



# NATIONAL ENERGY BALANCE

# 20 18





# NATIONAL ENERGY BALANCE

# 20 18



The data and information contained in this yearly publication is prepared and provided for general information purposes only. While the Energy Commission made reasonable efforts to ensure that the information contained in this publication is accurate, the Energy Commission shall not have any liability (whether arising from negligence, negligent misstatement, or otherwise) for any statements, opinions, information or matter (expressed or implied) arising out of, contained in or derived from, or for any omissions from, the information in this publication, or in respect of a person's use of the information (including any reliance on its currency, accuracy, reliability or completeness) contained in this publication.

© All rights reserved. Reproduction of all or any part of this publication via electronic, mechanical, recording or other medium is strictly prohibited without written consent from the Energy Commission.

---

**PUBLISHED BY:**

**SURUHANJAYA TENAGA (ENERGY COMMISSION)**

No. 12, Jalan Tun Hussein, Precinct 2, 62100 Putrajaya, Malaysia

Tel: (03)8870 8500 Fax: (03)8888 8637

Toll Free Number: 1 – 800 – 2222 – 78 (ST)

[www.st.gov.my](http://www.st.gov.my)

<https://meih.st.gov.my>

ISSN NO.: 0128 – 6323

ST(P) 1/06/2020

PRINTED IN MALAYSIA

# TABLE OF CONTENTS

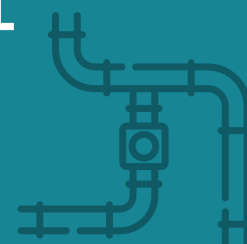


- 5** PREFACE
- 6** INTRODUCTION
- 7** DATA COMPILATION
- 8** EXECUTIVE SUMMARY

## KEY ECONOMIC AND ENERGY DATA



## NATURAL GAS



- 12** Table 1: Key Economic and Energy Data
- 13** Table 2: Key Economic and Energy Data by Region
- 16** Figure 1: Trends in GDP, Primary Energy Supply and Final Energy Consumption
- 17** Figure 2: Primary Energy Supply, Electricity Consumption and Final Energy Consumption per Capita
- 18** Figure 3: Trends in GDP and Electricity Consumption
- 19** Figure 4: Annual Growth Rates of GDP, Primary Energy Supply, Final Energy Consumption and Electricity Consumption
- 20** Figure 5: Primary and Final Energy Intensity
- 21** Figure 6: Electricity Intensity
- 22** Figure 7: Final Energy and Electricity Elasticity
- 23** Figure 8: Primary Energy Supply
- 24** Figure 9: Final Energy Consumption by Sectors
- 25** Figure 10: Final Energy Consumption by Fuel Type
- 26** Figure 11: Official Selling Prices of Malaysian Crude Oil
- 27** Figure 12: Ex-Singapore Prices of Major Petroleum Products

- 28** Figure 13: Annual Liquefied Petroleum Gas (LPG) Contract Prices – Arab Gulf
- 29** Figure 14: Average Annual Prices of Natural Gas in Malaysia
- 30** Figure 15: Final Energy Consumption per Capita in ASEAN
- 31** Figure 16: Final Energy Intensity in ASEAN

- 40** Table 6: Resources and Production of Natural Gas as of 1 January, 2018
- 40** Table 7: Consumption of Natural Gas in MMscf, 2018
- 41** Figure 21: Export and Import of Piped Natural Gas and LNG
- 42** Figure 22: Natural Gas Consumption by Sector
- 43** Figure 23: Conversion in Gas Plants

## OIL



## COAL



- 34** Table 3: Resources and Production of Oil as of 1 January, 2018
- 34** Table 4: Refinery Licensed Capacity, 2018
- 34** Table 5: Breakdown on Sales of Petroleum Products in Thousand Barrels, 2018
- 35** Figure 17: Net Export of Crude Oil
- 36** Figure 18: Export and Import of Petroleum Products
- 37** Figure 19: Production of Petroleum Products from Refineries
- 38** Figure 20: Final Consumption for Petroleum Products

- 46** Table 8: Resources and Production of Coal as of 31 December, 2018
- 46** Table 9: Consumption of Coal in Metric Tonnes, 2018
- 47** Figure 24: Net Import of Coal
- 48** Figure 25: Coal Consumption by Sector



## ELECTRICITY

- 50** Table 10: Installed Capacity as of 31 December 2018, in MW
- Figure 26: Installed Capacity as of 31 December, 2018
- 50** Table 11: Available Capacity as of 31 December 2018, in MW
- 51** Figure 27: Available Capacity as of 31 December, 2018
- 51** Table 12: Installed Capacity of Major Hydro Power Stations, 2018

- 53** Table 13: Installed Capacity of Mini Hydro Power Stations, 2018
- 54** Table 14: Transmission Network in Circuit – kilometres, 2018
- 54** Table 15: Distribution Network in Circuit – kilometres, 2018
- 54** Table 16: Gross Generation, Consumption, Available Capacity, Peak Demand and Reserve Margin for Electricity in Malaysia, 2018
- 55** Figure 28: Energy Input in Power Stations, 2018

- 55** Figure 29: Generation Mix by Fuel Type, 2018
- 56** Table 17: Electricity Consumption by Sector in GWh, 2018
- 56** Figure 30: Electricity Consumption by Sector, 2018
- 57** Figure 31: Electricity Consumption by Sector
- 58** Table 18: Electricity Generation and Installed Capacity of Renewable Energy by Public Licensees by Region in 2018
- 59** Table 19: Electricity Generation and Installed Capacity of Renewable Energy by Private Licensees by Region in 2018



## KEY ENERGY STATISTICS

- 62** Table 20: Primary Energy Supply in ktoe
- 63** Table 21: Net Import and Export of Energy in ktoe
- 64** Table 22: Conversion in Gas Plants in ktoe
- 65** Table 23: Conversion in Refineries in ktoe
- 66** Table 24: Conversion in Power Stations (exclude co-generation & private licensed plants) in ktoe
- 67** Table 25: Final Energy Consumption by Sector in ktoe
- 68** Table 26: Final Energy Consumption by Fuel Type in ktoe
- 69** Table 27: Final Consumption for Petroleum Products in ktoe
- 70** Table 28: Selected Energy and Economic Indicators (1990-2018)
- 72** Table 29: Energy Balance Table in 2018 (kilotonnes of oil equivalent)

## 76 | ENERGY FLOW CHART

### NOTES OF ENERGY BALANCE

- 78** Energy Balance Format
- 79** Notes on Electricity
- 79** Notes on Coal
- 80** Notes on GDP
- 80** Notes on GNI

### 81 | CONVERSION COEFFICIENTS AND EQUIVALENCE

### 82 | DEFINITION

# PREFACE

**The year 2018 is what would be considered as the year of unprecedented changes. Nevertheless, our economy remained resilient; it expanded at a more moderate pace, is supported by strong fundamentals and policy flexibility. The energy sector's performance remained strong and we are able to maintain the security and reliability of energy supply. As a regulator of the electricity and piped gas supply industry, the Commission strives to strike a balance between the consumers and providers of energy to ensure safe and reliable supply at reasonable prices.**



National Energy Balance (NEB) is the official energy data in Malaysia. It is an important document, as reliable and timely monitoring of the supply and consumption of energy becomes indispensable for sound decision-making. The basic concept behind the NEB is that the energy flow within the country for any particular year have to be such that 'Energy Supply' is always equal to 'Energy Consumption'. From this publication, we can see Malaysia's energy structure from production until consumption, covering all types of energy that is available in the country, including primary energy and secondary energy. The period covered is from 1990 until 2018.

