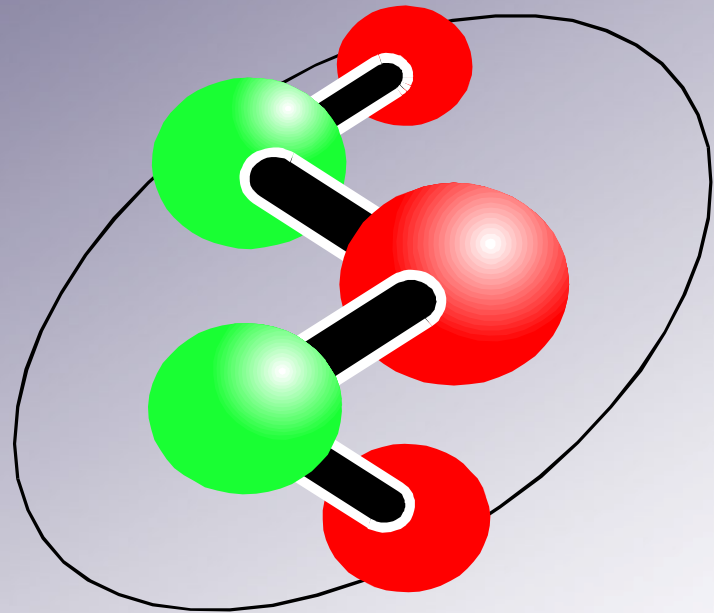




NATIONAL ENERGY BALANCE 2009 MALAYSIA

(Final Draft)



KetTHA

**KEMENTERIAN TENAGA,
TEKNOLOGI HIJAU DAN AIR**

Cover Rationale

- Five spheres symbolise Malaysia's five-fuel policy.
- The colour green connotes renewable energy: hydro and other renewable energy (biomass, wind, etc.)
- The colour red connotes hydrocarbon fuels: oil, gas and coal.
- The ellipse symbolises constant change and evolution of the Malaysian energy sector.

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DRAFT PREFACE

The Malaysian economy contracted by 1.7 percent in 2009, a year when global economy experience its deepest downturn in modern history. The domestic economy experienced the full impact of the global recession in the first quarter of the year. The collapse in global demand and world trade has led to influence the trend of energy supply and demand in the country. The Primary Energy Supply has decreased to 74,582 ktoe in 2009 compared to 75,490 ktoe in 2008, a decrease of 1.2 percent. Final Energy Demand recorded a negative growth of 9.0 percent, from 44,901 ktoe in 2008 to 40,845 ktoe in 2009.

The energy consumption in the industrial sector was recorded at 14,312 ktoe in 2009, a decrease of 25.2 percent. Based on Bank Negara Annual Report 2009, electronics and electrical products was the worst affected by the global downturn, declining by 22.8 percent in 2009. The transportation sector decrease by 1.7 percent to register at 16,119 ktoe, due to lower demand from motor petrol and diesel.

The share of natural gas in the generation mix has decreased from 56.5 percent in 2008 to 54.4 percent in 2009 while the share of coal registered a strong growth from 33.4 percent in 2008 to 36.6 percent in 2009. The share of hydro has decreased to 6.6 percent in 2009 from 8.1 percent in 2008. Fuel oil and diesel played a minor role in the generation mix with their share in 2008 was 2.4 percent.

To this end, the National Energy Balance (NEB) has strived to provide reliable data and information on energy in Malaysia. I sincerely hope that such valuable information will be of great importance and use to all levels of the society, in general, and to those who are actively involved in energy research, in particular.

The preparation of this important report would not have been possible without the collaborative effort from several key agencies. I would therefore like to place on record my utmost appreciation to the relevant government agencies, power utilities, independent power producers, private oil companies together with the coal producers, cement and iron & steel manufacturers for their crucial role in providing the much needed data and information. I wish that such cooperation will continue unabated in the years to come.

Thank you.

DATUK LOO TOOK GEE

Secretary General
Ministry of Energy, Green Technology and Water
Malaysia

DATA COMPILATION

The first stage in compiling the overall balance was to rearrange the data to fit into a standard structure of commodity (or partial) balance. The commodity balance shows clearly the production, imports, exports, stock change and demand for each energy commodity. The basic sequence adhered to in the overall balance is:-

Production + Imports - Exports +/- Stock change
= Apparent inland deliveries (or consumption)

In practice, however, "Apparent inland deliveries" deduced from supply statistics hardly ever match actual sales data. It is necessary, therefore, to include two "statistical discrepancies" - the first to account for the difference in apparent inland delivery of primary supply mainly due to the difficulties in obtaining actual stock change data and difference in data compilation at source and the second to account for the difference in secondary supply as the result of the transformation processes of one form of energy to another.

In addition, the statistical discrepancies also act as a balancing tool to minimize possible errors. In the case of oil and oil products, losses in transportation and distribution, as well as statistical errors are included in the statistical discrepancies. However, for electricity, distribution losses and the sector's own use of electricity are accounted for in the "losses and own use".

Stock changes are not fully accounted for in the balance. It is extremely difficult to obtain stocks of all energy commodities at distributors and final users. Only oil companies' stocks were readily available and these would include stocks at refineries and depots. The statistical discrepancy might thus also include unrecorded stock changes. Coal stocks at TNB power station and a producer in Sarawak are taken into account.

In summary, the flow of energy is represented by the following equations:-

Energy supply = Production + Imports - Exports - Bunkers +/- Stock change

Energy demand = Gross inland consumption
= Final energy consumption
+ Consumption of the energy transformation sector
+ Distribution losses
+ Non-energy consumption

DRAFT EXECUTIVE SUMMARY

Energy Overview

The Malaysian economy contracted by 1.7 percent in 2009. In the first half of 2009, the domestic economy experienced the full impact of the global recession declining by 6.2 percent. The manufacturing sector, particularly the export-oriented industries, was severely affected by the significant deterioration in external demand. However, the accelerated implementation of fiscal stimulus measures introduced to ensure continued access to financing contributed to stabilisation in the domestic economy in the second quarter and subsequent recovery in the second half of the year. As a result, the Malaysian economy resumed its growth momentum in the fourth quarter, growing by 4.5 percent, with strengthened domestic and external demand contributing to growth.

The impact on economy condition has affected the scenario trend of energy supply and demand in the country. Malaysia energy pattern is highly correlated with GDP; as a result the energy demand and supply experienced contraction in the year 2009. This trend was last observed in 1998 when GDP decline together with energy supply and demand.

Primary Supply of Commercial Energy

Malaysia primary energy supply registered at 74,582 ktoe, a decline of 1.2 percent compared to 72,384 ktoe during the previous year. The decrease was led by lower primary production of natural gas and crude oil in 2009. This was anticipated also by decreasing imports of total energy due to unattractive energy demand during the period. The production and export of Liquefied Natural Gas (LNG), however, has increased from 23,606 ktoe in 2009 from 22,277 ktoe in 2008 level.

Crude oil production registered a small decreased of 4.2 percent from 2008 level to 32,747 ktoe in 2009. This was driven by the lower production of crude oil at Peninsular Malaysia in 2009 reducing at 10.7 percent. In 2008, the crude oil production in Peninsular Malaysia registered at 336.1 kilo barrel per day, while in 2009 the production reduced to 300.0 kilo barrel per day. The primary supply of natural gas stood at 35,851 ktoe in 2009, recorded a decreased of 8.7 percent from 2008 at 39,289 ktoe. The reduction was mainly due to lower production of natural gas and higher exportation of LNG. Coal primary supply in the country recorded an increase of 8.6 percent in 2009 from 2008 level. The increment of primary production and imports of coal were the main contributors to the increase. In 2009, the primary supply of hydropower recorded a decrease of 17.1 percent to register at 1,627 ktoe.

As of 1st January 2009, Malaysia crude oil reserves stood at 5.517 billion barrels compared to 5.458 billion barrels in previous year. New discovery in Sarawak has resulted to higher reserves of crude oil for the country in 2009. Meanwhile, as of 1st January 2009, a natural gas reserve is at 87.968 trillion standard cubic feet (Tscf) lower by 0.05 percent from 2008 level at 88.010 Tscf.

Secondary Supply of Commercial Energy

The total production of oil refinery in 2009 was at 25,093 ktoe, a decrease of 5.2 percent compared to previous year (2008: 26,482 ktoe). Analysis on share shows that Diesel took up the highest share (37.5 percent), followed by Non-Energy (23.5 percent), Motor Petrol (16.1 percent), ATF and AV Gas (12.3 percent), Fuel Oil (4.6 percent), LPG (2.9 percent) Kerosene (2.3 percent) and Refinery Gas (0.8 percent). Malaysia's total refinery capacity currently is 492 thousand barrels per day, excluding the condensates splitter capacity of 74.3 thousand barrels per day.

Liquefied Petroleum Gas (LPG) production from LNG had decreased to 465 ktoe due to higher export LNG for trading purpose. The LPG production from Gas Processing Plant (GPP) recorded a decrease of 25.7 percent to register at 1,012 ktoe in 2009 compared to previous year. The Middle Distillate Synthesis (MDS) plant output also showed a downward trend of 11.4 percent to settle at 426 ktoe compared to the previous year at 481 ktoe. The petroleum products from MDS plant consisted of 67.4 percent Non-energy, 24.6 percent Diesel and 8.0 percent Kerosene.

Electricity

Malaysia's total installed capacity as of the end of 2009 was 24,377 MW, an increase of 10.9 percent from 21,988 MW in 2008. This was attributed to the commissioning of Unit 1 and Unit 2 coal-fired plant of (2 x 700 MW) at Jimah Energy Ventures in Port Dickson, Negeri Sembilan in January 2009 and July 2009 respectively and the commissioning of Combined Cycle gas turbine 694 MW (Phase 2) at Tuanku Ja'far Power Station's (PD2) in January 2009. In Sabah, the additional capacity were contributed by commissioning of Empty Fruit Branch (EFB) project in Sandakan with Capacity of 20 MW in January 2009 and March 2009, the commissioning of generation sets of SESB in Kinabatangan and Beluran in Sandakan with total capacity of 3.6 MW and the commissioning of Mini Hydro Project in Kadamaian River in Kota Belud with a capacity of 2 MW in July 2009. Electricity gross generation registered 105,706 GWh, a slight decrease of 0.1 percent from previous year. The electricity consumption was 96,307 GWh, an increase of 2.9 percent from the previous year (2008: 93,619 GWh). The peak demand for Peninsular Malaysia was recorded at 14,245 MW in the third quarter of the year (3Q 2009), Sarawak at 996 MW (in 4Q 2009) and Sabah at 719 MW (4Q 2009). The calculated reserve margin for Peninsular Malaysia in 2009 was 55.6 percent and 22.5 percent for Sarawak with Sabah at 36.9 percent.

The total energy or fuel input in power stations has increased slightly by 1.9 percent in 2009 to settle at 24,616 ktoe. Natural gas continued to remain the main fuel source for electricity generation, with a share of 54.4 percent from total fuel inputs, followed by coal at 36.6 percent, hydropower at 6.6 percent, diesel and fuel oil at 2.4 percent.

Industrial sector is the main user of electricity in Malaysia with its share of 44.9 percent from total consumption in 2009. The electricity consumption from the industrial sector increased by 0.9 percent to register at 3,719 ktoe (43,220 GWh) compared to the previous year. The consumption of electricity in the commercial sector also increased to reach 2,743 ktoe (31,857 GWh), boosted by tourism activities following the expansion of new routes by airlines and various tourism promotional activities organised during the year. The electricity consumption in the residential sector recorded an increase of 7.4 percent to register at 1,792 ktoe (20,822 GWh). The electricity consumption from the rail transport sector, however, decreased from 15 ktoe (173 GWh) in 2008 to 12 ktoe (163 GWh) in 2009. The total electricity consumption recorded a growth of 3.8 percent compared to the previous year to register at 8,286 ktoe (96,307 GWh).

Final Demand of Commercial Energy

The final energy demand in 2009 recorded a negative growth of 9.0 percent to settle at 40,845 ktoe compared to 44,901 ktoe in 2008. The declined were mainly due to the performance of industry sector that affected by the economy slowdown during the year. The total energy demand in industrial sector decrease 25.2 percent to settle at 14,312 ktoe with its share from total energy demand is 35.0 percent as the second largest consumer of total energy in Malaysia. In 2009, transport sector become the leading consumer of total energy with its share of 39.5 percent with negative growth rate of 1.7 percent compared to previous year. Residential and commercial sector constituted about 9.5 percent of share in 2009 with growth rate of 2.1 percent from last year. The total demand in non-energy use in 2009 was 3,868 ktoe with share of 9.5 percent from total energy demand. Agriculture sector the most least consume of energy register a negative growth at 26.5 percent to settle at 211 ktoe. This was due to unfavourable weather conditions that affected the production of crude palm oil and natural rubber.

The industrial GDP for Malaysia in 2009 registered a negative growth of 5.9 percent compared to previous year due to economic downturn especially in manufacturing industry. Malaysia's industrial energy intensity for 2009 was 78 toe/RM Million, a decrease of 12.4 percent from the previous year due to lower growth of final energy demand compared to the growth of GDP.

Total energy demand by type of fuels show that petroleum products constituted about 59.1 percent of total energy demand, followed by electricity at 20.3 percent, 16.6 percent for natural gas and 3.9 percent for coal and coke. Due to contraction of economy during the year, all type of fuels reporting a downward trend except for electricity. Total electricity demand in 2009 recorded an increase of 3.8 percent from previous year to register at 8,286 ktoe. Natural gas demand decreased by 36.7 percent in 2009 to 6,800 ktoe due to the economic condition especially in manufacturing industry during the year. In peninsular Malaysia, the declining of natural gas demand in industry sector were mainly come from the industry sub-sector of construction, wood and furniture, iron, steel and metal and glass and glass products. Coal and coke final demand also show a downward trend with negative growth of 5.8 percent to settle at 1,613 ktoe.

Final Demand for Petroleum Products

Total final energy demand of petroleum products in 2009 contracted by 1.3 percent with a major drop from the kerosene and fuel oil as these fuels become unpopular as demand for them were switch to natural gas and LPG. LPG showing an upward trend in non-energy sector in propane and butane form. Demand for Aviation Turbine Fuel (ATF) and Aviation Gas (AV Gas) were showing an increase with 0.4 percent compared to previous year to settle at 2,120 ktoe. In terms of share, motor petrol (36.3 percent) and diesel (35.8 percent) continued to be the largest contributors to the total demand of petroleum products. This was followed by LPG (10.4 percent), ATF and AV Gas (8.8 percent), fuel oil (5.3 percent), non-energy (3.3 percent), and kerosene (0.1 percent).

Conclusion

The contraction of energy supply and demand in the country was contributed by the economic performance in general. However, during the last quarter of 2009, the energy supply and demand begin to increase due to economy recover. The introduction economic stimulus package by the Government has minimizing the economic recession impact on our local condition. Measures on energy savings such as renewable energy and energy efficiency will be implemented gradually in the country to perform better intensity of energy and limitation of the emission. The short term outlook of energy in Malaysia will be actively moving due to Government Transformation Plan that is introduced by the Government.

Key Economic And Energy Data

National Energy Balance 2009

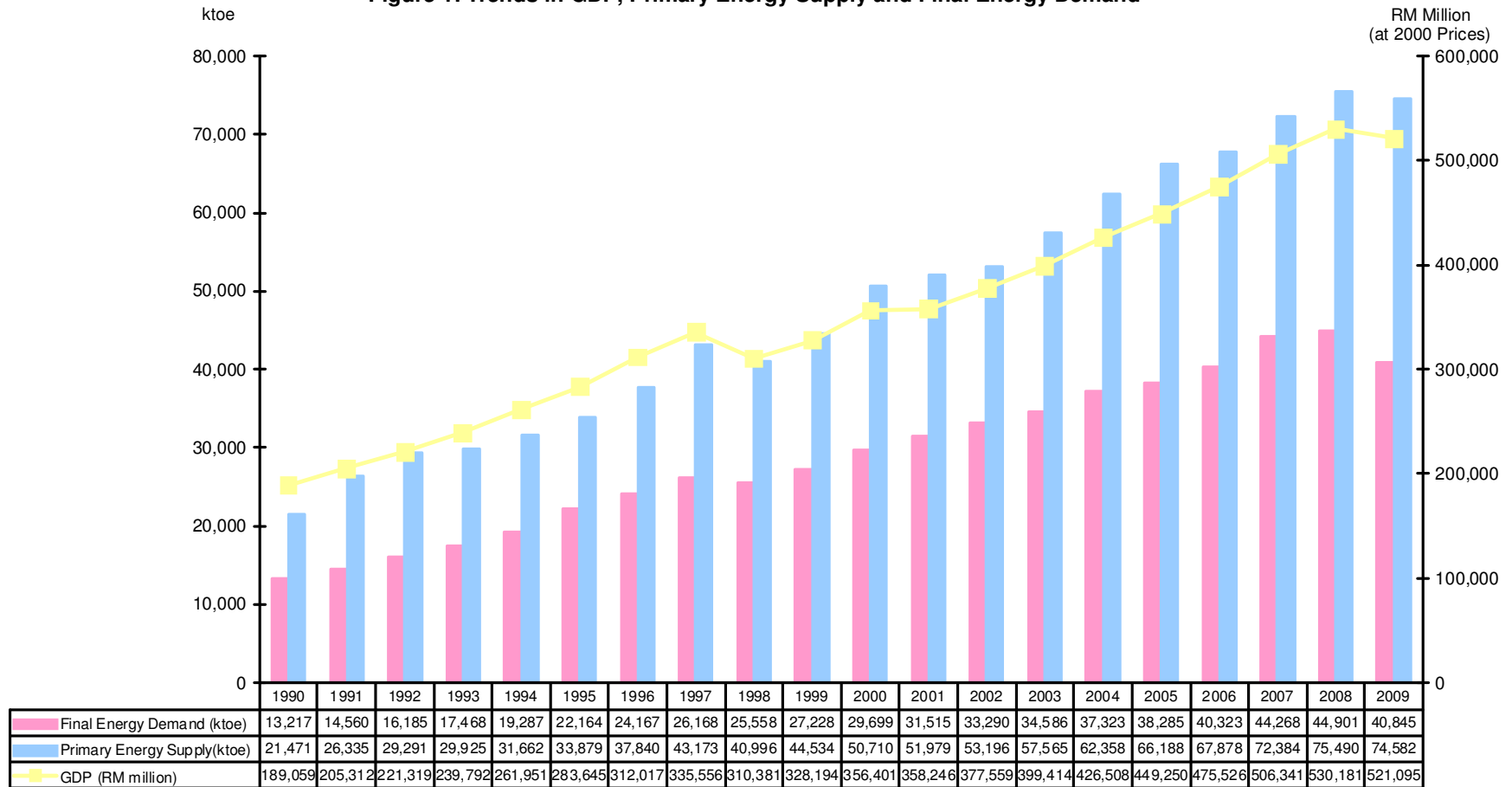
Table 1: Key Economic and Energy Data

	2009				
	1Q	2Q	3Q	4Q	Total
GDP at 2000 prices (RM million)*	121,660	127,256	134,717	137,463	521,095
GDP at current prices (RM million)*	156,658	162,481	174,759	185,790	679,687
GNI at 2000 prices (RM million)*	115,637	122,211	130,064	128,619	496,531
GNI at current prices (RM million)*	152,172	159,625	173,025	180,226	665,047
Population ('000 people)**	27,807	27,895	27,985	28,074	27,895
Primary Energy Supply (ktoe)	18,259	17,907	18,955	19,461	74,582
Final Energy Demand (ktoe)	10,056	10,150	10,425	10,214	40,845
Electricity Demand (ktoe)	1,892	2,074	2,190	2,131	8,287
Electricity Demand (GWh)	21,989	24,104	25,453	24,767	96,313
Per Capita					
GDP (at 2000 prices, RM million)*	4,375	4,562	4,814	4,896	18,681
Primary Energy Supply (toe)	0.657	0.642	0.677	0.693	2.674
Final Energy Demand (toe)	0.362	0.364	0.373	0.364	1.464
Electricity Demand (kWh)	791	864	910	882	3,453
Energy Intensity					
Primary Energy Supply (toe/GDP at 2000 prices (RM million))	150.1	140.7	140.7	141.6	143.1
Final Energy Demand (toe/GDP at 2000 prices (RM million))	82.7	79.8	77.4	74.3	78.4
Electricity Demand (toe/GDP at 2000 prices (RM million))	15.6	16.3	16.3	15.5	15.9
Electricity Demand (GWh/GDP at 2000 prices (RM million))	0.181	0.189	0.189	0.180	0.185

Note (*) : Quarterly data from Department of Statistics Malaysia

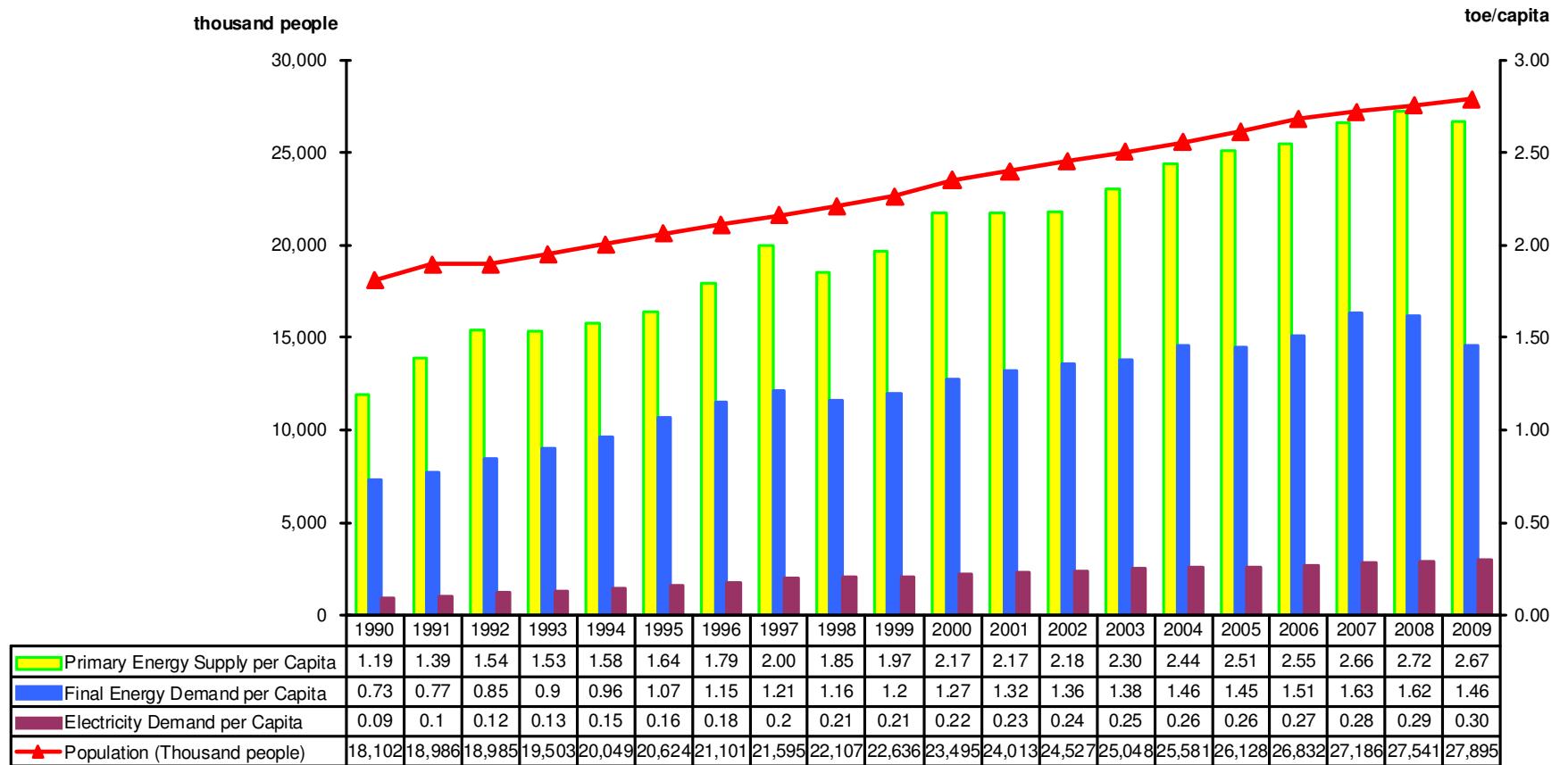
(**) :Mid-year population from Department of Statistics Malaysia

