3,064 KKL in 1990, by 0.7% per annum to 3,178 KKL in 1995, by 2.0% per annum to 3,509 KKL in 2000 and by 2.4% per annum to 3,941 KKL in 2005. In contrast with decrease of the demand for power generation which is forecast to decrease conspicuously from 2,387 KKL in 1985 to 1,228 KKL in 2005, the demand for non-power use is forecast to grow sharply from 586 KKL in 1985 to 2,713 KKL in 2005.

Gasoline demand is forecast to grow by 6.6% per annum from 2,740 KKL in 1985 to 5,199 KKL in 1995 and grow by 6.0% per annum to 9,293 KKL in 2005.

c) Long-term demand forecast used correlation model in Medium Case

The petroleum products demand forecast in Medium Case used correlation model between petroleum products demand and GDP is shown Table I.67(2). GDP used for demand forecast in Medium Case is GDP in 1978 constant prices as shown in Table I.68.

Demand for fuel use in total projected petroleum products demands, in case of including demand for power generation is forecast to grow from 10,802 KKL in 1985, 11,661 KKL in 1990, 13,700 KKL in 1995, 16,308 KKL in 2000 and 19,636 KKL in 2005. The projected average annual growth rate is 1.5% during the period 1985-1990, 3.3% during the period 1990-1995, 3.5% during the period 1995-2000 and 3.8% during the period 2000-2005.

In case of excluding demand for power generation, demand for fuel use is forecast to grow from 7,989 KKL in 1985 to 9,201

KKL in 1990, 11,485 KKL in 1995, 14,407 KKL in 2000 and 18,136 KKL in 2005. The projected average annual growth rate is 2.9% during the period 1985-1990, 4.5% during the period 1990-1995, 4.6% during the period 1995-2000 and 4.7% during the period 2000-2005.

LPG demand is forecast to grow from 364 KKL in 1985 to 528 KKL in 1990, 781 KKL in 1995, 1,108 KKL in 2000 and 1,522 KKL in 2005. The projected average annual growth rate is 7.7% during the period 1985-1990, 8.1% during the period 1990-1995, 7.3% during the period 1995-2000 and 6.6% during the period 2000-2005.

Kerosene demand is forecast to decrease from 451 KKL in 1985 to 423 KKL in 1990 and grow by 1.1% per annum to 447 KKL in 1995, by 1.4% per annum to 479 KKL in 2000 and by 1.6% per annum to 519 KKL in 2005.

Diesel oil demand is forecast to grow by 0.6% per annum from 3,847 KKL in 1985 to 3,968 KKL in 1990, by 1.2% per annum to 4,213 KKL in 1995, by 1.2% per annum to 4,480 KKL in 2000 and by 1.5% per annum to 4,821 KKL in 2005.

Fuel oil demand is forecast to decrease by 0.3% per annum from 2,973 KKL in 1985 to 2,934 KKL in 1990, to grow by 1.2% per annum to 3,116 KKL in 1995, by 1.8% per annum to 3,411 KKL in 2000 and by 2.2% per annum to 3,795 KKL in 2005. In contrast with decrease of the demand for power generation which is forecast to decrease from 2,387 KKL in 1985 to 1,272 KKL in 2005, the demand for non-power use is forecast to grow from 586 KKL in 1985 to 2,522 KKL in 2005.

Gasoline demand is forecast to grow by 3.9% per annum from 2,740 KKL in 1985 to 3,322 KKL in 1990, by 6.7% per annum to 4,602 KKL in 1995, by 6.3% per annum to 6,236 KKL in 2000 and by 6.0% per annum to 8,330 KKL in 2005.

d) Long-term demand forecast used correlation model in Low Case

The petroleum products demand forecast in Low Case used correlation model between petroleum products demand and GDP is shown in Table I.67(3). GDP used for demand forecast in Low Case is GDP in 1978 constant prices as shown in Table I.68.

Demand for fuel use in total projected petroleum products demands, in case of including demand for power generation is forecast to grow from 10,802 KKL in 1985 to 10,941 KKL in 1990, 12,034 KKL in 1995, 13,272 KKL in 2000 and 14,708 KKL in 2005. The projected average annual growth rate is 0.3% during the period 1985-1990, 1.9% during the period 1990-1995, 2.0% during the period 1995-2000 and 2.1% during the period 2000-2005.

In case of excluding demand for power generation, demand for fuel use is forecast to grow from 7,989 KKL in 1985 to 8,397 KKL in 1990, 9,619 KKl in 1995, 11,006 KKL in 2000 and 12,614 KKL in 2005. The projected average annual growth rate is 1.0% during the period 1985-1990, 2.8% during the period 1990-1995, 2.7% during the period 1995-2000 and 2.8% during the period 2000-2005.

LPG demand is forecast to grow from 364 KKL in 1985 to 442 KKL in 1990, 575 KKL in 1995, 729 KKL in 2000 and 908 KKL in 2005. The projected average annual growth rate is 3.9% during the period 1985-1990, 5.4% during the period 1990-1995, 4.9% during the period 1995-2000 and 4.5% during the period 2000-2005.

Kerosene demand is forecast to decrease from 451 KKL in 1985 to 423 KKL in 1990 and grow by 0.6% per annum to 436 KKL in 1995, by 0.7% per annum to 451 KKL in 2000 and by 0.8% per annum to 469 KKL in 2005.

Diesel oil demand is forecast to grow by 0.2% per annum from 3,847 KKL in 1985 to 3,886 KKL in 1990, by 0.7% per annum

to 4,014 KKL in 1995, by 0.6% per annum to 4,140 KKL in 2000 and by 0.7% per annum to 4,287 KKL in 2005.

Fuel oil demand is forecast to decrease by 1.0% per annum from 2,973 KKL in 1985 to 2,816 KKL in 1990, to grow by 0.7% per annum to 2,911 KKL in 1995, by 1.0% per annum to 3,060 KKL in 2000 and by 0.7% per annum to 3,162 KKL in 2005. In contrast with decrease of the demand for power generation which is forecast to decrease from 2,387 KKL in 1985 to 1,867 KKL in 2005, the demand for non-power use is forecast to grow from 586 KKL in 1985 to 1,296 KKL in 2005.

Gasoline demand is forecast to grow by 1.0% per annum from 2,740 KKL in 1985 to 2,890 KKL in 1990, by 4.3% per annum to 3,559 KKL in 1995, by 3.8% per annum to 4,298 KKL in 2000 and by 4.0% per annum to 5,233 KKL in 2005.

e) The correlation models and calculation formula used for long-term petroleum products demand forecast are shown in Table I.69.

3.1.2 Energy demand in Klang Valley Area

(1) Present situation of energy demand

Energy demand by sector and by kind of energy in Klang Valley Area as of 1985 is shown in Table I.70 and electricity demand by sector in Klang Valley Area as of 1984 is shown in Table I.71.

The statistics on energy demand in Klang valley Area except manufacturing industry are not available, therefore the Study Team estimated energy demand by sector/by kind based on integration of the results of field survey.

The field survey was conducted in households, hotels, restaurants and manufacturing industry.

(2) Energy demand forecast

Energy demand in Klang Valley Area is forecast in three cases that are Base case, Medium case and Low case.

Energy demand for household (DHH) is forecast by using following formula.

DHH = Population x (unit consumption of energy for cooking and hot shower) per population

Energy demand for hotel (DHT) is forecast by using following formula.

DHT = Number of hotels x unit consumption of energy per hotel

Energy demand for restaurant (DRST) is forecast by using following formula.

DRST= Number of restaurant x number of seats in restaurant x unit consumption of energy per seat

Energy demand for manufacturing industry (DMI) in Klang Valley Area is forecast by using following formula.

DMI = DMI(85) x (Growth rate of GRPM during 1985-t)

where, DMI(85) = DMI in 1985

The energy demand in Klang Valley Area is divided into district by using percentage of employees in manufacturing industry among total.

Energy demand for transportation (DTR) is forecast by using following formula.

DTR(t) = DTR(85) x (Growth rate of GRP during 1985-t) x C

Where,

DTR(85): DTR in 1985,

C: Coefficient by Energy

1) Energy demand forecast in Base Case

Energy demand forecast in Klang Valley Area which excludes jet fuel, electricity and fuel for power generation (hereafter described as energy demand) in Base case is shown in Table I.71(1).

The total energy demand is forecast to grow from 15,477 (10^9 Kcal = Tcal) in 1985 to 20,260 Tcal in 1990, 25,743 Tcal in 1995, 31,595 Tcal in 2000 and 38,452 Tcal in 2005.

The projected average annual growth rate is 5.5% during the period 1985-90, 4.9% during the period 1990-95, 4.2% during the period 1995-2000 and 4.0% during the period 2000-2005.

LPG demand is forecast to grow from 1,161 Tcal in 1985 to 1,792 Tcal in 1990, 2,394 Tcal in 1995, 3,121 Tcal in 2000 and 3,812 Tcal in 2005. The projected average annual growth rate is 9.1% during the period 1985-90, 6.0% during the period 1990-95, 5.5% during the period 1995-2000 and 4.1% during the period 2000-2005.

Kerosene demand is forecast to grow at a rate of 3.3% per annum from 388 Tcal in 1985 to 746 Tcal in 2005.

Gasoline demand is forecast to grow at a rate of 5.1% per annum from 6,844 Tcal in 1985 to 18,542 Tcal in 2005.

Fuel oil demand excluding power generation use is forecast to grow at a rate of 6.0% per annum from 1,778 Tcal in 1985 to 5,681 Tcal in 2005.

Diesel oil demand excluding power generation use is forecast to grow at a rate of 2.8% per annum from 5,150 Tcal in 1985 to 8,896 Tcal in 2005.

2) Energy demand forecast in Medium Case

The total demand is forecast to grow from 15,477 Tcal in 1985 to 18,417 Tcal in 1990, 23,185 Tcal in 1995, 28,954 Tcal in 2000 and 34,978 Tcal in 2005 as shown in Table I.72(2).

The projected average annual growth rate is 3.5% during the period 1985-90, 4.7% during the period 1990-95, 4.5% during the period 1995-2000 and 3.9% during the period 2000-2005.

LPG demand is forecast to grow from 1,161 Tcal in 1985 to 1,772 Tcal in 1990, 2,369 Tcal in 1995, 3,086 Tcal in 2000 and 3,768 Tcal in 2005. The projected average annual growth rate is 8.8% during the period 1985-90, 6.0% during the period 1990-95, 5.4% during the period 1995-2000 and 4.1% during the period 2000-05.

Kerosene demand is forecast to grow at a rate of 3.3% per annum from 388 Tcal in 1985 to 745 Tcal in 2005.

Gasoline demand is forecast to grow at a rate of 4.6% per annum from 6,844 Tcal in 1985 to 16,765 Tcal in 2005.

Fuel oil demand excluding power generation use is forecast to grow at a rate of 5.5% per annum from 1,778 Tcal in 1985 to 5,170 Tcal in 2005.

Diesel oil demand excluding power generation use is forecast to grow at a rate of 2.1% per annum from 5,150 Tcal in 1985 to 7,780 Tcal in 2005.

3) Energy demand forecast in Low Case

The total energy demand is forecast to grow from 15,477 Tcal in 1985 to 17,326 Tcal in 1990, 20,533 Tcal in 1995, 23,674 Tcal in 2000 and 27,039 Tcal in 2005.

The projected average annual growth rate is 2.3% during the period 1985-90, 3.5% during the period 1990-95, 2.9% during the

period 1995-2000 and 2.7% during the period 2000-05 as shown in Table I.72(3).

LPG demand is forecast to grow from 1.161 Tcal in 1985 to 1,729 Tcal in 1990, 2,302 Tcal in 1995, 2,968 Tcal in 2000 and 3,589 Tcal in 2005. The projected average annual growth rate is 8.3% during the period 1985-90, 5.9% during the period 1990-95, 5.2% during the period 1995-2000 and 3.9% during the period 2000-2005.

Kerosene demand is forecast to grow at a rate of 3.2% per annum from 388 Tcal in 1985 to 732 Tcal in 2005.

Gasoline demand is forecast to grow at a rate of 2.8% per annum from 6,844 Tcal in 1985 to 11,916 Tcal in 2005.

Fuel oil demand excluding power generation use is forecast to grow at a rate of 3.5% per annum, 1,778 Tcal in 1985 to 3,547 Tcal in 2005.

Diesel oil demand excluding power generation use is forecast to grow at a rate of 1.0% per annum 5,150 Tcal in 1985 to 6,593 Tcal in 2005.

(3) Comparison of energy demand forecast in base case with macro-energy demand forecast

Energy demand forecast in Klang Valley Area in Base Case which described above is compared with macroscopic energy demand forecast.

Macroscopic energy demand forecast is performed on household sector and commercial sector, because the energy demand for transportation sector and manufacturing industry sector are forecast by using macroscopic forecast procedures.

The macroscopic forecast of energy demand for household sector is performed by using following formula.

$$DHHK(t) = DHHM(t) \times (GRPK(t)/GDP(t))$$

Where,

DHHK(t) = Energy demand for household sector in Klang Valley Area in year (t)
DHHM(t) = Energy demand for household sector in Malaysia in year (t)
GRPK(t) = Gross Regional Product of Klang Valley Area in year (t)
GDP(t) = Gross Domestic Product in year (t)

The macroscopic forecast of energy demand for commercial sector is performed by using following formula.

$$DCOK(t) = DCOM(t) \times (GRPK(t)/GDP(t))$$

Where,

DCOK(t) = Energy demand for commercial sector in Klang Valley Area in year (t)
DCOM(t) = Energy demand for commercial sector in Malaysia in year (t)
GRPK(t) = Gross Regional Product of Klang Valley Area in year (t)
GDP(t) = Gross domestic product in year (t)

The data used for the macroscopic forecast of energy demand in Klang Valley Area are as follows.

	Unit	1985	1990	1995	2005
DHHM	Tcal	4,484.7	5,161.2	6,189.1	8,657.0
DCOM	Tcal	1,708.5	1,960.4	2,350.0	3,168.9
GRPK	Million B	15,511	20,564	28,274	48,482
GDP	Million B	59,344	75,597	96,665	157,457
GRPK/GDP		0.2164	0.2720	0.2925	0.3079

Table I.73 shows the comparison of demand forecast in Base case in Klang Valley Area forecast by using the results of field survey with macroscopic demand forecast.

The energy demand forecast in Base Case based on field survey is approximated to macroscopic demand forecast. Therefore, it is considered that the energy demand forecast in Base Case is reasonable basis of city gas demand forecast in Klang Valley Area.

3.1.3 Petroleum Products Distribution Channel

The petroluem products distribution channel is shown Figure I.14. The six reticulated LPG gas piping system are operating in Klang Valley Area at present and are supplying of piped LPG to households.

3.2 Crude Oil and Petroleum Product Price

3.2.1 Crude Oil Price in the World

Crude oil price is heavily fluctuated according to the demand supply balance and the strength of power of OPEC countries as illustrated in Figure I.15.

Table I.74 shows the official price of Arabian Light (FOB RAS TANURA) from 1965 to 1985. Table I.75 shows the official and spot prices of Arabian Light and UK Brent from December 2, 1983 to April 1986.

The spot price of crude oil corresponds more sharply to the demand and supply balance than the official price, however, for long run projection, the official price is more suitable because the official price absorbed the short period fluctuation. Therefore, the Study team use the Table I.74 as the past record of crude oil price. As reference, the trend of crude oil price in Malaysia is shown in Table I.76.

The scenario of the future price of crude oil was shown by EPU as mentioned in the Figure I.16 which was decided to use for the Study on 27 October, 1986.

The projected current price of crude oil is shown in Table I.77.

3.2.2 Petroleum Product Price in Singapore

The Study team has decided to use petroleum product price in Singapore (Table I.74) as the base of calculation of the petroleum product price in Malaysia who is importing petroleum product from Singapore.

Table I.78(1),(2) shows the export of selected petroleum product from Singapore and Table I.79 and I.80 shows the price of LPG exported from Singapore to Malaysia. As reference, LPG FOB Saudi Arabia who leads the price of LPG in the world and LPG CIF Japan are shown in Table I.81. LPG price in Singapore is higher than in Saudi Arabia.

The City Gas will replace LPG and Kerosene for household and commercial sector and LPG, diesel oil and fuel oil for manufacturing industry.

Therefore, the Study team estimated the price of LPG, kerosene, diesel oil and fuel oil. The projected price of petroleum product in Singapore by using correlation method with crude oil price are mentioned in Table I.77.

Figure I.17 and Table I.82 show the relation between prices of Arabian Light and petroleum products.

3.2.3 Petroleum Product Price in Malaysia

Table I.83 shows the automatic pricing mechanism (APM) of petroleum product in May 1986 and Table I.84 shows the Ex-KL price structure of petroleum product from September 1977 to June 1986. Table I.85 shows FOB Singapore price, CIF and duty of petroleum product in Malaysia.

Beside of the above, the Study team has received from PETRONAS about LPG sales price of reticulation system (Table I.86) and the list of Bulk LPG customer (Table I.87). The fuel oil and LPG price mechanism are summarized in Tables I.88 and I.89 from the above information.

Petroleum product price for domestic demand (household, automobile etc.) is controlled by the Government but for other (manufacturing industry etc.) is not controlled.

Handling cost and profit for fuel oil business is not mentioned in Table I.83 but settled between PETRONAS and the Study team as follows.

FUEL OIL PRICE ON JUNE, 1986

	FOB	Ocean Freight and Insurance	Inland Transportation and profit	Duty Price	Retail
MCent/liter	14.66	1.69	2.01	1.59	19.95
M$/Ton	-	-	-	16.73	210

Fuel oil price for electric power station is exempted from duty. The rate of duty mentioned in Table I.84 is changed to offset of fluctuation of crude oil price, however, it is not so big and the retail price of petroleum product is fluctuated according to the fluctuation of ex-factory price or imported price of petroleum product.

Handling cost and profit are calculated based on volume but not on the amount which will be changed according to the price of petroleum product.

From the above reasons, the Study team has applied the cost and profit in May 1986 after adjusted by escalation to future cost and profit.

Table I.91 (1) - (5) shows the petroleum products prices in Kuala Lumpur.

Chapter 4 PENINSULA GAS UTILIZATION PROJECT

4.1 Scheme of Project

At the offshore of Terengganu state, oil and gas field are there and gases from those fields are collected and sent to land as mentioned in Figure I.18.

After treated, gas is conveyed to the power station other as first stage of Peninsula Gas Utilization Project. Now the project of Trans Peninsula Gas pipeline is going as second stage. The scheme of Trans Pipeline is shown in Figure I.19.

The main purpose of this pipe line is to convey gas to the power stations which are using fuel oil as fuel. (Table I.92)

The route of Trans Pipeline in Klang Valley Area is shown in Figure I.20.

4.2 Schedule of Construction of Trans Peninsula Gas Pipeline

The utilization plan of natural gas is divided into 3 stages as mentioned in the Table I.93.

Trans Peninsula pipeline to Port Klang will be completed by the end of 1989. (Acquisition of land for pipeline is completed).

Therefore, natural gas can be expected to be utilized city gas from 1990.

4.3 Availability of Natural Gas for City Gas

4.3.1 Gas Volume

PETRONAS confirmed that required volume for city gas can be supplied without anxiety from Trans Peninsula Gas Pipeline and compressor station will be provided if necessary.

The capacity of Trans Peninsula gas pipeline is so big enough that it is unnecessary to install the tank to absorb the daily fluctuation of demand of city gas. Table I.94 shows the gas reserve, demand and pipe capacity.

4.3.2 Sales Gas Composition

Gas analysis to be supplied at Subang Jaya to city gas is as mentioned in Table I.95.

4.4 Gas Price

The Study team has proposed to PETRONAS to use fuel oil price as the price of gas to be fed to city gas because main purpose of Trans Peninsula Gas Pipeline is to send natural gas for power station to replace fuel oil and PETRONAS has accepted the proposal of the Study Team.

EPU has estimated the economic value of natural gas as mentioned in Table I.96 which will be used for economic analysis of this study.

Natural gas price at west coast conveyed through Trans Peninsula Pipeline is estimated 2.69 US$/MMBTU without company profit and 3,84 US$/MMBTU with company profit as constant term, however, these prices are higher than the present full oil price.