In 2018, there were various trends emerging with the advancement of technology. There were big talks on Industry 4.0 and Internet of Things (IoT) and how the energy sector could adapt to these changes. Digitalisation and Artificial Intelligence (AI) will be the future and Malaysia should not be left behind in applying them. The energy sector for one, should be more innovative in integrating these technologies. With these technologies in place the efficiency of resources will be greatly improved.

Energy market liberalisation is also one of the main agenda in the Malaysian energy sector. This is one of the key characteristics of a world-class energy regulator, and this is in line with the Commission's vision. The energy sector has shown positive progress in opening up the market with the Third Party Access (TPA) framework, New Enhanced Despatch Arrangement (NEDA), implementation of subsidy rationalisation, utility accounts unbundling, generation capacity competitive bidding, and ringfencing of Single Buyer and Grid System Operator. Opening the electricity market fully from generation to distribution is the ideal, however, it will require a lot of studies and time to ensure that a balance is struck for both the suppliers and consumers.

In Southeast Asia, the potential of Renewable Energy (RE) is not as big as countries in Europe where they could have more than 60% of RE in their energy mix.

However, Malaysia's geologically strategic position near the equator gives us vast opportunities for solar power. In Malaysia, we have integrated solar in most sectors, including the domestic, industry, commercial and who knows, soon our cars will be using solar PV panels. Besides that, we also have big potential for hydro power in the region of Sarawak, and consequently, the excess can be converted into hydrogen fuel.

I would like to express my heartfelt gratitude to the Honourable Minister and the Ministry of Energy and Natural Resources for their guidance and support for the annual publication of the NEB. I strongly believe that this publication will serve as a useful guide for policy makers and authorities to shape our energy industry to becoming world class. My sincere appreciation also goes out to our stakeholders for their contributions and we look forward to more collaborative efforts in the future.

Thank you.

A handwritten signature in black ink, appearing to read 'Azian', with a long horizontal stroke extending to the right and a vertical line extending downwards from the end of the horizontal stroke.

**Dato' Azian bin Osman**  
Chairman  
Energy Commission

# INTRODUCTION



Renewable energy (RE) is now one of the main agenda in the country to reduce dependency on fossil fuels as well as to conserve the environment for climate change. Currently, our RE mix (including large hydro) is at 22.9% and is projected to increase further with initiatives led by the Government, including Feed in Tariff (FiT), Net Energy Metering (NEM) and Large-Scale Solar (LSS). Existing policies on RE in Malaysia need to be supported not only by the Government but also by the private sector. Attractive and user-friendly mechanism of financing RE projects will be one of the main talking points in this area.

Energy efficiency will also play a vital role to combat climate change as many potential energy saving measures can be adopted in Malaysia. The Government of Malaysia is at the final stage of drafting the Energy Efficiency and Conservation Act (EECA) bill. This act will be instrumental for the mandatory implementation of energy efficiency initiatives, so that an improvement in energy intensity can be expected in the long run.

**The Malaysian economy recorded slower growth rate of 4.8% in 2018 compared to the previous year at 5.8% due to global trade tensions and uncertainty of the economy. The change in policy focus, while imperative for long-term sustainability, entailed inevitable short-term economic growth trade-offs through lower public sector spending.**

Malaysia continues to experience strong growth of energy supply and demand in 2018 despite the lower growth in economy. Total primary energy supply recorded an increase of 1.6% to settle at 99,873 ktoe. In tandem with economic growth, our final energy consumption continues to grow by 3.5% to register at 64,658 ktoe. Interestingly, our final energy consumption growth managed to remain below the Gross Domestic Product (GDP) growth rate. Final energy elasticity which is formulated as the growth rate of final energy consumption divided by the growth rate of GDP, was reported at 0.73 in 2018 compared to 1.58 in 2017. This indication showed that Malaysia managed to generate economy with less energy consumption.

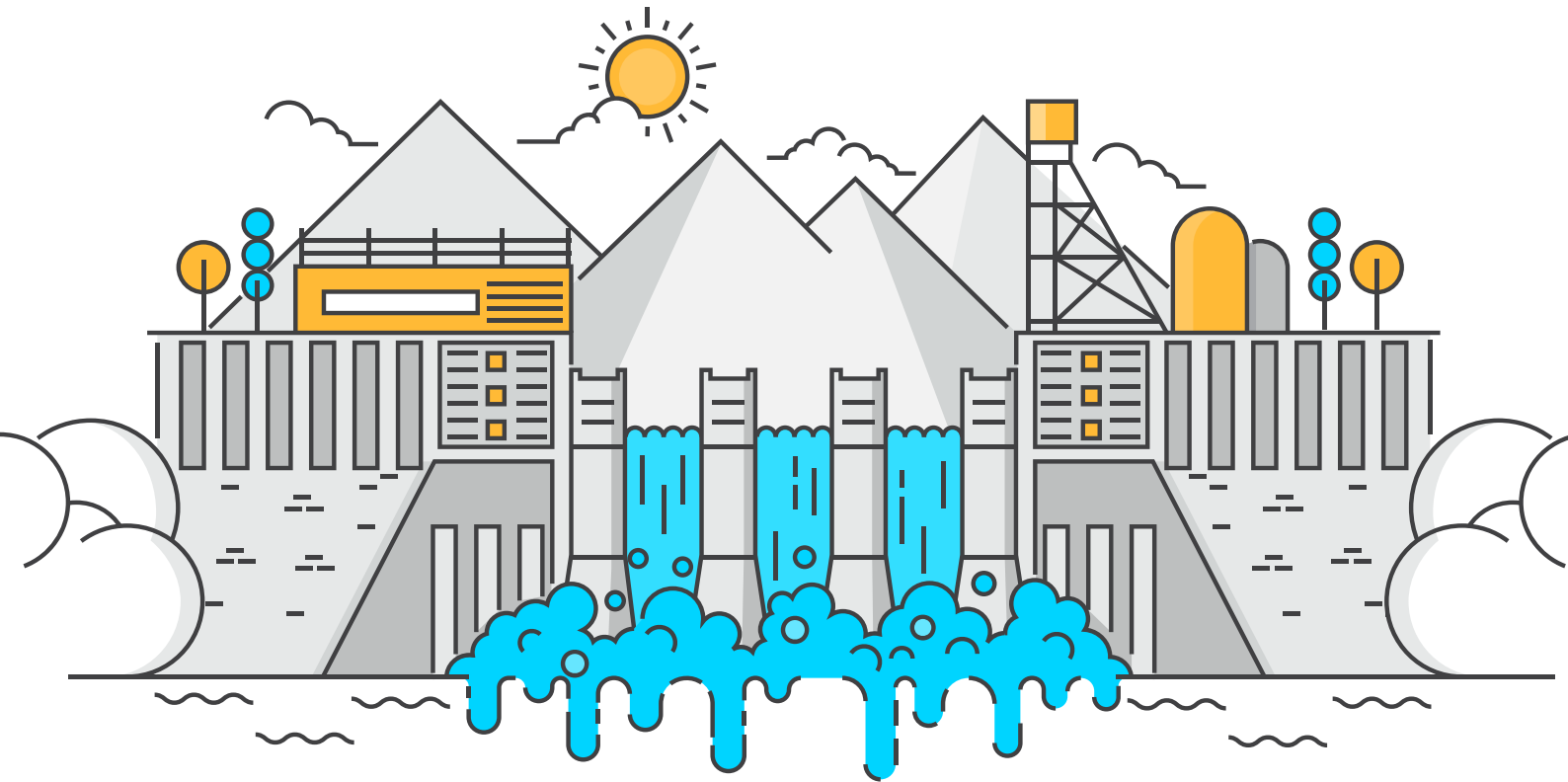
From time to time, we try to improve the quality of our energy data which includes a wider coverage, better segregation of fuel and sectors, and updating the NEB format based on the current energy development. Starting 2018, we have collected electricity consumption data for the road transport sector. Although the share of electric vehicles (EV) is still small at the moment, the values are expected to increase in the coming years.