Figure 1: Trends in GDP, Primary Energy Supply and Final Energy Demand



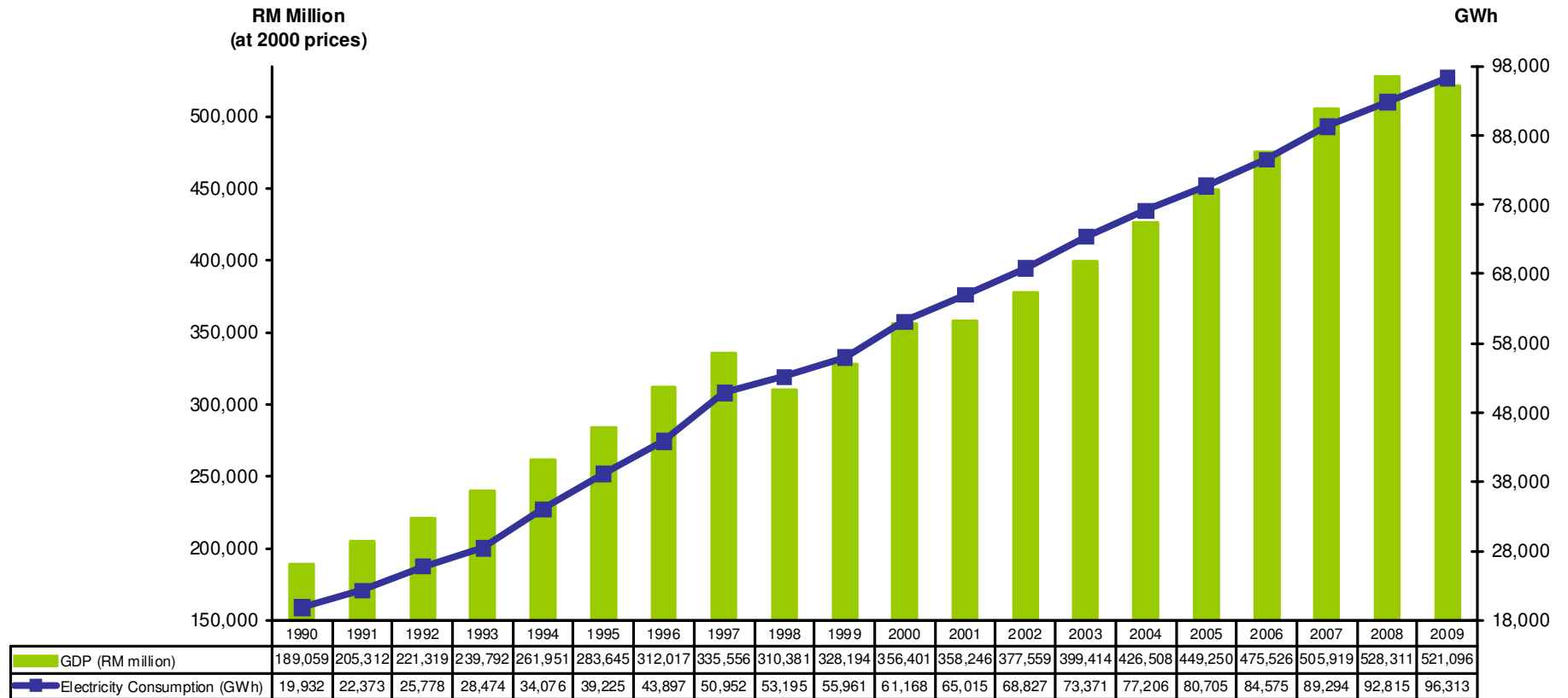
Source: i) Department of Statistics Malaysia
 ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 2: Trend of Primary Energy Supply, Electricity Demand and Final Energy Demand Per Capita



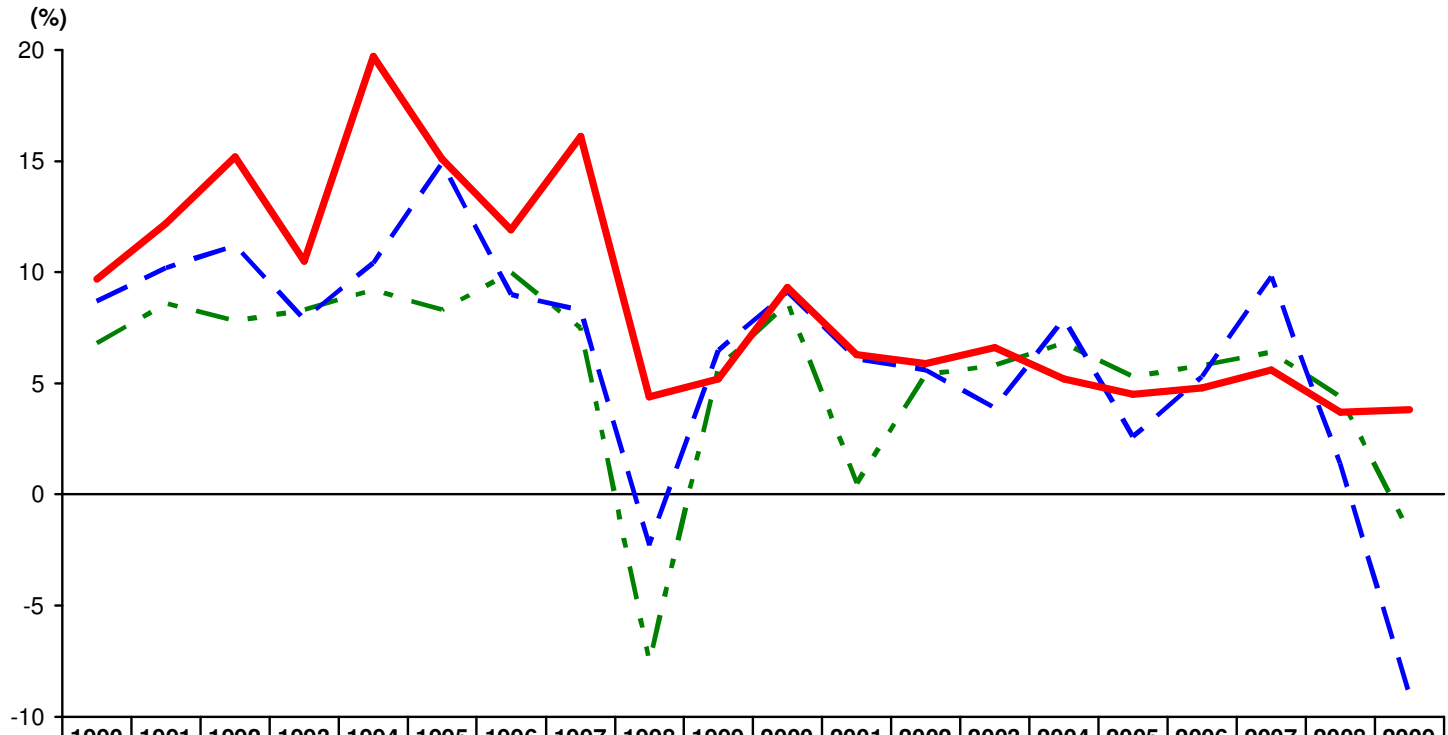
Source: i) Department of Statistics Malaysia
 ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 3: Trends in GDP and Electricity Consumption



Source: i) Department of Statistics Malaysia
 ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 4: Annual Growth Rates of GDP, Final Energy Demand and Electricity Demand

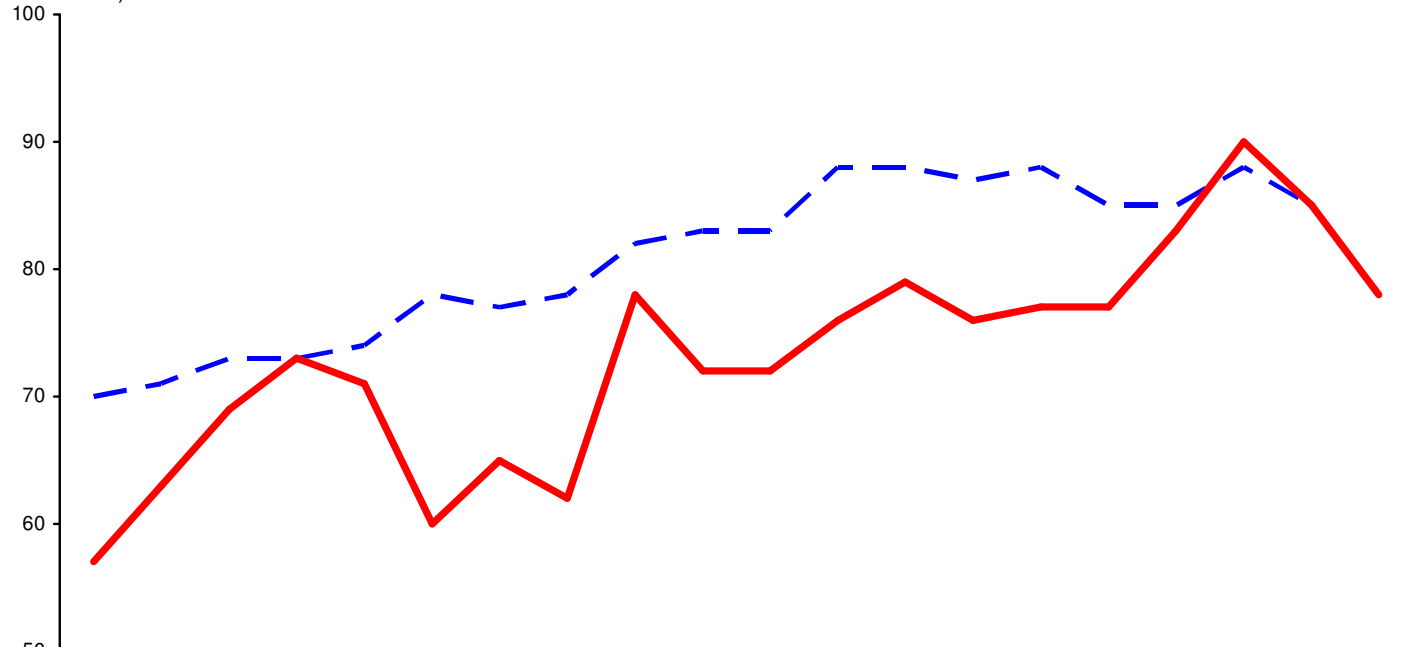


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
— GDP	6.8	8.6	7.8	8.3	9.2	8.3	10	7.5	-7.5	5.7	8.6	0.5	5.4	5.8	6.8	5.3	5.8	6.4	4.4	-1.7
— Final Energy Demand	8.7	10.2	11.2	7.9	10.4	14.9	9.0	8.3	-2.3	6.5	9.1	6.1	5.6	3.9	7.9	2.6	5.3	9.8	1.4	-9.0
— Electricity Demand	9.7	12.2	15.2	10.5	19.7	15.1	11.9	16.1	4.4	5.2	9.3	6.3	5.9	6.6	5.2	4.5	4.8	5.6	3.7	3.8

Source: i) Department of Statistics Malaysia
 ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 5: Final Energy Intensity

toe/RM million
(at 2000 Prices)



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Final Energy Intensity*	70	71	73	73	74	78	77	78	82	83	83	88	88	87	88	85	85	88	85	78
Industrial Energy Intensity**	57	63	69	73	71	60	65	62	78	72	72	76	79	76	77	77	83	90	85	78

Note: Intensity = Quantity of energy required per unit output or activity

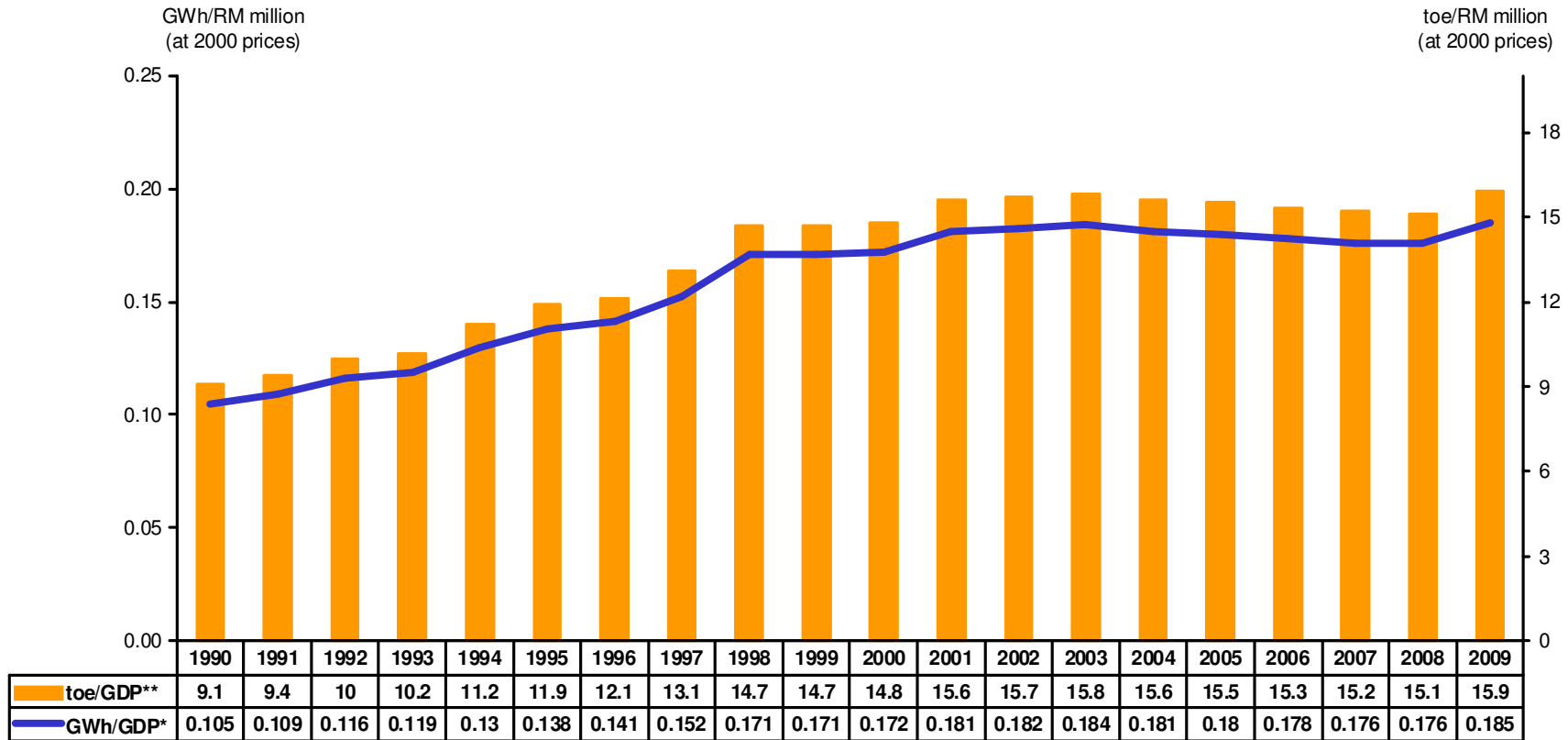
(*): Final Energy Demand/GDP at 2000 Prices

(**): Industrial Energy Demand/Industrial GDP at 2000 prices

Source: i) Department of Statistics Malaysia

ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 6: Electricity Intensity



Notes: Intensity = Quantity of energy required per unit output or activity

(*): Electricity Demand (GWh)/GDP at 2000 prices

(**): Electricity Demand (toe)/Industrial GDP at 2000 prices

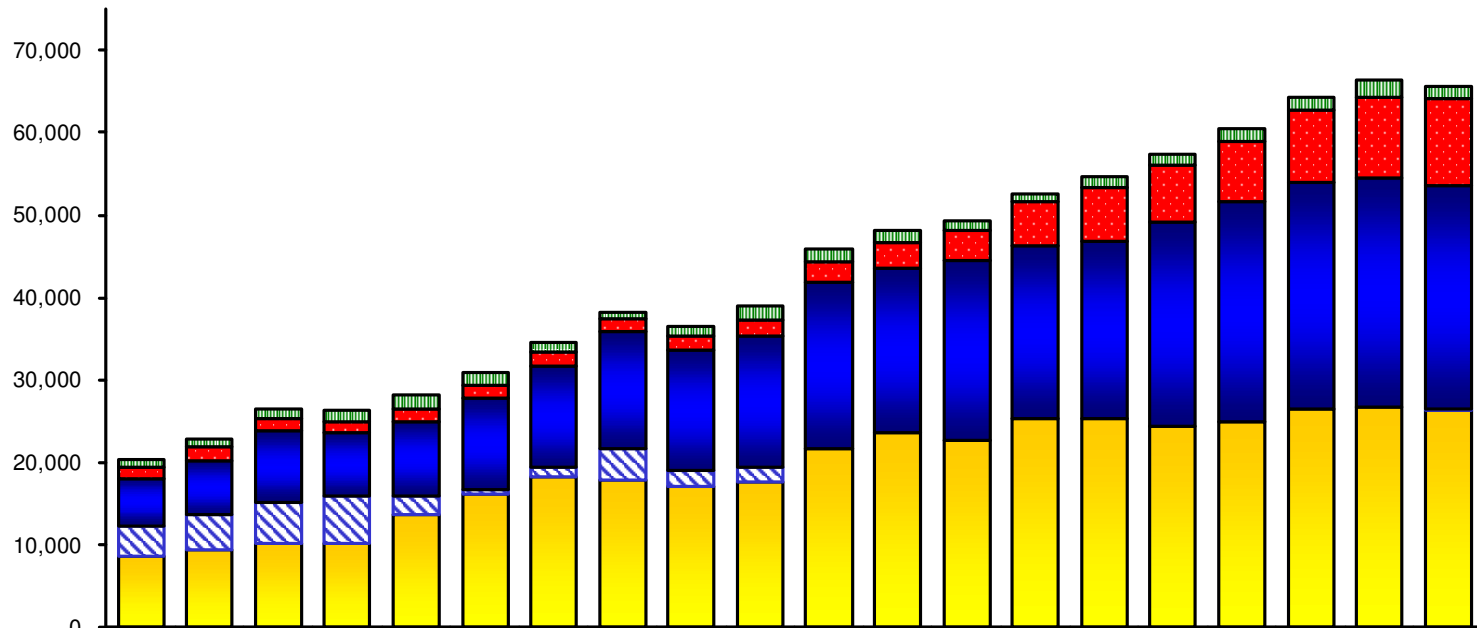
Source: i) Department of Statistics Malaysia

ii) TNB, SESB, SEB and IPPs

iii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

ktoe

Figure 7: Commercial Energy Supply

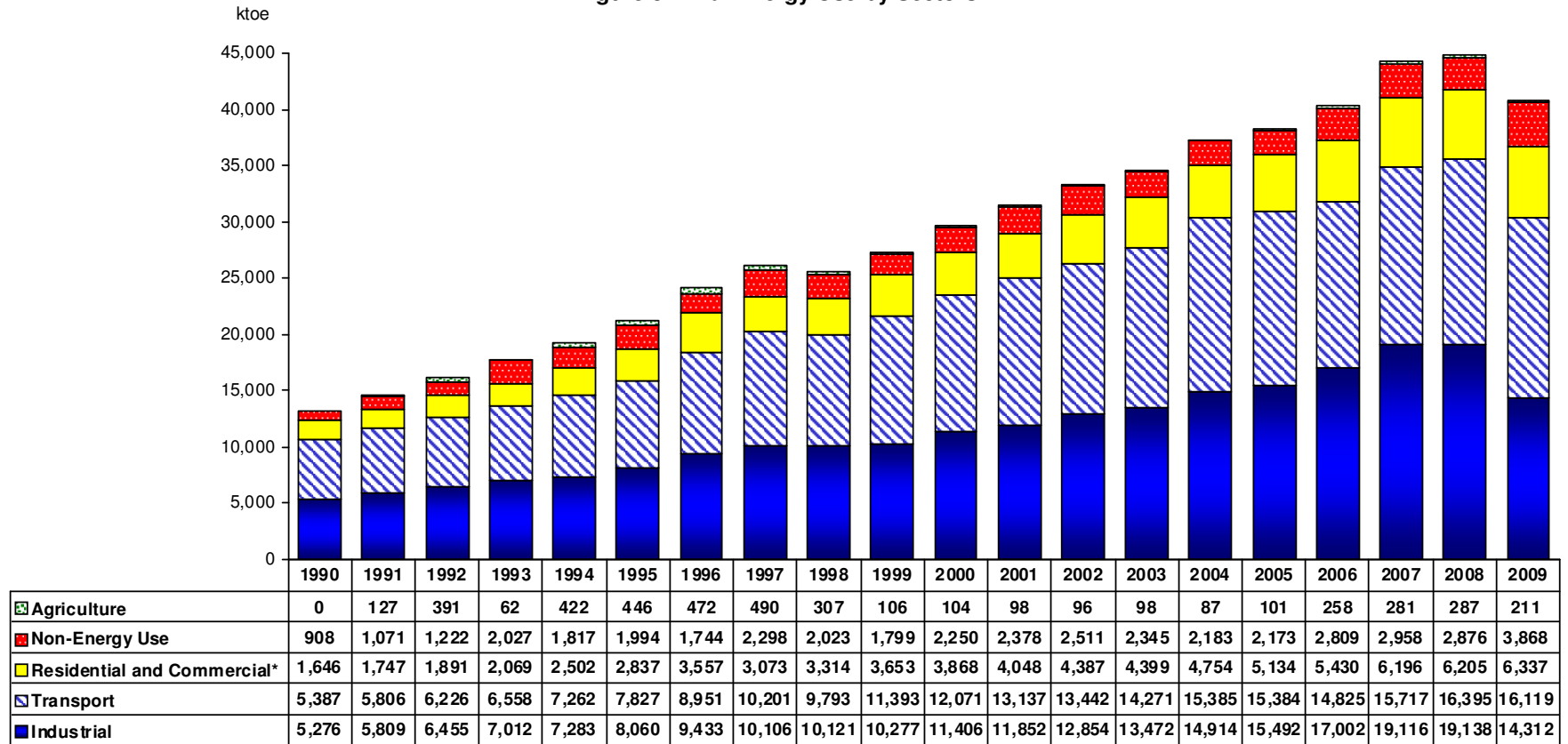


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydropower	915	1,053	997	1,262	1,652	1,540	1,243	790	1,113	1,668	1,560	1,687	1,329	1,056	1,329	1,313	1,568	1,510	1,964	1,627
Coal and Coke	1,326	1,564	1,640	1,352	1,563	1,612	1,677	1,622	1,731	1,940	2,486	2,970	3,642	5,316	6,631	6,889	7,299	8,848	9,782	10,623
Natural Gas*	5,690	6,675	8,545	7,729	8,977	11,064	12,339	14,108	14,549	15,893	20,194	20,032	21,802	20,878	21,409	24,783	26,704	27,362	27,800	26,960
Petroleum Products & Others	3,651	4,165	5,100	5,814	2,446	610	1,099	3,802	1,920	1,807	(1,431)	(1,917)	(521)	(1,391)	(37)	(75)	(1,474)	(995)	(2,282)	96
Crude Oil	8,783	9,443	10,175	10,135	13,605	16,159	18,255	17,916	17,133	17,643	21,673	23,590	22,647	25,344	25,335	24,339	24,909	26,571	26,776	26,386

Note (*): Net natural gas supply after subtracting exports, flared gas and re-injection and LNG production