Table I.1 MALAYSIA: GROSS DOMESTIC PRODUCT BY INDUSTRY OF ORIGIN, 1980-85
($ million in 1978 prices)

Industry	1980	1981	1982	1983	1984	1985	Average annual growth rate (%) 1981	1982	1983	1984	1985	1981-85	Forth Plan
Primary	14,676	14,973	15,992	16,639	17,6699	18,052	2.0	6.8	4.0	6.2	2.2	4.2	4.8
Agriculture, forestry, liverstock, and fishing	10,189	10,684	11,375	11,302	11,623	12,046	4.9	6.5	-0.6	2.8	3.6	3.4	4.2
Mining and quarrying	4,487	4,289	4,617	5,337	6,046	6,006	-4.4	7.6	15.6	13.3	-0.7	6.0	7.7
Secondary	10,998	11,710	12,292	13,355	14,691	14,405	6.5	5.0	8.6	10.0	-1.9	5.5	7.2
Manufacturing	8,932	9,343	9,694	10,488	11,703	11,357	4.6	3.8	8.2	11.6	-3.0	4.9	6.0
Construction	2,066	2,367	2,598	2,867	2,988	3,048	14.6	9,8	10.4	4.2	2.0	8.1	11.6
Tertiary	17,836	19,897	21,208	22,610	24,419	26,138	11.6	6.6	6.6	8.0	7.0	7.9	7.7
Electricity gas and water	640	689	721	798	890	988	7.7	4.6	10.7	11.5	11.0	9.1	9.0
Transport, storage, and communications	2,542	2,847	2,984	3,138	3,464	3,805	12.0	4,8	5.2	10.4	9.8	8.4	11.8
Wholesale and retail trade, hotols and restaurants	5,383	5,694	6,104	6,583	7,107	7,551	5.8	7.2	7.8	8.0	6.2	7.0	6.2
Finance, insurance, real estate, and business services	3,687	3,953	4,231	4,570	4,892	5,212	7.2	7.0	8.0	7.0	6.5	7.2	7.8
Government services	4,563	5,649	6,027	6,817	6,817	7,270	23.8	6.7	5.0	7.7	6.6	9.8	7.2
Other services	1,021	1,065	1,141	1,193	1,249	1,312	4.3	7.1	4.6	4.7	5.0	5.1	4.9
Less: Imported bank service charges	854	877	1,152	1,397	1,595	1,675	-	-	-	-	-	-	-
Plus: Import duties	2,046	2,087	2,116	2,429	2,522	2,424	-	-	-	-	-	-	-
Gross Domestic Product and purchasers' valve	44,702	47,790	50,456	53,636	57,706	59,344	6.9	5.6	6.3	7.6	2,8	5,8	6.4

Source: Department of Statistics, Preliminary National Accounts Statistics of Malaysia, 1989-1984, September, 1985.
Note: Figures for 1985 are estimates.

Table I.2 MALAYSIA: GROSS DOMESTIC PRODUCT BY SECTOR OF ORIGIN, 1970 - 1980

($ million in 1970 prices)

	GDP		Average annual growth rate (%)	Share of GDP (%)	
	1970	1980	1971-80	1970	1980
Agriculture, forestry and fishing	3,797	5,809	4.3	30.8	22.2
Mining and quarrying	778	1,214	4.6	6.3	4.6
Manufacturing	1,650	5,374	12.5	13.4	20.5
Construction	475	1,186	9.6	3.9	4.5
Electricity, gas and water	229	592	10.0	1.9	2.3
Transport, storage and communications	581	1,696	11.3	4.7	6.5
Wholesale and retail trade, hotels and restaurants	1,633	3,295	7.3	13.3	12.6
Finance, insurance, real estate and business services	1,036	2,155	7.6	8.4	8.2
Government services	1,367	3,398	9.5	11.1	13.0
Other services	306	657	7.9	2.5	2.5
Less: imported bank service charges	117	308	-	-	-
Plus: import duties	573	1,120			
Equals: gross domestic product at purchasers' value	12,308	26,188	7.8	100.0	100.0

Source: The Fourth Malaysia Plan

Table I.3 MALAYSIA: GROSS DOMESTIC PRODUCT BY INDUSTRY OF ORIGIN AND STATE, 1971 AND 1980

($ million in 1970 prices)

Sector	1971			1980			
	Selangor[1/]	Peninsular Malaysia	Malaysia	Selangor	Federal Territory	Peninsular Malaysia	Malaysia
Agriculture, forestry and fishing	410	3,104	3,852	611	-	4,485	5,809
Mining and quarrying	198	690	834	153	-	653	1,214
Manufacturing	940	1,759	1,858	2,462	-	5,159	5,374
Construction	242	456	541	492	-	961	1,186
Utilities	76	216	238	219	-	539	592
Transport, storage and communications	196	551	632	722	-	1,499	1,696
Wholesale and retail trade, hotels and restaurants	715	1,502	1,717	1,261	-	2,916	3,295
Finance, insurance, real estate and business services	299	999	1,126	662	-	1,907	2,155
Government services	509	1,287	1,466	1,033	-	2,990	3,398
Other services	128	325	354	279	-	597	657
Total:	3,722	10,888	12,618	7,894	-	21,706	25,376
GDP at purchasers' value	3,826	11,191	13,016	4,144	3,982	22,344	26,188
Population ('000)	1,777.1	9,404.6	11,104.4	1,561.1	997.7	11,849.0	114,261.2
Per capita GDP ($)	2,152.9	1,189.9	1,172.2	2,655	3,991	1,886	1,836
Ratio to malaysia average	1.84	1.02	1.00	1.45	2.17	1.03	1.00

Source: The Third Malaysia Plan and The Fourth Malaysia Plan

Note : 1/ Includes the Federal Territory

Table I.4 GDP OF MALAYSIA, FEDERAL TERRITORY AND SELANGOR

	MALAYSIA	SELANGOR	FEDERAL TERRITORY
$ million in 1970 price			
1970	10,708	2,736.7 1/	-
(%)	100	25.6	
1975	15,315	3,806.2 1/	-
(%)	100	24.9	
1978	22,284	6,776.4 1/	-
(%)	100	30.4	
1980	25,376	7,894 1/	-
(%)	100	31.1	
$ million in 1978 price			
1980	43,510	6,846	6,097
(%)	100	15.7	14.0
1985	58,595	8,955	8,844
(%)	100	15.3	15.0
Average annual growth rate (%)			
1971-75	7.42	6.82 1/	
1976-80	10.63	15.71	
1980-85	6.13	5.52	7.72

Source: during the period 1970-75 Third Malaysia Plan
1978 Mid-Term Review of 3rd Malaysia Plan
1980 Fourth Malaysia Plan
during the period 1980-85 Fifth Malaysia Plan

Note : 1/ includes the Federal Territory of Kuala Lumpur

Table I.5 POPULATION OF MALAYSIA AND BY STATE

(Unit: 1,000)

	1970	1980	1985	Average annual growth rate (%) 1971-80	1980-85
Malaysia	10,776.9 (100.0)	13,829.2 (100.0)	15,791.1 (100.0)	2.6	2.6
Peninsular Malaysia	8,810.0 (81.7)	11,473.0 (82.7)	12,968.8 (82.1)	2.6	2.5
Selangor State	1,629.0 (15.1)	1,521.6 (11.0)	1,822.1 (11.5)	4.3	3.6
Federal Territory		981.0 (7.0)	1,152.6 (7.3)	-	3.3
Sub-total of Selangor and Federal Territory	1,629.0 (15.1)	2,502.6 (18.0)	2,974.7 (18.8)	4.3	3.5
Klang Valley	1,266.0 (11.7)	2,020.0 (14.6)	2,534.0 (16.0)	4.8	4.6

Source: Population Census 1970, 1980
Fifth Malaysia Plan
Klang Valley Perspective Plan

Note : Figures in parenthesis shows percentage to Malaysia total.

Table I.6 PENINSULAR MALAYSIA: INCIDENCE OF POVERTY BY RURAL-URBAN STRATA, 1970, 1975 AND 1980

	1970				1975				1980			
	Total households (000)	Total poor households (000)	Incidence of poverty (%)	Percentage among poor (%)	Total households (000)	Total poor households (000)	Incidence of poverty (%)	Percentage among poor (%)	Total households (000)	Total poor households (000)	Incidence of poverty (%)	Percentage among poor (%)
RURAL:												
Agriculture	852.9	582.4	68.3	73.6	915.1	576.5	63.0	69.0	963.2	443.7	46.1	66.6
Rubber smallholders	350.0	226.4	64.7	28.6	396.3	233.8	59.0	28.0	425.9	175.9	41.3	26.4
Oil Palm smallholders	6.6	2.0	30.3	0.3	9.9	0.9	9.1	0.1	24.6	1.9	7.7	0.3
Coconut smallholers	32.0	16.9	52.8	2.1	34.4	17.5	50.9	2.1	34.2	13.3	38.9	2.0
Padi Farmers	140.0	123.4	88.1	15.6	148.5	114.3	77.0	13.7	151.0	83.2	55.1	12.5
Other agriculture	137.5	126.2	91,8	16.0	157.4	124.1	78.8	14.9	172.2	110.5	64.1	16.6
Fishermen	38.4	28.1	73.2	3.5	41.6	26.2	63.0	3.1	42.8	19.4	45.3	2.9
Eastate workers	148.4	59.4	40.0	7.5	127.0	59.7	47.0	7.1	112.5	39.5	35.1	5.9
Other industries	350.5	123.5	35.2	15.6	433.3	153.4	35.4	18.4	546.4	124.8	22.8	18.7
Sub-total	1,203.4	705.9	58.7	89.2	1,348.4	729.9	54.1	87.4	1,509.6	468.5	37.7	85.3
URBAN:												
Mining	5.4	1.8	33.3	0.2	5.3	2.0	37.7	0.2	5.4	1.8	33.0	0.3
Manufacturing	84.0	19.7	23.5	2.5	120.4	21.0	17.4	2.5	182.3	24.4	13.4	3.7
Construction	19.5	5.9	30.2	0.7	25.5	6.1	23.9	0.7	34.0	5.9	17.4	0.9
Transport and utilities	42.4	13.1	30.9	1.7	64.4	13.8	21.4	1.7	85.0	16.3	19.2	2.4
Trade and services	251.3	45.4	18.1	5.7	337.4	62.3	18.5	7.5	467.7	49.2	10.5	7.4
Sub-total	402.6	85.9	21.3	10.8	553.0	105.2	19.0	12.6	774.4	97.6	12.6	14.7
	1,606.0	791.8	49.3	100.0	1,901.4	835.1	43.9	100.0	2,284.0	666.1	29.2	100.0

NOTE: 1. The calculations took into consideration the effects of programmes implemented during 1971-80 as well as changes in other factors, such as prices and costs.

2. Data from studies conducted by Economic Planning Unit and Socio-Economic Research Unit in the Prime Minister's Department, Ministry of Agriculture, Department of Statistics and other agencies were used in the Computations.

Table I.7 PENINSULAR MALAYSIA: NUMBER AND AVERAGE SIZE OF HOUSEHOLD BY ETHNIC GROUP, 1970-80

	1970		1976		1980		Average annual growth rate (%)		1985		Average annual growth rate 1981-85 (%)
	('000)	(%)	('000)	(%)	('000)	(%)	1971-76	1971-80	('000)	(%)	
Malay											
Households	931	56.0	1,119	57.1	1,344	58.8	3.1	3.7	1,570	59.2	3.2
Persons	4,822	52.7	5,632	53.1	6,384	53.9	2.6	2.9	7,302	54.7	2.7
Persons per household	5.2		5.0		4.8				4.6		
Chinese											
Household	543	32.6	628	32.0	696	30.5	2.5	2.5	806	30.4	3.0
Persons	3,274	35.8	3,769	35.5	4,136	34.9	2.4	2.4	4,589	34.4	2.1
Persons per household	6.0		6.0		5.9				5.7		
Indian											
Households	173	10.4	197	10.0	226	9.9	2.2	2.7	257	9.7	2.6
Persons	978	10.7	1,122	10.6	1,239	10.5	2.3	2.4	1,370	10.2	2.0
Persons per household	5.7		5.7		5.5				5.3		
Others											
Households	17	1.0	17	0.9	18	0.8	0.0	0.6	19	0.7	1.1
Persons	73	0.8	84	0.8	90	0.7	2.4	2.1	96	0.7	1.3
Persons per household	4.3		4.9		5.0				5.1		
TOTAL											
Households	1,664	100.0	1,961	100.0	2,284	100.0	2.8	3.2	2,652	100.0	3.0
Persons	9,147	100.0	10,707	100.0	11,849	100.0	2.5	2.6	13,357	100.0	2.4
Persons per household	5.5		5.4		5.2				5.0		

Source: FOURTH MALAYSIA PLAN

Table I.8 PENINSULAR MALAYSIA, PER CAPITAL MONTHLY HOUSEHOLD INCOME BY STATE AND URBAN-RURAL STRATA, 1982

($ in current prices)

State	Total	Urban	Rural
Johor	116	181	89
Kedah	78	143	70
Kelantan	92	114	84
Melaka	109	154	95
Negeri Sembilan	130	207	98
Pahang	102	180	89
Perak	91	130	74
Perlis	76	-	76
Pulau Pinang	120	140	101
Selangor	171	268	120
Terengganu	90	113	74
Federal Territory	308	308	-
Peninsular Malaysia	128	204	89

Source: The Social Economic Research Unit (SERU)

Table I.9 MALAYSIA: EMPLOYMENT ESTIMATES BY SECTOR 1980 - 85

	1980		1985		Increase 1981-85	Average annual growth rate (%)	
	'000	%	'000	%	'000	1981-85	Fourth Plan
Agriculture, forestry, livestock and fishing	1,910.9	39.7	1,953.2	35.7	42.3	0.4	0.7
Mining and quarrying	80.1	1.7	60.5	1.1	-19.6	-5.5	-4.7
Manufacturing	755.1	15.7	828.0	15.1	72.9	1.9	3.2
Construction	270.2	5.6	378.7	6.9	108.5	7.0	7.6
Electricity, gas, and water	31.0	0.6	39.9	0.7	8.9	5.2	3.1
Transport, storage and communications	209.5	4.3	264.9	4.9	55.4	4.8	6.5
Wholesale, retail trade, hotels and restaurants	676.2	14.0	846.3	15.5	170.1	4.6	3.8
Finance, insurance, real estate, and business services	78.3	1.6	101.6	1.9	23.3	5.3	3.4
Government services	658.2	13.7	819.5	15.0	161.3	4.5	5.3
Other services	147.4	3.1	175.9	3.2	28.5	3.6	4.0
Total	4,816.9	100.0	5,468.5	100.0	651.6	2.6	3.0
Labour force	5,108.9		5,917.1		808.2	3.0	3.1
Unemployment	292.0		448.6		156.6		
Unemployment rate (%)	5.7		7.6				

Source: Fifth Malaysia Plan

Table I.10 MALAYSIA: SELECTED KEY REGIONAL INDICATORS, 1980 AND 1985

Indicator	Northern					Central					Eastern				Southern
	Total	Kedah	Perak	Perlis	Pulau Pinang	Total	Melaka	Negeri Sembilan	Selangor	F.T. of K. Lumpur	Total	Kelantan	Pahang	Terengganu	Johor
Economic (in 1978 prices)															
Per capita GDP ($)															
1980	2,811	2,102	2,853	2,265	3,649	4,602	2,297	3,440	4,610	6,367	2,631	1,489	3,182	3,705	2,916
1985	3,162	2,358	3,194	2,604	4,120	5,322	2,765	3,846	4,963	7,783	3,111	1,740	3,495	4,719	3,324
Ratio of per capita GDP to Malaysian average															
1980	0.87	0.65	0.89	0.70	1.13	1.34	0.71	1.07	1.43	1.98	0.82	0.46	0.99	1.15	0.91
1985	0.84	0.63	0.85	0.69	1.10	1.42	0.74	1.02	1.32	2.07	0.83	0.46	0.93	1.26	0.88
Per capita GDP growth (% p.a), 1981-85	2.4	2.3	2.3	2.8	2.5	2.9	3.8	2.3	1.5	4.1	3.4	3.2	1.9	5.0	2.7
Demographic Population ('000)															
1980	4,039.9	1,120.6	1,812.3	148.8	958.2	3,545.1	466.65	575.9	1,521.6	981.0	2,243.1	897.8	802.2	543.1	1,644.9
1985	4,360.4	1,210.9	1,934.6	165.1	1,049.8	4,092.6	492.5	625.4	1,822.1	1,152.6	2,661.8	1,026.3	998.7	636.8	1,854.0
Population growth rate (% p.a), 1981-85	1.5	1.5	1.31	2.0	1.8	2.9	1.1	1.6	3.6	3.3	3.4	2.6	4.4	3.1	2.4
1980	6.1	6.6	6.3	7.2	5.1	4.5	6.4	5.3	4.4	3.5	6.5	7.4	4.7	7.9	5.3
1985	7.7	8.4	8.1	7.6	6.4	6.6	8.3	7.5	6.3	5.9	8.1	8.1	7.2	9.4	6.9
Net internal migration ('000), 1981-85	-144.4	-50.3	-91.2	-0.6	-2.3	95.5	-28.6	-19.4	107.9	35.6	49.5	-25.4	77.4	-2.5	-12.5
Socio-economic Infant mortality rate (per 1,000 live births)															
1980	25.1	28.7	25.2	24.2	29.9	21.2	18.8	23.7	21.2	20.7	29.7	31.8	27.1	29.9	24.6
1985	19.2	21.0	29.9	18.4	15.1	14.3	16.0	18.3	13.4	12.6	21.6	23.1	19.1	22.2	17.0
Acute care hospital bed (per 1,000 population)															
1980	1.7	1.1	1.9	2.4	1.9	1.7	2.0	2.8	0.8	2.4	1.3	1.0	1.7	1.2	1.6
1985	1.8	1.6	1.7	2.5	1.9	1.5	1.9	2.9	0.9	1.5	1.7	1.5	1.7	2.0	1.7
Per cent of population with piped water II															
1980	69.1	57.2	68.2	57.2	87.0	78.3	76.5	72.8	80.0	80.0	43.5	28.4	58.8	46.4	48.8
1985	80.6	70.4	82.4	70.4	91.1	86.4	84.4	79.6	88.1	88.1	54.0	32.8	72.8	59.1	69.0
Per cent of population with electricity															
1980	39.8	33.0	25.3	68.4	70.8	57.3	54.2	68.7	44.8	71.4	39.7	38.8	34.0	49.8	40.3
1985	65.6	60.9	58.0	90.3	81.0	85.5	70.9	91.6	81.0	95.7	59.7	62.8	49.5	70.6	62.9
Motorcars and motorcycles registered (per 1,000 population)															
1980	169	125	167	153	228	221	187	207	314	103	116	99	156	83	214
1985	254	197	241	231	348	389	283	305	287	642	180	165	216	147	197
Natural resources. 1981-85															
New land development by FELDAs:															
Area ('000 ha.)	9.7	2.9	4.6	2.2	0	22.0	0.2	18.2	3.6		80.6	17.2	56.0	7.4	19.7
Number of settlers ('000)	2.4	0.8	1.2	0.4	-	4.7	-	4.5	0.2	-	12.5	1.1	9.1	2.3	5.0
Idle land development('000 ha.)															
Padi	5.9	-	0.6	-	5.3	0.4	-	0.4	-	-	2.6	2.4	0.1	0.1	1.1
Non-padi	3.5	0.2	3.1	0.1	0.1	2.0	0.4	1.3	0.3	-	7.7	0.8	5.7	1.2	1.4
Log production ('000 cu.m)	8,334	1,887	6,456	80	11	5,207	71	3,445	1.691	-	29,729	7,574	14,604	7,551	8,477
Forest regeneration('000 ha.)	64.8	12.6	52.2	-	-	33.3	2.2	16.8	14.3	-	221.5	52.1	81.9	87.5	34.4
Mineral production															
Tin ore ('000 tonnes)	106.6	1.9	104.4	0.3	-	68.7	0.2	1.0	67.5	-	9.6	-	7.7	1.9	2.8
Crude petroleum('000 barrels)	-	-	-	-	-	-	-	-	-	-	146,803	-	-	146,803	-
Natural gas ('000 mmscf)	-	-	-	-	-	-	-	-	-	-	123.5	-	-	123.5	-