On behalf of the Energy Commission, I would like to extend my sincere appreciation for all the contributions, cooperation and timely submission of data by the Government Agencies, oil and gas companies, public utilities, independent power producers (IPP), cement, iron and steel manufacturers and all relevant parties in making the production of NEB 2018 a reality. I hope that the NEB 2018 will serve its purpose by allowing its readers to further understand the trends and directions of our energy industry.

Thank you.

**Abdul Razib bin Dawood**  
Chief Executive Officer  
Energy Commission





The first stage in compiling the overall energy balance is 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 consumption 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 the 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 the actual stock change data and difference in data compilation at source and the second is 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 minimise 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 under “losses and own use”.

Stock changes are not fully accounted for in the balance because it is not possible to obtain accurate stock data of energy commodities at the distributors’ and users’ levels. Only oil companies’ stocks are readily available, and these would include stocks at refineries and depots. Therefore, the statistical discrepancy might also include unrecorded stock changes. Coal stocks at power stations and industry manufacturers are also considered in this report.

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

$$\text{Primary Energy Supply} = \text{Production + Imports - Exports - Bunkers +/- Stock change}$$

$$\begin{aligned} \text{Energy Consumption} &= \text{Gross inland consumption} \\ &= \text{Final energy consumption + Consumption of the energy transformation sector +} \\ &\quad \text{Distribution losses + Non-energy consumption} \end{aligned}$$

# EXECUTIVE SUMMARY



## ENERGY OVERVIEW

Malaysia is a sovereign nation that adopts the system with various races and religions living in harmony. Bountiful sources of energy such as oil, gas, hydro and biomass make Malaysia independent from external sources of energy. In fact, Malaysia is still considered as one of the major energy exporting countries in the world.

Following a robust growth in 2017, Malaysia's economic growth was expected to normalise in 2018. The economy, however, was confronted with several external and domestic challenges during the year. Major policy and political shifts, arising partly from the global trade tensions and the historic change of government in Malaysia, became sources of uncertainty for the economy. Unanticipated supply disruptions in the commodity sectors adversely affected Malaysia's economic performance, resulting in a larger-than-expected moderation in growth. Overall, the Malaysian economy recorded a respectable growth of 4.8% in 2018, demonstrating considerable resilience in the face of multiple headwinds.

The energy sector in 2018 showed lower growth rates compared to 2017, in tandem with lower growth rate of GDP. Total primary energy supply posted an increase of 1.6% to settle at 99,873 ktoe, while total final energy consumption growth was at 3.5% to register at 64,658 ktoe.

## PRIMARY ENERGY SUPPLY

Primary energy supply marked an increase of 1.6% from the 2017 level to register at 99,873 ktoe (2017: 98,298 ktoe). All fuels recorded an increase except for natural gas, as it dropped slightly by 0.6%. This was potentially due to the gas leak incident at Sabah-Sarawak Gas Pipeline (SSGP) located in Long Luping, Lawas, Sarawak on 10 January 2018. As a result of the incident, gas supply from the Sabah Oil and Gas Terminal (SOGT) to PETRONAS LNG Complex (PLC) in Bintulu has been stopped to ensure the safety of the incident site. Furthermore, the gross production of natural gas also experienced a downward trend of 4.1%. Coal and coke remained the biggest growth with 7.3%. Higher demand from the power sector had influenced the strong supply growth for coal and coke. Renewable Energy (RE) including large hydro registered an increase of 4.0% with larger output of hydro from Sarawak as well as more commissioning of RE projects under the Feed in Tariff (FiT), Net Energy Metering (NEM) and Large-Scale Solar (LSS) which was observed during 2018. Crude oil, petroleum products and others increased slightly to 29,429 ktoe or 0.2% (2017: 29,380 ktoe).

All the fuel shares in 2018 almost remain unchanged from 2017. Natural gas still dominates, with the share of 41.0%, followed by crude oil, petroleum products and others with 29.5%. The share of coal and coke increased to 22.3% (2017: 21.1%) and hydropower and renewable energy at 7.2% (2017: 7.1%).

## ENERGY TRANSFORMATION

Malaysia is rich with energy resources such as oil and gas; hence we have the facilities that could transform the primary energy into secondary energy. Mainly, these secondary energy is consumed locally and exported to other countries. In general, there are three types of energy transformation process in the country and they are gas processing plants, oil refineries and power stations.

Generally, there are four types of gas processing plants in Malaysia, namely Malaysia Liquefied Natural Gas (MLNG) that transforms natural gas into Liquefied Natural Gas (LNG) for export purposes, Gas Processing Plant – Liquefied Petroleum Products (GPP-LPG) that transforms natural gas into Liquefied Petroleum Gas (LPG), Middle Distillate Synthesis (MDS) plant that transforms natural gas into petroleum products and Regasification Gas Terminal (RGT) that transforms LNG into natural gas. The MLNG output recorded a reduction of 8.9% from 2017 level to register at 25,920 ktoe due to lower supply of natural gas. MDS plants also showed a downtrend in terms of the output with negative growth of 1.0% to settle at 501 ktoe. However, the output from GPP-LPG plant increased by 3.3% and a higher LPG consumption by end-users was observed in 2018. The RGT supply into the country decreased by 23.1% to register at 1,383 ktoe.

As of 31 December 2018, Malaysia's total refinery capacity is at 492,000 barrels per day excluding 74,300 barrels per day of condensates splitter. All of the oil refineries are located in Peninsular Malaysia. The total input of crude oil into the refineries was 25,533 ktoe, which declined by 6.2% from the previous year. Majority of the crude oil input which constituted of 63.2% was locally sourced, while the remaining 36.8% was imported. The total output from oil refineries decreased by 9.4% to settle at 24,669 ktoe. Majority of the petroleum products share remained consistent from the previous year's level with diesel and petrol representing 39.2% and 22.4% respectively. This was followed by Aviation Turbine Fuel (ATF) and Aviation (AV) Gas at 14.0%, non-energy products at 10.3%, fuel oil at 9.9%, LPG at 3.6%, refinery gas at 0.5% and kerosene at 0.1%.

## ELECTRICITY

Total installed capacity in Malaysia was 33,991 MW as of 31 December 2018. Natural gas appeared as the biggest share with 43.7% followed by coal at 31.4%, hydro (major and mini) at 18.1%, diesel/MFO at 2.5%, solar power at 2.3%, biomass at 1.6%, biogas at 0.2%, and others at 0.2%. From the total installed capacity, 79.4% were in Peninsular Malaysia, while the rest were 15.0% in Sarawak and 5.6% in Sabah. The peak demand in Peninsular Malaysia was recorded at 18,338 MW on 15 August 2018, which was a 3.1% increase from 17,790 MW in 2017. In Sabah, the peak demand rose by 1.8% (938 MW to 955 MW) and in Sarawak, the peak demand increased slightly by 0.4% from 3,489 MW to 3,504 MW. Peak demand is a point when the electricity consumption is at its highest, at a time of a day.

The types of power stations in Malaysia consist of hydro, thermal and self-generation plants. The total energy input in power stations (excluding self-generation) registered at 38,723 ktoe, an increase of 3.2% from the previous year. Coal still dominates the fuel input in power stations with 52.9% followed by natural gas at 29.8%, hydropower at 16.1%, RE at 0.7% and the remaining 0.5% from oil. Total RE recorded a remarkable growth of 49.9% in 2018 compared to 2017 as more aggressive measures has been taken up to achieve the target of 20% of renewable energy capacity mix by 2025 set by the Government.