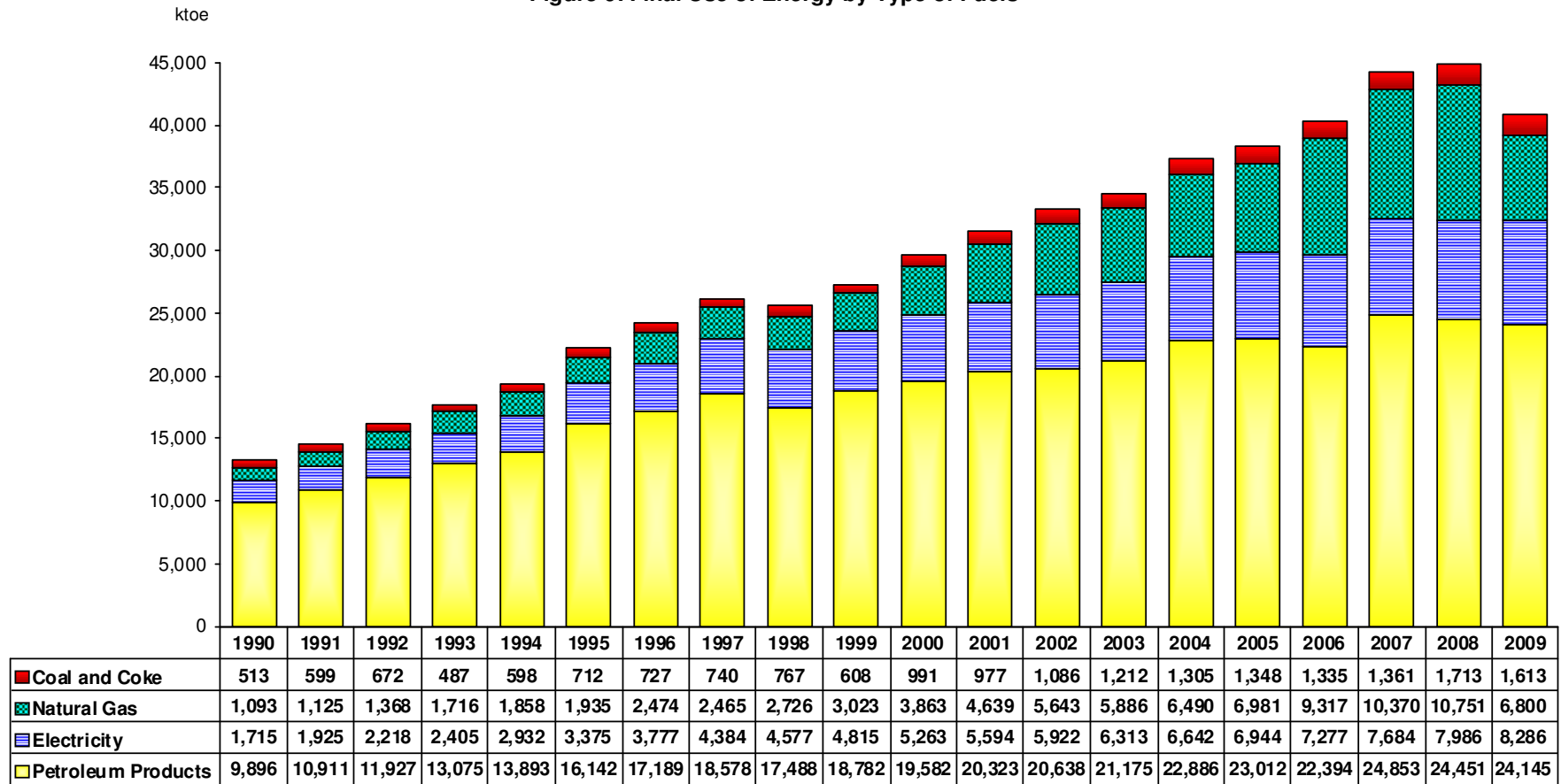
Source: National Energy Balance 2008, Ministry of Energy, Green Technology and Water , Oil and gas companies, power utilities, IPPs and cement, iron and steel manufacturers

Figure 8: Final Energy Use by Sectors



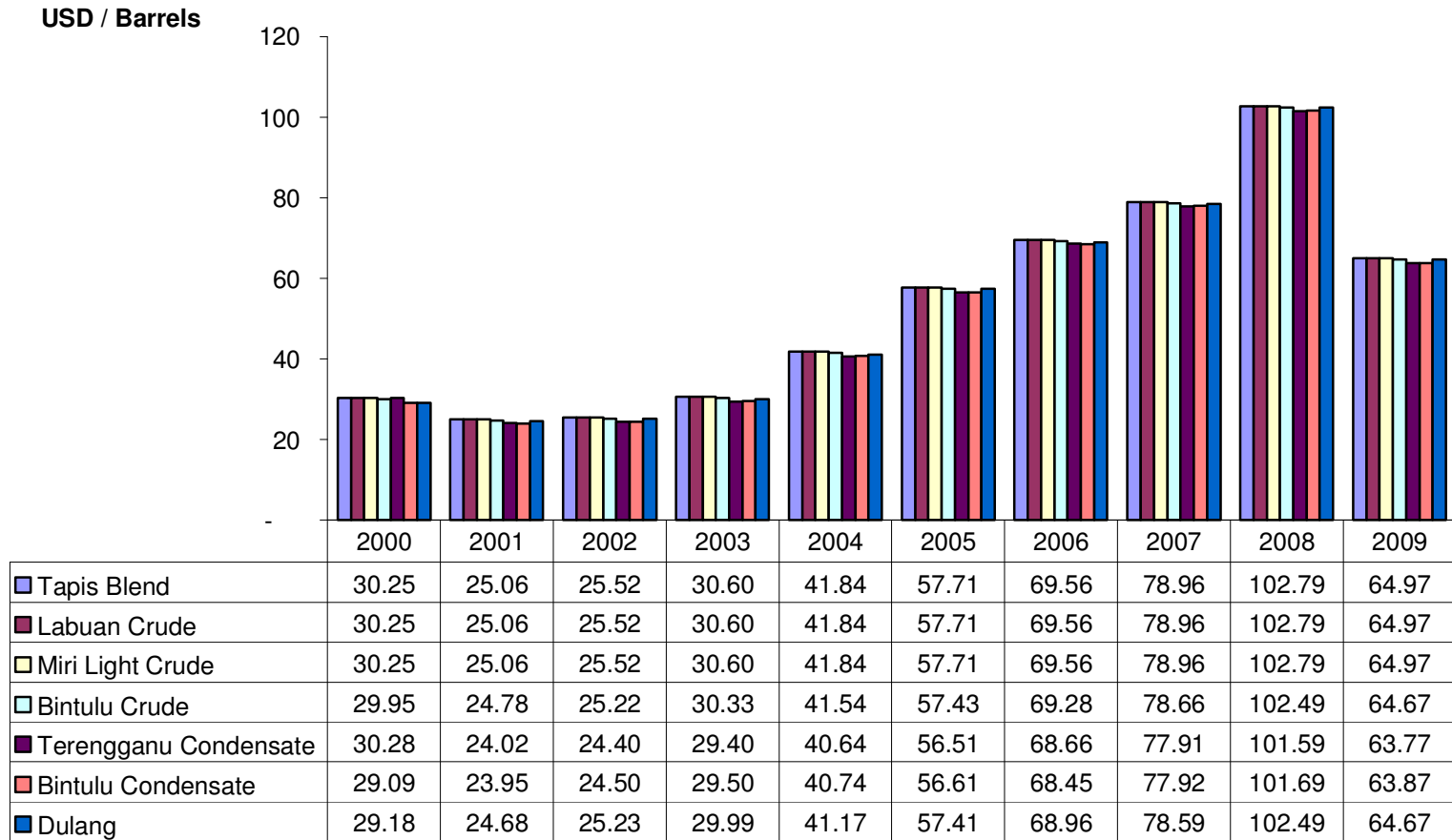
Note (*): Estimated data for Residential and Commercial from 1990 until 1996
 Source : i) Oil and gas companies, TNB, SESB, SEB, IPPs, cement, iron and steel manufacturers
 ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 9: Final Use of Energy by Type of Fuels



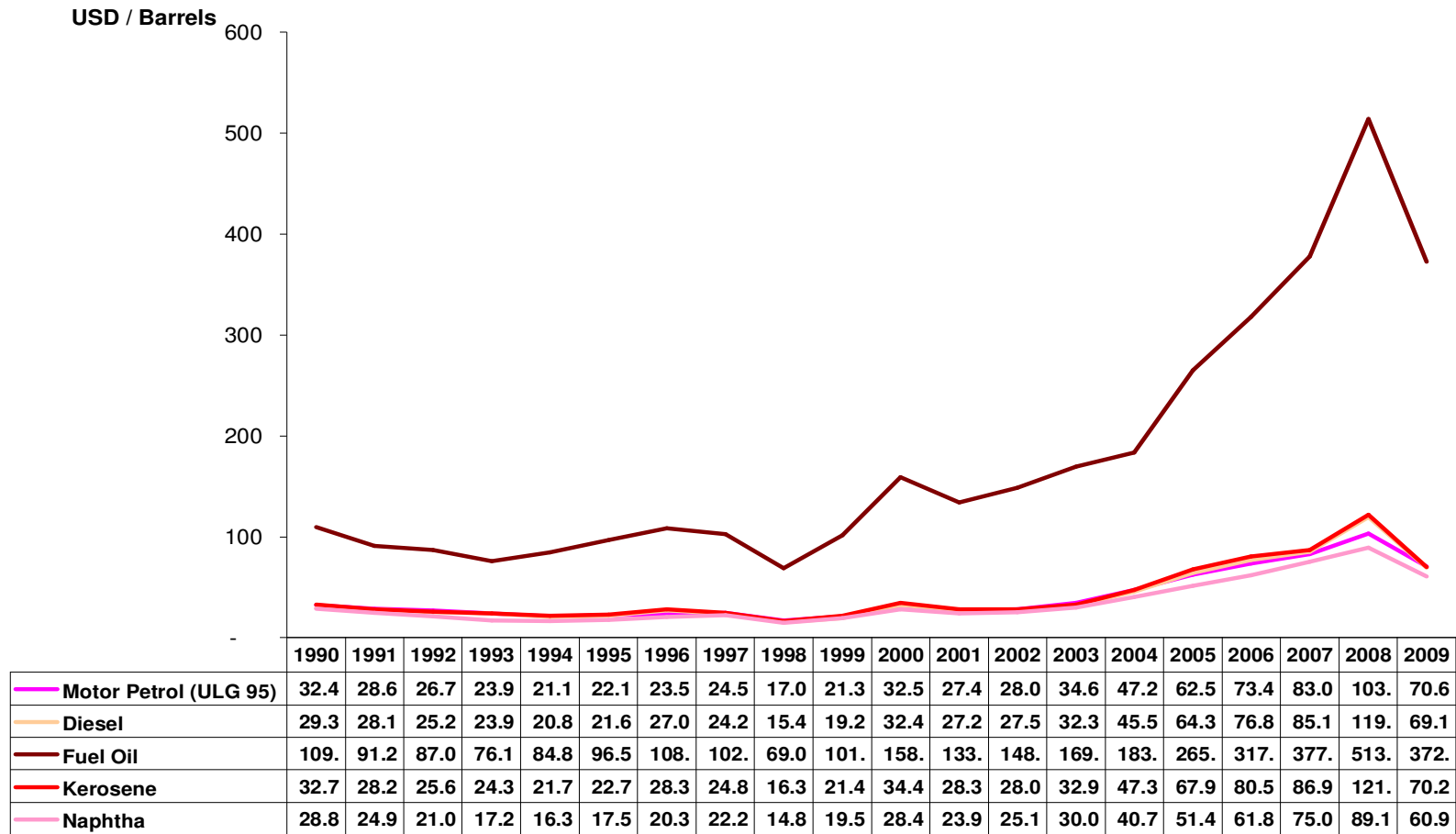
Source: i) Oil and gas companies, TNB, SESB, SEB, IPPs, cement, iron and steel manufacturers
 ii) National Energy Balance 2008, Ministry of Energy, Green Technology and Water

Figure 10: Official Selling Prices of Malaysian Crude Oil



Source: PETRONAS Website

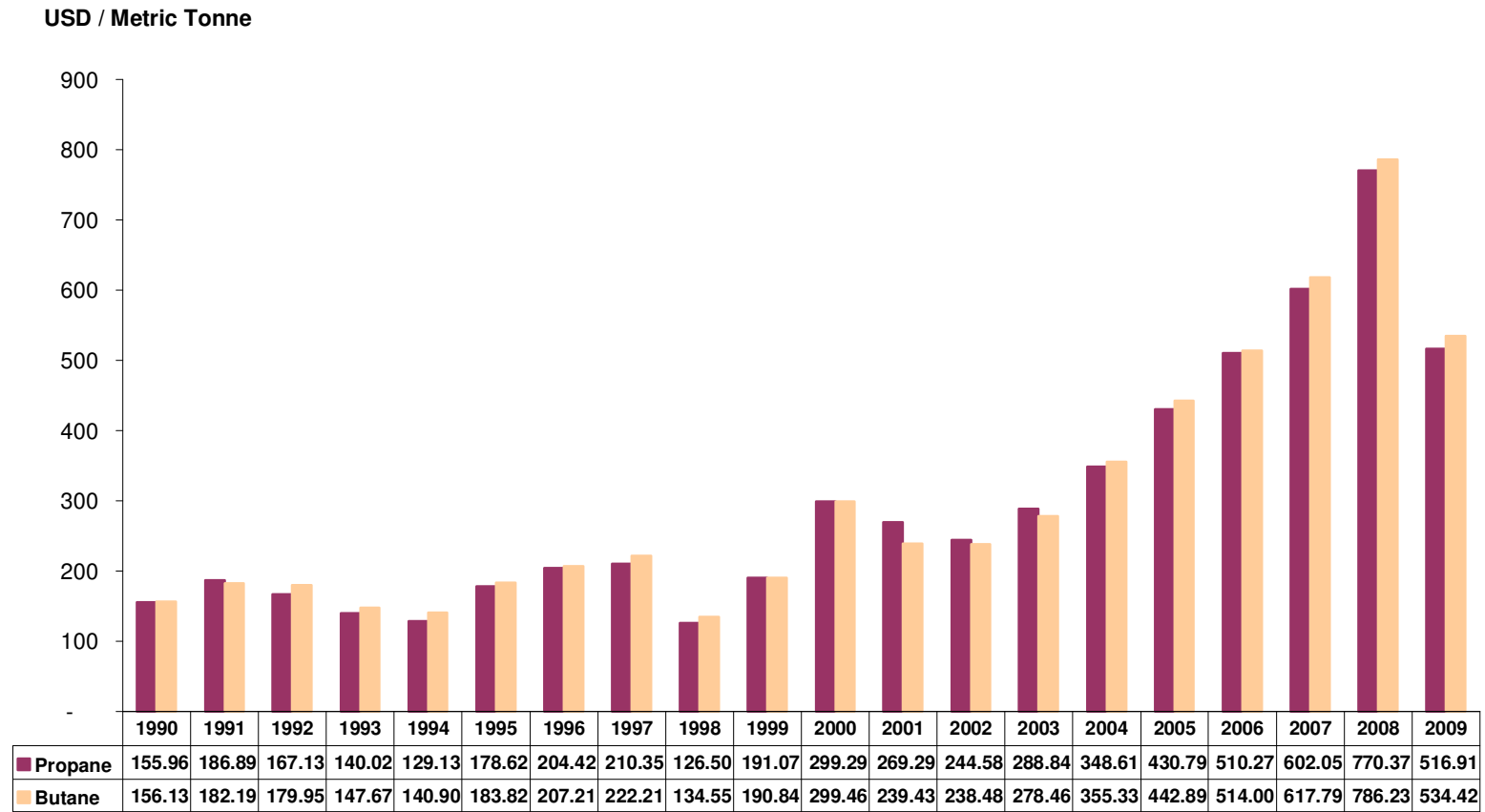
Figure 11: Market Prices of Major Petroleum Products



Source: Platts

Note: Historical prices have been revised as per revision by Platts

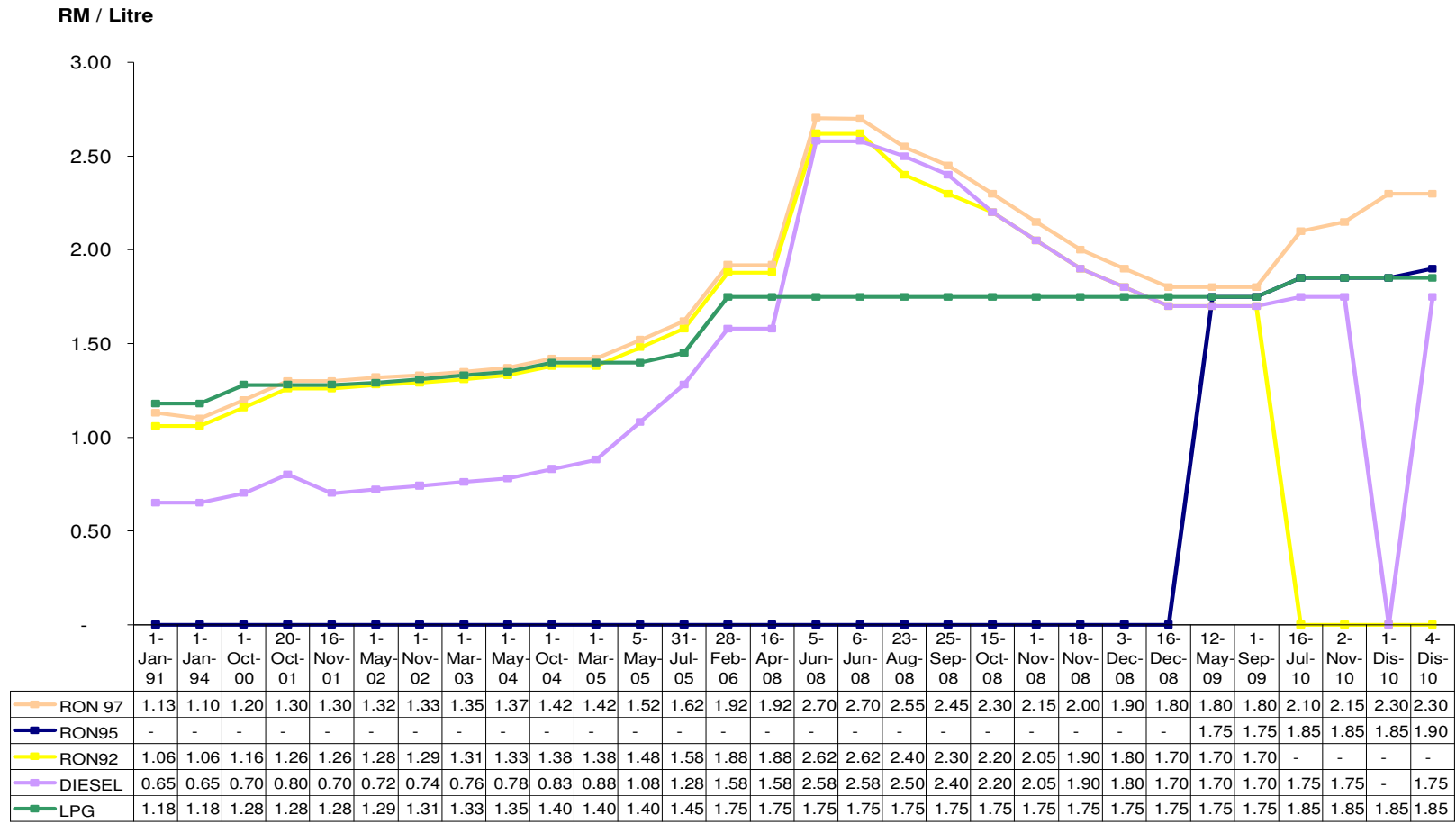
Figure 12: Yearly Liquefied Petroleum Gas (LPG) Contract Prices – Arab Gulf



Source: Platts

Note: Historical prices have been revised as per revision by Platts

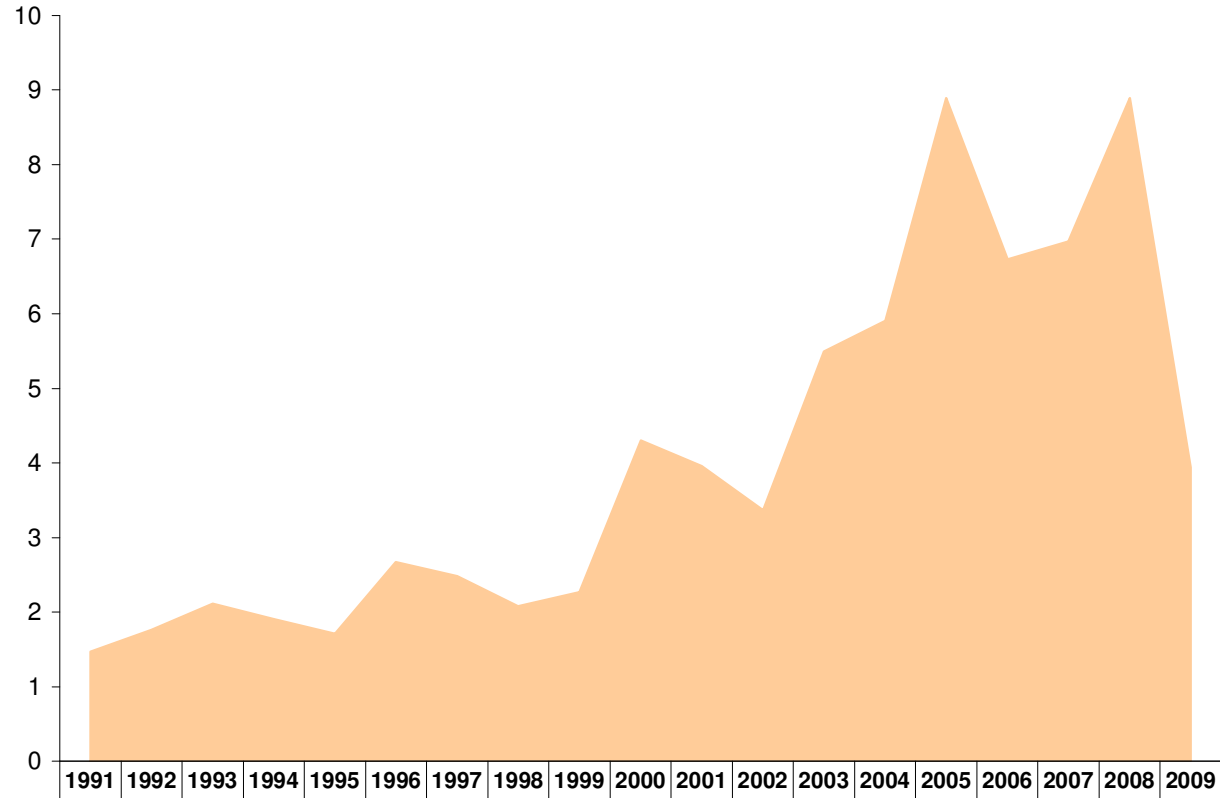
Figure 13: Retail Fuel Price in Malaysia