Table I.11 MALAYSIA: POPULATION DISTRIBUTION BETWEEN RURAL AND URBAN, 1980 - 85

(Unit: 1000)

	1980					1985					Urbanization Rate (%)		Average annual growth rate(%) 1981-85	
	Urban	%	Rural	%	Total	Urban	%	Rural	%	Total	1980	1985	Urban	Rural
Peninsular Malaysia	4,304.4	90.6	7,168.6	78.5	11,473.0	5,326.4	90.1	7,642.4	90.1	12,968.8	37.5	41.1	4.3	1.3
(%)	(37.5)		(62.5)		(100.0)	(41.1)		(58.9)		(100.0)				
Sabah	210.6	4.4	844.5	9.3	1,055.1	289.4	4.9	990.1	10.0	1,279.5	20.0	22.6	6.4	3.2
(%)	(20.0)		(80.0)		(100.0)	(22.6)		(77.4)		(100.0)				
Sarawak	238.2	5.0	1,112.9	12.2	1,351.1	296.4	5.0	1,246.4	12.6	1,542.8	17.6	19.2	4.4	2.3
(%)	(17.6)		(82.4)		(100.0)	(19.2)		(80.8)		(100.0)				
Malaysia	4,753.2	100.0	9,126.0	100.0	13,879.2	5,912.2	100.0	9,878.9	100.0	15,791.1	34.2	37.4	4.4	1.6
(%)	(34.2)		(65.8)		(100.0)	(37.4)		(62.6)		(100.0)				

Source: Fifth Malaysia Plan

Table I.12 MALAYSIA: PUBLIC AND PRIVATE SECTOR HOUSING PERFORMANCE, 1981 - 1985

(Units)

Programme	Units Planned	Number of units completed					Total
	1981-85	1981	1982	1983	1984	1985 1/	1981-85
Public sector	398,570	31,010	43,480	35,050	44,480	47,880	201,900
Public low-cost housing	176,500	12,900	20,100	11,500	12,590	14,220	71,310
Housing in land schemes	110,010	8,930	10,220	5,780	5,740	4,310	34,980
Institutional quarters and other staff accommodation	58,500	3,660	4,000	5,850	5,390	6,550	25,450
Medium and high-cost housing	53,560	5,520	9,160	11,920	20,760	22,800	70,160
Private sector	524,730	37,600	44,330	37,710	38,600	45,930	204,170
Private developer low-cost housing	90,000	5,800	4,860	1,820	4,150	2,540	19,170
Private developer medium and high-cost housing	259,470	11,690	19,270	15,980	15,020	23,670	85,630
Co-operative societies	25,260	1,170	1,270	980	500	650	4,570
Individuals and groups	150,000	18,940	18,930	18,930	18,930	19,070	94,800
Total	923,300	68,610	87,810	72,760	83,080	93,810	406,070

Source: Ministry of Housing and Local Government
Note : 1/ Estimates

Table I.13 GDP ORIGINATED FROM MANUFACTURING (GDPM)

	1970	1980	1985
$ million in 1970 price	1,650	5,374	
$ million in 1978 price	-	8,932	11,357
Average annual growth rate (%)			
1971 - 1980		12.5	
1981 - 1985			4.9

Source: Fourth Malaysia Plan

Fifth Malaysia Plan

Table I.14 PENINSULAR MALAYSIA: AVERAGE ANNUAL PRODUCTION OF MANUFACTURES, 1982-85 (1981 : 100)

Industry	Production Index 1/				Average annual growth rate (%)				
	1982	1983	1984	1985	1982	1983	1984	1985	1982-85
Processed foods	91.9	95.4	95.8	106.3	-8.2	3.8	0.4	11.0	1.5
Oils and fats	119.2	114.7	135.3	141.8	19.2	-3.8	18.0	4.7	9.1
Other foods	93.4	105.3	108.3	108.8	-6.6	12.7	2.8	0.3	2.1
Beverages and tobacco	101.8	94.5	97.8	99.8	1.8	-7.2	3.5	2.0	-0.5
Textiles and wearing apparel	95.9	95.2	104.4	102.3	-4.1	-0.7	9.7	-1.6	0.7
Sawmill and wood products	108.4	121.4	99.9	108.3	8.4	12.0	-17.7	8.4	2.0
Industrial chemicals	86.4	88.7	101.4	113.1	-13.6	2.7	14.3	11.5	3.1
Other chemical products	96.0	100.9	103.6	116.7	-4.0	5.1	2.7	12.0	3.8
Petroleum refineries	109.2	139.8	149.0	137.2	9.2	28.0	6.6	-7.9	8.2
Rubber processing and rubber products	105.7	108.4	109.5	113.0	5.7	2.6	1.0	3.2	3.1
Non-metallic mineral products	94.8	99.9	111.3	102.7	-5.2	5.2	31.4	-7.7	0.7
Iron and steel basic industries	104.5	123.1	164.3	132.5	4.5	17.8	33.4	-19.3	7.2
Non-ferrous metal basic industries	114.8	99.3	135.5	87.6	14.8	-13.5	-12.6	0.9	-3.2
Fabricated metal products	100.9	90.8	135.5	132.2	0.9	-10.0	49.2	-2.4	7.2
Electrical machinery	126.7	148.3	201.6	161.8	26.7	17.0	35.9	-19.8	12.8
Transport equipment	96.0	111.1	119.7	128.8	-4.0	15.7	7.7	7.6	6.5
Other establishments	93.1	93.4	94.3	100.2	-6.9	0.3	1.0	6.3	-0.1
Total	106.8	111.1	125.4	121.6	6.8	4.0	12.9	-3.0	5.0

Source: Department of Statistics, Monthly Surveys of Manufacturing Industries (1981 - 85)
Note: 1/ Data used for the Fourth Plan are not comparable because the base year was 1968.

Table I.15 GDP ORIGINATED FROM COMMERCIAL SECTOR 1/

	1970	1980	1985
$ million in 1970 price	2,975	6,107	
$ million in 1978 price	-	10,091	14,075
Average annual growth rate (%)			
1971 - 1980		7.46	
1981 - 1985			6.88

1/ Includes:

1) Wholesale and retail trade, hotels and restaurants

2) Finance, insurance, real estate and business services

3) Other services

Table I.16 GDP ORIGINATED FROM WHOLESALE AND RETAIL TRADE, HOTEL AND RESTAURANT

	1970	1980	1985
$ million in 1970 price	1,633	3,295	
$ million in 1978 price	-	5,383	7,551
Average annual growth rate (%)			
1971 - 1980		7.3	
1981 - 1985			7.0

Source: Fourth Malaysia Plan

Fifth Malaysia Plan

Table I.17(1) MALAYSIA: SELECTED KEY REGIONAL INDICATORS
1980, 1985 AND 1990

	Selangor	F.T. or K.L.	Malaysia
Per capital GDP ($) 1/			
1980	4,610	6,367	3,221
1985	4,963	7,783	3,758
1990	5,249	8,855	4,229
Ratio of per capital to Malaysia average			
1980	1.43	1.98	1.00
1985	1.32	2.07	1.00
1990	1.24	2.09	1.00
Per Capital GDP Growth % p.a.			
1981-85	1.5	4.1	3.1
1986-90	1.1	2.6	2.4
Population			
1980	1,521.6	981.0	13,879.2
1985	1,822.1	1,152.6	15,791.1
1990	2,158.2	1,362.8	17,877.2
Population Growth Rate % p.a.			
1981-85	3.6	3.6	2.6
1986-90	3.4	3.4	2.5
Net Internal Migration 2			
1981-85	107.9	35.6	-
1986-90	127.8	34.8	-
GDP ($ million)			
1980	7,014	6,246	44,702
1985	9,043	8,971	59,344
1990	11,328	12,068	75,509
GDP Growth Rate % p.a.			
1981-85	5.2	7.5	5.8
1986-90	4.6	6.1	5.8
Manufacturing ($ million)			
1980	2,570 (28.8) (36,64%)	1,102 (12.3) (17.6%)	8,932 (100) (20%)
1985	3,310 (29.1) (36.6%)	1,421 (12.5) (15.8%)	11,357 (100) (19.1%)
1990	4,491 (39.6%)	1,901 (15.8%)	15,509 (20.5%)
Manufacturing growth rate % p.a.			
1981-50	5.2	5.2	4.9
1986-90	6.3	6.0	6.4
Wholesale/retail hotel and Restaurants 1 ($ million)			
1980	509 (7.3%)	2,038 (32.6%)	5,383
1985	748 (8.3%)	2,992 (33.4%)	-7,551
1990	1,047 (9.2%)	4,179 (34.6%)	10,252
Wholesale/retail hotel and Restaurant growth rate % p.a.			
1981-85	8.0	8.0	7.0
1986-90	6.8	6.9	6.3

Source: 5th Five Year Plan
Note: 1/ Price in 1978 prices
2/ Net Internal Migrant

Table I.17(2) HOUSING PERFORMANCE AND PROGRAMMES

	a) Units Planned 1981-85	b) Units Completed 1981-85	Ratio b/a	Unit Needs 1986 - 1990			Target Unit 1986-90
				Replace	Population Increase	Total	
Public Sector	398,570	201,900	50.7				149,000
Private	524,730	204,170	38.9				552,500
Total	923,300	406.070	44.0	349,300	486,200	835,550	701,500
F.T. of KL				9,600	54,200	63,800	
Selangor				17,600	106,400	124,000	
Others				322,100	325,600	647,700	

	Population			Increase of Population		Population Increase		
	1980	1985	1990	1981-85	1986-90	Unit Planned 1981-85	Unit Completed	Unit Planned 1986-1990 for increase)
Malaysia	13,879.2	15,791.1	17,877.2	1,911.9	2,086.1	2.07	4.71	4.29
F.T. of KL	981.0	1,152.6	1,362.8	171.6	210.2	(3.56) 1/	(8.09)	3.88
Selangor	1,521.6	1,822.1	2,158.2	300.5	336.1			3.15

Source: 5th five year plan
Note : 1/ 923.3 / 835.5 x 486.2 = 537.3

Table I.17(3) MALAYSIA : DISTRIBUTION OF URBAN POPULATION BY REGION

	Selangor	F.T. of K.L.	Malaysia
Total			
1980	1,521.6	981.0	13,879.2
1985	1,822.1	1,152.6	15,791.1
1990	2,158.2	1,362.8	17,877.2
Urban			
1980	524.4	981.0	4,753.2
1985	832.7	1,152.6	5,912.2
1990	1,193.8	1,362.8	7,281.8
Urbanization Rate (%)			
1980	34.5	100	34.2
1985	45.7	100	37.4
1990	55.3	100	40.7
Average annual rate of urban growth (%)			
1981 - 85	9.2	3.2	4.4
1986 - 90	7.2	3.4	4.2
1981 - 90	8.2	3.3	4.3

Source: Fifth Five Year Plan

Table I.18 INDEX OF INDUSTRY

	1980	1985	1990
Manufacturing			
Employment (1,000)	755.1	828.0	941.1
GDPM ($ million)	8,932.0	11,357.0	15,509.0
GDPM/Employment	11.82	13.72	16.48
Energy (PJ)	109.5	162.2	242.5
Energy/Employment	0.145	0.196	0.258
Energy/GDPM	0.0123	0.0143	0.0156
Wholesale/Retail and Hotel & Restaurant			
Employment	676.2	846.3	1,044.4
GDPW 1/	5,383	7,551	10,252
GDPW/Employment	7.96	8.92	9.82

Source: Fifth Five Year Plan

Note : 1/ 1978 price

Table I.19 MALAYSIA: KEY DATA AND FORECASTS

	1985		1986		1987	
POPULATION	(Million)		(Million)		(Million)	
Malaysia	15.677		16.109		16.544	
Peninsular Malaysia	12.978		13.324		13.684	
Malays	7.344		7.588		7.794	
Chinese	4.245		4.318		4.434	
Indians	1.307		1.334		1.370	
Others	0.082		0.084		0.086	
Sarawak	1.477		1.514		1.555	
Sabah	1.222		1.271		1.305	
NATIONAL PRODUCT	($ million)	(% growth)				
Gross National Product in constant 1978 prices	52,716	- 1.5	52,955	+ 0.5	52,926	- 0.1
Consumption expenditure: Public	9,417	- 0.9	10,063	+ 6.9	10,048	- 0.1
Private	29,299	+ 0.5	26,389	- 9.9	26,948	+ 2.1
Fixed capital formation: Public	9,483	+ 1.2	8,922	- 5.9	6,352	-28.8
Private	8,405	-19.1	7,296	-13.2	7,486	+ 2.6
Exports of goods and services	32,069	+ 1.1	35,851	+11.8	37,623	+ 4.9
Imports of goods and services	30,095	- 9.8	29,864	- 0.8	30,556	+ 2.3
Gross National Savings (at current prices)	19,552	-14.2	16,324	-16.5	15,220	- 6.8
Per capita GNP (at current prices, M$)	4,581	- 5.7	4,094	-10.6	3,993	- 2.5
DOMESTIC PRODUCT						
GDP in constant 1978 prices	57,150	- 1.0	57,436	+ 0.5	57,990	+ 1.0
FEDERAL GOVERNMENT FINANCE	($ Million)		($ Million)		($ Million)	
Revenue	21,114		19,158		18,021	
EXTERNAL TRADE						
Total Export (FOB)	38,017	- 1.6	33,552	-11.7	34,360	+ 2.4
Total Imports (CIF)	30,438	- 7.6	26,774	-12.0	27,646	+ 3.3
Balance of trade	7,579		6,778		6,714	
PRODUCTION AND PRICES	(Volume)	(% growth)				
Production						
Rubber (1,000 tonnes)	1,469	- 4.0	1,460	- 0.6	1,460	-
Crude petroleum (1,000 barrels/day)	446	- 0.1	501	+12.2	510	+ 1.8
Tin (1,000 tonnes)	37	-10.7	27	-28.2	26	- 3.8
Palm oil (1,000 tonnes)	4,133	+11.3	4,800	+16.1	5,200	+ 8.3
Sawlogs (1,000 cu metres)	30,957	- 0.4	29,500	- 4.7	29,200	- 1.0
EXCHANGE RATES (Equivalent in Malaysian Ringgit)	(End December)		(End August)			
1 US$ =	2.42		2.61		-	
100 yen =	1.21		1.67		-	
LABOUR	(Thousand)	(Growth)				
Labour force	5,917	+ 2.8	6,083	+ 2.8	6,250	+ 2.8
Unemployment rate (% of labour force)	7.6		8.7		9.5	

Table I.20(1) GROSS DOMESTIC PRODUCT BY KIND OF ECONOMIC ACTIVITY, 1985-1990

($ million in 1978 prices)

	1985		1990		Annual Growth Rate, 1986-1990	
	Selangor	Wilayah	Selangor	Wilayah	Selangor	Wilayah
Agriculture, forestry, livestock and fishing	978	8	1,024	8	0.9	0
Mining and quarrying	665	56	412	36	-9.1	-8.5
Manufacturing	3,283	1,409	3,802	1,609	3.0	2.7
Construction	562	347	408	261	-6.2	-5.5
Electricity, gas and water	151	167	187	209	4.4	4.6
Transport, storage and communication	898	509	1,096	623	4.1	4.1
Wholesale and retail trade, hotels and restaurants	685	2,738	731	2,932	1.3	1.4
Finance, insurance, real estate & business services	488	1,418	524	1,577	1.4	2.1
Government services	725	1,411	771	1,520	1.2	1.5
Other services	257	384	299	451	3.1	3.3
Total	8,692	8,447	9,254	9,226	1.3	1.8
GDP at purchases' value	8,709	8,639	9,330	9,939	1.4	2.8
Per capita GDP ($)	4,780	7,495	4,323	7,293	-2.0	-0.5

Note: Based on Malaysia GDP growth rate of about one percent.

Table I.20(2) GROSS DOMESTIC PRODUCT BY KIND OF ECONOMIC ACTIVITY, 1985-1990

($ million in 1978 prices)

	1985		1990		Annual Growth Rate, 1986-1990	
	Selangor	Wilayah	Selangor	Wilayah	Selangor	Wilayah
Agriculture, forestry, livestock and fishing	978	8	1,050	8	1.4	0
Mining and quarrying	665	56	433	37	-8.2	-8.0
Manufacturing	3,283	1,409	4,080	1,727	4.4	4.2
Construction	562	347	457	293	-4.1	-3.3
Electricity, gas and water	151	167	204	227	6.2	6.3
Transport, storage and communication	898	509	1,153	656	5.1	5.2
Wholesale and retail trade, hotels and restaurants	685	2,738	729	2,925	1.3	1.3
Finance, insurance, real estate & business services	488	1,418	555	1,670	2.6	3.3
Government services	725	1,411	756	1,491	0.8	1.1
Other services	257	384	273	412	1.2	1.4
Total	8,692	8,447	9,690	9,446	2.2	2.3
GDP at purchases' value	8,709	8,639	9,677	10,308	2.2	3.6
Per capita GDP ($)	4,780	7,495	4,484	7,564	-1.3	0.2

Note: Based on Malaysia GDP growth rate of about three percent.

Table I.20(3) MALAYSIA: EMPLOYMENT ESTIMATES

(1,000)

Sector	1985	1990 1/	1990 2/	Agerage Annual Growth Rate (%)	
				1986-90 1/	1986-90 2/
Mining and quarrying	60.5	45.5	45.5	-5.5	-5.5
Manufacturing	828.0	850.0	870.0	0.5	1.0
Construction	378.7	330.7	340.7	-2.7	-2.1
Electricity, gas and water	39.9	46.0	46.0	2.9	2.9
Transport, storage and communication	264.9	293.9	305.0	2.1	2.9
Other sectors	3,896.5	4,073.9	4,319.8	0.9	2.1
Total	5,468.5	5,640.0	5,927.0	0.6	1.6

Note: 1/ Assuming GDP growth of 1% p.a.
2/ Assuming GDP growth of 3% p.a.

Table I.21 GROWTH RATE BY INDUSTRIAL SECTORS FOR BASE, MEDIUM AND LOW CASES

	Base Case	Key Data			1986 - 1990 Medium		1986 - 1990 Low	
	1985-95	1985	1986	1987	S 1/	K 2/	S 1/	K 2/
Agriculture, forestry livestock and fishing	1.0	2.5	2.7	2.6	1.4	0	0.9	0
Manufacturing	6.4	-3.8	2.0	2.5	4.4	4.2	3.0	2.7
Mining and Quarrying	-7.8	-1.4	6.3	1.1	-8.2	-8.0	-9.1	-8.5
Construction	5.1	-8.4	-9.0	-10.0	-4.1	-3.3	-6.2	-5.5
Transport, storage and Communications	7.4	4.8	3.5	4.0	5.1	5.2	4.1	4.1
Wholesale and Retail Trade, Hotel and Restaurant	7.0	-2.8	-4.3	-0.8	1.3	1.3	1.3	1.4
Finance, Insurance Real Estate	8.5	-4.1	-1.0	-	2.6	3.3	1.4	2.1
Government	4.3	2.1	3.0	4.0	0.8	1.1	1.2	1.5
Others					1.2	1.4	3.1	3.3
Total					2.2	2.3	1.3	1.8

Note: 1/ = Selangor
2/ = K. L.

Table I.22 GROSS DOMESTIC PRODUCT, MALAYSIA, 1985 - 2005

(in 1978 Constant Prices)

	Base Case		Medium Case		Low Case 2	
	Average Annual Growth Rate (%)	M$ Million	Average Annual Growth Rate (%)	M$ Million	Average Annual Growth Rate (%)	M$ Million
1985		59,344		59,344		59,344
	5	(57,150)	3	(57,150)	1	(57,150)
1990		75,599		68,796		62,371
	5	(72,939)	5	(66,253)	3	(60,065)
1995		96,665		87,803		72,305
	5	(93,091)	5	(84,557)	3	(69,632)
2000		123,143		112,062		83,821
	5	(118,810)	5	(107,919)	3	(80,722)
2005		157,457		143,021		97,172
		(151,636)		(137,735)		(93,579)

Source: Fifth Five Year Plan
Figures in parenthesis are based on the data given by EPU.