The total electricity generation (excluding self-generation) in 2018 was recorded at 163,415 GWh, an increase of 5.1% from 2017 level at 155,456 GWh. Coal remained as the highest fuel consumed to generate electricity with 47.3% of generation mix. This was followed by natural gas at 35.7%, hydropower at 16.1%, renewables at 0.6% and oil at 0.3%. The total electricity consumption stood at 152,866 GWh in 2018, an increase by 4.3% from the 2017 level. From the total of electricity consumption, 78.9% of electricity was consumed in Peninsular Malaysia, followed by Sarawak at 17.4% and Sabah at 3.7%. Almost half of Malaysia's total electricity was consumed by the industrial sector in 2018 at 49.8% or 76,096 GWh. The commercial sector consumed 29.0% of total electricity consumption while residential sector consumed 20.5%. Agriculture and transport sector consumed 0.4% and 0.3% of total electricity consumption, respectively.

## FINAL ENERGY CONSUMPTION

In 2018, the total energy consumption was reported to be 64,658 ktoe, an increase by 3.5% from the previous year. All sectors showed an upward trend in 2018 except for the transport, residential and commercial sectors. The transport sector's energy consumption declined by 2.0% to settle at 23,555 ktoe, while residential and commercial sector dropped to 7,773 ktoe. The agriculture sector (including fishery) recorded the highest growth with 51.5% followed by the industry sector which increased by 9.1% to settle at 19,046 ktoe. The non-energy sector which

uses energy as feedstock increased by 6.0% in 2018. The transport sector still dominates the share with 36.4%, followed by the industrial sector at 29.5%. 20.5% of total final energy consumption was consumed by non-energy use, 12.0% by residential and commercial and remaining 1.6% was consumed by the agriculture sector.

All fuel types recorded an increase in 2018 except for petroleum products, which declined by 1.3% to settle at 30,409 ktoe. The reduction was due to the lower petrol demand in the transport sector during the period. Natural gas consumption showed strong growth of 12.0% at 18,851 ktoe due to greater demand of natural gas for heating. Electricity consumption also recorded an increase with a growth of 4.3% to register at 13,153 ktoe. Final energy consumption of coal and coke increased slightly in 2018 at 0.2% as demand for cement remained strong with more construction projects on site. Most of the coal and coke was consumed by cement manufacturers at 88.2% while the remaining 11.8% was consumed by iron and steel manufacturers.

Malaysia's final energy consumption per capita increased by 2.3% to settle at 2.0 toe per person. The final electricity consumption per capita followed suit, with a growth rate of 3.2% at 4,721 kWh per person in 2018. Improved efficiency was observed in 2018 as final energy intensity declined by 1.2% to register at 47.44 toe/RM Million. Final electricity intensity also decreased by 0.4% to settle at 0.112 GWh/RM Million. As a result, Malaysia's energy and electricity elasticity in 2018 were reported lower than 1.0 as our GDP growth rate is greater than energy and electricity consumption growth rates.

## CONCLUSION

In 2018, Malaysia energy sector's performance managed to continue its good momentum despite the political and economic uncertainties. Energy efficiency and RE became more significant as we try to strike a balance between the energy security, sustainability and equity or better known as the energy trilemma. Going forward, challenges will present itself, thus Malaysia needs to optimise its strength to overcome any shock or unwanted scenarios.





# KEY ECONOMIC AND ENERGY DATA



**TABLE 1: KEY ECONOMIC AND ENERGY DATA**

	2018				
	1Q	2Q	3Q	4Q	Total
GDP at current prices (RM million) *	346,708	353,821	367,778	379,145	<b>1,447,451</b>
GDP at 2015 prices (RM million) *	326,800	332,254	345,329	357,432	<b>1,362,815</b>
GNI at current prices (RM million) *	338,406	343,128	353,729	367,106	<b>1,402,369</b>
Population ('000 people) **	32,292	32,382	32,432	32,482	<b>32,382</b>
Primary Energy Supply (ktoe)	24,273	24,698	25,246	25,656	<b>99,873</b>
Final Energy Consumption (ktoe)	16,409	15,649	16,003	16,597	<b>64,658</b>
Electricity Consumption (ktoe)	3,176	3,323	3,355	3,300	<b>13,153</b>
Electricity Consumption (GWh)	36,912	38,615	38,987	38,352	<b>152,866</b>
<b>Per Capita</b>					
GDP at Current Prices (RM)*	42,496	43,705	45,360	46,690	<b>44,699</b>
Primary Energy Supply (toe)	0.752	0.763	0.777	0.788	<b>3.084</b>
Final Energy Consumption (toe)	0.508	0.483	0.493	0.510	<b>1.997</b>
Electricity Consumption (kWh)	1,143	1,192	1,202	1,181	<b>4,721</b>
<b>Energy Intensity</b>					
Primary Energy Supply (toe/GDP at 2015 prices (RM million))	74.27	74.11	73.11	71.78	<b>73.28</b>
Final Energy Consumption (toe/GDP at 2015 prices (RM million))	50.2	47.0	46.3	46.4	<b>47.4</b>
Electricity Consumption (toe/GDP at 2015 prices (RM million))	9.7	10.0	9.7	9.2	<b>9.7</b>
Electricity Consumption (GWh/GDP at 2015 prices (RM million))	0.113	0.116	0.113	0.107	<b>0.112</b>

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

(\*\*) : Mid-year population data is from the Department of Statistics Malaysia

**TABLE 2: KEY ECONOMIC AND ENERGY DATA BY REGION**

Peninsular Malaysia	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP at Current Prices (RM million) *	516,321	571,945	651,915	610,691	684,057	751,734	806,569	849,891	925,232	975,581	1,038,585	1,131,564	1,193,179
GDP at 2015 Prices (RM million) *	628,560	667,980	701,990	688,320	744,624	784,737	833,245	873,486	928,517	975,581	1,020,869	1,079,978	1,137,741
Population ('000 people) **	21,180	21,577	21,970	22,363	22,753	23,099	23,417	23,868	24,281	24,669	24,995	25,303	25,593
Final Energy Consumption (ktoe)	34,390	37,921	38,530	34,521	35,593	35,968	36,683	41,859	42,470	43,011	45,872	46,520	47,446
Electricity Consumption (ktoe)	6,669	7,030	7,307	7,567	8,145	8,427	8,791	9,108	9,315	9,531	10,026	10,004	10,378
Electricity Consumption (GWh)	77,504	81,710	84,924	87,950	94,666	97,939	102,174	105,861	108,259	110,770	116,529	116,272	120,617
<b>Per Capita</b>													
GDP at Current Prices (RM)*	24,378	26,508	29,674	27,308	30,064	32,544	34,444	35,608	38,105	39,547	41,551	44,721	46,621
Final Energy Consumption (toe)	1.624	1.757	1.754	1.544	1.564	1.557	1.567	1.754	1.749	1.744	1.835	1.839	1.854
Electricity Consumption (kWh)	3,659	3,787	3,866	3,933	4,161	4,240	4,363	4,435	4,459	4,490	4,662	4,595	4,713
<b>Energy Intensity</b>													
Final Energy Consumption (toe/GDP at 2015 prices (RM million))	54.7	56.8	54.9	50.2	47.8	45.8	44.0	47.9	45.7	44.1	44.9	43.1	41.7
Electricity Consumption (toe/GDP at 2015 prices (RM million))	10.6	10.5	10.4	11.0	10.9	10.7	10.6	10.4	10.0	9.8	9.8	9.3	9.1
Electricity Consumption (GWh/GDP at 2015 prices (RM million))	0.123	0.122	0.121	0.128	0.127	0.125	0.123	0.121	0.117	0.114	0.114	0.108	0.106