Source: Ministry of Domestic Trade, Co-operatives and Consumerism

Figure 14: Market Prices of Natural Gas

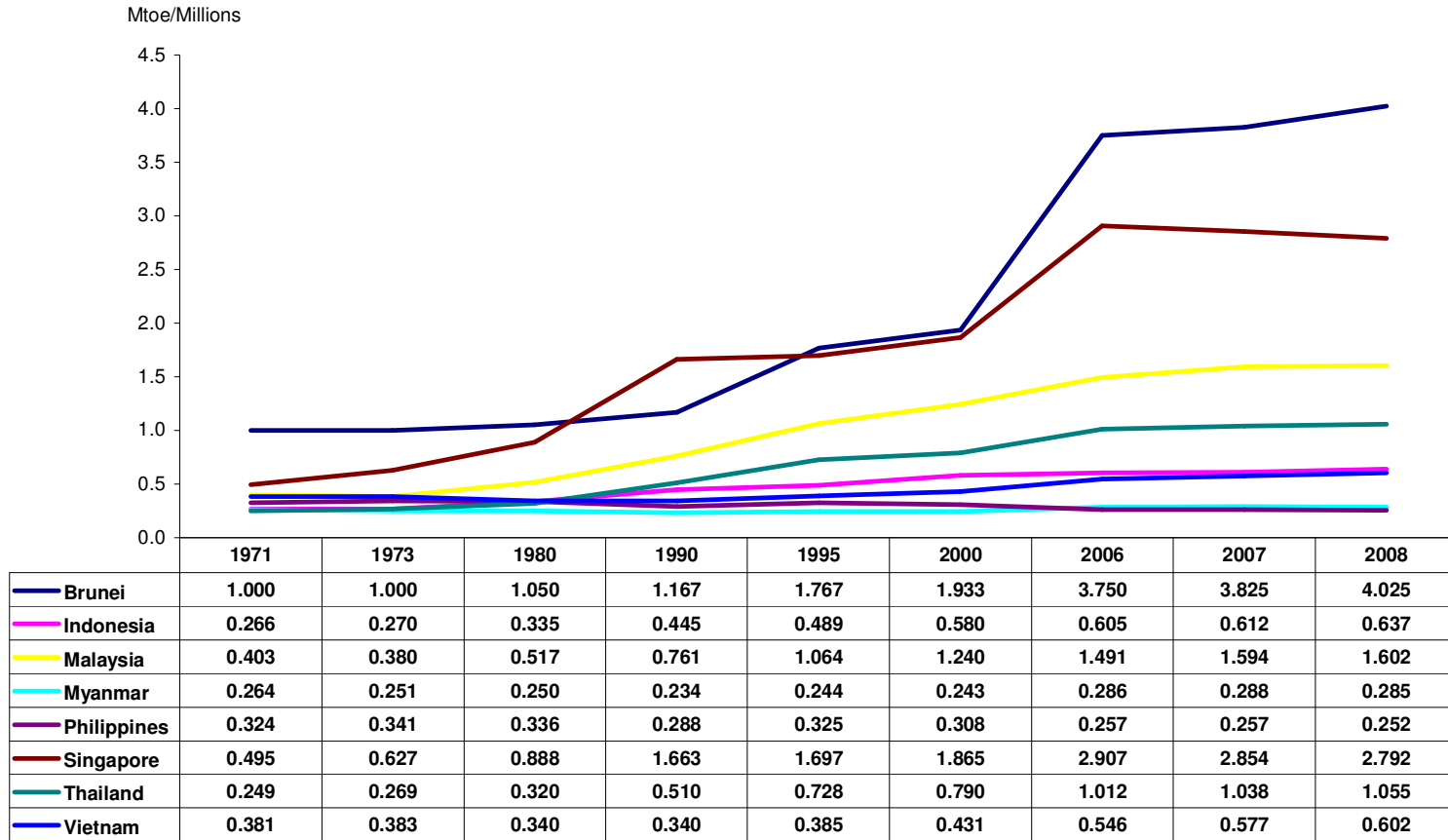
USD / mmbtu



Market Prices of Natural Gas - Henry Hub	1.47	1.76	2.11	1.91	1.71	2.67	2.48	2.08	2.27	4.30	3.96	3.37	5.49	5.90	8.89	6.73	6.97	8.89	3.94
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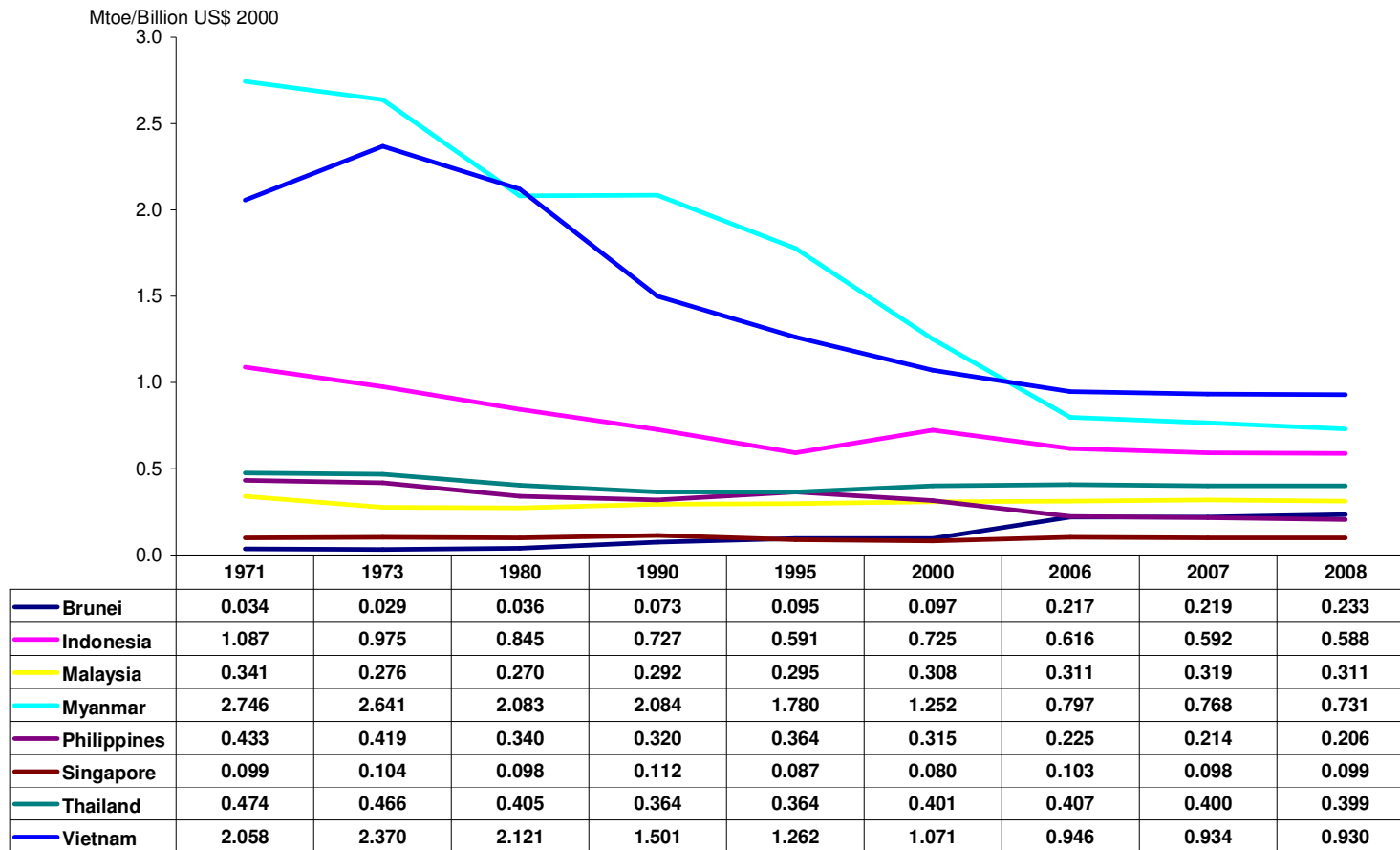
Source: Bloomberg

Figure 15: Energy Per Capita in ASEAN



Source: Energy Balances of Non-OECD Countries (2007-2008), 2010 Edition, International Energy Agency (IEA)

Figure 16: Energy Intensity in ASEAN



Source: Energy Balances of Non-OECD Countries (2007-2008), 2010 Edition, International Energy Agency (IEA)

Oil

National Energy Balance 2009

OIL

Table 2: Production and Reserves of Oil as of 1st January 2009

Region	Reserves billion barrels	Production thousand barrels per day		
		Crude Oil	Condensates	Total
Peninsular Malaysia	1.781	255.0	45.0	300.0
Sabah	2.348	174.5	0.2	174.7
Sarawak	1.388	106.5	77.6	184.1
Total	5.517	536.1	122.8	658.8

Source: PETRONAS

Table 3: Refinery Licensed Capacity

	Location	Start up date	Thousand barrels/day
SHELL Refining Co. (FOM) Bhd	Port Dickson, Negeri Sembilan	1963	155
ESSO Malaysia Bhd	Port Dickson, Negeri Sembilan	1960	88
PETRONAS	Kertih, Terengganu*	1983	49
PETRONAS	Melaka	1994	100
Malaysia Refining Company Sdn Bhd (PETRONAS / ConocoPhillips)	Melaka	1998	100
Total			492

Source: ESSO, PETRONAS & SHELL

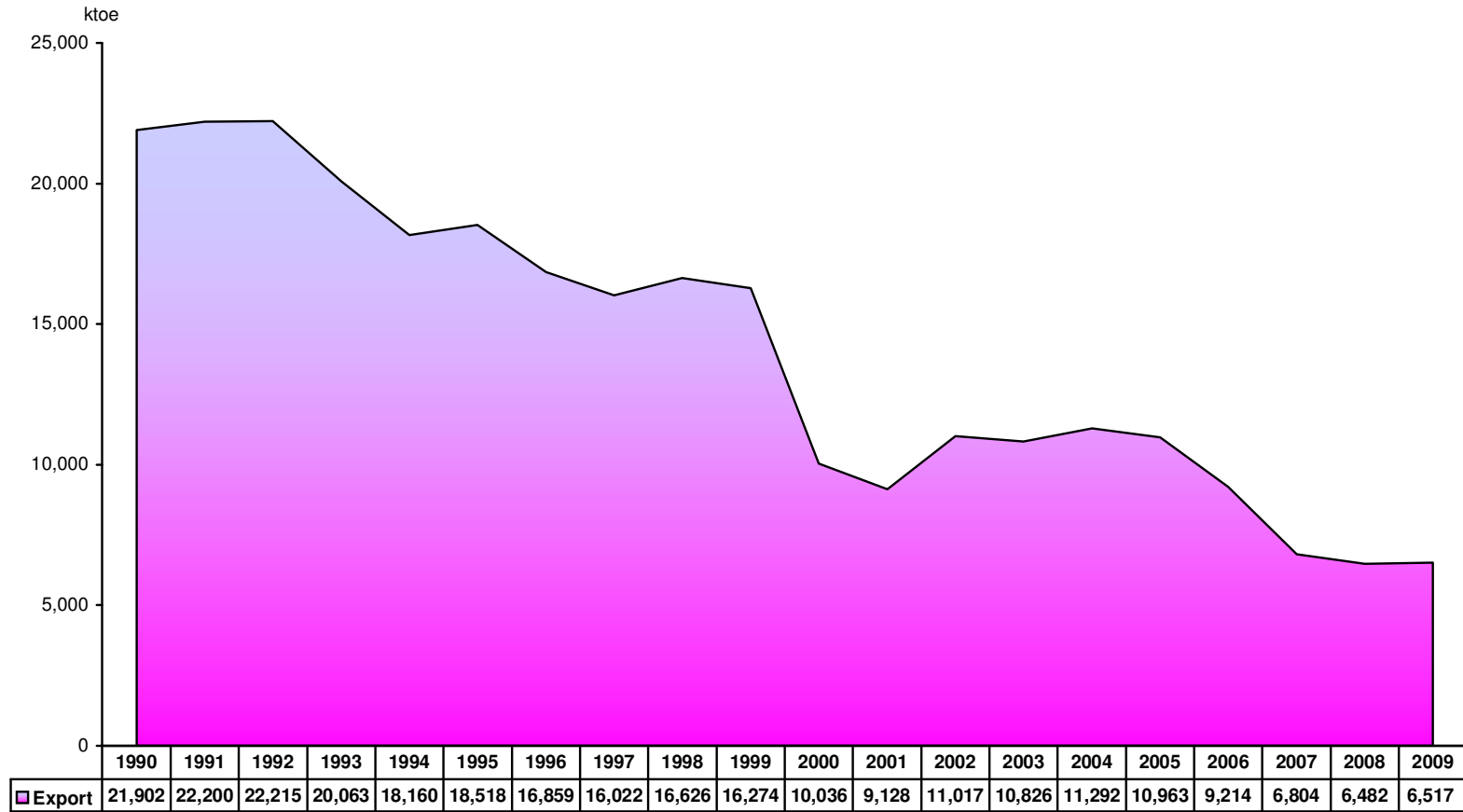
Note (*): Excludes condensate splitter of 74,300 bpd

Table 4: Breakdown on Sales of Petroleum Products for Malaysia in thousand barrels

Petroleum Products	Peninsular Malaysia	Sabah	Sarawak	TOTAL
Petrol	65,499	2,986	2,921	71,406
Diesel	45,671	8,892	8,493	63,057
Fuel Oil	4,949	1,751	1,890	8,590
Kerosene	183	25	28	236
LPG	13,041	1,134	1,227	15,401
ATF & AV Gas	15,663	269	306	16,238
Non Energy	4,243	432	480	5,155
Total	149,250	15,488	15,345	180,083

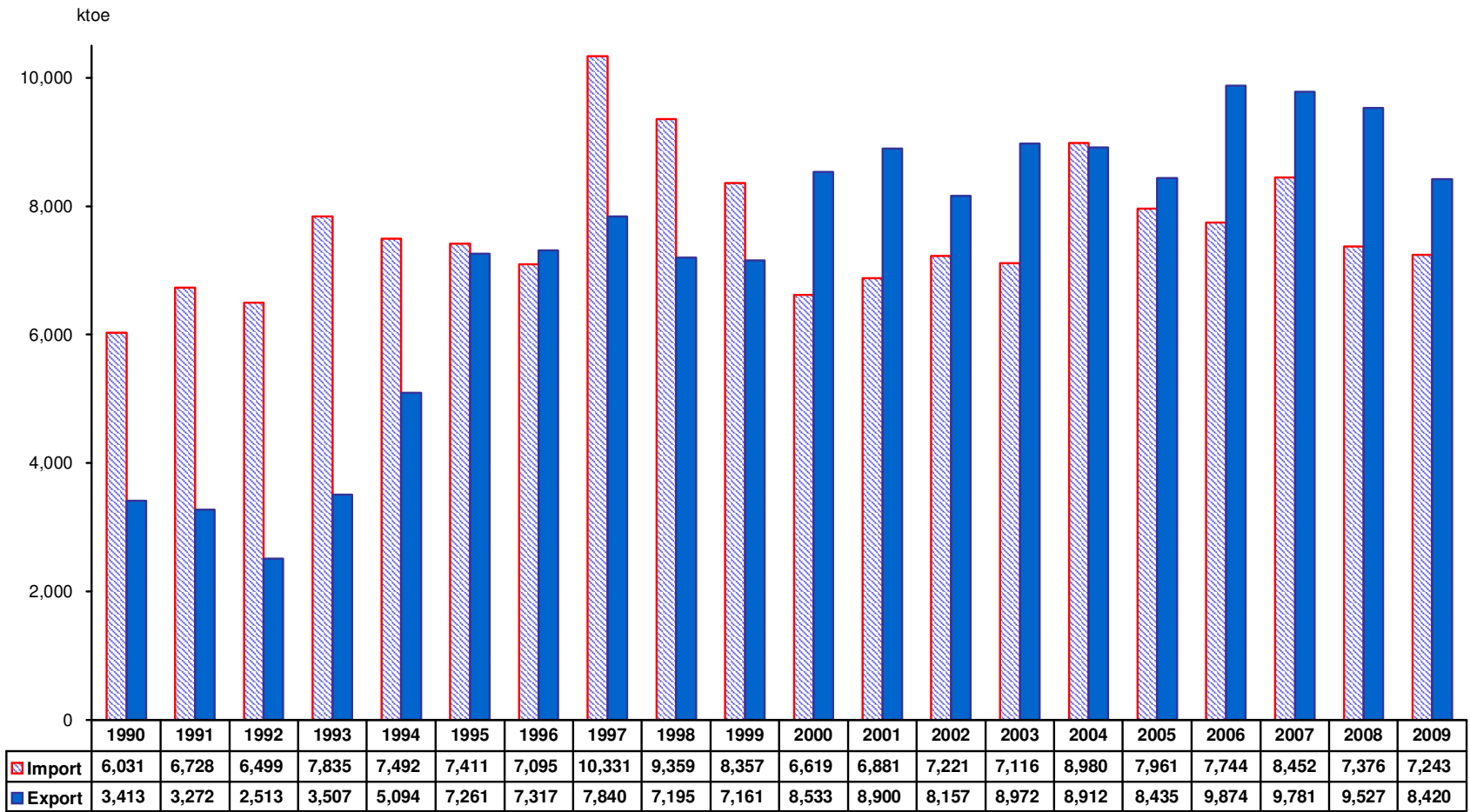
Source: Oil Companies

Figure 17: Net Export of Crude Oil



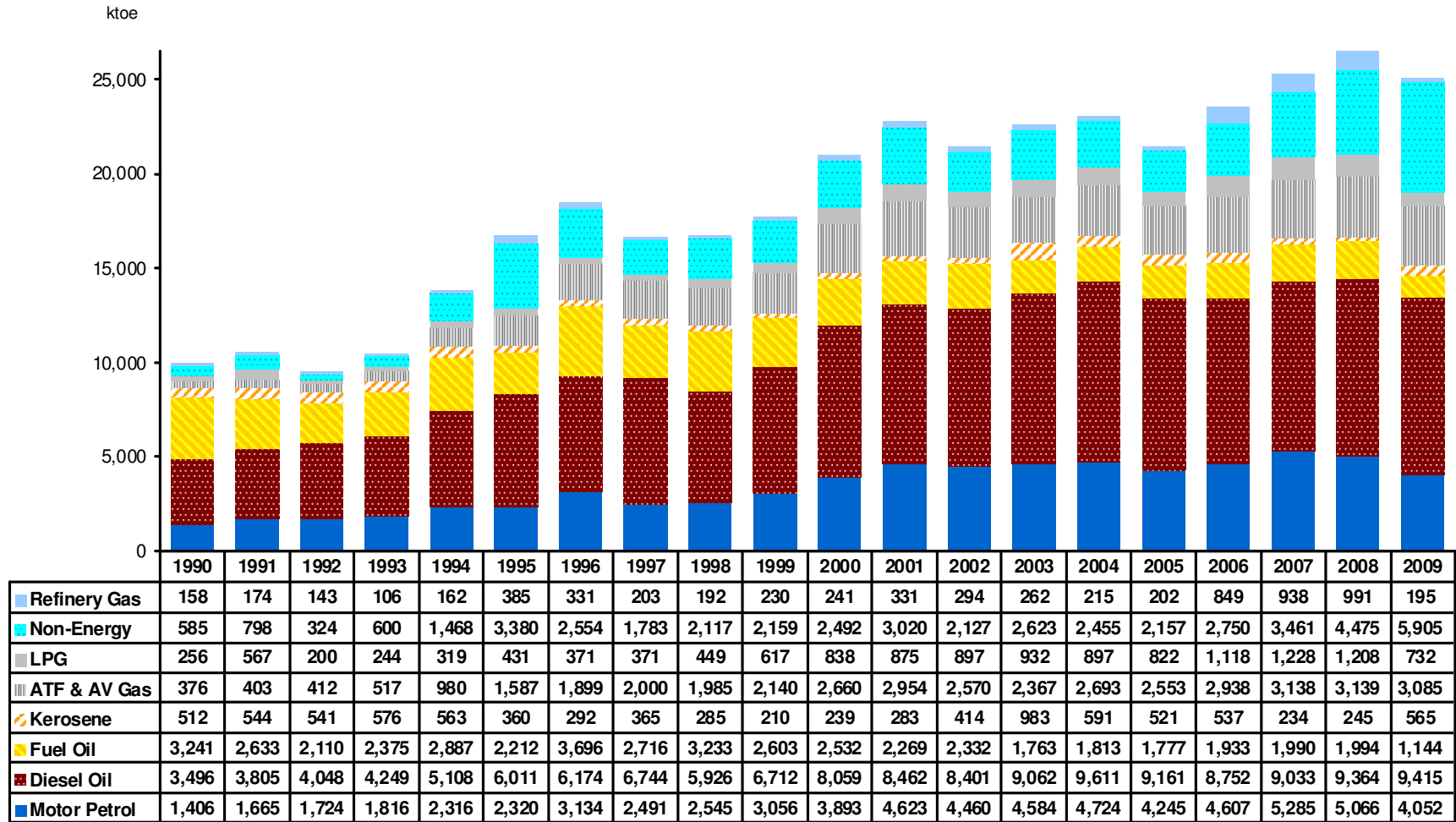
Source: Department of Statistics Malaysia and oil companies

Figure 18: Export and Import of Petroleum Products



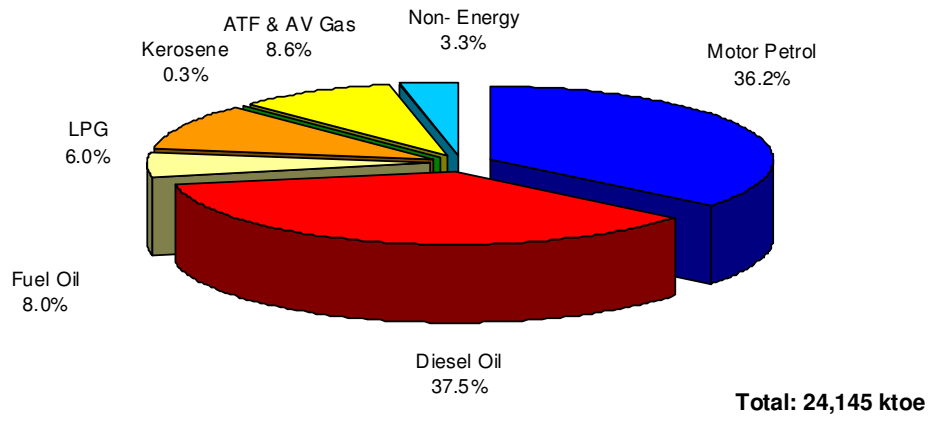
Source: Department of Statistics Malaysia and oil companies

Figure 19: Conversion in Refineries



Source: Oil Companies

Figure 20: Final Consumption for Petroleum Products



Source: Oil companies

Natural Gas

National Energy Balance 2009

NATURAL GAS

Table 5: Reserves and Production of Natural Gas as of 1st January 2009

Region	Reserves			Production
	Trillion standard cubic feet (Tscf)			Million standard cubic feet per day (MMscf/d)
	Associated	Non-Associated	Total	
Peninsular Malaysia	9.153	24.079	33.232	2,462.33
Sabah	3.523	8.578	12.101	485.16
Sarawak	2.908	39.727	42.635	3,809.17
Total	15.584	72.384	87.968	6,756.66

Notes (*): Refers to the amount of gas produced/generated from associated fields

1 cubic feet = 0.028317 cubic metre

Associated Gas: Natural gas produced in association with oil

Non-Associated Gas: Natural gas produced from a gas reservoir not associated with oil

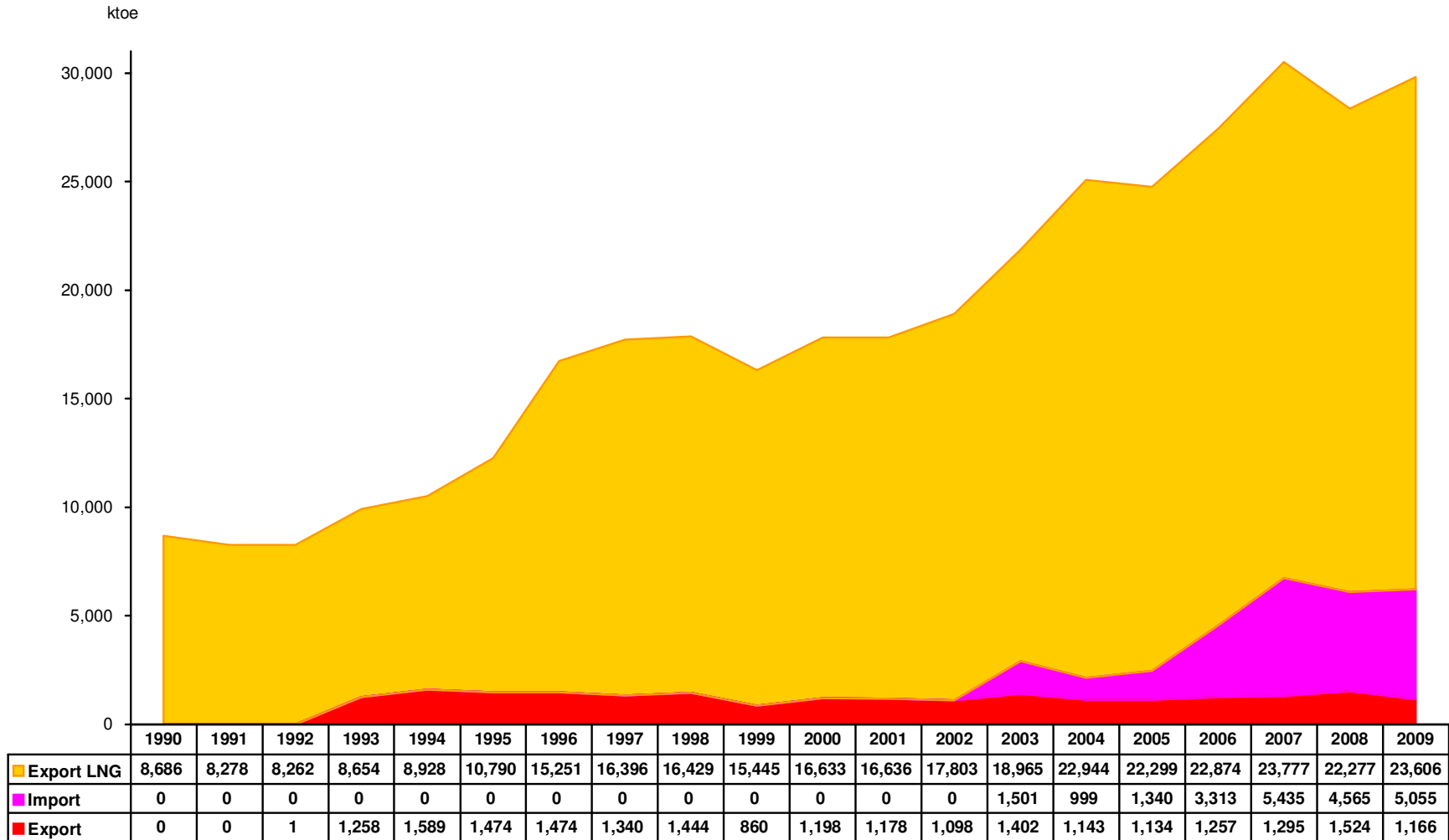
Source: PETRONAS

Table 6: Consumption of Natural Gas for Malaysia in MMscf

Sectors	Peninsular Malaysia	Sabah	Sarawak	Malaysia
Residential	16	-	-	16
Commercial	810	-	-	810
Industry	158,339	4,344	1,197	163,880
Non-energy	35,077	16,601	20,262	71,940
Transport	8,499	-	-	8,499
Power Stations	457,411	24,046	31,922	513,379
Total	660,152	44,991	53,381	758,524