Table I.23 GROSS REGIONAL PRODUCT, MALAYSIA, 1980 - 1985

(in 1978 Constant Prices)

	Selangor State and Federal Territory of Kuala Lumpur		Selangor State		Federal Territory of Kuala Lumpur		Malaysia	
	GRP	%	GRP	%	GRP	%	GDP	%
1980	13,260	29.7	7,014	15.7	6,246	14.0	44,702	100.0
1985	18,014 (17,139	30.3 30.0)	9,043 (8,692	15.2 15.2)	8,971 (8,477	15.1 14.8)	59,344 (57,150)	100.0
1985/ 1980	1.36 (1.29)	-	1.29 (1.24)	-	1.44 (1.35)	-	1.33 (1.28)	-

Source: Fifth Malaysia Plan
Figures in parenthesis are given by EPU in October 1986

Table I.24 ESTIMATED GROSS REGIONAL PRODUCT, 1985-2005

(M$ Million in 1978 Constant Prices)

	Share to Malaysia (%)			Base Case		Medium Case		Low Case	
	F.T of K.L	Selangor State	F.T of K.L and Selangor	Malaysia	F.T of K.L Selangor	Malaysia	F.T of K.L Selangor	Malaysia	F.T of K.L Selangor
1985	15.1	15.2	30.3	59,344	18,014	59,344	18,014	59,344	18,014
	(14.8)	(15.2)		(57,150)*	(17,139)*	(57,150)*	(17,139)*	(57,150)*	(17,139)*
1990	15.9	15.0	30.9	75,599	23,396	68,796	21,258	62,371	19,273
			(28.9-30.8)			(66,253)	(19,136)*	(60,065)	(18,480)*
1995	16.7	15.8	32.5	96,665	31,417	87,803	28,536	72,305	23,499
2005	17.5	16.4	33.9	157,457	53,379	143,021	48,484	97,172	32,941

Note: Figures with * are given by EPU.

Table I.25 GROSS REGIONAL PRODUCT, KLANG VALLEY AREA

(M$ Million in 1978 Constant Prices)

	Klang Valley Share to F.T of K.L and Selangor (%)	Base Case		Medium Case		Low Case	
		F.T of K.L Selangor	Klang Valley	F.T of K.L Selangor	Klang Valley	F.T of K.L Selangor	Klang Valley
1980	85.7	12,943	11,099	12,943	11,099	12,943	11,099
1985	86.1	18,014 * (17,139)	15,511 (14,757)	18,014 * (17,139)	15,511 (14,757)	18,014 * (17,139)	15,511 (14,757)
1990	87.9	23,396	20,564	21,258 * (19,136)	18,686 (16,821)	19,273 * (18,480)	16,941 (16,244)
1995	90.0	31,417	28,275	28,536	25,682	23,499	21,149
2005	91.5	53,379	48,842	48,484	44,363	32,941	30,141

Note: Figure with * are given by EPU.

Table I.26 GROSS REGIONAL PRODUCT IN KLANG VALLEY, 1980 - 2005, KLANG VALLEY (BASE CASE)

(M$ million in 1978 Prices)

	Gross Regional Product (M$ million)					Average Annual Growth Rate (%)	
	1980	1985	1990	1995	2005	1985-1995	1995-1005
Primary	249	307	330	341	348	1.0	0.2
Agriculture	249	307	330	341	348	1.0	0.2
Secondary	4,372	5,467	6,955	9,262	15,463	5.4	5.3
Mining	545	483	312	215	109	-7.8	-6.6
Manufacturing	3,168	4,082	5,511	7,561	13,129	6.4	5.7
Construction	659	902	1,132	1,486	2,225	5.1	4.1
Tertiary	6,478	9,737	13,279	18,671	33,031	6.7	5.9
Transport and Utilities	1,045	1,587	2,263	3,253	5,732	7.4	5.8
Wholesale	2,454	3,603	5,029	7,112	12,449	7.0	5.8
Finance	1,234	1,883	2,732	4,263	9,439	8.5	8.3
Government-) Services) Others)	1,745	2,664	3,255	4,043	5,411	4.3	3.0
Total	11,099	15,511	20,564	28,274	48,842	6.2	5.6

Source: Klang Valley Transportation Study Team's Estimates

Note: GRP by sector for medium and low cases is estimated that the structure by sector of alternative cases is the same with one of base case at the year in which total GRP is the same as follows.

	1990	1995	2000	2005
Medium Case I	1988	1993	1998	2003
Low Case II	1986	1989	1992	1995

Table I.27 · POPULATION DISTRIBUTION BY DISTRICT, 1980 - 2005, STUDY AREA

		1980 [1]	1985 [2]	1995 [3]	2005 [3]
Kuala Lumpur	Number ('000)	977	1,215	1,770	2,240
	Annual Growth Rate (%)		4.0	3.8	2.4
Gombak District	Number ('000)	176	243	444	746
	Annual Growth Rate (%)		4.7	6.2	5.3
Hulu Langat District	Number ('000)	188	240	386	630
	Annual Growth Rate (%)		5.0	4.9	5.0
Petaling District	Number ('000)	382	491	850	1,157
	Annual Growth Rate (%)		5.0	5.6	3.7
Klang District	Number ('000)	296	345	490	677
	Annual Growth Rate (%)		3.1	3.6	3.3
Klang Valley	Number ('000)	2,020	2,534	3,940	5,450
	Annual Growth Rate (%)		4.6	4.5	3.3
Bukit Tinggi	Number ('000)	-	-	-	100
	Annual Growth Rate (%)		-	-	-
Study Area	Number ('000)	2,020	2,534	3,940	5,550
	Annual Growth Rate (%)		4.6	4.5	3.5

Source: 1/ 1980 National Census
2/ Home Interview Survey in 1985 by Klang Valley Transportation Study
3/ Projected by Klang Valley Transportation Study Team based on the KVPP and Interim Gombak Development Plan

Table I.28 ESTIMATED EMPLOYMENT, 1985 - 2005, KLANG VALLEY

(Unit: 1,000)

	1980 1/	1985 2/	1990 3/	1995	2000	2005
Population	2,020	2,534	3,283	3,940	4,760	5,550
Working Age Population (15-64)	1,300	1,632	2,114	2,537	3,065	3,574
Participation Rate (%) 4/	62.0	62.5	63.0	63.5	64.0	64.5
Labour Force	806	1,020	1,332	1,610	1,962	2,305
Unemployment Rate (%)						
Base Case	5.7	7.0	6.5	6.0	5.5	5.0
Medium Case	5.7	7.0	6.5	6.0	5.5	5.0
Low Case	5.7	7.0	12.0	10.0	10.0	10.0
Unemployment 5/	46	70	87	96	108	115
Employment						
Base Case	760	950	1,245	1,514	1,854	2,190
Medium Case	760	950	1,245	1,514	1,854	2,190
Low Case	760	950	1,172	1,449	1,766	2,075

Source: 1/ Department of Statistics
2/ Modified from HIS Data by Klang Valley Transportation Study Team
3/ Klang Valley Transportation Study Team's Estimates

Notes : 4/ Participation rate is defined as labour force per working age population.
5/ Unemployment is defined as the status of employment as not at work actively unemployed and inactively unemployed and out of labour force.

Table I.29 VALUE ADDED BY INDUSTRY (BASE CASE)

(M$/Employment)

	1980 1/	1985 1/	1995 2/	2005 2/
Primary	4,399	6,631	7,544	8,992
Secondary	18,992	20,301	23,126	28,089
Tertiary	13,690	15,348	17,477	20,634
Total	14,604	16,327	18,675	22,302

Source: 1/ Calculated form GRP and Employment
2/ Klang Valley Transportation Study Team's Estimates

Note: Value added by industry for alternative cases is calculated from GRP by sector (Table I.26) and Employment by sector (Table I.30)

Table I.30 EMPLOYMENT IN KLANG VALLEY

(Unit: 1,000)

	1980	1985	1990	1995	2000	2005
Base and Medium Case						
Primary	56.6	46.3	45.6	45.2	44.2	38.7
Secondary	230.2	269.3	338.8	400.6	478.2	550.5
Tertiary	473.2	634.4	860.6	1,068.2	1,331.6	1,600.8
Total	760.	950.	1,245.	1,514.	1,854.	2,190.
Low Case						
Primary	56.6	46.3	45.5	44.4	39.2	37.8
Secondary	230.2	269.3	319.9	384.1	455.3	522.3
Tertiary	473.2	634.4	806.6	1,020.5	1,281.5	1,514.9
Total	760.0	950.0	1,172.0	1,449.0	1,766.0	2,075.0

Table I.31 RATIO OF EMPLOYMENT IN WORKING AND RESIDENTIAL LOCATION, 1985 AND 2005, KLANG VALLEY

	1985 1/	2005 2/
Kuala Lumpur	1.13	1.09
Gombak	0.70	0.80
Hulu Langat	0.49	0.80
Petaling	1.13	1.09
Klang	0.81	0.90

Source: 1/ HIS Data, 1985
2/ Assumed by Klang Valley Transportation Study Team

Table I.32 DISTRIBUTION OF EMPLOYMENT AT WORKING PLACES, 1985, 1995 and 2005, KLANG VALLEY (BASE AND MEDIUM CASES)

		Employment ('000)			Average Annual Growth Rate (%)	
		1985 1/	1995 2/	2005 3/	1985-1995	1995-2005
Kuala Lumpur	Primary	9.6	9.4	8.0	-0.2	-1.6
	Secondary	102.5	154.1	182.3	4.2	1.7
	Tertiary	429.3	620.9	843.7	3.8	3.1
	Total	541.4	784.4	1,034.0	3.8	2.4
Gombak	Primary	7.0	6.8	5.9	-0.3	-1.4
	Secondary	28.6	53.4	101.0	6.4	6.6
	Tertiary	21.7	54.9	113.8	9.7	7.6
	Total	57.3	115.1	220.7	7.2	6.7
Hulu Langat	Primary	7.1	6.9	5.9	-0.2	-1.6
	Secondary	13.6	29.2	58.4	7.9	7.2
	Tertiary	17.8	56.4	120.0	12.2	7.8
	Total	38.5	92.5	184.3	9.2	7.1
Petaling	Primary	13.4	13.1	11.2	-0.2	-1.6
	Secondary	96.8	120.7	149.3	2.2	2.2
	Tertiary	112.6	237.5	376.1	7.7	4.7
	Total	222.8	371.3	536.6	5.2	3.8
Klang	Primary	9.2	9.0	7.7	-0.2	-1.5
	Secondary	27.8	43.1	59.5	4.5	3.3
	Tertiary	53.0	98.6	147.2	6.6	4.1
	Total	90.0	150.7	214.4	5.3	3.6
Klang Valley	Primary	46.3	45.2	38.7	-0.2	-1.5
	Secondary	269.3	400.5	550.5	4.1	3.2
	Tertiary	634.4	1,068.3	1,600.8	5.3	4.1
	Total	950.0	1,514.0	2,190.0	4.8	3.8

Source: 1/ Modified from HIS data
2/ Klang Valley Transportation Study Team's Estimates
3/ Figures for Kuala Lumpur include those of Bukit Tinggi

Table I.33 INCOME DISTRIBUTION (1985) (BY HOUSEHOLD)

	KUALA LUMPUR	(%)	REST OF KLANG VALLEY	(%)	KLANG VALLEY	(%)
0 - 100	1.8	0.7	2.0	0.7	3.8	0.7
101 - 200	2.0	0.8	2.2	0.8	4.2	0.8
201 - 300	4.8	1.8	5.3	2.0	10.1	1.9
301 - 400	10.6	4.0	11.8	4.4	22.4	4.2
401 - 500	15.9	6.0	17.7	6.6	33.6	6.3
501 - 600	22.0	8.3	24.4	9.1	46.4	8.7
601 - 700	23.3	8.8	25.8	9.6	49.1	9.2
701 - 800	20.2	7.6	22.4	8.3	42.6	8.0
801 - 900	15.2	5.8	16.8	6.2	32.0	6.0
901 - 1000	13.2	5.0	14.6	5.4	27.8	5.2
1001 - 1500	52.4	19.8	47.6	17.7	100.0	18.8
1501 - 2000	38.9	14.7	35.3	13.1	74.2	13.9
2001 - 3000	29.9	11.3	25.2	9.4	55.1	10.3
3001 - 4000	4.5	1.7	4.8	1.8	9.3	1.7
4001 - 5000	4.3	1.6	4.5	1.7	8.8	1.7
5000 -	5.1	1.9	8.8	3.3	13.9	2.6
Total	264.1	100.0	269.2	100.0	533.3	100.0
Average	1,371		1,395		1,384	

Table I.34 SCENARIO OF POPULATION TARGETS IN KLANG VALLEY BY DISTRICT AND ETHNIC GROUP, 1980-2000

Area/District	Population						Annual Growth Rate	
	1980		1990		2000		1980-1990	1990-2000
	Number	%	Number	%	Number	%		
1. FEDERAL TERRITORY	977,102	100.0	1,488,550	100.0	2,150,000	100.0		
Malay	324,398	33.2	521,343	35.0	774,000	36.0		
Chinese	509,070	52.1	759,671	51.0	1,096,500	50.0	4.3	3.7
Indian	143,634	14.7	208,536	14.0	279,500	14.0		
2. 4 DISTRICTS IN SELANGOR								
1) PETALING	382,335	100.0	711,991	100.0	1,011,380	100.0		
Malay	126,990	33.2	307,190	43.1	-451,725	44.3		
Chinese	180,818	47.3	297,825	41.8	408,252	40.6	6.4	3.6
Indian	74,527	19.5	106,976	15.1	151,403	15.1		
2) KLANG	296,125	100.0	417,491	100.0	576,055	100.0		
Malay	111,724	37.7	166,602	39.9	247,553	43.0		
Chinese	126,186	42.6	172,536	41.3	226,182	39.3	3.5	3.3
Indian	58,215	19.7	78,353	15.8	102,320	17.7		
3) GOMBAK	175,867	100.0	342,428	100.0	575,414	100.0		
Malay	95,509	54.3	197,045	57.5	330,281	57.4		
Chinese	53,164	30.2	103,447	30.2	162,070	28.2	6.9	5.3
Indian	27,194	15.5	41,936	12.2	83,063	14.4		
4) HULU LANGAT	188,370	100.0	321,566	100.0	447,151	100.0		
Malay	94,564	50.2	177,249	55.1	238,222	53.3		
Chinese	72,167	38.3	113,350	35.2	160,627	35.9	5.5	3.4
Indian	21,639	11.5	30,967	9.7	48,302	10.8		
3. TOTAL KLANG VALLEY	2,019,799	100.0	3,283,026	100.0	4,760,000	100.0		
Malay	753,185	37.3	1,369,429	41.7	2,041,781	42.9		
Chinese	941,405	46.6	1,446,829	44.1	2,053,631	43.1	5.0	3.8
Indian	325,209	16.1	466,768	14.2	664,588	14.0		

Source: Klang Valley Perspective Plan

Table I.35 SCENARIO OF POPULATION IN KLANG VALLEY, 1980-2000
(MAJOR GROWTH CENTRES)

Urban centres	1980	%	1990	%	2000	%	Annual Growth Rate (%) 1980-1990	1990-2000
Major Centres								
1) KUALA LUMPUR	977,102	100.0	1,489,550	100.0	2,150,000	100.0		
Malay	324,398	33.2	521,343	35.0	774,000	36.0		
Chinese	509,070	52.1	759,671	51.0	1,096,500	50.0	4.3	3.7
Indian	143,634	14.7	208,536	14.0	279,500	14.0		
2) PETALING JAYA	220,065	100.0	280,000	100.0	400,000	100.0		
Malay	58,537	26.6	78,400	28.0	112,000	28.0		
Chinese	126,317	57.4	156,800	56.0	220,000	55.0	2.4	3.6
Indian	35,211	16.0	44,800	16.0	68,000	17.0		
3) SHAH ALAM	20,164	100.0	260,000	100.0	370,000	100.0		
Malay	13,308	66.0	156,000	60.0	229,400	62.0		
Chinese	2,157	10.7	83,460	32.1	111,000	30.8		
Indian	4,699	23.3	20,540	7.9	29,600	8.0	29.1	3.6
4) KLANG	203,413	100.0	300,000	100.0	430,000	100.0		
Malay	54,718	26.9	90,000	30.0	146,200	34.0		
Chinese	106,181	52.2	150,000	50.0	109,200	44.0	4.0	3.7
Indian	42,518	20.9	60,000	20.0	94,600	22.0		
5) BANGI	33,339	100.0	125,000	100.0	180,400	100.0		
Malay	8,035	24.1	64,500	51.6	99,220	55.0		
Chinese	20,037	60.1	49,750	39.8	61,336	34.0	14.1	3.7
Indian	5,267	15.8	10,750	8.6	19,884	11.0		
6) SELAYANG	3,548	100.0	60,000	100.0	130,000	100.0		
Malay	1,447	40.8	39,000	65.0	84,500	65.0		
Chinese	1,029	29.0	16,900	28.2	36,400	28.0	32.7	8.0
Indian	1,072	30.2	4,080	6.8	9,100	7.0		
7) OTHER TOWNS	196,938	100.0	267,533	100.0	428,900	100.0		
Malay	80,548	40.9	128,183	47.9	205,443	47.9		
Chinese	96,988	49.2	117,351	43.9	188,287	48.9	3.1	4.8
Indian	19,402	9.9	21,999	8.2	35,170	8.2		
RURAL AREAS	365,230	100.0	500,943	100.0	670,700	100.0		
Malay	212,194	58.1	292,003	58.3	391,018	58.3		
Chinese	79,618	21.8	112,077	22.5	150,908	22.5	3.2	3.0
Indian	73,410	20.1	96,063	19.2	128,774	19.2		
TOTAL KLANG VALLEY	2,019,799	100.0	3,283,026	100.0	4,760,000	100.0		
Malay	753,185	37.3	1,369,429	41.7	2,041,781	42.9		
Chinese	941,405	46.6	1,446,829	44.1	2,053,631	43.1	5.0	3.8
Indian	325,209	16.1	446,768	14.2	664,588	14.0		

Source: Klang Valley Perspective Plan

Table I.36 AVERAGE HOUSEHOLD SIZE

	Average Household Size (Persons/household)	No. of Household per dwelling Unit	Occupanycy Rate (Persons per dwelling unit)
1980 - 1985	4.45	1.20	5.34
1986 - 1990	4.30	1.15	4.94
1991 - 1995	4.15	1.10	4.57
1996 - 2000	4.00	1.00	4.00

Source: The Extension Plan of Shah Alam

Table I.37 HOUSEHOLD SIZE

	Klang Valley Region	Federal Territory	Petaling District	Klang	Hulu Langat	Gombak
Housing density	4.87	4.75	4.61	5.6	5.32	5.03
Household/ dwelling	1.18	1.26	1.17	1.11	1.08	1.07
Squatter Houses	73,611 1/	40,937	22,931	2,229	3,550	3,967

Source: Bangi Structure Plan

Note: 1/ 19.3% of the total housing stock

Table I.38 FUTURE HOUSEHOLD SIZE

(Persons per Household)

	1970 1/	1980 2/	1985 3/	1995 3/	2005 3/
Federal Territory of Kuala Lumpur	-	4.87	4.67	4.30	4.00
Rest of Klang Valley	-	5.22	5.00	4.66	4.35
Klang Valley	5.68	5.04	4.84	4.50	4.20

Source: 1/ 1970 Population Census
2/ 1980 Population Census
3/ Study Team Estimates

Table I.39 TOTAL HOUSING NEEDS BY DISTRICTS, FOR URBAN AND RURAL IN KLANG VALLEY BETWEEN 1980-1990

District	Areas	Housing Stock 1980[1/]	Requirement by Unit			Total Need 1980-1990	Total Need per year between 1980-1990
			Population Increase	Normal Replacement	Immediate Replacement		
Federal Territory	Urban	134,571	114,310	29,470	1,123	144,903	14,490
Petaling	Urban	34,993	72,831	7,663	479	80,973	8,097
	Rural	21,793	2,387	4,773	101	7,260	726
	Total	56,786	75,218	12,436	580	88,233	8,823
Klang	Urban	33,791	14,472	7,400	412	22,284	2,228
	Rural	15,741	3,160	3,447	361	6,968	697
	Total	49,532	17,632	10,847	773	29,252	2,925
Gombak	Urban	10,241	26,795	2,243	35	29,073	2,907
	Rural	22,647	3,940	4,960	132	9,031	903
	Total	32,888	30,735	7,203	167	38,104	3,810
Hulu Langat	Urban	16,919	20,053	3,705	176	23,934	2,393
	Rural	17,550	1,656	3,843	13	5,512	551
	Total	34,469	21,709	7,548	189	29,446	2,994
Klang Valley	Urban	230,515	248,461	50,481	2,225	301,167	30,116
	Rural	77,731	11,143	17,021	607	28,771	2,877
	Total	308,246	259,604	67,502	2,832	329,938	32,993