Note (\*): 1. GDP data by State is from the Department of Statistics Malaysia

2. GDP for Peninsular Malaysia including Supra State (Supra State covers production activities that beyond the centre of predominant economic interest for any state)

3. GDP data by State from 2006 until 2014 were estimated by the Energy Commission

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

Sabah	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP at Current Prices (RM million) *	40,997	48,541	60,829	55,574	62,043	70,269	71,958	72,981	78,258	79,775	86,924	101,953	108,212
GDP at 2015 prices (RM million) *	53,354	55,130	60,190	63,076	64,926	66,693	69,014	71,531	75,093	79,775	83,930	90,598	92,284
Population ('000 people) **	3,045	3,116	3,190	3,267	3,348	3,435	3,523	3,703	3,764	3,816	3,900	3,954	3,997
Final Energy Consumption (ktoe)	2,587	2,879	3,068	3,046	2,758	3,466	4,671	4,097	4,128	3,845	5,015	9,512	6,598
Electricity Consumption (ktoe)	255	285	299	329	355	368	425	439	423	499	487	477	484
Electricity Consumption (GWh)	2,969	3,317	3,474	3,818	4,127	4,275	4,943	5,097	4,919	5,805	5,665	5,545	5,630
<b>Per Capita</b>													
GDP at Current Prices (RM)*	13,464	15,580	19,071	17,009	18,530	20,457	20,424	19,709	20,793	20,908	22,291	25,788	27,071
Final Energy Consumption (toe)	0.850	0.924	0.962	0.932	0.824	1.009	1.326	1.106	1.097	1.008	1.286	2.406	1.651
Electricity Consumption (kWh)	975	1,065	1,089	1,169	1,233	1,245	1,403	1,377	1,307	1,521	1,453	1,402	1,408
<b>Energy Intensity</b>													
Final Energy Consumption (toe/GDP at 2015 prices (RM million))	48.5	52.2	51.0	48.3	42.5	52.0	67.7	57.3	55.0	48.2	59.8	105.0	71.5
Electricity Consumption (toe/GDP at 2015 prices (RM million))	4.8	5.2	5.0	5.2	5.5	5.5	6.2	6.1	5.6	6.3	5.8	5.3	5.2
Electricity Consumption (GWh/GDP at 2015 prices (RM million))	0.056	0.060	0.058	0.061	0.064	0.064	0.072	0.071	0.066	0.073	0.067	0.061	0.061

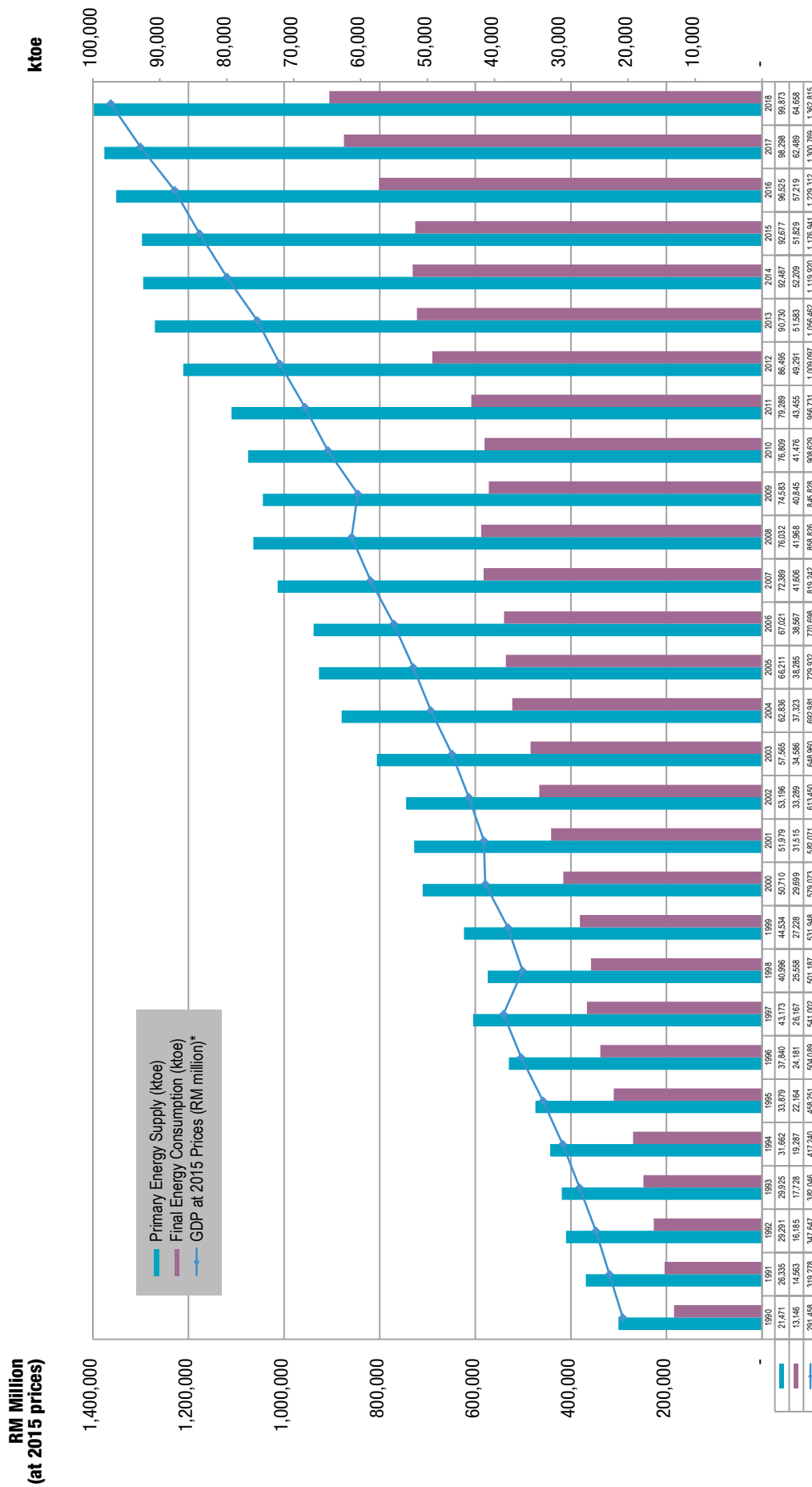
Note (\*) : 1. GDP data by State is from the Department of Statistics Malaysia  
2. GDP for Sabah includes WP Labuan  
3. GDP data by State from 2006 until 2014 were estimated by the Energy Commission  
(\*\*) : Mid-year population data is from the Department of Statistics Malaysia