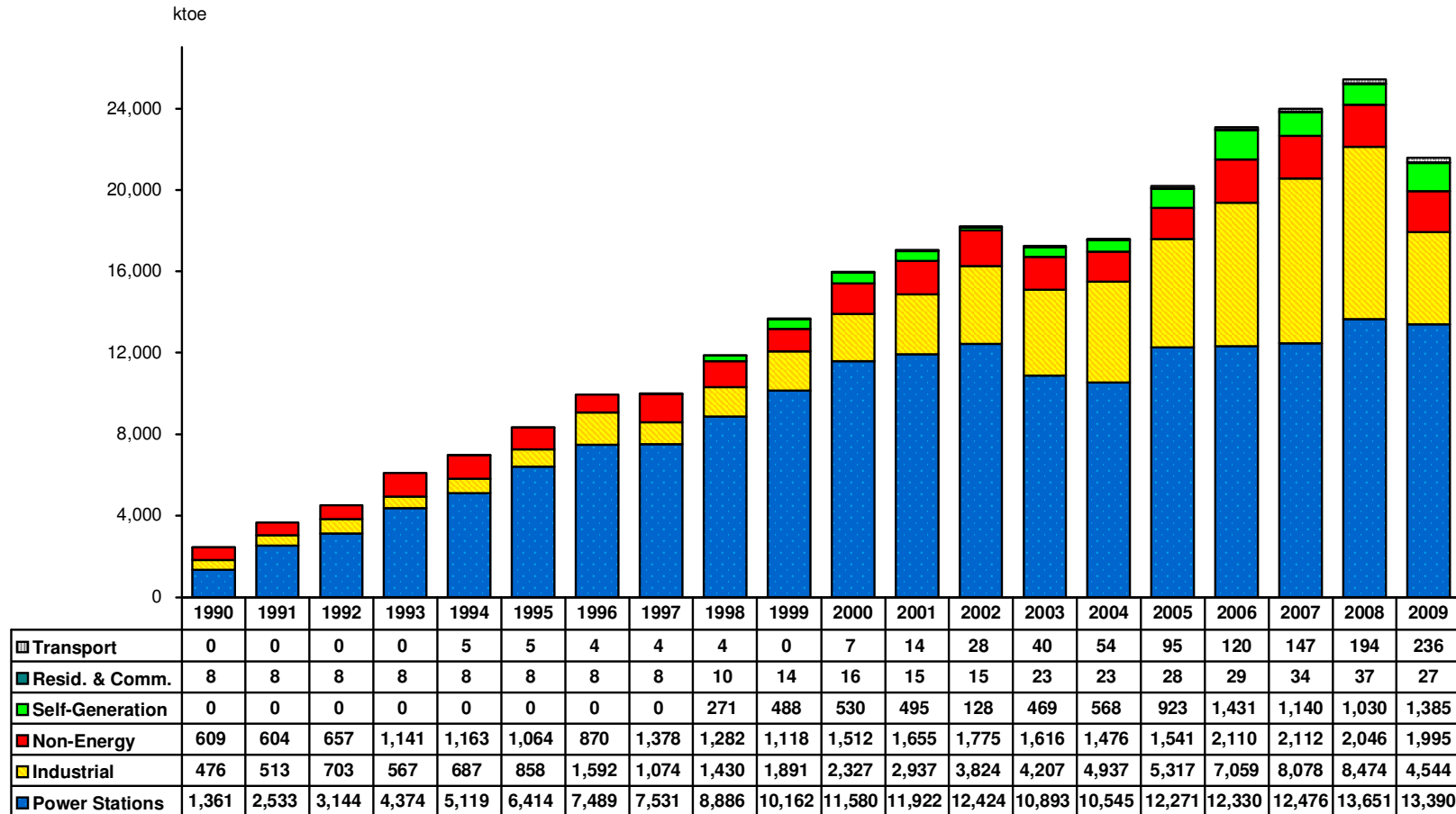
Source: Power utilities, IPPs, PETRONAS and gas distribution companies

Figure 21: Export & Import of Natural Gas and LNG



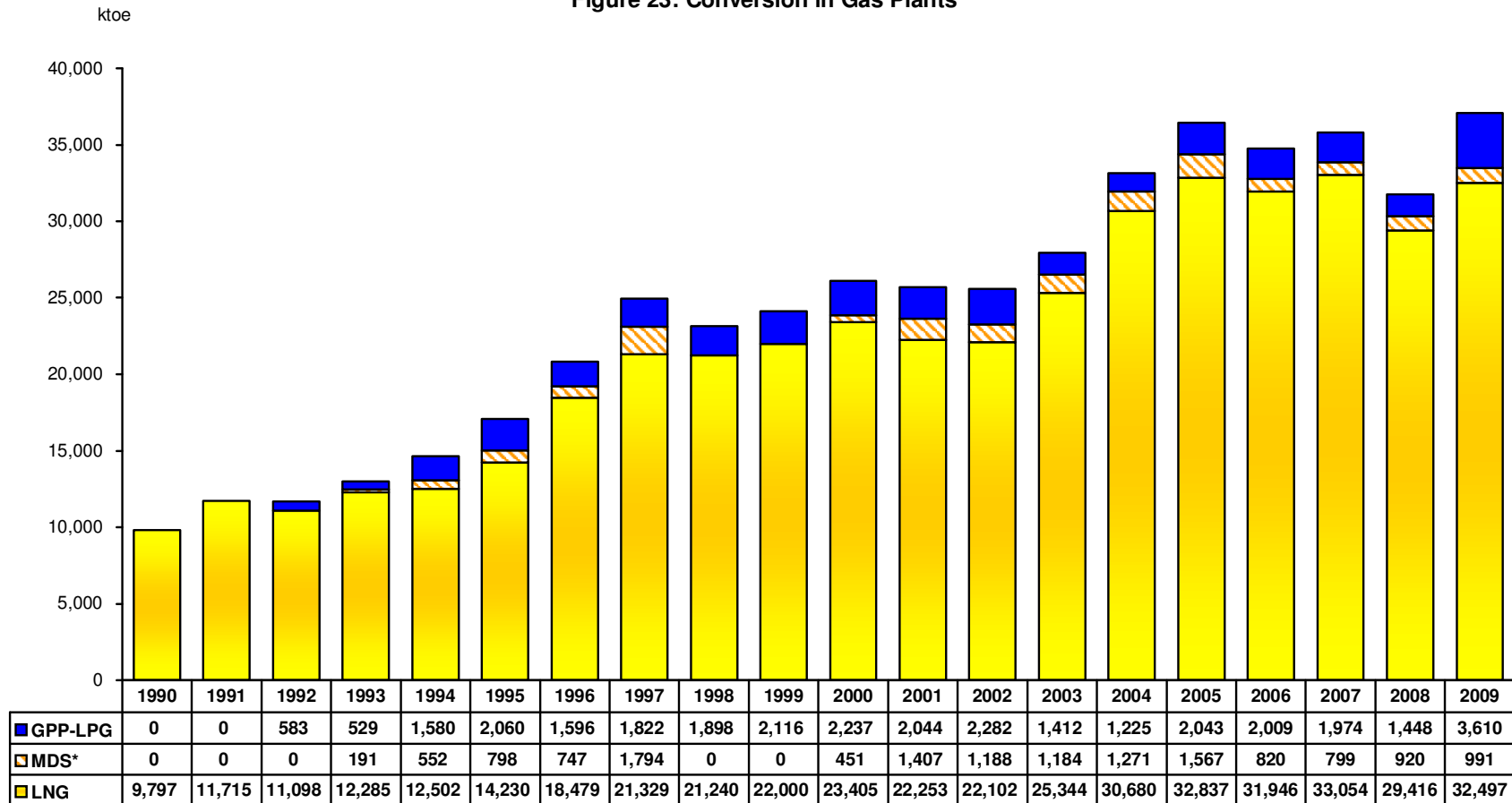
Source: Department of Statistics Malaysia, oil companies and others

Figure 22: Natural Gas Consumption by Sectors



Source: PETRONAS, Gas Companies, Malaysian Energy Commission, power utilities, IPPs and self-generation plants

Figure 23: Conversion in Gas Plants



Note *: MDS commenced pre-commercialization operation in year 2000

Source: Oil and gas companies

Coal

National Energy Balance 2009

COAL

Table 7: Production and Reserves of Coal as of 31st December 2009

Location	Reserves (million tonnes)			Production (metric tonnes)	Coal Type
	Measured	Indicated	Inferred		
Sarawak					
1. Abok, Sri Aman	7.3	10.6	32.4	106,919.5	Coking coal, semi-anthracite
2. Kapit & Mukah	262.7	312.4	916.7	2,031,471.5	Sub-bituminous
3. Bintulu	6.0		14.0		Hydrous Lignite
Subtotal	276.0	323.0	963.1	2,138,391.0	
Sabah					
1. Silimponon	4.8	14.1	7.7		Sub-bituminous
2. Labuan			8.9		Sub-bituminous
3. Maliau			215.0		Bituminous
4. Malibau		17.9	25.0		
5. South West Malibau		23.2			
6. Pinangan West Middle Block			42.6		Bituminous
Subtotal	4.8	55.2	299.2		
Selangor					
1. Batu Arang			17.0		Sub-bituminous
Subtotal			17.0		
Total	280.8	378.2	1,279.3		
Grand Total		1,938.4		2,138,391.0	

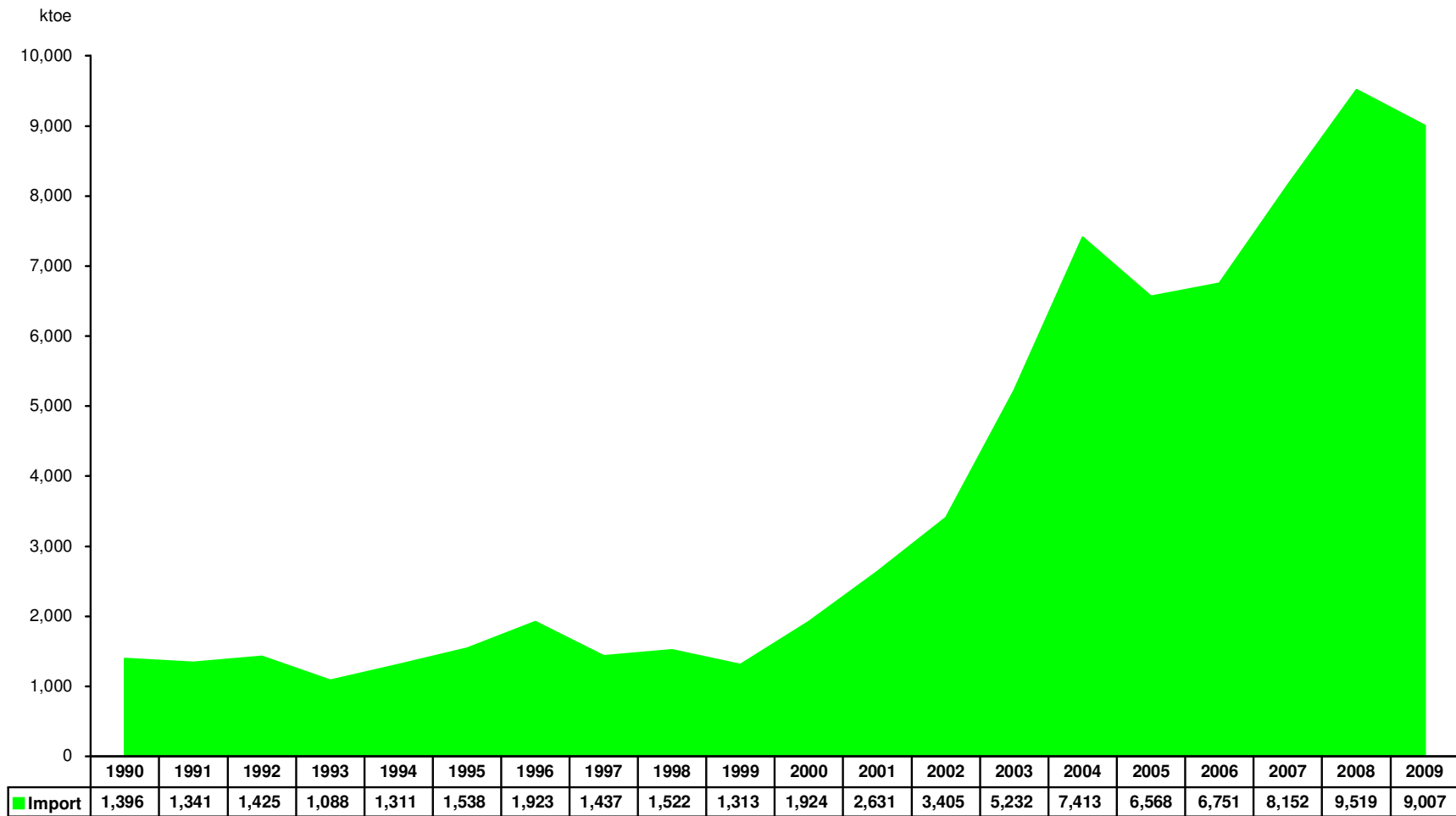
Source: Department of Mineral & Geosciences Malaysia

Table 8: Consumption of Coal for Malaysia in metric tonnes

Sectors	Peninsular Malaysia	Sabah	Sarawak	Malaysia
Industry	1,817,638	-	212,476	2,030,114
Power Stations	12,667,266	-	1,889,099	14,556,366
Total	14,484,904	-	2,101,575	16,586,479

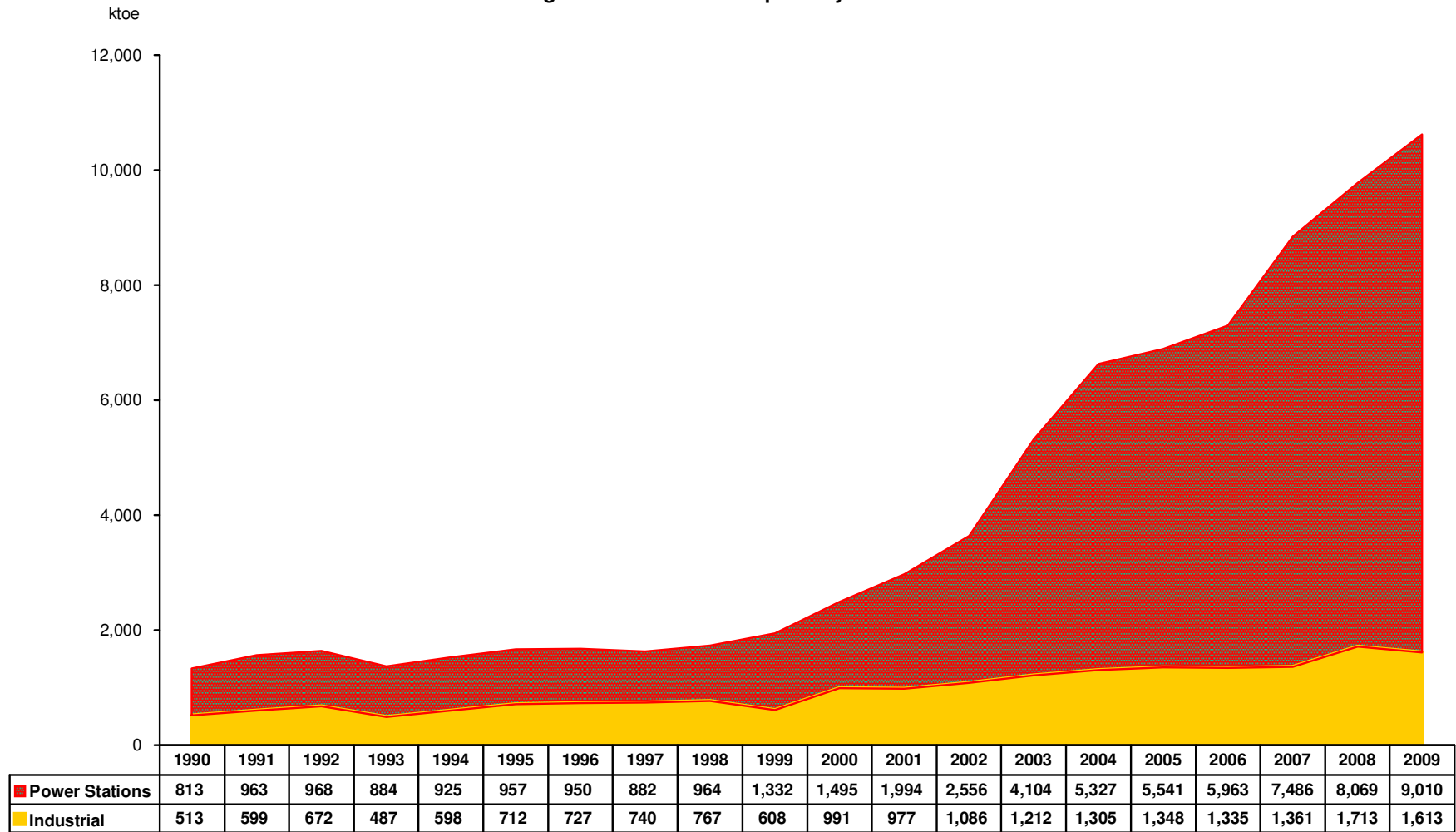
Source: TNB and cement, iron and steel manufacturers

Figure 24: Net Import of Coal



Source: Department of Statistics Malaysia, TNB, cement, iron and steel manufacturers

Figure 25: Coal Consumption by Sectors



Source: TNB, cement and iron and steel manufacturers

Electricity

National Energy Balance 2009

ELECTRICITY

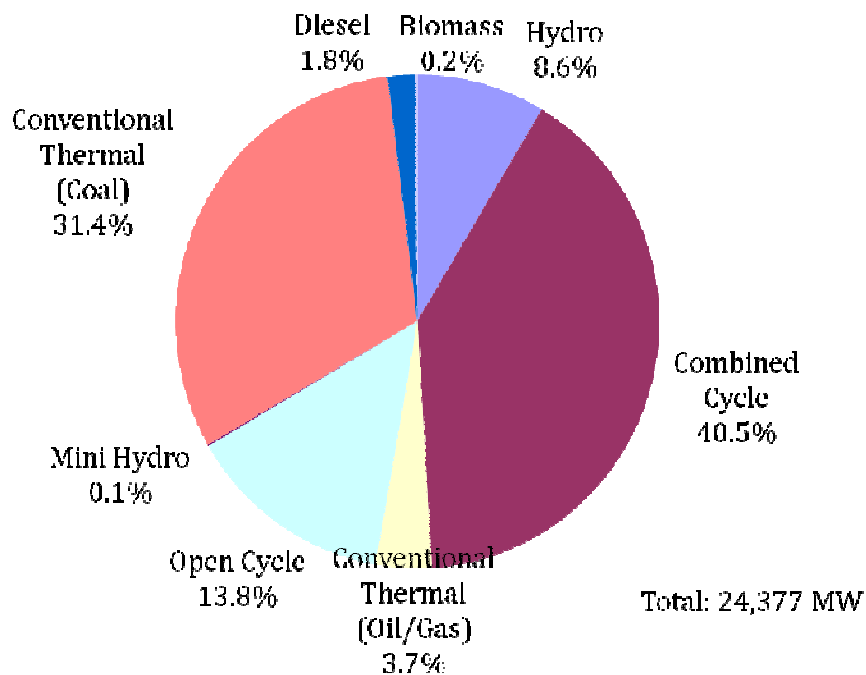
Table 9: Malaysia Installed Capacity as of 31st December 2009 in MW

	TNB	SEB	SESB	IPPs			TOTAL	%
				PM	SWK	SAB		
Steam								
Coal	0	0	0	7,170	480	0	7,650	<i>31.4</i>
Gas	240	0	64	600	0	0	904	<i>3.7</i>
Oil	0	0	0	0	0	0	0	<i>0.0</i>
Hydro	1,911*	94	66	20	0	0	2,091	<i>8.6</i>
Mini Hydro	7	7	8	0	0	0	22	<i>0.1</i>
Diesel/LFO	0	95	159	0	0	182	436	<i>1.8</i>
Rural Diesel	0	0	4	0	0	0	4	<i>0.0</i>
Combined-cycle	3,456	0	48	6,238	0	124	9,866	<i>40.5</i>
Open Cycle								
Diesel/Oil	68	64	90	0	0	0	222	<i>0.9</i>
Gas	1,365	270	0	1,096	210	200	3,141	<i>12.9</i>
Biomass	0	0	0	2	0	39	41	<i>0.2</i>
Total	7,047	530	439	15,126	690	545	24,377	<i>100.0</i>
<i>Percentage % (share)</i>	<i>28.9</i>	<i>2.2</i>	<i>1.8</i>	<i>62.1</i>	<i>2.8</i>	<i>2.2</i>	<i>100.0</i>	

Source: Power utilities and IPPs

Note (*): Including Cameron Highland Scheme (Odak, Habu, Kg. Raja, Kg. Terla and R. Falls)

Figure 26: Malaysia Installed Capacity as of 31st December 2009



Source: Power utilities and IPPs

Table 10: Malaysia Available Capacity as of 31st December 2009 in MW

	TNB	SEB	SESB**	IPPs			TOTAL	%
				PM	SWK	SAB		
Steam								
Coal	0	0	0	6,295	460	0	6,755	29.8
Gas	184	0	56	556	0	0	796	3.5
Oil	0	0	0	0	0	0	0	0.0
Hydro	1,868*	88	44	20	0	0	2,020	8.9
Mini Hydro	7	5	7	0	0	0	19	0.1
Diesel/LFO	0	78	79	0	0	176	333	1.5
Rural Diesel	0	0	3	0	0	0	3	0.0
Combined-cycle	3,245	0	43	6,145	0	100	9,533	42.1
Open Cycle								
Diesel/Oil	64	45	73	0	0		182	0.8
Gas	1,269	228	0	1,075	210	190	2,972	13.1
Biomass	0	0	0	0	0	30	30	0.1
Total	6,637	444	305	14,091	670	496	22,643	100.0
<i>Percentage % (share)</i>	29.3	2.0	1.3	62.2	3.0	2.2	100.0	

Source: Power utilities and IPPs

Note (*): Including Cameron Highland Scheme (Odak, Habu, Kg. Raja, Kg. Terla and R. Falls)