Source : Klang Valley Perspective Plan, 1983
Note : Housing stock 1980 for individual urban areas by district
(Squatter houses are not included)

Table I.40 HOUSING DEMAND BY URBAN INCOME GROUP IN KLANG VALLEY, 1990

Income Group ($)	Affordability ($) 000	Type	Federal Territory		Petaling		Klang		Gombak		Hulu Langat		Klang Valley	
			% Household	Unit	% Household	Unit	% Household	Unit	% Household	Unit	% Household	Unit	% Household	Unit
750 below	10-20	1	36.0	52,165	28.3	20,680	39.3	8,490	35.2	9,075	44.4	12,299	34.5	102,709
751-1,000	30	2	24.0	34,777	19.7	14,396	31.1	6,719	24.6	6,342	22.4	6,205	23.1	68,439
1,000-1,500	45	2	14.9	21,590	14.3	10,450	13.8	2,981	16.9	4,357	14.5	4,017	14.7	43,395
1,501-2,000	75	2	9.3	13,476	10.2	7,454	7.2	1,555	9.8	2,527	8.4	2,327	9.4	27,340
2,001-3,000	100	2	6.3	9,129	11.3	8,257	3.5	756	7.0	1,805	5.8	1,607	7.7	21,554
3,001-4,000	130	3	5.2	7,535	8.3	6,065	3.0	648	4.0	1,031	3.0	831	5.7	16,110
4,000 above	150 above	3	4.3	6,231	7.9	5,773	2.1	454	2.5	644	1.5	415	4.9	13,517
Total			100	144,903	100	73,075	100	21,604	100	25,781	100	27,701	100	293,064

Source: Report of Survey, Kuala Lumpur Structure Plan, 1981
Klang Valley Perspective Plan, 1983

Note : Type 1 is low cost
Type 2 is medium cost
Type 3 is high cost

Table I.41 NUMBER OF SQUATTER HOUSING

District	Squatter Houses			Normal Houses			Total Population 1980	Total Population 1990	
	Population	No.of Sq. Unit	Household per Dwelling	Household Size	Housing Stock 1980	Housing Stock	Population	Population	Unit for Population Increase
Federal Territory		40,935	1.26	4.75	134,571	175,503	977,102	1,489,550	114,310
Petaling		22,931	1.17	4.61	56,786	79,717	382,335	711,991	75,218
Klang		2,229	1.11	5.6	49,532	51,761	296,125	417,491	17,632
Gombak		3,967	1.09	5.03	32,888	36,853	175,869	342,428	30,935
Hulu Langat		3,550	1.08	5.32	34,469	38,019	188,370	321,566	21,709
Klang Valley	437,190	73,611	1.18	4.87	308,246	381,859	2,019,799	3,283,026	259,604

	No. of Area	Population	Household Size	No. of Unit	Increase of population 1980-1984
Squatter in Klang in 1984	17	14,668	5.5	2,667	1435
Squatter in Bangi		4,900		800	
Squatter in Klang Valley	319	437,190			

Table I.42 SELANGOR INDUSTRIAL ESTATE AS AT 31ST DECEMBER, 1980

Districts	Total Planned Area (Acre)	Total Acreage Developed (Acre)	Total Acreage Saleable (Acre)	Total Acreage Allocated (Acre)	Total Acreage Still Available
Shah Alam	1,362.0 (26.18)	1,362.0 (33.95)	1,066 (33.28)	1,066 (37.96)	0 -
Petaling Jaya Section 51A & 52 Other Areas (P.Jaya)	770.0 (14.80)	770.0 (19.21)	574.5 (16.26)	574.5 (20.46)	0 -
Pandamaran	171.7 (3.30)	171.7 (4.28)	150.4 (4.78)	150.4 (5.36)	0 -
Telok Panglima Carang	64.6 (1.24)	64.6 (1.61)	62.6 (1.99)	20.9 (0.74)	41.8 (12.37)
Telok Panglima Carang (Free Trade (Zone)	49.3 (0.96)	49.3 (1.23)	46.3 (1.47)	42.4 (1.51)	3.9 (1.16)
Batu Caves	141.7 (2.72)	141.7 (3.53)	136.0 (4.26)	134.0 (4.77)	0 -
Sungei Way/Subang (Free Trade Zone)	140.5 (2.70)	140.5 (3.51)	104.0 (3.31)	104.0 (3.70)	0 -
Ampang/Ulu Klang (Free Trade Zone)	50.0 (0.96)	50.0 (1.25)	43.3 (1.38)	43.3 (1.54)	0 -
Ampang/Ulu Klang (None-Trade Zone)	60.0 (1.15)	60.0 (1.50)	51.0 (1.62)	51.0 (1.82)	0 -
Selat Klang Utara	1,654.0 (31.80)	545.2 (13.60)	545.2 (17.33)	345.9 (12.32)	199.3 (59.00)
Bangi	387.0 (7.44)	302.2 (7.54)	114.4 (3.47)	87.1 (3.10)	27.2 (8.05)
Bukit Raja	351.3 (6.75)	351.3 (8.76)	254.3 (8.08)	188.7 (6.72)	65.6 (19.42)
Total	5,202.1 (100.00)	4,008.5 (100.00)	3,146 (100.00)	2,808.2 (100.00)	337.8 (100.00)

Source: Shah Alam Extension Plan

Tabale I.43 EXISTING AND PLANNED INDUSTRIAL ESTATES, LPAA, 1984 I

Location		Total Area/No. of Units approved by Authority		Status of Project	Existing Situation		Implementing Agency
		Unit/Lot	Area(ha)		Unit/Lot	Area(ha)	
Outside PKNS Industrial Area	1. Bukit Raja	19	90.18	Completed	2	12.54	PKNS
		48	8.67	Under construction	-	-	PKNS
	Total project inclusive of road & drainage reserve, LLN substation, open space and green areas						
	Sub-Total		142.13			12.54	
Inside Industrial Areas	2. Selat Klang Utata Phase I	219	220.60	Completed	76	117.48	PKNS
	3. Selat Klang Utara, Phase II		135.95	Proposal	-	-	PKNS
	4. Pandamaran:						
	a) Kampong Pandamaran &	37	53.27	Completed	41	61.88	PKNS
	Jalan Watson	36	4.57	Under Construction			PKNS
	Total project inclusive of road & drainage reserve, shophouses, green areas		69.45				
	b) Pandamaran Jaya	174	20.35	Not imple-	-	-	PKNS
	SUB-TOTAL		448,35				
Industrial Areas within MPK Area	1. Jalan Kapar	47	25.85	Completed	47	-	Private Ownership
	2. Jalan Goh	67	22.25	Completed	67	-	Private Ownership
	3. Sungai Rase	199	47.01	Completed	199	-	Private Ownership
	4. Jalan Pelabuhan	-	211.20	Pertially Implemented	NA	-	Private Ownership
	5. Jalan Kem, Palabuhan Klang	18	12.95	Completed	18	-	Private Ownership
	6. Pekan Kapar	-	29.45	Not Implemented	-	-	Private Ownership
	7. Kampong Sungai Sireh		52.19	Not Implemented	-	-	The zoning to be revised, as housing applications received in parts of the area zoned for industry.
	SUB-TOTAL		400.90			-	
Proposed Industrial Areas Outside MPK Area	1. 5th-6th Mile, Jalan Kaper (Shelford Estate)		196.07	Proposal	-	-	Private Ownership. The zoning to be revised as housing application received from PKNS in the area. in the area.
	2. 3rd-4th Mile. Jalan Meru		128.62	Proposal			YPPN/Private Ownership
	3. Mukim Klang		126.71	Proposal	-	-	-
	4. Kampung Jawa		47.95	Proposal	-	-	-
	SUB-TOTAL		499.35			-	
Total			1,488.73			191.90	

Source: PKNS/MPK 1983.
Note: Since completion of this table Phase II and III of the S.K.U. industrial area have been privatised.

Table I.44 HICOM PROJECT

Project	Acreage	Basic Employment	Cumulative Basic Employment
a) 1983 - 1985			
National Car Plant	135.0	3,239	-
HICOM Engineering Complex	160.0	2,079	-
	295.0	5,318	5,318
b) 1986 - 1990			
Defence I-dustries, Small Engineering & Copper Alloy	120.0	2,400	-
Other Industries 25% (555.13-120)	109.0	2,175	-
	229.0	4,575	9,893
c) 1991 - 1995			
Other Industries 50% [75% (555.13-120)]	163.0	3,263	-
			13,158
d) 1996 - 2000			
Other Industries 50% [75% (555.13-120)]	163.0	3,263	-
	850.0	16,419	16,419

Table I.45 MALAYSIA: PRIMARY SUPPLY OF ENERGY [1/] 1980, 1985 AND 1990

Source	1980		1985		1990		Average annual growth rate (%)		
	PJ	%	PJ	%	PJ	%	1981-85	1986-90	1981-90
Crude Oil	246.9	55.1	360.2	53.0	360.2	41.7	7.8	0.0	3.8
Petroleum products	97.4	21.8	60.7	8.9	102.0	11.8	-9.0	10.9	0.5
Natural gas [2/]	2.3	0.5	122.8	18.1	179.5	20.8	121.5	7.9	54.6
Hydropower	16.2	3.6	19.4	2.9	20.7	2.4	3.7	1.3	2.5
Coal and coke	2.2	0.5	19.3	2.8	74.9	8.7	54.4	31.2	42.3
Charcoal [3/]	3.0	0.7	-	-	-	-	-	-	-
Fuelwood	53.5	11.9	58.9	8.7	78.0	9.0	1.9	5.8	3.8
Palm oil mill wastes	26.3	5.9	38.3	5.6	47.8	5.6	7.8	4.5	6.2
Total	447.8	100.0	769.6	100.0	863.1	100.0	8.7	4.9	6.8

Source: The National Energy Planning Study, 1985.

Notes: 1/ Primary supply of energy refers to those that has not undergone a conversion process.
2/ Excluding flared gas and export of gas products (condensates, methanol and LNG).
3/ Part of the fuelwood is converted to charcoal which is accounted for under secondary supply.

Table I.46 MALAYSIA: ELECTRICITY GENERATION BY SOURCE 1980, 1985 AND 1990

(%)

	1980	1985 (Estimate)	1990 (Forecast)
Oil	87.2	65.8	14.2
Gas	0.3	9.3	50.6
Hydropower	12.5	24.9	19.7
Coal	0	0	15.5
Total (PJ)	100.0	100.0	100.0
Total Electricity Generation (PJ)	32.5	50.6	79.2

Source: Fifth Malaysia Plan

Table I.47 MALAYSIA: ENERGY DEMAND BY SOURCE, 1980, 1985 AND 1990

Source	1980		1985		1990		Average annual growth rate (%)		
	PJ	%	PJ	%	PJ	%	1981-85	1986-90	1981 90
Petroleum products	232.2	69.6	318.5	66.8	432.8	64.7	6.5	6.3	6.4
Electricity	30.9	9.3	44.1	9.3	65.8	9.8	7.4	8.3	7.9
Coal and coke	0.9	0.3	18.1	3.8	39.0	5.8	82.3	16.6	45.8
Charcoal	8.8	2.6	8.5	1.8	8.3	1.2	-0.7	-0.5	-0.6
Gas	0.9	0.3	11.6	2.4	18.4	2.8	66.7	9.7	35.2
Fuelwood	33.4	10.0	37.6	7.9	57.2	8.6	2.4	8.8	5.5
Palm oil wastes	26.3	7.9	38.3	8.0	47.4	7.1	7.8	4.4	6.1
Total	333.4	100.0	476.7	100.0	668.9	100.0	7.4	7.0	7.2

Source: The National Energy Planning Study, 1985
Note: 1/ Energy demand refers to energy delivered to final energy users.

Table I.48 MALAYSIA: ENERGY DEMAND BY SECTOR
1980, 1985 AND 1990

Sector	1980		1985		1990		Average annual growth rate (%)		
	PJ	%	PJ	%	PJ	%	1981-85	1986-90	1981-90
Agriculture	28.8	8.7	35.3	7.4	40.7	6.1	4.2	2.9	3.5
Mining and quarrying	19.2	5.8	15.3	3.2	18.6	2.8	-4.4	4.0	-0.3
Manufacturing	109.5	32.8	162.2	34.0	242.5	36.2	8.2	8.4	8.3
Construction	8.8	2.6	14.7	3.1	21.9	3.3	10.8	8.3	9.5
Transport and communications	51.3	15.4	83.3	17.5	110.9	16.6	10.2	5.9	8.0
Trade and banking	25.1	7.5	33.4	7.0	44.1	6.6	5.9	5.7	5.8
Services	9.8	2.9	13.2	2.8	17.0	2.5	6.1	5.2	5.7
Households	80.9	24.3	119.3	25.0	173.2	25.9	8.1	7.7	7.9
Total	333.4	100.0	476.7	100.0	668.9	100.0	7.4	7.0	7.2

Source: The National Energy Planning Study, 1985

Table I.49 ENERGY BALANCE FOR MALAYSIA 1979 AND 1984

(UNIT: 1000 TOE)

ENERGY SOURCE	1979								1984								Av.A.G
	Natural Gas	LNG	Crude Oil	Petrol Product.	Coal & Coke	Hydro Power	Elect-ricity	Total	Natural Gas	LNG	Cruce Oil	Petrol Product	Coal & Coke	Hydro Power	Elect-ricity	Total	84/79 (total)
PRIMARY SUPPLY																	
Primary Production	2,524	0	14,115	0	0	296	0	16,935	8,715	0	22,240	0	0	913	0	31,868	13.5
Import	0	0	4,508	1,888	33	0	9	6,438	0	0	2,687	3,418	270	0	7	6,382	-0.2
Export	-9	0	-12,455	-177	0	0	0	-12,641	0	4,774	-17,075	-1,676	0	0	0	-23,525	13.2
Bunkers	0	0	0	-72	0	0	0	-72			0	-60	0	0	0	-60	-
Stock Change (Rise -, Fall +)	0	0	94	-22	0	0	0	72	0	0	-81	2	0	0	0	-79	-
Statistical Discr	0	0	-197	0	0	0	0	-197	0	0	-133	0	0	0	0	-133	-
Primary Supply	2,524	0	6,065	1,617	33	296	9	10,535	8,715	4,774	-7,638	1,684	270	913	7	14,453	6.5
TRANSFORMATION																	
LNG	0	0	0	0	0	0	0	0	-5,188	4,774	0	0	0	0	0	-414	-
Refineries	0	0	-6,065	5,891	0	0	0	-174	0	0	-7,638	7,600	0	0	0	-38	5.2 1/
Power Station																	
Hydro	0	0	0	0	0	-296	94	-202	0	0	0	0	0	-913	294	-619	106.7
Thermal	-2.4	0	0	-2,177	0	0	699	-1,502	-81	0	0	-2,672	0	0	888	-1,865	4.4
Sub Total	-2.4	0	0	-2,177	0	0	793	-1,704	-81	0	0	-2,762	0	0	1,182	-2,484	7.8
Losses & Own Use	-2,458	0	0	-136	0	0	-166	-2,710	-3,312	0	0	-209	0	0	0183	-3,704	-
Statistical Discr.	0	0	0	-163	0	0	0	-1630	0	0	0	216	0	0	0	216	-
Secondary Supply	-2,482	0	-6,065	3,415	0	-296	677	-4,751	-8,581	4,774	-7,638	4,935	0	-913	999	-6,424	6.2
FINAL USE																	
Residential & Commercial	32	0	0	432	0	0	329	793	47	0	0	488	0	0	553	1,080	6.4
Industrial	1	0	0	2,223	33	0	357	2,614	87	0	0	2,545	270	0	453	3,355	5.1
Transport	0	0	0	2,123	0	0	0	2,123	0	0	0	3,271	0	0	0	3,271	9.0
Non-Refinery Use	0	0	0	254	0	0	0	254				315	0	0	0	315	4.4
Total Final Use	33	0	0	5,032	33	0	357	5,784	134	0	0	6,619	270	0	1,006	8,029	6.8

Source: The Ministry of Energy, Telecommunications and Posts "National Energy Balance", 11 October 1985

Note: Av.A.G: Average annual growth rate

1/: Average annual growth rate of Petroleum refining

Table I.50 MALAYSIA: ACTUAL ENERGY DOMESTIC FINAL DEMAND BY SECTOR BY KIND

(UNIT: 1000 TOE)

Year	Sector	Natural Gas	Total Petroleum Product	Aviation Gas	LPG	Motor Petroleum	ATF	Kerosene	Diesel Oil	Fuel Oil	Non-Energy	Refinery Gas	Coal and Coke	Electricity	Total
1979	Resident'l & Comm'l	32	432	0	97	0	0	335	0	0	0	0	0	329	793
	Industrial	1	2,223	0	17	20	0	23	1,354	807	0	2	33	357	2,614
	Transport	0	2,123	5	0	1,158	202	0	758	0	0	0	0	0	2,123
	Non-Energy Use	0	254	0	0	0	0	0	0	0	231	23	0	0	254
	Total	33	5,032	5	114	1,178	202	358	2,112	807	231	25	33	686	5,784
1980	Resident'l & Comm'l	34	429	0	101	0	0	328	0	0	0	0	0	382	845
	Industrial	1	2,407	0	20	21	0	23	1,496	846	0	1	53	368	2,829
	Transport	0	2,419	5	0	1,296	250	0	868	0	0	0	0	0	2,419
	Non-Energy Use	0	291	0	0	0	0	0	0	0	269	22	0	0	291
	Total	34	5,546	5	121	1,317	250	351	2,364	846	269	23	53	750	6,384
1981	Resident'l & Comm'l	38	448	0	104	0	0	344	0	0	0	0	0	409	895
	Industrial	1	2,738	0	20	19	0	24	1,932	734	0	9	99	378	3,216
	Transport	0	2,527	6	0	1,404	279	0	838	0	0	0	0	0	2,527
	Non-Energy Use	0	287	0	0	0	0	0	0	0	270	17	0	0	287
	Total	38	6,000	6	124	1,423	279	368	2,770	734	270	26	99	787	6,925
1982	Resident'l & Comm'l	45	457	0	113	0	0	344	0	0	0	0	0	448	950
	Industrial	1	2,767	0	22	20	0	20	2,162	537	0	6	93	405	3,266
	Transport	0	2,763	4	0	1,509	342	0	908	0	0	0	0	0	2,763
	Non-Energy Use	0	332	0	0	0	0	0	0	0	314	18	0	0	332
	Total	46	6,319	4	135	1,529	342	364	3,070	537	314	24	93	853	7,311
1983	Resident'l & Comm'l	44	484	0	149	0	0	335	0	0	0	0	0	511	1,039
	Industrial	1	2,631	0	25	30	0	17	1,931	604	0	24	249	435	3,316
	Transport	0	3,152	3	0	1,726	355	0	1,068	0	0	0	0	0	3,152
	Non-Energy Use	0	320	0	0	0	0	0	0	0	320	0	0	0	320
	Total	45	6,587	3	174	1,756	355	352	2,999	604	320	24	249	946	7,827
1984	Resident'l & Comme'l	47	488	0	155	0	0	333	0	0	0	0	0	553	1,088
	Industrial	87	2,545	0	33	33	0	24	1,893	528	0	34	270	453	3,355
	Transport	0	3,271	3	0	1,892	368	0	1,008	0	315	0	0	0	3,271
	Non-Energy Use	0	315	0	0	0	0	0	0	0	315	0	0	0	315
	Total	134	6,619	3	188	1,925	368	368	2,901	528	315	34	0	1,006	8,029
Average annual growth rate (%) 84/79	Resident'l & Comm'l	2.5	2.5	0	9.8	0	0	-0.1	0	0	0	0	0	10.9	6.5
	Industrial	144.3	2.7	0	14.1	10.5	0	0.9	6.9	-8.1	0	6.3	52.3	4.9	5.1
	Transport	0	9.0	-9.7	0	10.3	12.7	0	5.9	0	0	0	0	0	9.0
	Non-Energy Use	0	8.0	0	0	0	0	0	0	0	6.4	0	0	0	4.4
	Total	32.3	5.6	-9.7	10.5	10.3	12.7	0.0	6.6	-8.1	6.4	6.3	52.3	8.0	6.8