Sarawak	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP at Current Prices (RM million) *	67,634	76,287	93,639	80,309	88,935	104,840	108,833	112,650	121,323	121,585	124,189	138,793	146,060
GDP at 2015 prices (RM million) *	89,707	97,176	97,455	95,524	99,653	106,023	107,524	112,186	117,070	121,585	124,513	130,193	132,789
Population ('000 people) **	2,325	2,366	2,408	2,451	2,487	2,528	2,570	2,643	2,664	2,702	2,739	2,766	2,792
Final Energy Consumption (ktoe)	3,330	3,461	3,302	3,277	3,125	4,086	5,358	5,628	5,612	4,951	6,331	6,458	10,614
Electricity Consumption (ktoe)	348	368	380	391	493	445	795	1,043	1,304	1,344	1,878	2,126	2,290
Electricity Consumption (GWh)	4,045	4,277	4,416	4,544	5,730	5,172	9,237	12,118	15,152	15,624	21,831	24,703	26,618
<b>Per Capita</b>													
GDP at Current Prices (RM)*	38,585	41,070	40,465	38,977	40,068	41,941	41,843	42,455	43,945	45,007	45,464	47,064	47,566
Final Energy Consumption (toe)	1.432	1.463	1.371	1.337	1.256	1.616	2.085	2.130	2.106	1.833	2.312	2.335	3.802
Electricity Consumption (kWh)	1,740	1,808	1,834	1,854	2,304	2,046	3,594	4,586	5,688	5,784	7,971	8,930	9,535
<b>Energy Intensity</b>													
Final Energy Consumption (toe/GDP at 2015 prices (RM million))	37.1	35.6	33.9	34.3	31.4	38.5	49.8	50.2	47.9	40.7	50.8	49.6	79.9
Electricity Consumption (toe/GDP at 2015 prices (RM million))	3.9	3.8	3.9	4.1	4.9	4.2	7.4	9.3	11.1	11.1	15.1	16.3	17.2
Electricity Consumption (GWh/GDP at 2015 prices (RM million))	0.045	0.044	0.045	0.048	0.057	0.049	0.086	0.108	0.129	0.129	0.175	0.190	0.200

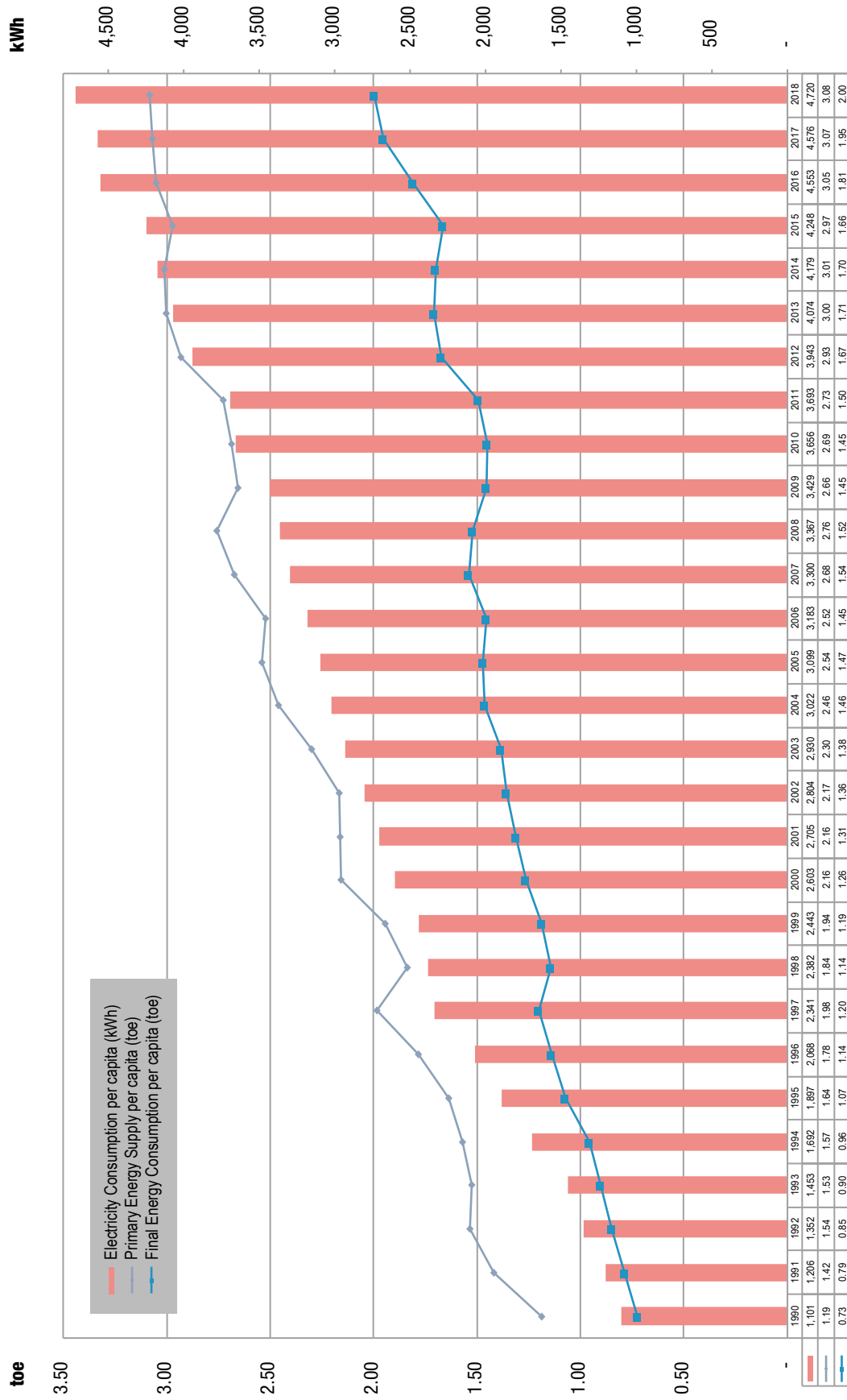
Note (\*) : 1. GDP data by State is from the Department of Statistics Malaysia  
2. GDP data by State from 2006 until 2014 were estimated by the Energy Commission  
(\*\*) : Mid-year population data is from the Department of Statistics Malaysia

**FIGURE 1: TRENDS IN GDP, PRIMARY ENERGY SUPPLY AND FINAL ENERGY CONSUMPTION**



Source : GDP data is from the Department of Statistics Malaysia  
 Note : GDP at 2015 Prices (RM Million) for 1990 until 2014 was calculated by the Energy Commission