(**): Dependable Capacity

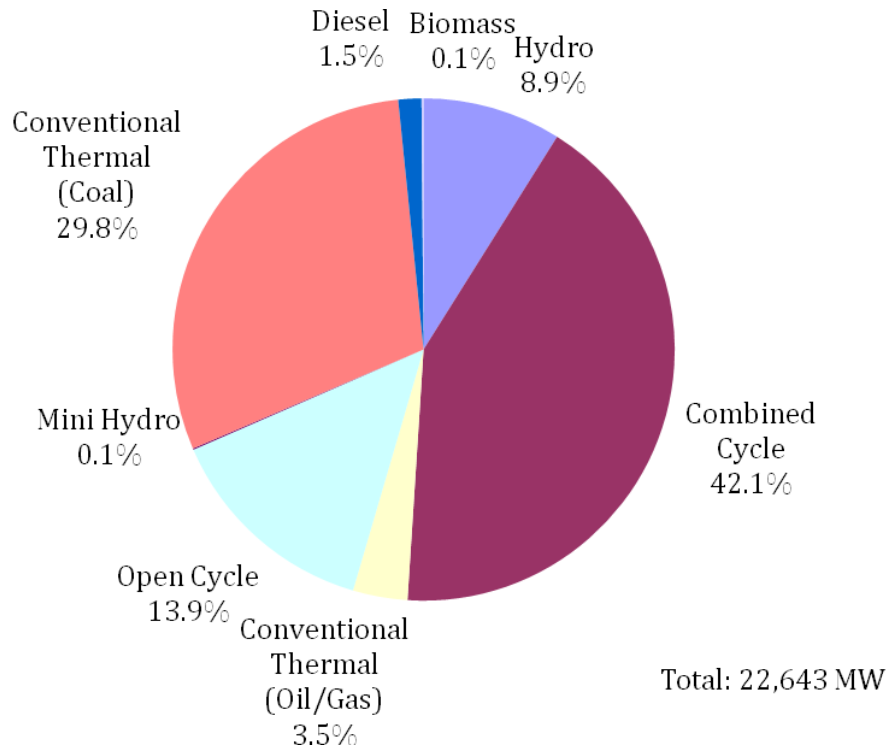
Figure 27: Malaysia Available Capacity as of 31st December 2009

Table 11: Installed Capacity of Major Hydro Power Stations in Malaysia

Station	Installed Capacity (MW)	Total (MW)
Peninsular Malaysia		
1. Terengganu		
- Stesen Janakuasa Sultan Mahmud Kenyir	4 x 100	400.0
2. Perak		
- Stesen Janakuasa Temenggor	4 x 87	348.0
- Stesen Janakuasa Bersia	3 x 24	72.0
- Stesen Janakuasa Kenering	3 x 40	120.0
- Chenderoh	3 x 10.7 + 1 x 8.4	40.5
- Sg. Piah Hulu	2 x 7.3	14.6
- Sg. Piah Hilir	2 x 27	54.0
3. Pahang		
- Stesen Janakuasa Sultan Yussuf, Jor	4 x 25	100.0
- Stesen Janakuasa Sultan Idris II, Woh	3 x 50	150.0
- Cameron Highland Scheme*		11.9
4. Kelantan		
- Pergau	4 x 150	600.0
- Kenerong Upper	2 x 6	12.0
- Kenerong Lower	2 x 4	8.0
Sub Total		1,931.0
Sabah		
- Tenom Pangi	3 x 22.0	66.0
Sub Total		66.0
Sarawak		
- Batang Ai	4 x 23.5	94.0
Sub Total		94.0
Total		2,091.0

Source: TNB, SESB and SEB

Note (*): Cameron Highland Scheme includes Odak, Habu, Kg. Raja, Kg. Terla and R. Falls stations

Table 12: Installed Capacity of Mini Hydro Power Stations in Malaysia

Station	Total (MW)
1. Kedah	
- Sg Tawar Besar	0.540
- Sg Mempelam	0.397
- Sg Mahang	0.483
2. Perak	
- Sg Tebing Tinggi	0.178
- Sg Asap	0.110
- Sg Kinjang	0.349
- Sg Bil	0.258
3. Pahang	
- Sg Sempam G2	0.450
- Sg Pertang	0.492
- Sg Perdak	0.364
4. Kelantan	
- Sg Renyok G1	0.800

- Sg Renyok G2	0.800
- Sg Sok	0.588
- Sg Rek	0.270
5. Terengganu	
- Sg Brang	0.422
Sub Total	6.501
Sabah	
- Carabau (Ranau)	2.000
- Melangkap (Kota Belud)	1.000
- Sayap (Kota Belud)	1.000
- Bombalai (Tawau)	1.100
- Merotai (Tawau)	1.100
- Kiau (Kota Belud)	0.375
- Naradau (Ranau)	1.760
Sub Total	8.335
Sarawak	
- Sg Pasir	0.760
- Penindin	0.352
- Sebako	0.333
- Lundu	0.352
- Kalamuku 1	0.500
- Kalamuku 2	0.500
- Sg Keijin	0.500
- Sg Kota 1	2.000
- Sg Kota 2	2.000
Sub Total	7.297
Total	22.133

Source: TNB, SESB and SEB

Table 13: Transmission Network in Circuit – kilometres (Total of Overhead Lines Length and Underground Cable Length)

Utility	500 kV	275 kV	132 kV	66 kV
TNB	890.0*	6,785.00	11,116.00	171
SESB	-	492	1,587.00	123
SESCo	-	765	138.2	-
Total	890	8,135.00	11,501.20	294

Note (*): 440 km operated at 275 kV
Source: TNB, SESB and SEB

Table 14: Distribution Network in circuit – kilometres

Utility	33 kV	22 kV	11 kV	6.6 kV	LV	Total
TNB	8,606.0	6,537.0	251,097.0	1,022.0	220,487.0	487,749.0
SESB	499.0	287.0	5,149.0	-	-	5,935.0
SESCo	2,374.8	-	7,284.8	-	12,506.4	22,166.0
Total	11,479.8	6,824.0	263,530.8	1,022.0	232,993.4	515,850.0

Source: TNB, SESB and SEB

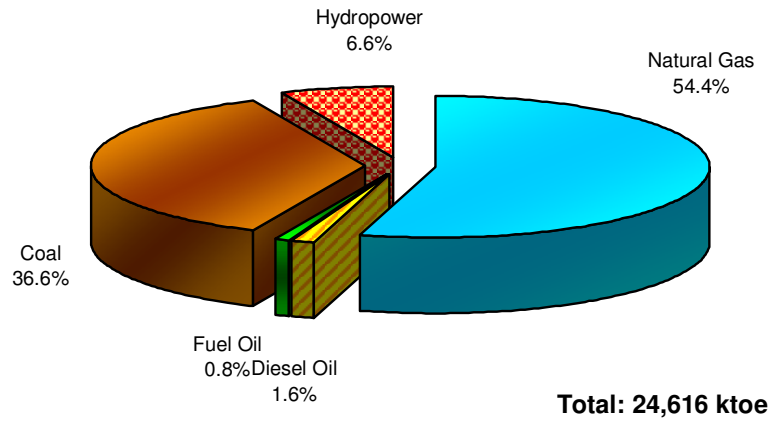
Table 15: Breakdown on Electricity (Gross Generation, Consumption, Installed Capacity, Peak Demand and Reserve Margin) for Malaysia

Region	Electricity Gross Generation		Electricity Consumption		Installed Capacity	Peak Demand	Reserve Margin
	GWh	%	GWh	%	MW	MW	%
Peninsular Malaysia	95,120	90.0	87,950	91.3	22,173	14,245	55.7
Sarawak	6,068	5.7	4,539	4.7	1,220	996	22.5
<i>Grid</i>	<i>5,910</i>	<i>5.6</i>	<i>4,415</i>	<i>4.6</i>	<i>1,170</i>	<i>967</i>	<i>21.0</i>
<i>Non-Grid</i>	<i>158</i>	<i>0.1</i>	<i>124</i>	<i>0.1</i>	<i>50</i>	<i>29</i>	<i>72.8</i>
Sabah	4,518	4.3	3,818	4.0	984	719	36.9
<i>Sabah Grid*</i>	<i>4,518</i>	<i>4.3</i>	<i>3,818</i>	<i>4.0</i>	<i>984</i>	<i>719</i>	<i>36.9</i>
Total	105,706	100.0	96,307	100.0	24,377		

Source: TNB and IPPs, SESB and SEB

Note (*): Most diesel units in SESB are aged sets hence they are derated due to thermal limitations. However, during operational state, some generating units are not available due to maintenance outages as well as random breakdowns; the actual operation capacity available to system operation for dispatch was very limited.

Figure 28: Energy Input in Power Stations



Note: Figures exclude fuel consumption for self-generation plants
 Source: Power utilities and IPPs

Table 16: Electricity Consumption by Sectors in GWh

Region	Industry		Commercial		Residential		Transport		Agriculture		Total GWh
	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%	
Peninsular Malaysia	40,518	93.7	28,762	90.3	18,262	87.7	163	100.0	245.0	100.0	87,950
Sarawak	1,606	3.7	1,621	5.1	1,311	6.3	-	-	-	-	4,539
Sabah	1,096	2.5	1,473	4.6	1,249	6.0	-	-	-	-	3,818
Total	43,220	100.0	31,857	100.0	20,822	100.0	163	100.0	245	100.0	96,307

Figure 29: Electricity Consumption by Sectors

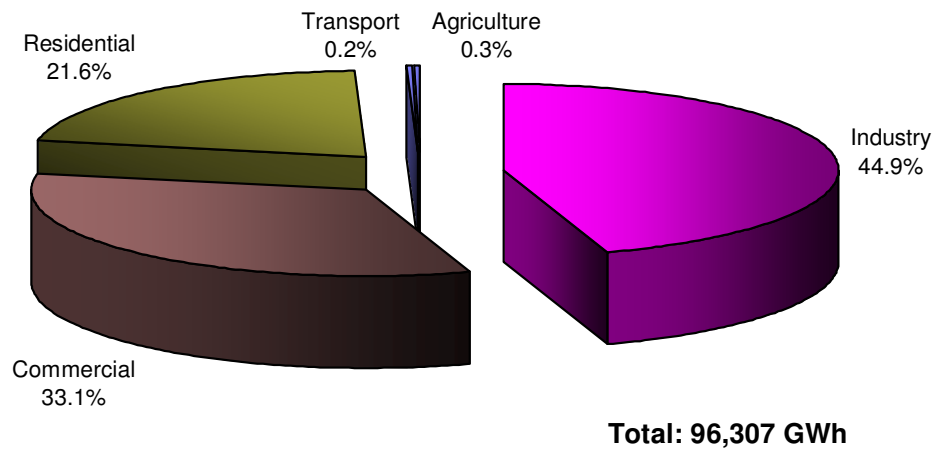
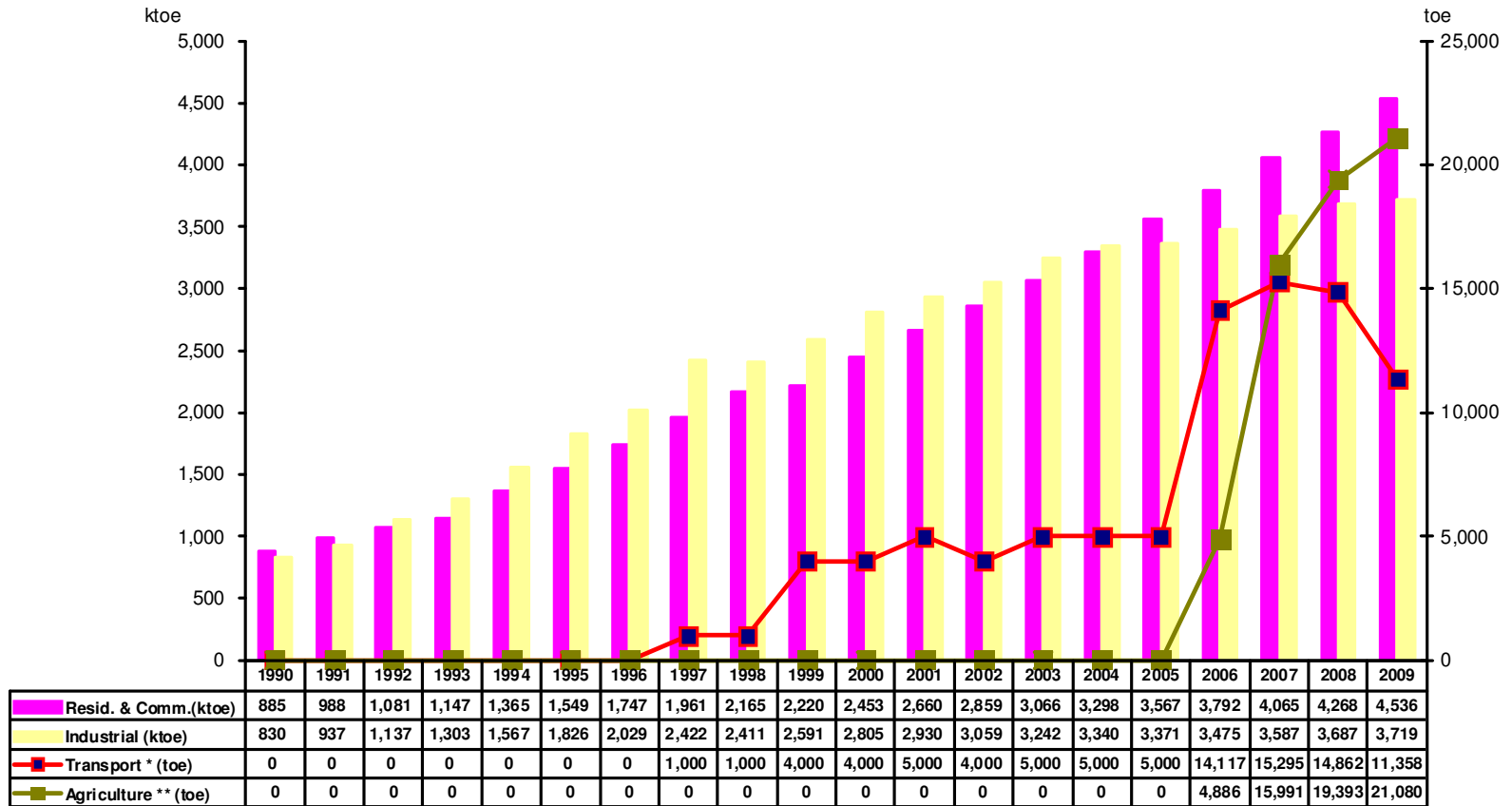


Figure 30: Electricity Consumption by Sectors



Source: Malaysian Energy Commission, Sarawak Chief Electricity Inspectorate, TNB, SEB, SESB and GDC (M)

Note (*): From 2006 until 2009 data were collected directly from train operators

(**): Effective from 1st June 2006, TNB has introduced Specific Agriculture Tariff; previously agriculture was under the Commercial Tariff

Table 17: Electricity Generation and Installed Capacity of Renewable Energy by Public Licensee by Region in 2009

Region	Type of Prime Mover	Unit Generated (MWh)	Installed Capacity MW
Peninsular Malaysia	Land Fill Gas	-	2.0
	Mini Hydro	48,950	23.8
	Solar	9,103	0.5
	Sub Total	58,053	24.3
Sarawak	Palm Oil Waste	2,681	4.8
	Wood / Sawmill Dust	19,261	6.0
	Mini Hydro –SEB	4,261	1.8
	Sub Total	26,203	12.6
Sabah	EFB & Palm Shell	105,829	33.2
	Wood Waste	1,884	10.0
	Mini Hydro - ST	3,794	2.0
	Palm Oil Waste	82,946	14.0
	Mini Hydro - SESB	31,083	8.3
	Sub Total	225,536	67.5
Grand Total		309,792	104.4

Source: TNB, Energy Commission, Kementerian Kemudahan Awam Sarawak

Table 18: Electricity Generation and Installed Capacity of Renewable Energy by Private Licensee by Region in 2009

Region	Type of Prime Mover	Unit Generated (MWh)	Installed Capacity MW
Peninsular Malaysia	Paddy Husk	6,059	14.9
	Palm Oil Waste	690,045	980.1
	Wood Waste	4,273	8.8
	Municipal Waste	711	8.0
	EFB/Palm Shell/Fibre	33,017	79.2
	Wood Dust	0	0.8
	Palm Fibre & Shell	6,353	12.9
	Sub Total	740,459	1,104.7
Sarawak	Palm Oil Waste	7,090	2.6
	Wood / Sawmill Dust	23,026	5.0
	Mini Hydro - SEB	10,780	5.5
	Sub Total	40,896	13.1
Sabah	Palm Oil Waste	208,465	119.2
	Wood Waste	135	1.4
	EFB/ Palm Shell	39,892	14.0
	Fuelwood	228,574	57.0
	Sub Total	477,067	191.7
Grand Total		1,258,421	1,309.4

Source: TNB, Energy Commission, Kementerian Kemudahan Awam Sarawak

KEY ENERGY STATISTICS 1990 - 2009

National Energy Balance 2009

Table 19: Commercial Energy Supply in ktoe

	Crude Oil	Petroleum Products & Others	Natural Gas*	Coal and Coke	Hydro power	Total	Annual Growth Rate (%)	Share (%)			
								Crude Oil and Petroleum Products & Others	Natural Gas	Coal and Coke	Hydro power
1990	8,783	3,651	5,690	1,326	915	20,365	3.3	61.1	27.9	6.5	4.5
1991	9,443	4,165	6,675	1,564	1,053	22,900	12.4	59.4	29.1	6.8	4.6
1992	10,175	5,100	8,545	1,640	997	26,457	15.5	57.7	32.3	6.2	3.8
1993	10,135	5,814	7,729	1,352	1,262	26,292	(0.6)	60.7	29.4	5.1	4.8
1994	13,605	2,446	8,977	1,563	1,652	28,243	7.4	56.8	31.8	5.5	5.8
1995	16,159	610	11,064	1,612	1,540	30,985	9.7	54.1	35.7	5.2	5.0
1996	18,255	1,099	12,339	1,677	1,243	34,613	11.7	55.9	35.6	4.8	3.6
1997	17,916	3,802	14,108	1,622	790	38,238	10.5	56.8	36.9	4.2	2.1
1998	17,133	1,920	14,549	1,731	1,113	36,446	(4.7)	52.3	39.9	4.7	3.1
1999	17,643	1,807	15,893	1,940	1,668	38,951	6.9	49.9	40.8	5.0	4.3
2000	21,673	(1,431)	20,194	2,486	1,560	44,482	14.2	45.5	45.4	5.6	3.5
2001	23,590	(1,917)	20,032	2,970	1,687	46,362	4.2	46.7	43.2	6.4	3.6
2002	22,647	(521)	21,802	3,642	1,329	48,899	5.5	45.2	44.6	7.4	2.7
2003	25,344	(1,391)	20,878	5,316	1,056	51,203	4.7	46.8	40.8	10.4	2.1
2004	25,335	(37)	21,409	6,631	1,329	54,667	6.8	46.3	39.2	12.1	2.4
2005	24,339	(75)	24,783	6,889	1,313	57,249	4.7	42.4	43.3	12.0	2.3
2006	24,909	(1,474)	26,704	7,299	1,568	59,006	3.1	39.7	45.3	12.4	2.7
2007	26,571	(995)	27,362	8,848	1,510	63,296	7.3	40.4	43.2	14.0	2.4
2008	26,776	(2,282)	27,800	9,782	1,964	64,040	1.2	38.2	43.4	15.3	3.1
2009	26,386	96	26,960	10,623	1,627	65,692	2.6	40.3	41.0	16.2	2.5

Note (*): Net natural gas supply after subtracting exports, flared gas and re-injection and LNG production

Table 20: Net Import and Export of Energy in ktoe

	Net Export of Crude Oil	Net Export of LNG	Net Export of Natural Gas	Net Export of Electricity	Net Import of Petroleum products	Net Import of Coal and Coke
1990	21,902	8,686	-	5	2,618	1,396
1991	22,200	8,278	-	2	3,456	1,341
1992	22,215	8,262	1	2	3,986	1,425
1993	20,063	8,654	1,258	(2)	4,328	1,088
1994	18,160	8,928	1,589	(4)	2,398	1,311
1995	18,518	10,790	1,474	2	150	1,538
1996	16,859	15,251	1,474	1	778	1,923
1997	16,022	16,396	1,340	(1)	2,491	1,437
1998	16,626	16,429	1,444	(1)	2,164	1,522
1999	16,274	15,445	1,177	-	1,196	1,313
2000	10,036	16,633	1,198	npl	(1,914)	1,924
2001	9,128	16,636	1,163	npl	(2,019)	2,631
2002	11,017	17,803	1,098	npl	(936)	3,405
2003	10,826	18,965	(99)	17	(1,856)	5,232
2004	11,292	22,944	144	45	68	7,413
2005	10,963	22,299	(206)	192	(474)	6,568
2006	9,214	22,874	(2,056)	200	(2,130)	6,751
2007	6,804	23,777	(4,140)	195	(1,329)	8,357
2008	6,482	22,277	(3,041)	41	(2,151)	9,519
2009	6,517	23,606	(3,889)	8	(1,177)	9,007

Note: (()) means negative value

Table 21: Conversions in Gas Plants in ktoe

	Input:	Output:		
	Natural Gas	LNG	GPP - LPG	MDS
1990	9,797	8,761	na	na
1991	11,715	8,749	na	na
1992	11,681	8,425	392	na
1993	13,005	9,019	529	39
1994	14,634	9,087	948	238
1995	17,088	11,244	1,900	421
1996	20,822	15,251	1,212	344
1997	24,945	16,396	1,258	389
1998	23,138	16,688	1,526	na
1999	24,116	16,417	1,472	na
2000	26,093	17,231	1,482	164
2001	25,703	16,636	1,310	513
2002	25,571	17,803	1,504	445
2003	27,940	18,965	790	443
2004	33,176	22,944	1,225	1,271
2005	36,447	32,837	2,043	1,567
2006	34,775	31,946	2,009	820
2007	35,827	33,054	1,974	799
2008	36,135	33,766	1,448	920
2009	37,098	32,497	991	3,610

Note: na means not applicable

Middle Distillate Synthesis (MDS) commenced pre-commercialization operation in year 2000

MLNG plant produced LPG in the year 2003

Table 22: Conversion in Refineries in ktoe

	Input:		Total Input	Output:								Total Output
	Local Crude Oil	Imported Crude Oil & Others		Motor Petrol	Diesel Oil	Fuel Oil	Kerosene	ATF	LPG	Non-Energy	Refinery Gas	
1990	7,736	2,244	9,980	1,406	3,496	3,241	512	376	256	585	158	10,030
1991	8,199	2,044	10,243	1,665	3,805	2,633	544	403	567	798	174	10,589
1992	9,016	1,409	10,425	1,724	4,048	2,110	541	412	200	324	143	9,502
1993	8,502	3,195	11,697	1,816	4,249	2,375	576	517	244	600	106	10,483
1994	12,326	1,853	14,179	2,316	5,108	2,887	563	980	319	1,468	162	13,803
1995	15,991	969	16,960	2,320	6,011	2,212	360	1,587	431	3,380	385	16,686
1996	15,879	3,501	19,380	3,134	6,174	3,696	292	1,899	371	2,554	331	18,451
1997	16,382	1,535	17,917	2,491	6,744	2,716	365	2,000	371	1,783	203	16,673
1998	15,942	1,190	17,132	2,545	5,926	3,233	285	1,985	449	2,117	192	16,732
1999	14,595	3,048	17,643	3,056	6,712	2,603	210	2,140	617	2,159	230	17,727
2000	15,421	6,252	21,673	3,893	8,059	2,532	239	2,660	838	2,492	241	20,954
2001	13,299	10,290	23,589	4,623	8,462	2,269	283	2,954	875	3,020	331	22,817
2002	14,838	8,032	22,870	4,460	8,401	2,332	414	2,570	897	2,127	294	21,495
2003	17,127	8,254	25,381	4,584	9,062	1,763	983	2,367	932	2,623	262	22,576
2004	16,810	8,524	25,334	4,724	9,611	1,813	591	2,693	897	2,455	215	22,999
2005	18,216	6,123	24,339	4,245	9,161	1,777	521	2,553	822	2,157	202	21,438
2006	16,797	8,112	24,909	4,607	8,752	1,933	537	2,938	1,118	2,750	849	23,484
2007	17,320	9,251	26,571	5,285	9,033	1,990	234	3,138	1,228	3,461	938	25,307
2008	18,638	8,138	26,776	5,066	9,364	1,994	245	3,139	1,208	4,475	991	26,482
2009	20,685	5,701	26,386	4,052	9,415	1,144	565	3,085	732	5,905	195	25,093

Table 23: Conversion in Power Stations (exclude co-generation & private licensed plants) in ktoe