Source: The Ministry of Energy, Telecommunications and Posts, 11 October 1985 Energy Balance Malaysia: Commercial Energy 1978-1984

Table I.51 MALAYSIA: THE SHARE OF DEMAND BY SECTOR/BY KIND OF ENERGY (1978-1984)

Year	Sector	Natural Gas	Total Petrl Prod.	Aviation Gas	LPG	Motor Petrl	ATF	Kerosene	Diesel Oil	Fuel Oil	Non-Energy	Refinery Gas	Coal and Coke	Electricity	TOTAL
1978	Resindent'l & Comm'l	96.8	9.0	-	85.1	-	-	93.5	-	-	-	-	-	44.9	13.8
	Industrial	3.2	42.8	-	14.9	1.7	-	6.5	60.3	100.0	-	28.6	100.0	55.1	44.3
	Transport	-	43.7	100.0	-	98.3	100.0	-	39.7	-	-	-	-	-	38.0
	Non-Energy Use	-	4.5	-	-	-	-	-	0.0	-	100.0	71.4	-	-	3.9
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1979	Resindent'l & Comm'l	97.0	8.6	-	85.1	-	-	93.6	-	-	-	-	-	48.0	13.7
	Industrial	3.0	44.2	-	14.9	1.7	-	6.4	63.7	100.0	-	8.0	100.0	52.0	45.2
	Transport	-	42.2	100.0	-	98.3	100.0	-	36.3	-	-	-	-	-	36.7
	Non-Energy Use	-	5.0	-	-	-	-	-	-	-	100.0	92.0	-	-	4.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1980	Resindent'l & Comm'l	97.1	7.7	-	83.5	-	-	93.5	-	-	-	-	-	50.9	13.2
	Industrial	2.9	43.4	-	16.5	1.6	-	6.5	63.3	100.0	100.0	4.3	100.0	49.1	44.3
	Transport	-	43.6	100.0	-	98.4	100.0	-	36.7	-	-	-	-	-	37.9
	Non-Energy Use	-	5.3	-	-	-	-	-	-	-	-	95.7	-	-	4.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1981	Resindent'l & Comm'l	97.4	7.5	-	83.9	-	-	93.5	-	-	-	-	-	52.0	12.9
	Industrial	2.6	45.6	-	16.1	1.3	-	6.5	69.7	100.0	-	34.7	100.0	48.0	45.5
	Transport	-	42.1	100.0	-	98.7	100.0	-	30.3	-	-	-	-	-	36.5
	Non-Energy Use	-	4.8	-	-	-	-	-	-	-	100.0	65.3	-	-	4.1
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1982	Resindent'l & Comm'l	97.8	7.2	-	83.7	-	-	94.5	-	-	-	-	-	52.5	13.0
	Industrial	2.2	43.8	-	16.3	1.3	-	5.5	70.4	100.0	-	25.0	100.0	47.5	44.7
	Transport	-	43.7	100.0	-	98.7	100.0	-	29.6	-	-	-	-	-	37.8
	Non-Energy Use	-	5.3	-	-	-	-	-	-	-	100.0	75.0	-	-	4.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	Resindent'l & Comm'l	97.8	7.3	-	85.6	-	-	95.1	-	-	-	-	-	54.0	13.3
	Industrial	2.2	39.9	-	14.4	1.7	-	4.9	64.4	100.0	-	100.0	100.0	46.0	42.4
	Transport	-	47.9	100.0	-	98.3	100.0	-	35.6	-	-	-	-	-	40.3
	Non-Energy Use	-	4.9	-	-	-	-	-	-	-	100.0	-	-	-	4.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1984	Resindent'l & Comm'l	35.1	7.4	-	82.4	-	-	93.3	-	-	-	-	-	55.0	13.6
	Industrial	64.9	38.5	-	17.6	1.7	-	6.7	65.3	100.0	-	100.0	100.0	45.0	41.8
	Transport	-	49.4	100.0	-	98.3	100.0	-	34.7	-	-	-	-	-	40.7
	Non-Energy Use	-	4.7	-	-	-	-	-	-	-	100.0	-	-	-	3.9
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: The Ministry of Energy, Telecommunications and Posts (11 October 1985), Energy Balance for MY: Commercial Energy 1978-84

Table I.52 MALAYSIA: THE SHARE OF DEMAND BY KIND OF ENERGY/BY SECTOR (1978-1984)

Year	Sector	Natural Gas	Total Petri Prod.	Aviation Gas	LPG	Motor Petri	ATF	Kerosene	Diesel Oil	Fuel Oil	Non-Energy	Refinery Gas	Coal and Coke	Electricity	TOTAL
1978	Resindent'l & Comm'l	4.2	56.4	-	12.1	-	-	44.3	-	-	-	-	-	39.4	100.0
	Industrial	0.0	83.9	-	0.7	0.8	-	1.0	49.6	31.6	-	0.2	1.0	15.1	100.0
	Transport	-	100.0	0.3	-	50.8	10.7	-	38.2	-	-	-	-	-	100.0
	Non-Energy Use	-	10.0	-	-	-	-	-	-	-	89.6	10.4	-	-	100.0
	Total	0.6	86.8	0.1	2.0	19.6	4.0	6.7	36.5	14.0	3.5	0.5	0.5	12.1	100.0
1979	Resindent'l & Comm'l	4.0	54.5	-	12.2	-	-	42.3	-	-	-	-	-	41.5	100.0
	Industrial	0.0	85.0	-	0.7	0.8	-	0.9	51.8	30.9	-	0.0	1.3	13.7	100.0
	Transport	-	100.0	0.2	-	54.6	9.5	-	35.7	-	-	-	-	-	100.0
	Non-Energy Use	-	100.0	-	-	-	-	-	-	-	90.9	9.1	-	-	100.0
	Total	0.6	87.0	0.1	2.0	20.4	3.4	6.2	36.5	14.0	4.0	0.4	0.6	11.8	100.0
1980	Resindent'l & Comm'l	4.0	50.8	-	12.0	-	-	38.8	-	-	-	-	-	45.2	100.0
	Industrial	0.0	85.1	-	0.7	0.7	-	0.8	52.9	29.9	-	0.0	1.9	13.0	100.0
	Transport	-	100.0	0.2	-	53.6	10.3	-	35.9	-	-	-	-	-	100.0
	Non-Energy Use	-	100.0	-	-	-	-	-	-	-	92.4	7.6	-	-	100.0
	Total	0.6	86.9	0.1	1.9	20.6	3.9	5.5	37.0	13.3	4.2	0.4	0.8	11.7	100.0
1981	Resindent'l & Comm'l	4.3	50.0	-	11.6	-	-	38.4	-	-	-	-	-	45.7	100.0
	Industrial	0.0	85.1	-	0.6	0.6	-	0.6	60.1	22.8	-	0.3	3.1	11.8	100.0
	Transport	-	100.0	0.2	-	55.6	11.0	-	33.2	-	-	-	-	-	100.0
	Non-Energy Use	-	100.0	-	-	-	-	-	-	-	94.0	6.0	-	-	100.0
	Total	0.6	86.6	0.1	1.8	20.6	4.0	5.3	40.0	10.6	3.9	0.4	1.4	11.4	100.0
1982	Resindent'l & Comm'l	4.7	48.1	-	11.9	-	-	36.2	-	-	-	-	-	47.2	100.0
	Industrial	0.0	84.7	-	0.7	0.6	-	0.6	66.2	16.4	-	0.2	2.8	12.4	100.0
	Transport	-	100.0	0.1	0.0	54.6	12.4	-	32.9	-	-	-	-	-	100.0
	Non-Energy Use	-	100.0	-	-	-	-	-	-	-	94.5	5.5	-	-	100.0
	Total	0.6	86.4	0.1	1.9	20.9	4.7	5.0	42.0	7.3	4.3	0.3	1.3	11.7	100.0
1983	Resindent'l & Comm'l	4.2	46.6	-	14.3	-	-	32.2	-	-	-	-	-	49.2	100.0
	Industrial	0.0	79.3	-	0.8	0.9	-	0.5	58.2	18.2	-	0.7	7.5	13.1	100.0
	Transport	-	100.0	0.1	-	54.8	11.3	-	33.9	-	-	-	-	-	100.0
	Non-Energy Use	-	100.0	-	-	-	-	-	-	-	100.0	-	-	-	100.0
	Total	0.6	84.2	0.0	2.2	22.4	4.5	4.5	38.3	7.7	4.1	0.3	3.2	12.1	100.0
1984	Resindent'l & Comm'l	4.3	44.9	-	14.2	-	-	30.6	-	-	-	-	-	50.8	100.0
	Industrial	0.3	75.9	-	1.0	1.0	-	0.7	56.4	15.7	-	1.0	8.0	13.5	100.0
	Transport	-	100.0	0.1	-	57.8	11.3	-	30.8	-	-	-	-	-	100.0
	Non-Energy Use	-	100.0	-	-	-	-	-	-	-	100.0	-	-	-	100.0
	Total	1.7	82.4	0.0	2.3	24.0	4.6	4.5	36.1	6.6	3.9	0.4	3.4	12.5	100.0

Source: The Ministry of Energy, Telecommunications and Posts (11 October 1985), Energy Balance for MY: Commercial Energy 1978-84

Table I.53 MALAYSIA: CRUDE OIL ACTUAL SUPPLY AND DEMAND

(UNIT: BBLS/D)

	1979	1980	1981	1982	1983	1984	Average annual growth rate(%) 1984/1979
Production	288,568	279,461	261,991	307,642	389,398	453,434	9.5
Imports	88,884	79,322	71,336	51,008	61,674	52,840	-9.9
Saudi Arabia	37,955	61,037	44,939	33,223	49,550	43,478	-
Kuwait	47,454	10,026	-	-	-	7,754	-
UAE	-	-	15,850	6,322	-	-	-
Iran	3,474	-	6,962	4,899	8,509	-	-
Iraq	-	8,259	-	-	-	-	-
Quatar	-	-	3,585	6,564	3,615	-	-
Indonesia	-	-	-	-	-	1,608	-
Exports	254,523	236,890	214,601	253,343	300,978	348,129	6.5
Japan	113,864	93,862	76,075	68,905	71,135	93,177	-
USA	72,053	58,288	30,368	36,098	50,442	58,098	-
Singapore 1/	42,086	59,934	78,221	107,153	119,984	115,711	-
Thailand	10,511	11,840	12,266	19,876	30,910	26,319	-
Philippines	8,459	9,731	9,628	5,365	6,508	6,937	-
Taiwan	1,354	-	2,447	5,057	6,436	7,601	-
S.Korea	-	-	4,991	5,050	8,288	22,254	-
Sri Lanka	-	-	605	4,825	3,571	1,891	-
Others	6,196	3,235	-	1,014	3,704	16,141	-
Consumption	119,395	116,386	114,272	109,715	134,771	153,779	5.2

Source: PETRONAS Department of Statistics and Ministry of Energy, Telecommunications and Posts "National Energy Balances Malaysia 1978-1984"

Note : 1/ includes crude oil entrusted to refine by Malaysia.

Table I.54 MALAYSIA: PRIMARY ENERGY DEMAND FORECAST
(CONDUCTED BY ASCOPE)

	Acutual (1000 BOE/D)	Forecast (1,000 BOE/D)			Average Annual Growth Rate (%)		
	1983	1985	1990	1995	1985/1983	1990/1985	1995/1990
Crude Oil	195 (77.7)	196 (75.4)	210 (65.6)	239 (60.4)	0.3	1.4	2.6
Natural Gas	40 (15.9)	52 (20.0)	73 (22.8)	98 (24.7)	5.4	7.0	6.1
Coal	6 (2.4)	6 (2.3)	23 (7.2)	36 (9.1)	0.0	30.8	9.4
Hydro	10 (4.0)	6 (2.3)	14 (4.4)	23 (5.8)	-22.5	18.5	10.4
Total	251 (100.0)	260 (100.0)	320 (100.0)	396 (100.0)	1.8	4.2	4.4

Source: ASCOPE Economic Committee (Long Range Outlook of Petroleum Product Supply and Demand and the Utilization of Refining Capacity in the ASEAN Region), December, 1985.
The 3rd ASCOPE Conference
Note: The figure in parenthesis shows percentage among total.

Table I.55 MALAYSIA: NATURAL GAS ACTUAL SUPPLY AND DEMAND

(Unit: 1 million cuft)

	1979	1980	1981	1982	1983	1984	Average annual growth rate(%) 1984/1979
Production	105,604	93,931	79,119	99,537	240,036	364,636	28.1
Consumption	105,228	93,597	78,701	99,077	239,953	364,635	28.2
for LNG	-	-	-	-	111,796	217,066	-
Own use	102,843	90,751	75,563	95,688	123,805	138,574	6.1
Power generation	1,004	1,381	1,506	1,464	2,469	3,389	27.5
Residential & Commercial	1,339	1,423	1,590	1,883	1,841	1,966	8.0
Industrial	42	42	42	42	42	3,640	144.1
LNG Exports (1000t)	-	-	-	-	1,840	3,640	-

Source: Ministry of Energy, Telecommunications and Posts, National Energy Balances Malaysia 1978-=984, 1985.

Table I.56 MALAYSIA: ACTUAL PETROLEUM PRODUCTS PRODUCTION

(UNIT: 1000 TOE)

		1979	1980	1981	1982	1983	1984	Average annual growth rate (%)
LPG		82	83	75	86	111	142	11.6
	(%)	(1.4)	(1.5)	(1.4)	(1.6)	(1.7)	(1.9)	
Motor Petroleum		1,035	993	916	949	1,031	1,205	3.1
	(%)	(17.6)	(16.5)	(16.9)	(18.1)	(15.7)	(15.8)	
ATF		180	214	218	256	259	258	7.5
	(%)	(3.0)	(3.8)	(4.0)	(4.9)	(3.9)	(3.4)	
Kerosene		237	232	275	286	542	812	27.9
	(%)	(4.0)	(4.0)	(5.1)	(5.4)	(8.3)	(10.7)	
Diesel Oil		1,702	1,748	1,765	1,921	2,384	2,539	8.3
	(%)	(28.9)	(30.8)	(32.5)	(36.6)	(36.4)	(33.4)	
Fuel Oil		2,465	2,257	1,979	1,554	1,986	2,044	-3.7
	(%)	(41.9)	(39.8)	(36.4)	(29.6)	(30.3)	(26.9)	
Refinery Gas		66	64	63	60	121	170	20.8
	(%)	(1.1)	(1.1)	(1.1)	(1.1)	(1.8)	(2.2)	
Non-Energy		124	136	139	144	124	430	28.2
	(%)	(2.1)	(2.4)	(2.6)	(2.7)	(1.9)	(5.7)	
Total (A)		5,891	5,667	5,430	5,256	6,558	7,600	5.2
	(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Crude Oil refined (B)		6,065	5,901	5,784	5,435	6,753	7,638	
(A)/(B)		0.9713	0.9603	0.9388	0.9671	0.9711	0.9950	

Source: The ministry of Engergy, Telecommunications and Posts, 11 October 1985
Note: ATF: Air Transportation Fuel
The figure in parenthesis shows percentage among total.

Table I.57 MALAYSIA: ACTUAL PETROLEUM PRODUCTS IMPORTS AND EXPORTS

(UNIT: 1000 TOE)

		1979		1980		1981		1982		1983		1984		Average annual growth rate (%)	
		IMP.	EXP.	IMP.	EXP.	IMP.	EXP.	IMP.	EXP.	IMP.	EXP.	IMP.	EXP.	IMP.	EXP.
Aviation gas		6	0	5	0	5	0	4	0	3	0	3	0	-12.9	-
	%	(0.3)		(0.2)		(0.2)		(0.1)		(0.1)		(0.1)			
LPG		35	0	36	0	42	0	44	0	61	0	47	0	6.0	-
	%	(1.9)		(1.4)		(1.3)		(1.1)		(1.5)		(1.4)			
Motor Petroleum		163	0	389	0	601	0	586	1	668	0	656	1	32.1	-
	%	(8.6)		(14.8)		(19.0)		(14.6)	(0.3)	(16.8)		(19.2)	(0.0)		
ATF		9	0	17	0	20	0	99	0	82	0	92	19	36.8	-
	%	(0.5)		(0.6)		(0.6)		(2.5)		(2.0)		(2.7)	(1.1)		
Kerosene		142	38	177	42	148	73	156	132	127	320	90	572	-8.7	72.0
	%	(7.5)	(21.5)	(6.7)	(31.8)	(4.7)	(59.3)	(3.9)	(3.2)	(32.8)	(2.6)	(2.6)	(34.1)		
Diesel Oil		817	6	1,074	7	1,241	0	1,431	3	1,210	133	887	277	1.7	115.2
	%	(43.3)	(3.4)	(40.9)	(5.3)	(39.3)		(35.7)	(1.0)	(30.4)	(13.6)	(26.0)	(16.5)		
Fuel Oil		539	109	753	61	900	38	1,492	148	1,641	520	1,512	561	22.9	38.8
	%	(28.5)	(61.6)	(28.7)	(28.5)	(30.9)	(30.9)	(37.2)	(50.9)	(41.2)	(53.3)	(44.1)	(33.5)		
Non-Energy		177	24	176	22	203	12	190	7	189	3	132	246	-5.7	59.3
	%	(9.4)	(13.5)	(6.7)	(16.7)	(6.4)	(9.8)	(4.7)	(2.4)	(4.8)	(0.3)	(3.9)	(14.7)		
Total		1,888	177	2,627	132	3,160	123	4,002	291	3,981	976	3,418	1,676	27.8	60.8
		(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		

Source: The Ministry of Engergy, Telecommunications and Posts, 11 October 1985
Note: ATF: Air Transportation Fuel
The figure in parenthesis shows percentage among total

Table I.58 ACTUAL PETROLEUM DEMAND IN MALAYSIA

(Unit: 1,000 TOE)

	1979	1980	1981	1982	1983	1984	Average Annual Growth Rate 1984/1979 (%)
Gasoline	1,178 (16.2)	1,322 (16.6)	1,429 (16.9)	1,533 (17.1)	1,759 (18.5)	1,928 (20.5)	10.3
LPG	114 (1.6)	121 (1.5)	124 (1.5)	135 (1.5)	174 (1.8)	188 (2.0)	10.5
ATF	202 (2.8)	250 (3.1)	279 (3.3)	342 (3.8)	355 (3.7)	368 (3.9)	12.7
Kerosene	358 (4.9)	351 (4.4)	368 (4.4)	364 (4.1)	352 (3.7)	357 (3.8)	0.0
Diesel Oil	2,396 (32.9)	2,680 (33.7)	3,097 (36 7)	3,440 (38.4)	3,540 (37.1)	3,254 (34.7)	6.4
Fuel Oil	2,770 (38.0)	2,937 (36.9)	2,848 (33.7)	2,807 (31.3)	3,006 (31.5)	2,907 (31.0)	1.0
Non-Energy	233 (3.2)	272 (3.4)	271 (3.2)	315 (3.5)	320 (3.4)	315 (3.3)	6.2
Refinery Gas	25 (0.4)	23 (0.3)	26 (0.3)	24 (0.3)	24 (0.3)	34 (0.4)	6.3
Total	7,281 (100.0)	7,955 (100.0)	8,442 (100.0)	8,960 (100.0)	9,530 (100.0)	9,351 (100.0)	5.1

Source: The Ministry of Energy, Telecommunications and Posts, "National Energy Balance" October 11, 1985

Note : Figure in parenthesis shows percentage among total

Table I.59 PETROLEUM PRODUCTS DEMAND STRUCTURE IN MALAYSIA (QUANTITY)

(Unit: 1,000 TOE)