**FIGURE 2: PRIMARY ENERGY SUPPLY, ELECTRICITY CONSUMPTION AND FINAL ENERGY CONSUMPTION PER CAPITA**



Source : Population data is from the Department of Statistics Malaysia

Note : Based on the Energy Commission's calculations

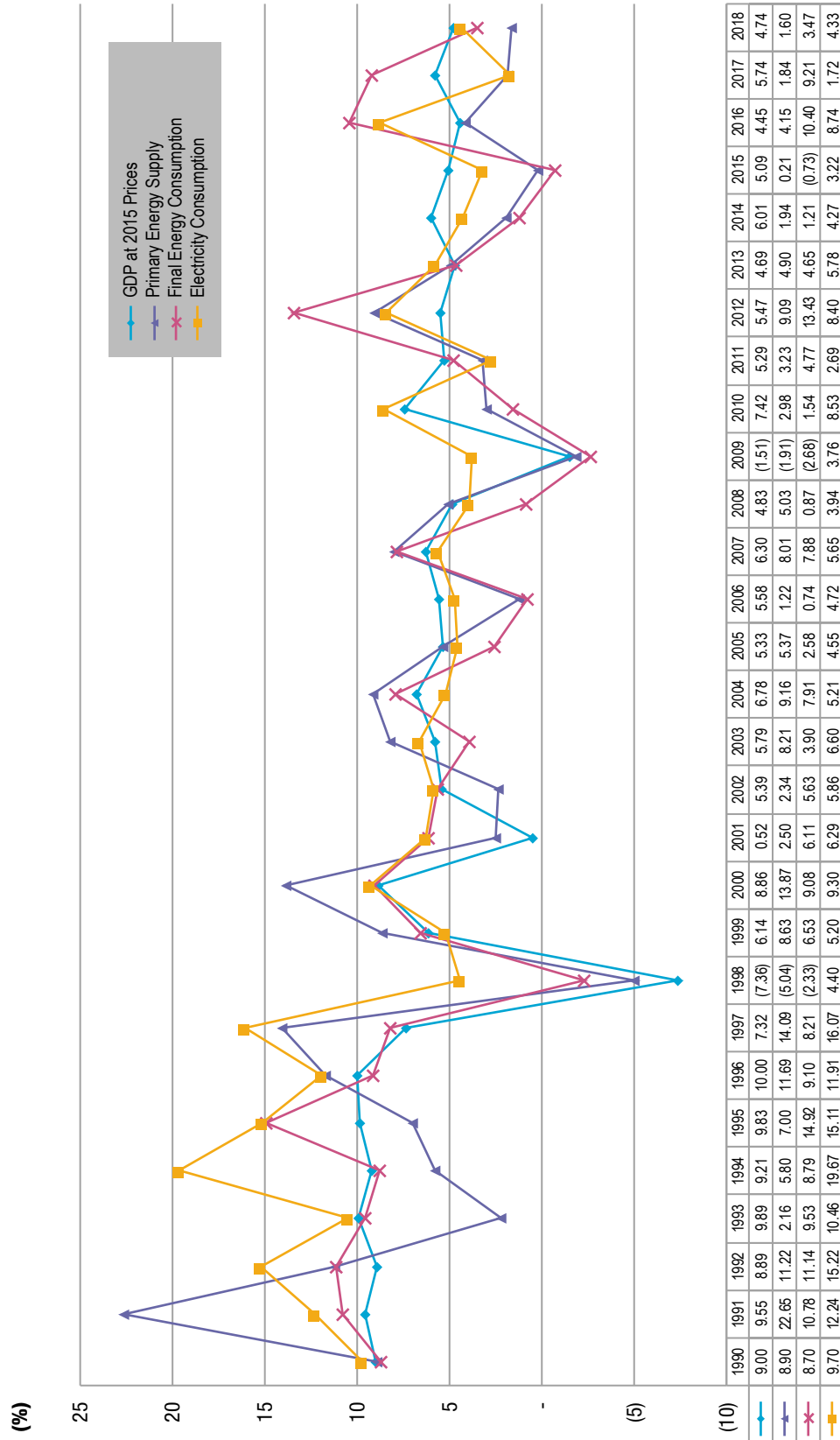
**FIGURE 3: TRENDS IN GDP AND ELECTRICITY CONSUMPTION**



Source : GDP data is from the Department of Statistics Malaysia

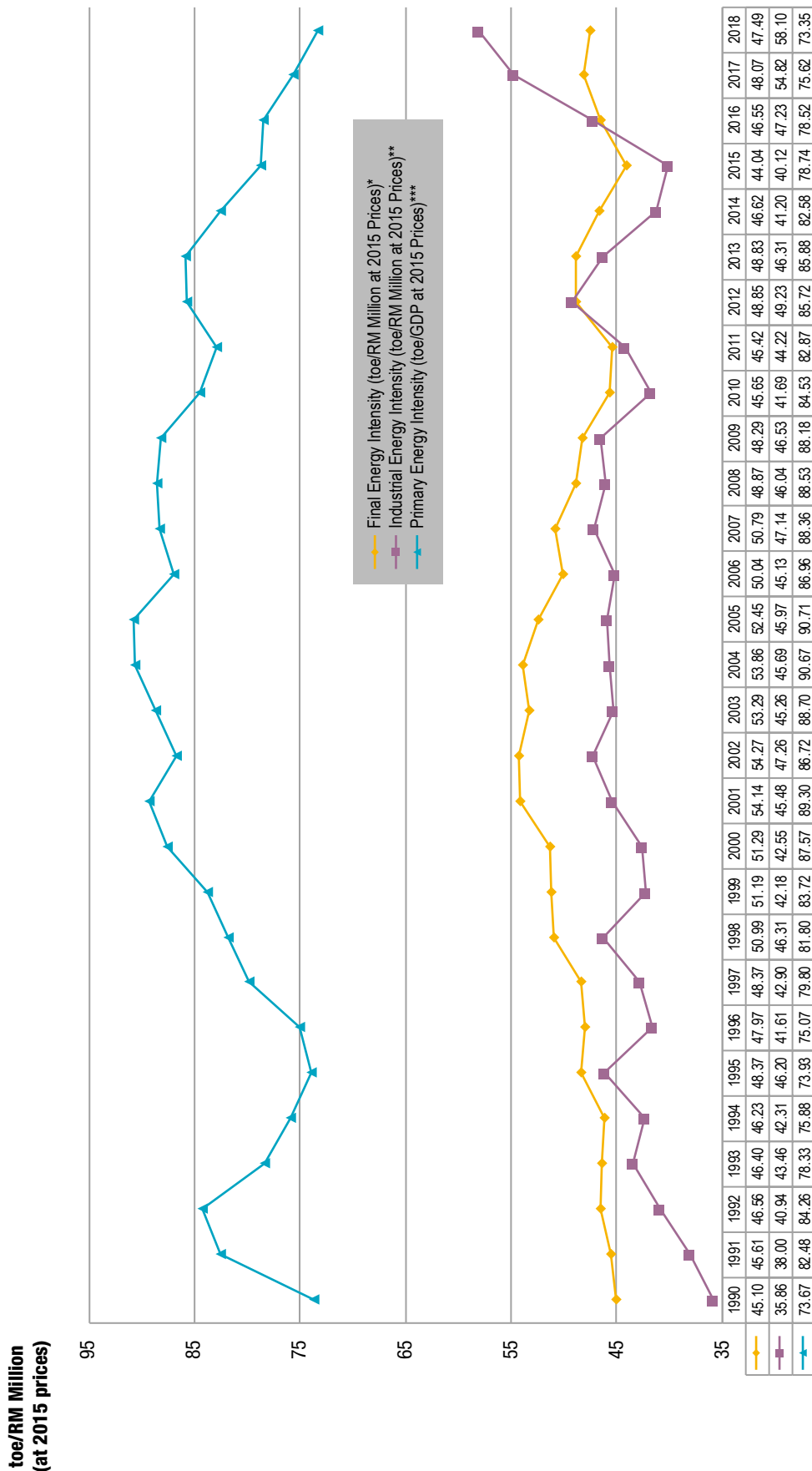
Note : GDP at 2015 Prices (RM Million) for 1990 until 2014 was calculated by the Energy Commission