	Input:					Total Input	Annual Growth Rate (%)	Input Share (%)				Output: Total Electricity Generated
	Fuel Oil	Diesel Oil	Natural Gas	Hydro power	Coal			Fuel and Diesel Oil	Natural Gas	Hydro power *	Coal	
1990	2,873	116	1,361	915	813	6,078		49.2	22.4	15.1	13.4	1,979
1991	2,687	164	2,533	1,053	963	7,400	21.8	38.5	34.2	14.2	13.0	2,283
1992	2,352	160	3,144	997	968	7,621	3.0	33.0	41.3	13.1	12.7	2,521
1993	2,388	87	4,374	1,262	884	8,995	18.0	27.5	48.6	14.0	9.8	2,987
1994	1,957	249	5,119	1,652	925	9,902	10.1	22.3	51.7	16.7	9.3	3,362
1995	2,073	265	6,414	1,540	957	11,249	13.6	20.8	57.0	13.7	8.5	3,909
1996	2,354	284	7,489	1,243	950	12,320	9.5	21.4	60.8	10.1	7.7	4,421
1997	2,482	185	7,531	790	882	11,870	(3.7)	22.5	63.4	6.7	7.4	4,977
1998	2,130	275	8,886	1,116	964	13,371	12.6	18.0	66.5	8.3	7.2	5,013
1999	950	172	10,162	1,668	1,332	14,284	6.8	7.9	71.1	11.7	9.3	5,609
2000	592	191	11,580	1,612	1,495	15,470	8.3	5.1	74.9	10.4	9.7	5,263
2001	730	278	11,922	1,687	1,994	16,611	7.4	6.1	71.8	10.2	12.0	6,112
2002	1,363	476	12,424	1,329	2,556	18,148	9.3	10.1	68.5	7.3	14.1	6,384
2003	289	340	10,893	1,056	4,104	16,682	(8.1)	3.8	65.3	6.3	24.6	6,747
2004	274	272	10,545	1,329	5,327	17,747	6.4	3.1	59.4	7.5	30.0	7,075
2005	275	298	12,271	1,313	5,541	19,698	11.0	2.9	62.3	6.7	28.1	7,296
2006	170	618	12,330	1,568	5,963	20,649	4.8	3.8	59.7	7.6	28.9	7,724
2007	199	314	12,476	1,517	7,486	21,992	6.5	2.3	56.7	6.9	34.0	8,385
2008	181	299	13,651	1,964	8,069	24,164	9.9	2.0	56.5	8.1	33.4	8,422
2009	205	384	13,390	1,627	9,010	24,616	1.9	2.4	54.4	6.6	36.6	8,531

Note (*): Figures calculated from average efficiency of thermal stations of respective year

Table 24: Final Energy Use by Sectors in ktoe

	Industrial	Transport	Residential and Commercial	Non-Energy Use	Agriculture	Total	Annual Growth Rate	Industrial including Agriculture & Non-Energy	Industrial GDP*	Industrial Energy Intensity (toe/RM Million at 2000 Prices)
1990	5,276	5,387	1,646	908	-	13,217	8.7	6,184	116,230	53
1991	5,809	5,806	1,747	1,071	127	14,560	10.2	7,007	109,673	64
1992	6,455	6,226	1,891	1,222	391	16,185	11.2	8,068	117,150	69
1993	7,012	6,558	2,069	2,027	62	17,728	9.5	9,101	124,496	73
1994	7,283	7,262	2,502	1,817	422	19,286	8.8	9,522	133,788	71
1995	8,060	7,827	2,837	1,994	446	21,164	9.7	10,500	175,055	60
1996	9,433	8,951	3,557	1,744	472	24,157	14.1	11,649	179,395	65
1997	10,106	10,201	3,073	2,298	490	26,168	8.3	12,894	207,028	62
1998	10,121	9,793	3,314	2,023	307	25,558	(2.3)	12,451	159,986	78
1999	10,277	11,393	3,653	1,799	106	27,228	6.5	12,182	168,661	72
2000	11,406	12,071	3,868	2,250	104	29,699	9.1	13,760	192,233	72
2001	11,852	13,137	4,048	2,378	98	31,513	6.1	14,328	187,302	76
2002	12,854	13,442	4,387	2,511	96	33,290	5.6	15,461	194,484	79
2003	13,472	14,271	4,399	2,345	98	34,585	3.9	15,915	209,047	76
2004	14,914	15,385	4,754	2,183	87	37,323	7.9	17,184	223,585	77
2005	15,492	15,384	5,134	2,173	101	38,284	2.6	17,766	230,932	77
2006	17,002	14,825	5,430	2,809	258	40,324	5.3	20,069	241,523	83
2007	19,116	15,717	6,196	2,958	281	44,268	9.8	22,355	248,021	90
2008	19,138	16,395	6,205	2,876	287	44,901	1.4	22,301	251,197	89
2009	14,312	16,119	6,336	3,868	211	40,846	(9.0)	18,391	236,369	78

Note (*): Defined as total GDP for Agriculture, Forestry and Fishing, Mining and Quarrying, Manufacturing and Construction

Table 25: Final Use of Commercial Energy by Type of Fuels in ktoe

	Petroleum Products	Electricity	Gas for Non-Energy	Gas for Heating	Natural Gas	Coal and Coke	Total	Total (excl. Non-Energy)	Annual Growth Rate (%)
1990	9,896	1,715	609	484	1,093	513	13,217	12,608	8.2
1991	10,911	1,925	604	521	1,125	599	14,560	13,956	10.7
1992	11,927	2,218	657	711	1,368	672	16,185	15,528	11.3
1993	13,075	2,405	1,141	575	1,716	487	17,683	16,542	6.5
1994	13,893	2,932	1,163	695	1,858	598	19,281	18,118	9.5
1995	16,142*	3,375	1,064	871	1,935	712	22,164	21,100	16.5
1996	17,189	3,777	870	1,604	2,474	727	24,167	23,297	10.4
1997	18,578	4,384	1,391	1,074	2,465	740	26,167	24,776	6.3
1998	17,488	4,577	1,282	1,444	2,726	767	25,558	24,276	(2.0)
1999	18,782	4,815	1,118	1,905	3,023	608	27,228	26,110	7.6
2000	19,582	5,263	1,512	2,351	3,863	991	29,699	28,187	8.0
2001	20,323	5,594	1,684	2,955	4,639	977	31,533	29,849	5.9
2002	20,638	5,922	1,775	3,868	5,643	1,086	33,289	31,514	5.6
2003	21,175	6,313	1,616	4,270	5,886	1,212	34,586	32,970	4.6
2004	22,886	6,642	1,476	5,014	6,490	1,305	37,323	35,847	8.7
2005	23,012	6,944	1,541	5,440	6,981	1,348	38,285	36,744	2.5
2006	22,394	7,277	2,110	7,212	9,322	1,335	40,328	38,218	4.0
2007	24,853	7,684	2,112	8,274	10,386	1,361	44,284	42,172	10.3
2008	24,451	7,986	2,046	8,705	10,751	1,713	44,901	42,855	1.6
2009	24,145	8,286	1,995	4,805	6,800	1,613	40,844	38,849	(9.3)

Note (*): Petroleum Products for 1995 include 1,212 ktoe of butane and propane from GPP (16,142 ktoe vs 14,930 ktoe previously). This amount is deducted from natural gas non-energy use reported earlier (1,064 ktoe vs 2,276 ktoe previously).

Table 26: Final Demand for Petroleum Products in ktoe

	Diesel	Motor Petrol	Fuel Oil	LPG	Kerosene	ATF & AVGAS	Non-energy & Others	Total
1990	4,421	2,901	883	548	203	628	239	9,823
1991	4,873	3,135	945	612	180	690	479	10,914
1992	5,291	3,326	1,088	733	160	764	565	11,927
1993	5,339	3,666	1,293	1,119	149	875	635	13,076
1994	5,643	4,139	1,392	926	152	978	664	13,894
1995	5,810	4,548	1,506	2,215	177	1,160	726	16,142
1996	6,735	5,205	1,756	1,215	197	1,335	746	17,189
1997	7,314	5,586	1,978	1,245	169	1,439	847	18,578
1998	6,252	5,854	1,678	1,301	165	1,619	619	17,488
1999	6,506	6,793	1,792	1,523	162	1,424	582	18,782
2000	7,627	6,387	1,875	1,362	131	1,574	625	19,581
2001	6,827	8,116	1,497	1,392	99	1,762	626	20,319
2002	8,041	6,947	1,589	1,542	92	1,785	639	20,635
2003	7,360	8,539	1,256	1,437	93	1,852	639	21,176
2004	9,262	7,839	1,463	1,542	86	2,056	637	22,885
2005	8,672	8,211	1,953	1,510	81	2,010	574	23,011
2006	8,540	7,517	1,901	1,520	79	2,152	684	22,393
2007	9,512	8,600	2,202	1,474	76	2,155	832	24,851
2008	9,167	8,842	1,963	1,475	75	2,112	818	24,452
2009	8,634	8,766	1,291	2,506	30	2,120	799	24,145

Key Statistics

Table 27: Selected Energy and Economic Indicators (1990 – 2009)

	GDP at 2000 Prices (RM million)*	Population ('000 people)*	Primary Energy Supply (ktoe)	Final Energy Demand (ktoe)	Electricity Demand (ktoe)	Electricity Demand (GWh)	Average Annual Growth (%)				Per Capita				Energy Intensity			
							GDP at 2000 Prices	Primary Energy Supply	Final Energy Demand	Electricity Demand	GDP at 2000 Prices (RM)	Primary Energy Supply (toe)	Final Energy Demand (toe)	Electricity Demand (kWh)	Primary Energy Supply (toe/GDP at 2000 Prices (RM Million))	Final Energy Demand (toe/GDP at 2000 Prices (RM Million))	Electricity Demand (toe/GDP at 2000 Prices (RM Million))	Electricity Demand (GWh/GDP at 2000 Prices (RM Million))
1990	189,059	18,102	21,471	13,217	1,715	19,932	6.80	8.90	8.70	9.70	10,444	1.19	0.73	1,101	114	70	9.1	0.105
1991	205,312	18,986	26,335	14,560	1,925	22,373	8.60	22.65	10.16	12.24	10,814	1.39	0.77	1,178	128	71	9.4	0.109
1992	221,319	18,985	29,291	16,185	2,218	25,778	7.80	11.22	11.16	15.22	11,658	1.54	0.85	1,358	132	73	10.0	0.116
1993	239,792	19,503	29,925	17,468	2,450	28,474	8.35	2.16	7.93	10.46	12,295	1.53	0.90	1,460	125	73	10.2	0.119
1994	261,951	20,049	31,662	19,287	2,932	34,076	9.24	5.80	10.41	19.67	13,066	1.58	0.96	1,700	121	74	11.2	0.130
1995	283,645	20,624	33,879	22,164	3,375	39,225	8.28	7.00	14.92	15.11	13,753	1.64	1.07	1,902	119	78	11.9	0.138
1996	312,017	21,101	37,840	24,167	3,777	43,897	10.00	11.69	9.04	11.91	14,787	1.79	1.15	2,080	121	77	12.1	0.141
1997	335,556	21,595	43,173	26,168	4,384	50,952	7.54	14.09	8.28	16.07	15,539	2.00	1.21	2,359	129	78	13.1	0.152
1998	310,381	22,107	40,996	25,558	4,577	53,195	(7.50)	(5.04)	(2.33)	4.40	14,040	1.85	1.16	2,406	132	82	14.7	0.171
1999	328,194	22,636	44,534	27,228	4,815	55,961	5.74	8.63	6.53	5.20	14,499	1.97	1.20	2,472	136	83	14.7	0.171
2000	356,401	23,495	50,710	29,699	5,263	61,168	8.59	13.87	9.08	9.30	15,169	2.16	1.26	2,603	142	83	14.8	0.172
2001	358,246	24,123	51,979	31,515	5,594	65,015	0.52	2.50	6.11	6.29	14,851	2.15	1.31	2,695	145	88	15.6	0.181
2002	377,559	24,727	53,196	33,290	5,922	68,827	5.39	2.34	5.63	5.86	15,269	2.15	1.35	2,783	141	88	15.7	0.182
2003	399,414	25,320	57,565	34,586	6,313	73,371	5.79	8.21	3.89	6.60	15,775	2.27	1.37	2,898	144	87	15.8	0.184
2004	426,508	25,905	62,358	37,323	6,643	77,206	6.78	8.33	7.91	5.23	16,464	2.41	1.44	2,980	146	88	15.6	0.181
2005	449,250	26,477	66,188	38,285	6,944	80,705	5.33	6.14	2.58	4.53	16,968	2.50	1.45	3,048	147	85	15.5	0.180
2006	475,526	26,832	67,878	40,323	7,277	84,575	5.85	2.55	5.32	4.80	17,722	2.53	1.50	3,152	143	85	15.3	0.178
2007	506,341	27,186	72,377	44,268	7,683	89,294	6.48	6.63	9.78	5.58	18,625	2.66	1.63	3,285	143	87	15.2	0.176
2008	530,181	27,541	75,490	44,901	7,986	92,815	4.71	4.30	1.43	3.94	19,251	2.74	1.63	3,370	142	85	15.1	0.175
2009	521,095	27,895	74,582	40,845	8,286	96,302	(1.71)	(1.20)	(9.03)	3.76	18,681	2.67	1.46	3,452	143	78	15.9	0.185

Source (*): Monthly Statistical Bulletin, Bank Negara Malaysia (GDP at 2000 Prices (RM Million) for 1990 until 1999 by Pusat Tenaga Malaysia)

Table 28: Commercial Energy Balance for Malaysia in 2009 (kilo tonnes of oil equivalent)

Commercial Energy Balance for Malaysia 2009																	
(Thousand Tonnes of Oil Equivalent)																	
Energy Source	NATURAL GAS	LNG	CRUDE OIL (1/)	OTHERS (2/)	TOTAL PETROLEUM PRODUCTS	Petroleum Products								COAL & COKE	HYDRO POWER	ELECTRICITY	TOTAL
						Motor Petrol	Diesel	Fuel Oil	LPG	Kerosene	ATF & AV Gas	Non Energy	Refinery Gas				
PRIMARY SUPPLY																	
1. Primary Production	64,661	0	32,747	0	0	0	0	0	0	0	0	0	0	1,370	1,627	0	100,406
2. Gas Flaring, Reinjection & Use	-9,093	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-9,093
3. Imports	5,055	0	5,718	121	7,243	3,299	1,978	1,055	394	148	56	313	0	9,126	0	1	27,266
4. Exports	-1,166	-23,606	-12,235	-11	-8,420	-0	-1,415	-578	-1,519	-600	-782	-3,525	0	-119	0	-9	-45,565
5. Bunkers	0	0	0	0	-47	0	-22	-21	0	0	0	-4	0	0	0	0	-47
6. Stock Change	0	0	-76	0	1,216	1,174	-994	-334	1,269	-1	-222	324	0	192	0	0	1,332
7. Statistical Discrepancy	0	0	231	0	0	0	0	0	0	0	0	0	0	54	0	0	285
8. Primary Supply	59,457	-23,606	26,386	111	-8	4,474	-454	123	144	-454	-949	-2,892	0	10,623	1,627	-7	74,582
TRANSFORMATION																	
9. Gas Plants																	
9.1 LNG	-32,497	24,538	0	0	465	0	0	0	465	0	0	0	0	0	0	0	-7,493
9.2 MDS	-991	0	0	0	426	0	105	0	0	34	0	287	0	0	0	0	-565
9.3 GPP-LPG (3&4/)	-3,610	0	0	0	1,012	0	0	0	1,012	0	0	0	0	0	0	0	-2,598
Subtotal	-37,098	24,538	0	0	1,904	0	105	0	1,478	34	0	287	0	0	0	0	-10,656
10. Refineries	0	0	-26,386	-111	25,093	4,052	9,415	1,144	732	565	3,085	5,905	195	0	0	0	-1,404
11. Power Stations & Self-Generation																	
11.1 Hydro Stations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,627	574	-1,053
11.2 Thermal Stations	-13,390	0	0	0	-588	0	-384	-205	0	0	0	0	0	-9,010	0	7,957	-15,030
11.3 Self-Generation (5/)	-1,385	0	0	0	-92	0	-92	0	0	0	0	0	0	0	0	560	-917
Subtotal	-14,774	0	0	0	-681	0	-476	-205	0	0	0	0	0	-9,010	-1,627	9,091	-17,001
12. Losses & Own Use	-833	-932	0	0	-2,663	0	0	0	0	0	0	-2,468	-195	0	0	-515	-4,942
13. Statistical Discrepancy	48	-0	0	0	500	240	43	229	153	-117	-16	-33	0	0	0	-283	266
14. Secondary Supply	-52,657	23,606	-26,386	-111	24,153	4,292	9,088	1,168	2,363	483	3,068	3,691	0	-9,010	-1,627	8,294	-33,737
FINAL USE																	
15. Residential	2	0	0	0	750	0	0	0	736	14	0	0	0	0	0	1,792	2,543
16. Commercial	25	0	0	0	1,026	0	328	66	632	0	0	0	0	0	0	2,743	3,793
17. Industrial	4,544	0	0	0	4,436	98	3,063	1,196	64	16	0	0	0	1,613	0	3,719	14,312
18. Transport	236	0	0	0	15,871	8,667	5,063	21	0	0	2,120	0	0	0	0	12	16,119
19. Agriculture	0	0	0	0	190	1	181	7	0	0	0	0	0	0	0	21	211
20. Non-Energy Use	1,995	0	0	0	1,874	0	0	0	1,075	0	0	799	0	0	0	0	3,868
21. Total Final Use	6,800	0	0	0	24,145	8,766	8,634	1,291	2,506	30	2,120	799	0	1,613	0	8,286	40,845

1/ Crude production includes Condensates comprising Pentane and Heavier Hydrocarbons.

2/ Others Refer to Non-Crude Energy Forms (consist of Imported Light Diesel, Slip Reprocess, Crude Residuum & Middle East Residue) Which are Used as Refinery Intake.

3/ GPP-LPG Extracts Liquid Products i.e Condensates, Ethane, Butane, Propane from Natural Gas, Ethane is Not included under LPG production.

4/ Butane and Propane as MTBE Feedstocks are Presented as Non-Energy use under LPG column. Ethane is Presented under Natural Gas Column.

5/ Estimated figures based from the Energy Commission, Statistics of Electricity Supply Industry in Malaysia 2009.

Note : Total may not necessarily add up due to rounding

National Energy Balance 2009

Table 29: Commercial Energy Balance for Malaysia in First Quarter (Q1) of 2009 (kilo tonnes of oil equivalent)

Commercial Energy Balance for Malaysia Quarter 1 2009 (Thousand Tonnes of Oil Equivalent)																	
Energy Source	NATURAL GAS	LNG	CRUDE OIL (1/)	OTHERS (2/)	TOTAL PETROLEUM PRODUCTS	Petroleum Products							COAL & COKE	HYDRO POWER	ELECTRICITY	TOTAL	
						Motor Petrol	Diesel	Fuel Oil	LPG	Kerosene	ATF & Av Gas	Non Energy					Refinery Gas
PRIMARY SUPPLY																	
1. Primary Production	16,400	0	8,254	0	0	0	0	0	0	0	0	0	0	252	426	0	25,332
2. Gas Flaring, ReInjection & Use	-1,865	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1,865
3. Imports	1,285	0	1,120	0	1,324	682	139	338	68	0	0	97	0	1,303	0	0	5,040
4. Exports	-298	-6,632	-2,793	-11	-2,266	0	-354	-63	-407	-7	-252	-1,184	0	-8	0	-5	-12,012
5. Bunkers	0	0	0	0	-17	0	-6	-11	0	0	0	-1	0	0	0	0	-17
6. Stock Change	0	0	193	0	1,151	402	435	-15	266	0	-0	63	0	338	0	0	1,683
7. Statistical Discrepancy	0	0	13	0	0	0	0	0	0	0	0	0	0	84	0	0	98
8. Primary Supply	15,522	-6,632	6,788	-2	193	1,084	215	250	-73	-6	-252	-1,024	0	1,969	426	-5	18,259
TRANSFORMATION																	
9. Gas Plants																	
9.1 LNG	-8,737	6,728	0	0	129	0	0	0	129	0	0	0	0	0	0	0	-1,880
9.2 MDS	-248	0	0	0	118	0	33	0	0	10	0	75	0	0	0	0	-130
9.3 GPP-LPG (3&4/)	-1,005	0	0	0	318	0	0	0	318	0	0	0	0	0	0	0	-687
Subtotal	-9,990	6,728	0	0	565	0	33	0	447	10	0	75	0	0	0	0	-2,698
10. Refineries	0	0	-6,788	2	6,328	879	2,377	158	183	154	762	1,771	45	0	0	0	-458
11. Power Stations & Self-Generation																	
11.1 Hydro Stations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-426	146	-279
11.2 Thermal Stations	-3,425	0	0	0	-108	0	-69	-39	0	0	0	0	0	-1,564	0	1,739	-3,358
11.3 Self-Generation (5/)	-376	0	0	0	-42	0	-42	0	0	0	0	0	0	0	0	147	-271
Subtotal	-3,802	0	0	0	-150	0	-110	-39	0	0	0	0	0	-1,564	-426	2,033	-3,908
12. Losses & Own Use	-197	-96	0	0	-823	0	0	0	0	0	0	-779	-45	0	0	-120	-1,237
13. Statistical Discrepancy	-10	-0	0	0	123	235	-245	88	33	-140	-11	164	0	0	0	-16	98
14. Secondary Supply	-13,999	6,632	-6,788	2	6,043	1,114	2,054	207	662	24	751	1,232	0	-1,564	-426	1,897	-8,203
FINAL USE																	
15. Residential	0	0	0	0	195	0	0	0	183	11	0	0	0	0	0	421	616
16. Commercial	6	0	0	0	257	0	70	24	164	0	0	0	0	0	0	647	910
17. Industrial	901	0	0	0	1,346	13	880	428	19	6	0	0	0	406	0	815	3,467
18. Transport	55	0	0	0	3,944	2,184	1,260	1	0	0	499	0	0	0	0	3	4,002
19. Agriculture	0	0	0	0	64	1	59	4	0	0	0	0	0	0	0	5	69
20. Non-Energy Use	561	0	0	0	431	0	0	0	223	0	0	208	0	0	0	0	992
21. Total Final Use	1,523	0	0	0	6,236	2,197	2,269	456	589	18	499	208	0	406	0	1,892	10,056

Table 30: Commercial Energy Balance for Malaysia in Second Quarter (Q2) of 2009 (kilo tonnes of oil equivalent)