Kind	Sector	1979	1980	1981	1982	1983	1984	Average Annual Growth Rate 1984/1979 (%)
Aviation Gas	Transportation	5	5	6	4	3	3	-9.7
Motor Petroleum	Industrial	20	21	19	20	30	33	10.5
	Transportation	1,158	1,296	1,404	1,509	1,726	1,892	10.3
	Sub-Total	1,178	1,317	1,423	1,529	1,756	1,925	10.3
	Gasoline Sub-Total	1,183	1,322	1,429	1,533	1,759	1,928	10.3
LPG	Resident'l & Comm'l	97	101	104	113	149	155	9.8
	Industrial	17	20	20	22	25	33	14.2
	Sub-Total	114	121	124	135	174	188	10.5
ATF	Transportation	202	250	279	342	355	368	12.7
Kerosene	Resident's & Comm'l	335	328	344	344	335	333	-0.1
	Industrial	23	23	24	20	17	24	0.9
	Sub-Total	358	351	368	364	352	357	0.0
Diesel Oil	Bunkers	37	25	13	13	27	32	-2.8
	Power	247	291	314	357	514	321	5.4
	Industrial	1,354	1,496	1,932	2,162	1,931	1,893	6.9
	Transportation	758	868	838	908	1,068	1,008	9.1
	Sub-Total	2,396	2,680	3,097	3,440	3,540	3,254	6.4
Fuel Oil	Bunkers	33	32	17	27	32	28	-0.7
	Power	1,930	2,059	2,097	2,243	2,370	2,351	4.0
	Industrial	807	846	734	537	604	528	8.1
	Sub-Total	2,770	2,937	2,848	2,807	3,006	2,907	1.0
Non-Energy Product	Bunkers	2	2	1	1	0	0	0.0
	Non-Energy	231	270	270	314	320	315	6.0
	Sub-Total	233	272	271	315	320	315	6.2
Refinery Gas	Industrial	0	1	9	6	24	34	-
	Non-Energy	25	22	17	18	0	0	-
	Sub-Total	25	23	26	24	24	34	6.3
Total	Power	2,177	2,350	2,411	2,600	2,884	2,672	4.2
	Resident'l & Comm'l	432	429	448	457	484	488	2.5
	Industry	2,223	2,407	2,738	2,767	2,631	2,545	2.7
	Transportation	2,123	2,419	2,527	2,763	3,152	3,271	9.0
	Non-Energy	254	291	287	332	320	315	4.3
	Bunkers	72	59	31	41	59	60	3.6
	Total	7,281	7,955	8,442	8,960	9,530	9,351	5.1

Source: The Ministry of Energy, Telecommunications and Posts "National Energy Balance" October 11, 1985

Table I.60 PETROLEUM PRODUCTS DEMAND STRUCTURE IN MALAYSIA (PERCENTAGE)

Kind	Sector	1979	1980	1981	1982	1983	1984
Aviation Gas	Transportation	0.4	0.4	0.4	0.3	0.2	0.2
Motor Petroleum	Industrial	1.7	1.6	1.3	1.3	1.7	1.7
	Transportation	97.9	98.0	98.3	98.4	98.1	98.1
	Sub-Total	99.6	99.6	99.6	99.7	99.8	99.8
	Gasoline Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
LPG	Resident'l & Comm'l	85.1	83.5	83.9	83.7	85.6	82.4
	Industrial	14.9	16.5	16.1	16.3	14.4	17.6
	Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
ATF	Transportation	100.0	100.0	100.0	100.0	100.0	100.0
Kerosene	Resident's & Comm'l	93.6	93.5	93.5	94.5	95.1	93.3
	Industrial	6.4	6.5	6.5	5.5	4.9	6.9
	Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
Diesel Oil	Bunkers	1.5	0.9	0.4	0.3	0.8	1.0
	Power	10.3	10.9	10.1	10.4	14.5	9.9
	Industrial	56.5	55.8	62.4	62.9	54.5	58.1
	Transportation	31.7	32.4	27.1	26.4	30.2	31.0
	Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
Fuel Oil	Bunkers	1.2	1.1	0.6	1.0	1.1	1.0
	Power	69.7	70.1	73.6	79.9	78.8	80.9
	Industrial	29.1	28.8	25.8	19.1	20.1	18.1
	Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
Non-Energy Product	Bunkers	0.9	0.7	0.4	0.3	0	0
	Non-Energy	99.1	99.3	99.6	99.7	100.0	100.0
	Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
Refinery Gas	Industrial	0	4.3	34.6	25.0	100.0	100.0
	Non-Energy	100.0	95.7	65.4	75.0	0	0
	Sub-Total	100.0	100.0	100.0	100.0	100.0	100.0
Total	Power	29.9	29.5	28.5	29.0	30.3	28.6
	Resident'l & Comm'l	5.9	5.4	5.3	5.1	5.1	5.2
	Industry	30.5	30.3	32.4	30.9	27.6	27.2
	Transportation	29.2	30.4	30.0	30.8	33.0	35.0
	Non-Energy	3.5	3.7	3.4	3.7	3.4	3.4
	Bunkers	1.0	0.7	0.4	0.5	0.6	0.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: The Ministry of Energy, Telecommunications and Posts "National Energy Balance" October 11, 1985

Table I.61 MALAYSIA: PETROLEUM PRODUCTS DEMAND FORECAST
(CONDUCTED BY ASCOPE)

(UNIT: 1000 BLS/D)

	Actual	Forecast			Average Annual Growth Rate (%)		
	1983	1985	1990	1995	85/83	90/85	95/90
1. Gasoline	39 (20.0)	43 (21.9)	53 (25.2)	62 (25.9)	5.0	4.3	3.2
2. ATF & Kerosene	17 (8.7)	17 (8.7)	21 (10.0)	25 (10.5)	0.0	4.3	3.5
3. Diesel Oil	74 (38.0)	70 (35.7)	82 (39.1)	93 (38.9)	-2.7	3.2	2.5
4. Fuel Oil	54 (27.7)	57 (29.1)	38 (18.1)	37 (15.5)	2.7	-7.8	-0.5
5. LPG	5 (2.6)	6 (31.)	13 (6.2)	19 (7.9)	9.5	16.7	7.9
Fuel Sub Total (1 to 5)	189 (97.9)	193 (98.5)	207 (98.6)	236 (98.7)	1.1	1.4	2.7
Others	6 (3.0)	3 (1.5)	3 (1.4)	3 (1.3)	-29.3	0.0	0.0
Total	195 (100.0)	196 (100.0)	210 (100.0)	239 (100.0)	0.3	1.4	2.6

Source: ASCOPE Economic Committee (Long Range Outlook of Petroleum Product Supply and Demand and the Utilization of Refining Capacity in the ASEAN Region), December, 1985.
The 3rd ASCOPE Conference

Table I.62 ACTUAL PRODUCT DEMAND, 1979-1984 (TOTAL COUNTRY)

(UNIT: KL,except LPG in MT)

NO	PRODUCT	1979	1980	1981	1982	1983	1984	Ave.Annl Growth Rate(%)
1.	LPG-TOTAL (MT)	108360	115610	125910	135140	152600	179140	10.6
	DOM/COM/IND.	108360	115610	125910	135140	152410	178320	10.5
	AUTOGAS					190	820	0.0
	TOTAL (KL)	196390	209520	228200	244930	276570	324670	10.6
2.	GASOLINE-TOTAL	1527040	1709030	1862870	2046400	2256010	2489890	10.3
	PREMIUM	1179660	1357400	1557050	1769430	1997890	2252570	13.8
	REGULAR	347380	351630	305820	276970	258120	237320	-7.3
3.	JETFUEL	319150	387420	426580	429500	423800	426500	6.0
4.	KEROSENE	443850	454860	468000	478410	477650	454750	0.5
5.	DIESEL-TOTAL	2829180	3320410	3554970	3918580	4214140	3811320	6.1
	POWER	473820	488350	490480	615020	802810	478290	0.2
	NON-POWER	2355360	2832060	3064490	3303560	3411330	3333030	7.2
6.	FUEL OIL-TOTAL	2987800	3155130	3082170	3136550	3177480	3170810	1.2
	POWER	2123440	2302290	2451810	2602070	2762110	2637100	4.4
	NON-POWER	864360	852840	630360	534480	415370	533710	-9.2
7.	LUBRICANT	105840	116840	124820	131930	137200	141300	5.9
8.	ASPHALT	145210	173110	188620	224590	228450	237400	10.3
9.	TOTAL							
	INC. POWER (KL)	8554460	9526320	9936230	10610890	11191300	11056640	5.3
	kBBLS/DAY	149	166	173	185	195	193	5.3
	EXC. POWER (KL)	5957200	6735680	6993940	7393800	7626380	7941250	5.9
	kBBLS/DAY	103	116	120	127	131	137	5.9

Source: PETRONAS

Table I.63 DEMAND FORECAST, 1985/86-1990/91 (TOTAL COUNTRY)

(UNIT: KL, LPG in MT)

NO	PRODUCT	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	Ave.Anni Growth Rate(%)
1.	LPG-TOTAL (MT)	200900	223600	248900	277800	308900	341600	11.2
	DOMESTIC/COMM.	178900	197400	215800	234000	253000	272400	8.8
	INDUSTRIAL	20200	22700	26500	31500	37300	44200	17.0
	AUTOGAS	1800	3500	6600	12300	18600	25000	69.3
	TOTAL (KL)	364100	405300	451100	503500	559900	619100	11.2
2.	GASOLINE-TOTAL	2739600	2976900	3204000	3415100	3609300	3780400	6.7
	PREMIUM	2510300	2755500	2990500	3209500	3411500	3590400	7.4
	REGULAR	229300	221400	213500	205600	197800	190000	-3.7
3.	JETFUEL	428700	444200	458000	469500	478700	485700	2.5
4.	KEROSENE	450600	446100	441300	435100	428900	422700	-1.3
5.	DIESEL-TOTAL	3846500	3758100	3847600	3940000	4011700	4105800	1.3
	POWER	426800	249900	251700	256000	239200	244500	-10.5
	NON-POWER	3419700	3508200	3595900	3684000	3772500	3861300	2.5
6.	FUEL OIL-TOTAL	2972900	3016000	2846800	3092700	2797400	2974200	0.0
	POWER	2387000	2377900	2156800	2350600	2003300	2128000	-2.3
	NON-POWER	585900	638100	690000	742100	794100	846200	7.6
7.	LUBRICANT	146500	151300	156100	160800	165600	170400	3.1
8.	ASPHALT	246500	255500	264500	273500	282600	291600	3.4
9.	TOTAL							
	INC. POWER (KL)	11195400	11453400	11669400	12290200	12334100	12849900	2.8
	kBBLS/DAY	192.9	197.4	201.1	211.8	212.5	221.4	2.8
	EXC. POWER (KL)	8381600	8825600	9260900	9683600	10091600	10477400	4.6
	kBBLS/DAY	144.4	152.1	159.6	166.9	173.9	180.5	4.6

Source: PETRONAS

Table I.64 MALAYSIA: PETROLEUM PRODUCTS DEMAND FORECAST CONDUCTED BY PETRONAS AND ASCOPE

(UNIT: 1000 BLS/D)

	Actual		Forecast				Average Annual Growth Rate	
	1983		1985		1990		1990/1985	
	PETRONAS	ASCOPE	PETRONAS	ASCOPE	PETRONAS	ASCOPE	PETRONAS	ASCOPE
Gasoline	38.9	39	47.2	43	65.1	53	6.7	4.3
ATF & Kerosene	15.5	17	15.5	17	15.7	21	0.2	4.3
Diesel Oil	72.6	74	66.3	70	70.8	82	1.3	3.2
Fuel Oil	54.8	54	51.2	57	51.2	38	0.0	-7.8
LPG	4.8	5	6.3	6	10.6	13	11.2	16.7
Fuel Sub Total	186.6	189	186.1	193	213.4	207	2.8	1.4
Lubricant & Asphalt	8.0	6	6.8	3	8.0	3	3.3	0.0
Total	194.6	195	192.9	196	221.4	210	2.8	1.4

Source: PETRONAS: Table I.62 & I.63
ASCOPE: Table I.61

Table I.65 MALAYSIA: PETROLEUM PRODUCTS DEMAND FORECAST
1985, 1990, 1995, 2000 AND 2005 BY TIME SERIES MODEL

(UNIT: 1,000 KL)

		1985	1990	1995	2000	2005	Average annual growth rate (%) 85-90	90-95	95-00	00-05	FM
1. LPG Residential/Commercial		324.2	493.7	632.3	772.9	912.4	8.8	5.1	4.1	3.4	4
Industry		36.6	80.1	126.6	171.1	216.6	17.0	9.6	6.2	5.8	1
Sub total		360.8	573.8	758.9	944.0	129.0	9.7	5.8	4.5	3.6	3
Autogas		3.3	45.3	83.5	121.7	159.9	69.3	13.0	7.8	5.5	2
Total		364.1	619.1	842.4	1,065.7	1,288.9	11.2	6.4	4.8	3.9	5
2. Gasoline		2,739.6	3,780.4	4,839.3	5,897.7	6,956.2	6.7	5.1	4.0	3.3	6
3. Jet Fuel		428.7	485.7	540.2	594.7	649.2	2.5	2.1	1.9	1.8	7
4. Kerosene		450.6	422.7	405.9	389.0	372.0	-1.3	-0.8	-0.8	-0.9	8
5. Diesel	Power	426.8	244.5	206.4	177.1	153.7	-10.5	-3.3	-3.0	-3.0	11
	Non-Power	3,419.7	3,861.3	4,265.2	4,660.5	5,110.0	2.5	2.0	1.8	1.9	10
	Total	3,846.5	4,105.8	4,471.6	4,837.6	5,263.7	1.3	2.2	1.6	1.7	9
6. Fuel Oil	Power	2,387.0	2,128.0	1,858.2	1,579.1	1,295.4	-2.3	-2.7	-3.2	-3.8	15
	Non-Power	585.9	846.2	1,004.3	1,172.2	1,284.7	7.6	3.5	3.1	1.9	16
	Total	2,972.9	2,974.2	2,862.5	2,751.3	2,580.1	0.0	-0.8	-0.8	-1.3	17
7. Fuel	Power	2,813.8	2,372.5	2,064.6	1,756.2	1,449.1	-3.4	-2.7	-3.2	-3.8	14
	Non Power	7,988.6	10,015.4	11,897.3	13,779.8	15,661.0	4.6	3.5	3.0	2.6	13
	Total	10,802.4	12,387.9	13,961.9	15,536.0	17,110.1	2.8	2.4	2.2	1.8	12
8. Lubricant		146.5	170.4	197.5	224.6	251.7	3.1	3.0	2.6	2.3	18
9. Asphalt		246.5	291.6	350.6	409.4	68.3	3.4	3.7	3.2	2.7	19
10. Petroleum Product Total											
	Incl. Power	11,195.4	12,849.9	14,510.0	16,170.0	17,830.1	2.8	2.5	2.2	2.0	20
	Excl. Power	8,381.6	10,477.4	12,445.4	14,413.8	16,381.0	4.6	3.5	3.0	2.6	21
	Incl. Power	11,195.4	12,849.9	14,509.8	16,169.6	17,829.5	2.8	2.5	2.2	2.0	22
	Excl. Power	8,381.6	10,474.4	12,445.3	14,413.1	16,380.9	4.6	3.5	3.0	2.6	23

Source: During the period 1985-1990 : Forecast by PETRONAS
During the period 1995-2005 : Forecast by the Study Team

Note: FM = Forecast model's number

Table I.66 THE TIME SERIES MODELS AND CALCULATION FORMULAE USED FOR DEMAND FORECAST

(UNIT: 1,000 KL)

FM NO.	Item	Time Series Models and Calculation Formulae	Correlation Coefficient R
1	LPG Demand Industrial	DLPGID(t) = (33.508 + 8.8101T) x 1.03275	0.98705
2	LPG Demand Autogas	DLPGAG(t) = (-6.853 + 6.4120T) x 1.19142	0.94377
3	LPG Demand Res/Comm/Ind	DLPGRCI(t) = (159.707 + 35.485T) x 1.0432	0.98962
4	LPG Demand RestComm	DLPGRC(t) = DLPGRCI(t) - DLPGID(t)	
5	LPG Demand Total	DLPG(t) = DLPGRCI(t) + DLPGAG(t)	
6	Gasoline Demand	DGAS(t) = (1462.48 + 213.133T) x 0.99317	0.99862
7	Jet fuel Demand	DJF(t) = (370.726 + 11.0469T) x 0.98671	0.88761
8	Kerosene Demand	DK(t) = (469.085 - 3.43357T) x 0.980	0.69548
9	Diesel Oil Demand Total	DDO(t) = (3354.12 + 74.3759T) x 0.98408	0.71072
10	Diesel Oil Demand Non-Power	DDONP(t) = (2745.05 + 109.105T) x a(t)	0.92564
11	Diesel Oil Demand Power	DDOP(t) = DDO(t) - DDONP(t)	
12	Fuel Demand Total	DFL(t) = (8943.3 + 315.458T) x 0.99795	0.96475
13	Fuel Demand Non-Power	DFLNP(t) = (5844.78 + 374.429T) x 1.00521	0.99670
14	Fuel Demand Power	DFLP(t) = DFL(t) - DFLNP(t)	
15	Fuel Oil Demand Power	DFOP(t) = DFLP(t) - DDOP(t)	
16	Fuel Oil Non-Power	DFONP(t) = DFLNP(t) - (DLPG(t) + DGAS(t) + DJF(t) + DK(t) + DDONP(t))	
17	Fuel Oil Total	DFO(t) = DFOP(t) + DFONP(t)	
18	Lubricant	DLB(t) = (112.213 + 5.4865T) x 0.98748	0.96567
19	Asphalt Petroleum Products Demand	DAP(t) = (167.382 + 12.166T) x 0.96808	0.96846
20	Including Power	DPPIP(t) = DFL(t) + DLB(t) + DAP(t)	
21	Excluding Power	DPPEP(t) = DPPIP(t) - DFLP(t)	
22	Including Power	DPPIP(t) = (9224.62 + 332.92T) x 0.997144	0.96567
23	Excluding Power	DPPEP(t) = (6124.47 + 392.051T) x 1.003871	0.9970

Note: t: Year in question minus 1979 (1985=6) excludes LPG Autogas
t in LPG Autogas: Year in question minus 1983
T: Year in question as independent variables
a(t): 1990; 0.97873, 1995; 0.94976, 2000; 0.9254, 2005; 0.9155

Table I.67(1) MALAYSIA: PETROLEUM PRODUCTS DEMAND FORECAST 1985, 1990, 1995, AND 2005 BY CORRELATION MODEL (BASE CASE)

(Unit: 1,000 KL)

		1985	1990	1995	2000	2005	Average Annual Growth Rate (%)				FM
							85-90	90-95	95-00	00-05	
1. LPG		364.1	619.1	901.3	1,255.9	1,715.6	11.2	7.8	6.9	6.4	1
2. Gasoline		2,739.6	3,780.4	5,199.2	6,981.9	9,292.6	6.7	6.6	6.1	5.9	2
3. Jet Fuel		428.7	485.7	540.2	594.7	649.2	2.5	2.1	1.9	1.8	3
4. Kerosene		450.6	422.7	456.5	490.9	545.4	-1.3	1.6	1.5	2.1	4
5. Diesl Oil	Power	426.8	244.5	136.7	114.4	85.7	-10.5	-11.0	-3.5	-5.6	16
	Non-Power	3,419.7	3,861.3	4,240.6	4,552.8	4,959.0	2.5	1.9	1.4	1.7	17
	Sub Total	3,846.5	4,105.8	4,377.3	4,667.2	5,044.7	1.3	1.3	1.3	1.6	5
6. Fuel Oil	Power	2,387.0	2,218.0	1,963.3	1,643.0	1,228.2	-1.5	-2.4	-3.5	-5.7	14
	Non-Power	585.9	846.2	1,214.9	1,865.5	2,712.5	7.6	7.5	9.0	7.8	15
	Sub Total	2,972.9	3,064.2	3,178.2	3,508.5	3,940.7	0.6	0.7	2.0	2.4	13
7. Fuel (1 - 6)	Power	2,813.8	2,372.5	2,100.0	1,757.4	1,313.9	-3.4	-2.4	-3.5	-5.7	11
	Non-Power	7,988.6	10,015.4	12,552.7	15,741.7	19,894.3	4.6	4.6	4.6	4.8	12
	Sub Total	10,802.4	12,387.9	14,652.7	17,499.1	21,188.2	2.8	3.4	3.6	3.9	10
8. Lubricant		146.5	170.4	207.8	254.9	315.9	3.1	4.0	4.2	4.4	6
9 Asphalt		246.5	291.6	373.9	477.3	611.4	3.4	5.1	5.0	5.1	7
10. Petroleum Products Total											
Including Power		11,195.4	12,849.9	15,234.4	18,231.3	22,115.5	2.8	3.5	3.7	3.9	8
Excluding Power		8,381.6	10,477.4	13,134.4	16,473.9	20,801.6	4.6	4.6	4.6	4.8	9

Sources: During the period 1985 - 1990: Forecast conducted by PETRONAS
During the period 1995 - 2005: Forecast conducted by the Study Team

Note: FM, Forecast Model's number

Table I.67(2) MALAYSIA: PETROLEUM PRODUCTS DEMAND FORECAST 1985, 1990, 1995, AND 2005 BY CORRELATION MODEL (MEDIUM CASE)

(Unit: 1,000 KL)

		1985	1990	1995	2000	2005	Average Annual Growth Rate (%) 85-90	90-95	95-00	00-05	FM
1. LPG		364.1	528.0	780.6	1,107.5	1,522.2	7.7	8.1	7.3	6.6	1
2. Gasoline		2,739.6	3,322.3	4,602.2	6,235.8	8,329.6	3.9	6.7	6.3	6.0	2
3. Jet Fuel		428.7	485.7	540.2	594.7	649.2	2.5	2.1	1.9	1.8	3
4. Kerosene		450.6	422.7	447.4	478.9	519.2	-1.3	1.1	1.4	1.6	4
5. Diesl Oil	Power	426.8	373.2	335.9	288.3	227.6	-2.6	-2.1	-3.0	-4.6	16
	Non-Power	3,419.7	3,595.1	3,877.4	4,191.9	4,593.2	1.0	1.5	1.6	1.8	17
	Sub Total	3,846.5	3,968.3	4,213.3	4,480.2	4,820.8	0.6	1.2	1.2	1.5	5
6. Fuel Oil	Power	2,387.0	2,087.0	1,878.6	1,612.2	1,272.4	-2.7	-2.1	-3.0	-4.6	14
	Non-Power	585.9	897.3	1,237.3	1,798.3	2,522.3	8.9	6.6	7.8	7.0	15
	Sub Total	2,972.9	2,934.3	3,115.9	3,410.5	3,794.7	-0.3	1.2	1.8	2.2	13
7. Fuel (1 - 6)	Power	2,813.8	2,460.2	2,214.5	1,900.5	1,500.0	-2.7	-2.1	-3.0	-4.6	11
	Non-Power	7,988.6	9,201.1	11,485.1	14,407.1	18,135.7	2.9	4.5	4.6	4.7	12
	Sub Total	10,802.4	11,661.3	13,699.6	16,307.6	19,635.7	1.5	3.3	3.5	3.8	10
8. Lubricant		146.5	153.3	192.1	235.2	290.3	0.9	4.6	4.1	4.3	6
9 Asphalt		246.5	265.0	339.3	434.0	555.0	1.5	5.1	5.1	5.0	7
10. Petroleum Products Total											
Including Power		11,195.4	12,079.6	14,231.0	16,976.8	20,481.0	1.5	3.3	3.6	3.8	8
Excluding Power		8,381.6	9,619.4	12,016.5	15,076.3	18,981.0	2.8	4.6	4.6	4.7	9

Sources: During the period 1985: Estimated by PETRONAS
During the period 1990 - 2005: Forecast conducted by the Study Team

Note: FM, Forecast Model's number

Table I.67(3) MALAYSIA: PETROLEUM PRODUCTS DEMAND FORECAST 1985, 1990, 1995, AND 2005 BY CORRELATION MODEL (LOW CASE)

(Unit: 1,000 KL)

		1985	1990	1995	2000	2005	Average Annual Growth Rate (%) 85-90	90-95	95-00	00-05	FM
1. LPG		364.1	441.9	575.0	729.2	908.1	3.9	5.4	4.9	4.5	1
2. Gasoline		2,739.6	2,889.7	3,558.6	4,297.7	5,233.1	1.0	4.3	3.8	4.0	2
3. Jet Fuel		428.7	485.7	540.2	594.7	649.2	2.5	2.1	1.9	1.8	3
4. Kerosene		450.6	422.7	435.6	450.6	468.7	-1.3	0.6	0.7	0.8	4
5. Diesl Oil	Power	426.8	277.4	263.4	247.2	228.4	-8.3	-1.0	-1.3	-1.6	16
	Non-Power	3,419.7	3,608.1	3,750.1	3,893.0	4,058.7	1.1	0.8	0.8	0.8	17
	Sub Total	3,846.5	3,885.5	4,013.5	4,140.2	4,287.1	0.2	0.7	0.6	0.7	5
6. Fuel Oil	Power	2,387.0	2,266.6	2,152.3	2,019.5	1,865.7	-1.0	-1.0	-1.3	-1.6	14
	Non-Power	585.9	549.1	759.1	1,040.5	1,295.8	-1.3	6.7	6.5	4.5	15
	Sub Total	2,972.9	2,815.7	2,911.4	3,060.0	3,161.5	-1.0	0.7	1.0	0.7	13
7. Fuel (1 - 6)	Power	2,813.8	2,544.0	2,415.7	2,266.7	2,094.1	-2.0	-1.0	-1.3	-1.6	11
	Non-Power	7,988.6	8,397.2	9,618.6	11,005.7	12,613.6	1.0	2.8	2.7	2.8	12
	Sub Total	10,802.4	10,941.2	12,034.3	13,272.4	14,707.7	0.3	1.9	2.0	2.1	10
8. Lubricant		146.5	146.9	164.6	185.0	208.8	0.1	2.3	2.4	2.4	6
9 Asphalt		246.5	265.0	278.7	323.7	375.9	1.5	1.0	3.0	3.0	7
10. Petroleum Products Total											
Including Power		11,195.4	11,353.1	12,477.6	13,781.1	15,292.4	0.3	1.9	2.0	2.1	8
Excluding Power		8,381.6	8,809.1	10,061.9	11,514.4	13,198.3	1.0	2.7	2.7	2.7	9

Sources: During the period 1985: Estimated by PETRONAS
During the period 1990 - 2005: Forecast conducted by the Study Team

Note: FM, Forecast Model's number

Table I.68 MALAYSIA: GROSS DOMESTIC PRODUCTS

(M$ MILLION IN 1978 CONSTANT PRICES)

Year	Base Case	Medium Case	Low Case
1979	41,422		
1980	44,702		
1981	47,790		
1982	50,456		
1983	53,636		
1984	57,706		
1985	59,344	59,344	59,344
1990	75,599	68,796	62,371
1995	96,665	87,803	72,305
2000	123,143	112,062	83,821
2005	157,457	143,021	97,172

Source: 1979 - 1984 : Ministry of Finance, Economic Report Malaysia
1985 and 1990: Fifth Malaysia Plan
1995 and 2000: Klang Valley Transportation Study

Table I.69 CORRELATION MODELS AND CALCULATION FORMULAE USED FOR DEMAND FORECAST

FM No.	Item	Regression Models and Calculation Formulae	Correlation Coefficient R
1	LPG Demand	DLPG(t) = (-369.979 + 0.0125932 x GDP(t)) x 1.063645	0.97686
2	Gasoline Demand	DGAS(t) = (-1,303.71 + 0.0670 x GDP(t)) x 1.005656	0.99767
3	Jet Fuel Demand	DJF(t) = (370.726 + 11.0469 x (t-1979) x 0.98671	0.88761
4	Kerosene Demand	DK(t) = 422.7 + (GDPI(t) x Ch(t))	
5	Diesel Oil Demand Total	DDO(t) = 3,846.5 + (GDPI(t) x Cd(t))	
6	Lubricant Demand	DLB(t) = (36.741 + 0.001813 x GDP(t)) x 0.980432	0.98527
7	Asphalt Demand	DAP(t) = (-3.94264 + 0.004103 x GDP(t)) x 0.95216	0.95245
8	Petroleum Products Demand Including Power	DPPIP(t) = (4,387.51 + 0.115687 x GDP(t)) x 0.9784	0.95723
9	Petroleum Products Demand Excluding Power	DPPEP(t) = (937.232 + 0.125412 x GDP(t) x 1.00507	0.99423
10	Fuel Demand Total	DFL(t) = DPPIP(t) - (DLB(t) + DAP(t))	
11	Fuel Demand Power	DFLP(t) = DPPIP(t) - DPPEP(t)	
12	Fuel Demand Non-Power	DFLNP(t) = DFL(t) - DFLP(t)	
13	Fuel Oil Demand Total	DFO(t) = DFL(t)- (DLPG(t) + DGAS(t) + DJF(t) + DK(t) + DDO(t))	
14	Fuel Oil Demand Power	DFOP(t) = 2,387 x (1 + AAGROP(t)/100)^{n}	
15	Fuel Oil Demand Non-Power	DFONP(t) = DFO(t) - DFOP(t)	
16	Diesel Oil Demand Power	DDOP(t) = DFLP(t) - DFOP(t)	
17	Diesel Oil Non-Power	DDONP(t) = DDO(t) - DDOP(t)	

Notes: t : Year in question
n : Number of Years since 1980 (t-1980)
GDPI(t) : GDP increase; in FM4 GDPI(t) = GDP(t) - (GDP as of 1990)
in FM5 GDPI(t) = GDP(t) - (GDP as of 1985)
AAGROP(t) : Average Annual Growth Rate of Fuel Demand Power during the period 1980-t
Ch(t) : Modification Coefficient for Kerosene Demand
Cd(t) : Modification Coefficient for Diesel Demand
FM No. : Forecast Model's Number
Calculation Formula used for Jet Fuel Demand forecast is as same as the Time Series Model, because the Study Team considered that correlation between Jet Fuel Demand and GDP is not so high.

Unit: Petroleum Products; 1,000 KL, GDP; Million M$

Table 1.70 ENERGY DEMAND BY SECTOR/BY KIND IN KLANG VALLEY AREA AS OF 1985

(Unit: Tcal)

	Household	Commercial	Manuf. Industry	Transpor-tation	Total
LPG	645.7	345.6	147.9	21.4	1160.6
	(59.6)	(68.8)	(6.2)	(0.2)	(7.5)
GASOLINE	0.0	0.0	0.0	6843.7	6843.7
				(59.5)	(44.2)
KEROSENE	341.3	39.4	7.5	0.0	388.2
	(31.5)	(7.8)	(0.3)		(2.5)
DIESEL OIL	0.0	0.0	517.3	4633.1	5150.4
			(21.6)	(40.3)	(33.3)
FUEL OIL	0.0	57.8	1720.3	0.0	1778.1
		(11.5)	(71.9)		(11.5)
PETROLEUM PRD.	987.0	442.8	2393.0	11498.2	15321.0
TOTAL	(91.1)	(88.1)	(100.0)	(100.0)	(99.0)
CHARCOAL	96.4	50.1	0.0	0.0	146.5
	(8.9)	(10.0)			(0.9)
FIRE WOOD	0.0	8.6	0.0	0.0	8.6
		(1.7)			(0.1)
COAL	0.0	0.9	0.0	0.0	0.9
		(0.2)			(0.0)
TOTAL	1083.4	502.4	2393.0	11498.2	15477.0
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Estimation conducted by the Study Team
Note: Figures in the parentheses show the percentage among total.

Table I.71 ELECTRICITY DEMAND IN KLANG VALLEY AREA AS OF 1984

(Unit: MWH)

SECTOR	DEMAND	% AMONG TOTAL
Domestic	730,293	(18.8)
Commercial	1,563,290	(40.3)
Industrial	1,373,415	(35.4)
Mining	177,153	(4.5)
Public lightning	39,459	(1.0)
Total	3,883,610	(100.0)

Source: National Electricity Board, Statistical Bulletin Year ending 31 August 1984

Table I.72 (1) ENERGY DEMAND FORECAST IN KLANG VALLEY AREA
(BASE CASE)

(Unit: Tcal)

SECTOR		1985	1990	1995	2000	2005	Ave. Annual Growth Rate (%)			
							90/85	95/90	00/95	05/00
HOUSEHOLD	LPG	645.7	842.6	1019.3	1270.1	1491.6	5.47	3.88	4.50	3.27
	KEROSENE	341.3	436.8	515.5	584.2	631.6	5.06	3.37	2.53	1.57
	CHARCOAL	96.4	125.0	149.9	181.2	207.4	5.33	3.70	3.87	2.74
	LPG SHOWER	0.0	211.0	271.1	352.6	429.9	0.00	5.14	5.40	4.04
	SUB-TOTAL	1083.4	1615.4	1955.9	2388.1	2760.5	8.32	3.90	4.07	2.94
RESTAURANT	LPG	329.6	431.4	524.8	642.5	759.5	5.53	4.00	4.13	3.40
	KEROSENE	39.4	51.6	62.8	76.9	90.9	5.54	4.01	4.13	3.40
	CHARCOAL	50.1	65.6	79.8	97.8	115.5	5.54	4.00	4.15	3.38
	FIRE WOOD	8.6	11.2	13.6	16.7	19.8	5.43	3.96	4.19	3.46
	COAL	0.9	1.1	1.4	1.7	2.0	4.10	4.94	3.96	3.30
	SUB-TOTAL	428.6	561.0	682.4	835.5	987.7	5.53	4.00	4.13	3.40
HOTEL	LPG	16.0	20.4	27.2	33.9	40.7	4.98	5.92	4.50	3.72
	FUEL OIL	57.8	73.6	98.0	122.4	146.8	4.95	5.89	4.55	3.70
	SUB-TOTAL	73.8	94.0	125.2	156.3	187.5	4.96	5.90	4.54	3.71
TRANSPORTATION	LPG	21.4	297.5	548.4	799.3	1044.7	69.28	13.01	7.83	5.50
	GASOLINE	6843.7	8903.9	12007.1	14767.7	18541.7	5.40	6.16	4.23	4.66
	DIESEL OIL	4633.1	5410.3	5990.8	6582.1	7231.8	3.15	2.06	1.90	1.90
	SUB-TOTAL	11498.2	14611.7	18546.3	22149.1	26818.2	4.91	4.88	3.61	3.90
MANUFACTURING INDUSTRY	LPG	147.9	199.7	274.0	374.9	475.8	6.19	6.53	6.47	4.88
	FUEL OIL	1720.3	2323.1	3187.1	4360.7	5534.3	6.19	6.53	6.47	4.88
	DIESEL OIL	517.3	698.6	958.6	1311.6	1664.6	6.19	6.53	6.47	4.88
	KEROSENE	7.5	10.0	13.6	18.6	23.6	5.92	6.34	6.46	4.88
	SUB-TOTAL	2393.0	3231.4	4433.3	6065.8	7698.3	6.19	6.53	6.47	4.88
TOTAL	LPG	1160.6	1791.6	2393.7	3120.7	3812.3	9.07	5.97	5.45	4.09
	KEROSENE	388.2	498.4	591.9	679.7	746.1	5.13	3.50	2.81	1.88
	CHARCOAL	146.5	337.1	229.7	279.0	322.9	18.14	-7.39	3.97	2.97
	LPG SHOWER	0.0	211.0	271.1	352.6	429.9	0.00	5.14	5.40	4.04
	FIRE WOOD	8.6	11.2	13.6	16.7	19.8	5.43	3.96	4.19	3.46
	COAL	0.9	1.1	1.4	1.7	2.0	4.10	4.94	3.96	3.30
	GASOLINE	6843.7	8903.9	12007.1	14767.7	18541.7	5.40	6.16	4.23	4.66
	FUEL OIL	1778.1	2396.7	3285.1	4483.1	5681.1	6.15	6.51	6.42	4.85
	DIESEL OIL	5150.4	6108.9	6949.4	7893.7	8896.4	3.47	2.61	2.58	2.42
GRAND TOTAL		15477.0	20259.9	25743.0	31594.9	38452.2	5.53	4.91	4.18	4.01

Source: Forecasted by the Study Team

Table I.72 (2) ENERGY DEMAND FORECAST IN KLANG VALLEY AREA
(MEDIUM CASE)

(Unit: Tcal)

SECTOR		1985	1990	1995	2000	2005	Ave. Annual Growth Rate (%)			
							90/85	95/90	00/95	05/00
HOUSEHOLD	LPG	645.7	842.6	1019.3	1270.1	1491.6	5.47	3.88	4.50	3.27
	KEROSENE	341.3	436.8	515.5	584.2	631.6	5.06	3.37	2.53	1.57
	CHARCOAL	96.4	125.0	149.9	181.2	207.4	5.33	3.70	3.87	2.74
	LPG SHOWER	0.0	201.5	248.7	328.7	405.6	0.00	4.30	5.74	4.29
	SUB-TOTAL	1083.4	1605.9	1933.4	2364.2	2736.2	8.19	3.78	4.11	2.97
RESTAURANT	LPG	329.6	431.4	524.8	642.5	759.5	5.53	4.00	4.13	3.40
	KEROSENE	39.4	51.6	62.8	76.9	90.9	5.54	4.01	4.13	3.40
	CHARCOAL	50.1	65.6	79.8	97.8	115.5	5.54	4.00	4.15	3.38
	FIRE WOOD	8.6	11.2	13.6	16.7	19.8	5.43	3.96	4.19	3.46
	COAL	0.9	1.1	1.4	1.7	2.0	4.10	4.94	3.96	3.30
	SUB-TOTAL	428.6	560.9	682.4	835.6	987.7	5.53	4.00	4.13	3.40
HOTEL	LPG	16.0	20.4	27.2	33.9	40.7	4.98	5.92	4.50	3.72
	FUEL OIL	57.8	73.6	98.0	122.4	146.8	4.95	5.89	4.55	3.70
	SUB-TOTAL	73.8	94.0	125.2	156.3	187.5	4.96	5.90	4.54	3.71
TRANSPORTATION	LPG	21.4	297.5	548.4	799.3	1044.7	69.28	13.01	7.83	5.50
	GASOLINE	6843.7	8068.9	10595.1	13555.2	16764.5	3.35	5.60	5.05	4.34
	DIESEL OIL	4633.1	4869.4	5271.6	5735.2	6270.3	1.00	1.60	1.70	1.80
	SUB-TOTAL	11498.2	13235.8	16415.1	20089.7	24079.5	2.86	4.40	4.12	3.69
MANUFACTURING INDUSTRY	LPG	147.9	180.5	249.0	340.4	431.8	4.06	6.65	6.45	4.87
	FUEL OIL	1720.3	2099.4	2896.7	3959.6	5023.2	4.06	6.65	6.45	4.87
	DIESEL OIL	517.3	631.1	870.8	1190.4	1510.1	4.06	6.65	6.45	4.87
	KEROSENE	7.5	9.3	12.8	17.5	22.2	4.40	6.60	6.46	4.87
	SUB-TOTAL	2393.0	2920.3	4029.3	5507.9	6987.3	4.06	6.65	6.45	4.87
TOTAL	LPG	1160.6	1772.4	2368.7	3086.2	3768.3	8.84	5.97	5.43	4.07
	KEROSENE	388.2	497.7	591.1	678.6	744.7	5.10	3.50	2.80	1.88
	CHARCOAL	146.5	190.6	229.7	279.0	322.9	5.40	3.80	3.97	2.97
	LPG SHOWER	0.0	201.5	248.7	328.7	405.6	0.00	4.30	5.74	4.29
	FIRE WOOD	8.6	11.2	13.6	16.7	19.8	5.43	3.96	4.19	3.46
	COAL	0.9	1.1	1.4	1.7	2.0	4.10	4.94	3.96	3.30
	GASOLINE	6843.7	8068.9	10595.1	13555.2	16764.5	3.35	5.60	5.05	4.34
	FUEL OIL	1778.1	2173.0	2994.7	4082.0	5170.0	4.09	6.63	6.39	4.84
	DIESEL OIL	5150.4	5500.5	6142.4	6925.6	7780.4	1.32	2.23	2.43	2.36
GRAND TOTAL		15477.0	18416.9	23185.4	28953.7	34978.2	3.54	4.71	4.54	3.85

Source: Forecasted by the Study Team