Commercial Energy Balance for Malaysia Quarter 2 2009 (Thousand Tonnes of Oil Equivalent)																	
Energy Source	NATURAL GAS	LNG	CRUDE OIL (1/)	OTHERS (2/)	TOTAL PETROLEUM PRODUCTS	Petroleum Products							COAL & COKE	HYDRO POWER	ELECTRICITY	TOTAL	
						Motor Petrol	Diesel	Fuel Oil	LPG	Kerosene	ATF & Av Gas	Non Energy					Refinery Gas
PRIMARY SUPPLY																	
1. Primary Production	15,976	0	8,090	0	0	0	0	0	0	0	0	0	0	402	418	0	24,886
2. Gas Flaring, Reinjection & Use	-2,586	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,586
3. Imports	1,315	0	1,149	57	1,598	765	548	101	87	17	3	77	0	1,711	0	0	5,830
4. Exports	-286	-5,218	-2,511	0	-2,226	0	-491	-183	-393	-175	-183	-800	0	-60	0	-1	-10,302
5. Bunkers	0	0	0	0	-6	0	-5	0	0	0	0	-1	0	0	0	0	-6
6. Stock Change	0	0	-203	0	-3	372	-329	20	250	2	-21	-298	0	375	0	0	168
7. Statistical Discrepancy	0	0	7	0	0	0	0	0	0	0	0	0	0	-89	0	0	-83
8. Primary Supply	14,419	-5,218	6,530	57	-637	1,137	-277	-62	-56	-156	-201	-1,022	0	2,339	418	-0	17,907
TRANSFORMATION																	
9. Gas Plants																	
9.1 LNG	-7,731	5,877	0	0	115	0	0	0	115	0	0	0	0	0	0	0	-1,739
9.2 MDS	-249	0	0	0	95	0	25	0	0	7	0	63	0	0	0	0	-154
9.3 GPP-LPG (3&4/)	-768	0	0	0	315	0	0	0	315	0	0	0	0	0	0	0	-453
Subtotal	-8,748	5,877	0	0	524	0	25	0	430	7	0	63	0	0	0	0	-2,346
10. Refineries	0	0	-6,530	-57	6,375	904	2,521	282	205	175	719	1,515	54	0	0	0	-212
11. Power Stations & Self-Generation																	
11.1 Hydro Stations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-418	146	-272
11.2 Thermal Stations	-3,476	0	0	0	-148	0	-97	-51	0	0	0	0	0	-1,934	0	2,005	-3,552
11.3 Self-Generation (5/)	-318	0	0	0	-21	0	-21	0	0	0	0	0	0	0	0	136	-204
Subtotal	-3,794	0	0	0	-169	0	-118	-51	0	0	0	0	0	-1,934	-418	2,287	-4,028
12. Losses & Own Use	-242	-659	0	0	-378	0	0	0	0	0	0	-323	-54	0	0	-206	-1,484
13. Statistical Discrepancy	52	-0	0	0	269	158	18	73	57	-21	-4	-13	0	0	0	-8	313
14. Secondary Supply	-12,731	5,218	-6,530	-57	6,621	1,062	2,446	304	691	161	715	1,242	0	-1,934	-418	2,074	-7,758
FINAL USE																	
15. Residential	1	0	0	0	183	0	0	0	182	1	0	0	0	0	0	455	639
16. Commercial	8	0	0	0	280	0	113	0	167	0	0	0	0	0	0	694	982
17. Industrial	1,063	0	0	0	1,060	29	783	231	13	4	0	0	0	404	0	916	3,443
18. Transport	59	0	0	0	3,919	2,170	1,228	7	0	0	513	0	0	0	0	3	3,981
19. Agriculture	0	0	0	0	49	0	45	4	0	0	0	0	0	0	0	5	54
20. Non-Energy Use	557	0	0	0	493	0	0	0	274	0	0	220	0	0	0	0	1,050
21. Total Final Use	1,688	0	0	0	5,984	2,199	2,169	242	635	5	513	220	0	404	0	2,074	10,150

National Energy Balance 2009

Table 31: Commercial Energy Balance for Malaysia in Third Quarter (Q3) of 2009 (kilo tonnes of oil equivalent)

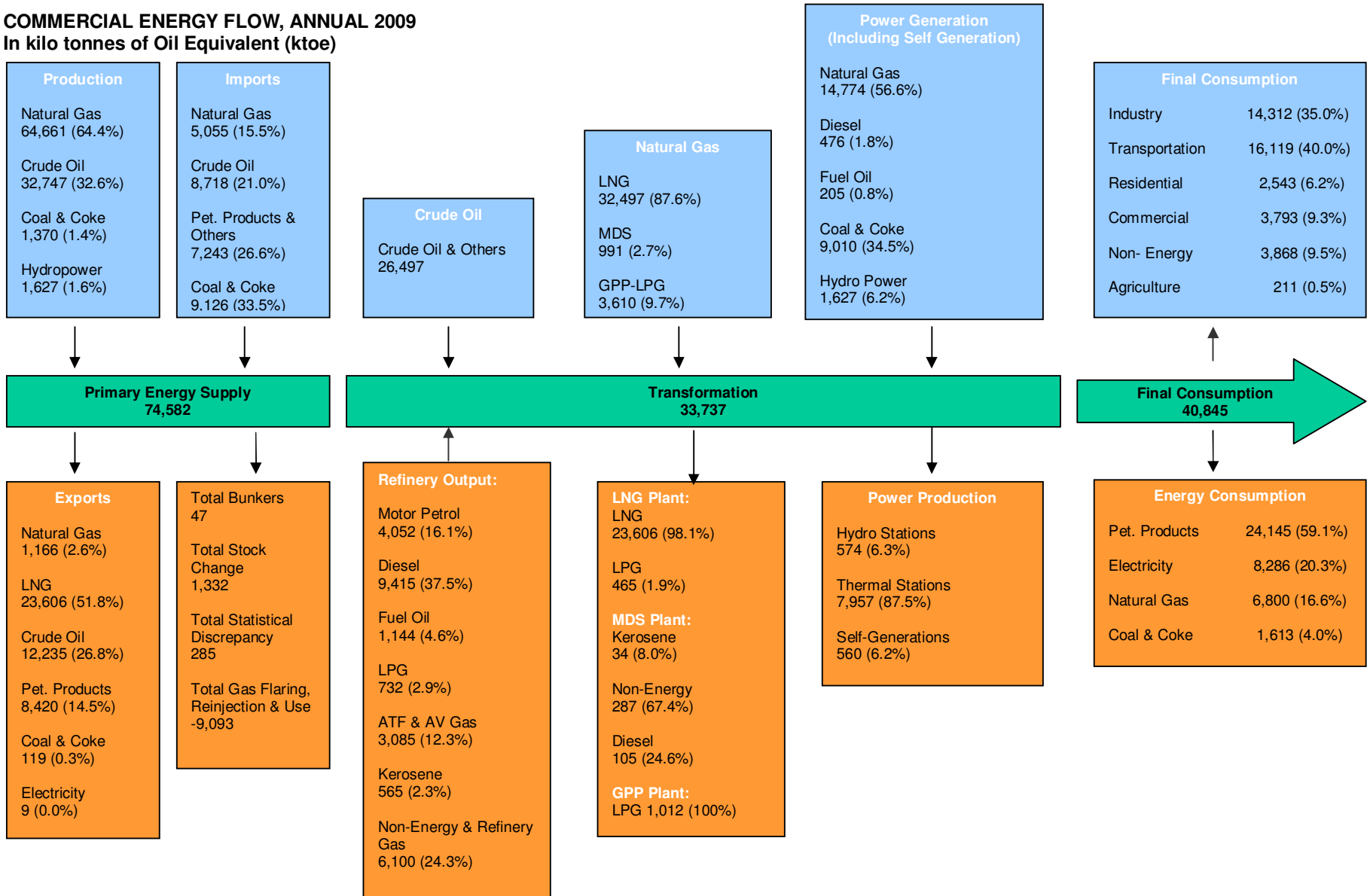
Commercial Energy Balance for Malaysia Quarter 3 2009																	
(Thousand Tonnes of Oil Equivalent)																	
Energy Source	NATURAL GAS	LNG	CRUDE OIL (1)	OTHERS (2)	TOTAL PETROLEUM PRODUCTS	Petroleum Products								COAL & COKE	HYDRO POWER	ELECTRICITY	TOTAL
						Motor Petrol	Diesel	Fuel Oil	LPG	Kerosene	ATF & Av Gas	Non Energy	Refinery Gas				
PRIMARY SUPPLY																	
1. Primary Production	15,780	0	8,266	0	0	0	0	0	0	0	0	0	0	348	348	0	24,742
2. Gas Flaring, Reinjection & Use	-2,433	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,433
3. Imports	1,155	0	1,537	57	2,124	888	660	385	86	23	8	74	0	2,453	0	0	7,326
4. Exports	-292	-5,486	-2,394	0	-2,110	-0	-501	-294	-413	-122	-204	-576	0	-44	0	-2	-10,327
5. Bunkers	0	0	0	0	-13	0	-7	-5	0	0	0	-1	0	0	0	0	-13
6. Stock Change	0	0	-363	0	-24	193	-365	-201	526	3	-114	-66	0	330	0	0	-57
7. Statistical Discrepancy	0	0	-235	0	0	0	0	0	0	0	0	0	0	-49	0	0	-284
8. Primary Supply	14,210	-5,486	6,812	57	-22	1,082	-213	-115	200	-96	-309	-569	0	3,039	348	-2	18,955
TRANSFORMATION																	
9. Gas Plants																	
9.1 LNG	-7,438	5,537	0	0	111	0	0	0	111	0	0	0	0	0	0	0	-1,790
9.2 MDS	-239	0	0	0	113	0	24	0	0	10	0	79	0	0	0	0	-126
9.3 GPP-LPG (3&4)	-821	0	0	0	186	0	0	0	186	0	0	0	0	0	0	0	-635
Subtotal	-8,498	5,537	0	0	410	0	24	0	297	10	0	79	0	0	0	0	-2,551
10. Refineries	0	0	-6,812	-57	6,565	1,138	2,460	394	191	116	864	1,352	50	0	0	0	-304
11. Power Stations & Self-Generation																	
11.1 Hydro Stations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-348	126	-222
11.2 Thermal Stations	-3,337	0	0	0	-153	0	-95	-59	0	0	0	0	0	-2,642	0	2,092	-4,040
11.3 Self-Generation (5)	-346	0	0	0	-15	0	-15	0	0	0	0	0	0	0	0	138	-223
Subtotal	-3,683	0	0	0	-168	0	-109	-59	0	0	0	0	0	-2,642	-348	2,357	-4,485
12. Losses & Own Use	-201	-51	0	0	-784	0	0	0	0	0	0	-734	-50	0	0	-84	-1,120
13. Statistical Discrepancy	-25	0	0	0	36	-20	18	36	-42	-25	-5	74	0	0	0	-80	-70
14. Secondary Supply	-12,408	5,486	-6,812	-57	6,058	1,118	2,393	371	446	100	859	770	0	-2,642	-348	2,192	-8,530
FINAL USE																	
15. Residential	0	0	0	0	181	0	0	0	180	1	0	0	0	0	0	478	659
16. Commercial	6	0	0	0	213	0	80	0	133	0	0	0	0	0	0	709	928
17. Industrial	1,336	0	0	0	1,080	28	785	249	17	3	0	0	0	397	0	995	3,808
18. Transport	60	0	0	0	4,008	2,173	1,278	7	0	0	550	0	0	0	0	2	4,071
19. Agriculture	0	0	0	0	37	0	37	0	0	0	0	0	0	0	0	6	43
20. Non-Energy Use	400	0	0	0	517	0	0	0	316	0	0	201	0	0	0	0	917
21. Total Final Use	1,802	0	0	0	6,036	2,200	2,180	256	646	4	550	201	0	397	0	2,190	10,425

Table 32: Commercial Energy Balance for Malaysia in Fourth Quarter (Q4) of 2009 (kilo tonnes of oil equivalent)

Commercial Energy Balance for Malaysia Quarter 4 2009 (Thousand Tonnes of Oil Equivalent)																	
Energy Source	NATURAL GAS	LNG	CRUDE OIL (1/)	OTHERS (2/)	TOTAL PETROLEUM PRODUCTS	Petroleum Products								COAL & COKE	HYDRO POWER	ELECTRICITY	TOTAL
						Motor Petrol	Diesel	Fuel Oil	LPG	Kerosene	ATF & Av Gas	Non Energy	Refinery Gas				
PRIMARY SUPPLY																	
1. Primary Production	16,505	0	8,137	0	0	0	0	0	0	0	0	0	0	368	435	0	25,445
2. Gas Flaring, Reinjection & Use	-2,209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,209
3. Imports	1,301	0	1,913	0	2,197	965	631	231	152	108	44	65	0	3,659	0	1	9,070
4. Exports	-290	-6,270	-4,537	0	-1,818	0	-68	-38	-306	-296	-143	-966	0	-7	0	-1	-12,924
5. Bunkers	0	0	0	0	-12	0	-5	-5	0	0	0	-2	0	0	0	0	-12
6. Stock Change	0	0	297	0	92	207	-736	-137	227	-6	-87	625	0	-851	0	0	-462
7. Statistical Discrepancy	0	0	446	0	0	0	0	0	0	0	0	0	0	107	0	0	554
8. Primary Supply	15,306	-6,270	6,256	0	458	1,172	-178	50	73	-194	-186	-277	0	3,276	435	-0	19,461
TRANSFORMATION																	
9. Gas Plants																	
9.1 LNG	-8,591	6,396	0	0	111	0	0	0	111	0	0	0	0	0	0	0	-2,084
9.2 MDS	-255	0	0	0	101	0	23	0	0	8	0	70	0	0	0	0	-154
9.3 GPP-LPG (3&4/)	-1,015	0	0	0	193	0	0	0	193	0	0	0	0	0	0	0	-822
Subtotal	-9,862	6,396	0	0	405	0	23	0	304	8	0	70	0	0	0	0	-3,060
10. Refineries	0	0	-6,256	0	5,826	1,132	2,057	310	154	120	740	1,267	46	0	0	0	-431
11. Power Stations & Self-Generation																	
11.1 Hydro Stations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-435	155	-280
11.2 Thermal Stations	-3,151	0	0	0	-179	0	-124	-56	0	0	0	0	0	-2,870	0	2,121	-4,080
11.3 Self-Generation (5/)	-345	0	0	0	-15	0	-15	0	0	0	0	0	0	0	0	139	-220
Subtotal	-3,496	0	0	0	-194	0	-138	-56	0	0	0	0	0	-2,870	-435	2,415	-4,580
12. Losses & Own Use	-193	-126	0	0	-678	0	0	0	0	0	0	-632	-46	0	0	-104	-1,101
13. Statistical Discrepancy	32	0	0	0	72	-134	253	32	106	69	3	-258	0	0	0	-179	-75
14. Secondary Supply	-13,518	6,270	-6,256	0	5,431	998	2,195	287	564	198	744	447	0	-2,870	-435	2,131	-9,247
FINAL USE																	
15. Residential	0	0	0	0	191	0	0	0	191	1	0	0	0	0	0	438	629
16. Commercial	6	0	0	0	275	0	66	42	167	0	0	0	0	0	0	692	973
17. Industrial	1,244	0	0	0	950	29	615	288	16	3	0	0	0	407	0	993	3,593
18. Transport	61	0	0	0	4,000	2,141	1,296	6	0	0	557	0	0	0	0	4	4,065
19. Agriculture	0	0	0	0	40	0	40	0	0	0	0	0	0	0	0	5	45
20. Non-Energy Use	476	0	0	0	433	0	0	0	263	0	0	170	0	0	0	0	909
21. Total Final Use	1,787	0	0	0	5,889	2,169	2,017	336	636	3	557	170	0	407	0	2,131	10,214

ENERGY FLOW CHART 2009

COMMERCIAL ENERGY FLOW, ANNUAL 2009
In kilo tonnes of Oil Equivalent (ktoe)



NOTES OF ENERGY BALANCE

The net calorific value (NCV) was chosen as the basis of calculations rather than the gross calorific value (GCV). The Joule was used as the rigorous accounting unit, while the “tonne oil equivalent” (1 toe= 41.84 Gigajoules) was chosen as the final unit for presentation in the Energy Balance.

COMMERCIAL ENERGY BALANCE FORMAT

The rows of the Energy Balance tables contain the following items:-

Primary supply	refers to supply of energy that has not undergone the transformations / conversion process within the country.
Primary production (1)	refers to the quantity of fuels extracted. Data for natural gas excludes the amount of reinjected and flared gas. Gross production of hydro is shown in conventional fuel equivalent input.
Gas Flaring, Reinjection & Use (2)	refers to the quantity of gas flared, re-injected into the gas fields and use for production purpose.
Imports (3) and exports (4)	refer to the amount of primary and secondary energy obtained from, or supplied to other countries. In the energy balance format, imports always carry a positive and export a negative sign.
Bunkers (5)	refer to the amount of fuels delivered to ocean-going ships of all flags engaged in international traffic.
Stock change (6)	refers to the difference between the amounts of fuel in stocks at the beginning and end of year and should ideally cover producers, importers and industrial consumers. At this stage, however, only oil companies' stocks are taken into account. A negative sign indicates net increases while a positive sign indicates net decreases in stocks.
Total	under primary supply, 'total' is the addition of columns to obtain total availability. Under transformation, 'total' is the addition of columns to obtain transformation and conversion losses.
Gas Plants (9)	shows the input of natural gas into the LNG, MDS and GPP-LPG plants and their respective outputs.
Refineries (10), power stations and Co-generation & Private licensees (11)	show the input of any energy product (negative sign) for the purpose of converting it to one or more secondary products (positive sign).
Losses and own use (12)	refers to losses of electrical energy and natural gas which occur outside the utilities and plants (i.e. distribution losses) and the consumption of energy by utilities and plants for operating their installation (i.e. electricity for operating auxiliary equipment and petroleum products used in the crude distillation process respectively). It does not, however, include conversion loss that is accounted for in the 'total' column.
Secondary supply (14)	refers to the supply of energy from the transformation process and after deducting the energy sector's own use and losses, including power station use.
Residential and commercial (15 & 16)	not only refers to energy used within households and commercial establishments but includes government buildings and institutions.
Industrial (17)	is a very broad-based sector ranging from manufacturing to mining and construction. Diesel sales through distributors are assumed to be to industrial consumers.
Transport (18)	basically refers to all sales of motor gasoline and diesel from service stations and sales of aviation fuel. It also includes diesel and motor gasoline sold directly to government and military.

Agriculture (19)	covers agriculture, forestry and fishing.
Non-energy use (20)	use of products resulting from the transformation process for non-energy purpose (i.e. bitumen/lubricants, asphalt/greases) and use of energy products (such as natural gas) as industrial feedstocks
Final use (21)	refer to the quantity of energy of all kinds delivered to the final user.

NOTE:

- I) Non-commercial energy such as firewood and other biomass fuels have been excluded in the energy balance until more reliable data are made available.
- II) The output side of the final user's equipment of device i.e. useful energy, will not be dealt with in the balance as it will involve assessing the efficiencies of end - use equipment operating under various different conditions.

Notes of Electricity

Reserve Margin	Total capacity margin is defined as the amount of installed generation available over and above system peak load Reserve Margin = $\frac{\text{Installed Capacity} - \text{Peak Demand}}{\text{Peak Demand}}$
Peak Demand	The maximum power demand registered by a customer or a group of customers or a system in a stated period of time such as a month or a year. The value may be the maximum instantaneous load or more usually, the average load over a designated interval of time, such as half an hour and is normally stated in kilowatts or megawatts.
Installed Capacity	Installed capacity is defined as the maximum possible capacity (nameplate rating) that can be provided by the plant.
Dependable Capacity	The maximum capacity, modified for ambient limitations for a specified period of time, such as a month or a season.
Available Capacity	Available capacity refers to the Latest Tested Net Capacity. It is the dependable capacity, modified for equipment limitation at any time.
Unit Generated (Gross Generation)	The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatt-hours (kWh) or megawatt hours (MWh)
Unit Sent Out From Station(s) (Net Generation)	The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries.

Notes of Coal

Measured Resources	Refers to coal for which estimates of the rank and quantity have been computed to a high degree of geologic assurance, from sample analyses and measurements from closely spaced and geologically well known sample sites.
Indicated Resources	Refers to coal for which estimates of the rank, quality, and quantity have been computed to a moderate degree of geologic assurance, partly from sample analyses and measurements and partly from reasonable geologic projections.
Inferred Resources	Refers to coal of a low degree of geologic assurance in unexplored extensions of demonstrated resources for which estimates of the quality and size are based on geologic evidence and projection. Quantitative estimates are based on broad knowledge of the geologic character of the bed or region where few measurements or sampling points are available and on assumed continuation from demonstrated coal for which there is geologic evidence.

CONVERSION COEFFICIENTS AND EQUIVALENCE

TJ/1000 Tonnes ¹

Hard coal	29.3076	Lignite/brown coal	11.2834
Coke/oven coke	26.3768	Peat	9.5250
Gas coke	26.3768	Charcoal	28.8888
Brown coal coke	19.6361	Fuelwood ²	13.4734
Pattern fuel briquettes	29.3076	Lignite briquettes	19.6361

Natural Gas Products (TJ/1000 Tonnes)

Liquefied Natural Gas (LNG)	45.1923	Natural Gas	1 TJ/ million scf 0.9479 mmbtu/GJ
Butane	50.393	Ethane	1,067.82 GJ/mscf
Propane	49.473	Methane	1,131.31 GJ/mscf

Electricity

Electricity	3.6 TJ/GWh
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Petroleum Products (TJ/1000 Tonnes)

Crude petroleum (imported)	42.6133	Gas oil/diesel oil	42.4960
Crude petroleum (domestic)	43.3000	Residual fuel oil	41.4996
Plant condensate	44.3131	Naphtha	44.1289
Aviation gasoline (Avgas)	43.9614	White/industrial spirit	43.2078
Liquefied petroleum gas (LPG)	45.5440	Lubricants	42.1401
Motor gasoline	43.9614	Bitumen (asphalt)	41.8000
Natural gasoline	44.8992	Petroleum waxes	43.3334
Aviation turbine fuel (ATF)	43.1994	Petroleum coke	36.4000
Kerosene	43.1994	Other petroleum products	42.4960

1000 Tonnes Oil Equivalent (toe) = 41.84 TJ

Note:- 1 Unless otherwise indicated

2 Assuming 9.7 TJ/1000 cu m

CONVERSION COEFFICIENTS FOR CRUDE OIL AND PETROLEUM PRODUCTS

Barrels to tonne

Product	Barrels/tonne
Crude Oil - Import	7.33
- Local	7.60
Motor Gasoline	8.55
Diesel Oil	7.50
Fuel Oil	6.60
Kerosene	7.90
LPG	11.76
ATF	7.91
AV Gas	9.05
Non-energy	6.50

DEFINITION

The sources of energy covered in the Energy Balances are as follows:-

Natural Gas	Is a mixture of gaseous hydrocarbons (mainly methane), which occurs in either gas fields or in association with crude oil in oil fields.
LNG	Is a natural gas that is liquefied for ocean transportation and export.
Crude oil	Is a natural product that is extracted from mineral deposits and consists essentially of many different non-aromatic hydrocarbons (paraffinic, cyclonic, etc.).
Aviation gasoline (Avgas)	Is a special blended grade of gasoline for use in aircraft engines of the piston type. Distillation range normally falls within 30°C and 200°C.
Liquefied petroleum gas (LPG)	Commercial LPG consists essentially of a mixture of propane and butane gases which are held in the liquid state by pressure or refrigeration.
Motor gasoline (mogas)	Petroleum distillate used as fuel in spark- ignition internal combustion engines. Distillation range is within 30°C and 250°C.
Aviation turbine Fuel (ATF)	Fuel for use in aviation gas turbines mainly refined from kerosene. Distillation range from 150°C and 250°C.
Kerosene	Is a straight-run fraction from crude oil, with boiling range from 150°C to 250°C. Its main uses are for domestic lighting and cooking.
Diesel oil (or gas oil)	Distillation falls within 200°C and 340°C. Diesel fuel for high-speed diesel engines (i.e. automotive) is more critical of fuel quality than diesel for stationary and marine diesel engines. Marine oil usually consists of a blend of diesel oil and some residual (asphaltic) material.
Fuel oil	Heavy distillates, residues or blends of these, used as fuel for production of heat and power. Fuel oil production at the refinery is essentially a matter of selective blending of available components rather than of special processing. Fuel oil viscosities vary widely depending on the blend of distillates and residues.
Non-energy products	Refer mainly to naphtha, bitumen and lubricants, which are obtained by the refinery process from petroleum but used for non-energy purposes. Naphtha is a refined or partly refined light distillate, which is further, blended into motor gasoline or used as feed-stock in the chemical industry. Bitumen is a viscous liquid or solid, non-volatile and possesses waterproofing and adhesive properties. Lubricating oil is used for lubricating purposes and has distillation range from 380°C to 500°C.
Refinery gas	The gas released during the distillation of crude oil and comprises methane, ethane, propane and butane. Most refinery gas is retained in the refinery and used as fuel in plant operations.

Coal and coke	Solid fuels consisting essentially of carbon, hydrogen, oxygen and sulphur. Coal in the energy balance is mainly bituminous coal (medium grade in terms of energy content) and some anthracite (high quality hard coal). Coke is obtained from coal by heating at high temperature in the absence of air.
Hydropower	Is the inferred primary energy available for electricity production and is shown in terms of conventional fossil fuel equivalent using the average thermal efficiency of conversion for the year, i.e. the hypothetical amount of fossil fuel, which would be needed to produce the same amount of electricity in existing thermal power plants.
Electricity Production	Production of electricity refers to production from public utilities as well as independent power producers (IPPs) and private installations & co-generation plants which obtain licenses from the Electricity and Gas Supply Department. Figures for 'fuel input' into power stations & co-generation plants were only available for Tenaga Nasional Berhad, SESCO, SESB, IPPs as well as GDC (M). Estimates were made using average conversion efficiency to obtain the fuel input into private installations.