**FIGURE 4: ANNUAL GROWTH RATES OF GDP, PRIMARY ENERGY SUPPLY, FINAL ENERGY CONSUMPTION AND ELECTRICITY CONSUMPTION**



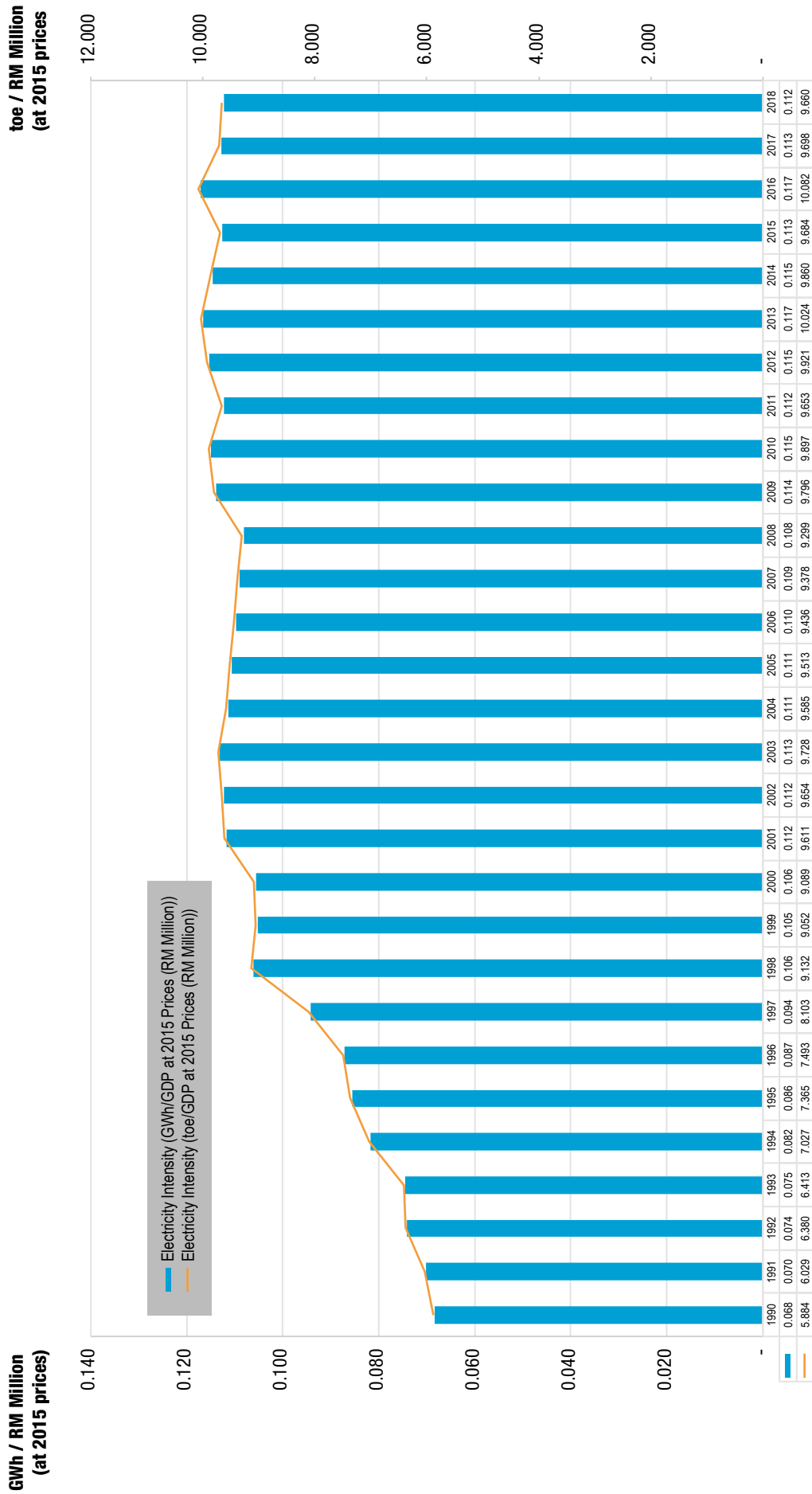
Source : GDP data is from the Department of Statistics Malaysia  
 Note : GDP growth rates at 2015 Prices (RM Million) for 1990 until 2014 was calculated by the Energy Commission

**FIGURE 5: PRIMARY AND FINAL ENERGY INTENSITY**



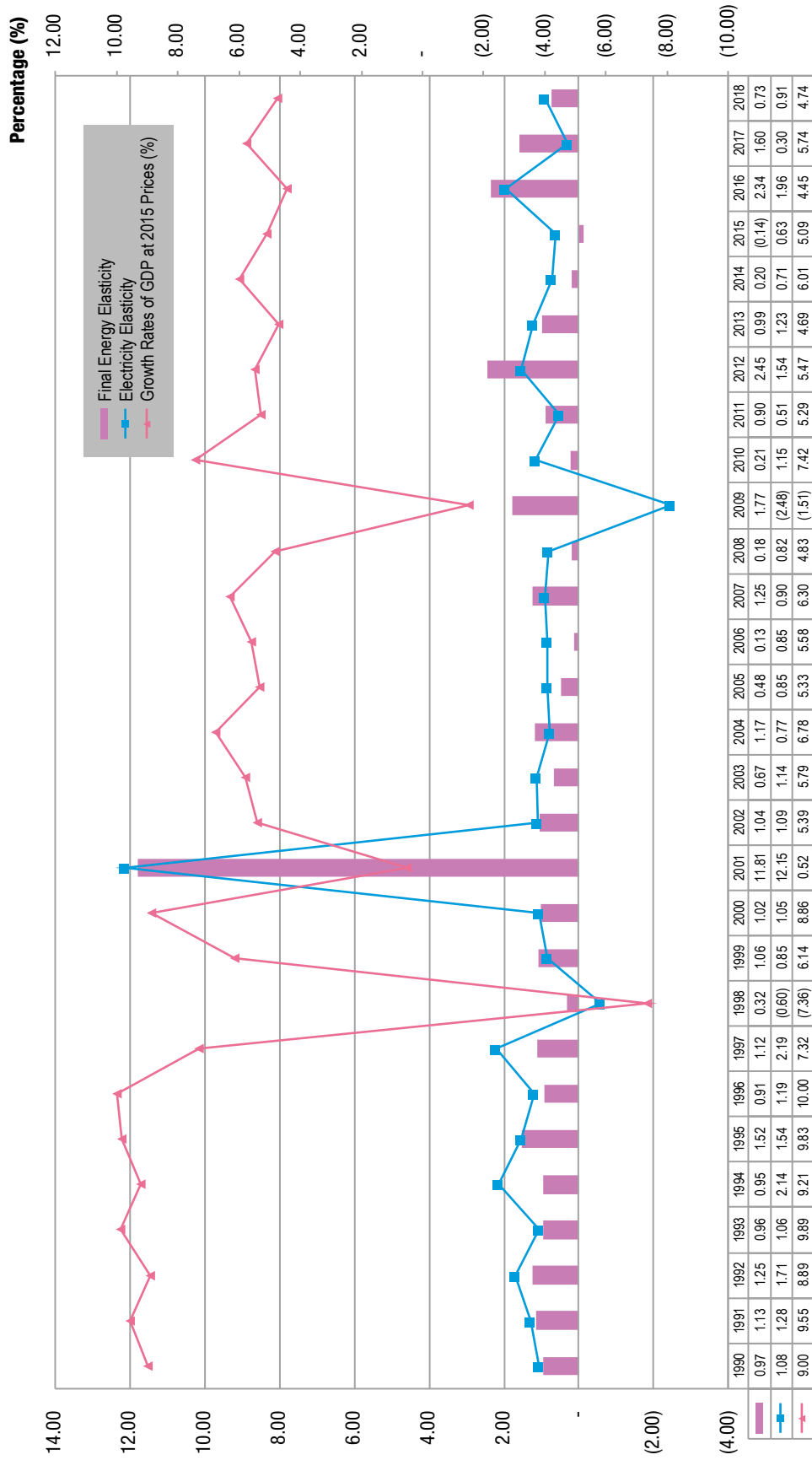
Source : GDP data is from the Department of Statistics Malaysia  
 Note : 1. Measurement in ktoe is based on the Energy Commission's calculations  
 2. Intensity = Quantity of energy required per unit output or activity  
 3. (\*): Final Energy Consumption (including non-energy use) / GDP at 2015 prices  
 4. (\*\*): Industry Energy Consumption / Industry GDP at 2015 prices  
 5. (\*\*\*) Primary Energy Supply / GDP at 2015 prices

**FIGURE 6: ELECTRICITY INTENSITY**



Sources : 1. GDP data is from the Department of Statistics of Malaysia  
 2. TNB, SESB, SEB, KUS, IPPs  
 Note : 1. Measurement in ktoe is based on the Energy Commission's calculations  
 2. Intensity = Quantity of energy required per unit output or activity  
 3. (\*): Electricity Intensity (toe/RM Million GDP at 2015 prices)  
 4. (\*\*): Electricity Intensity (GWh/RM Million GDP at 2015 prices)

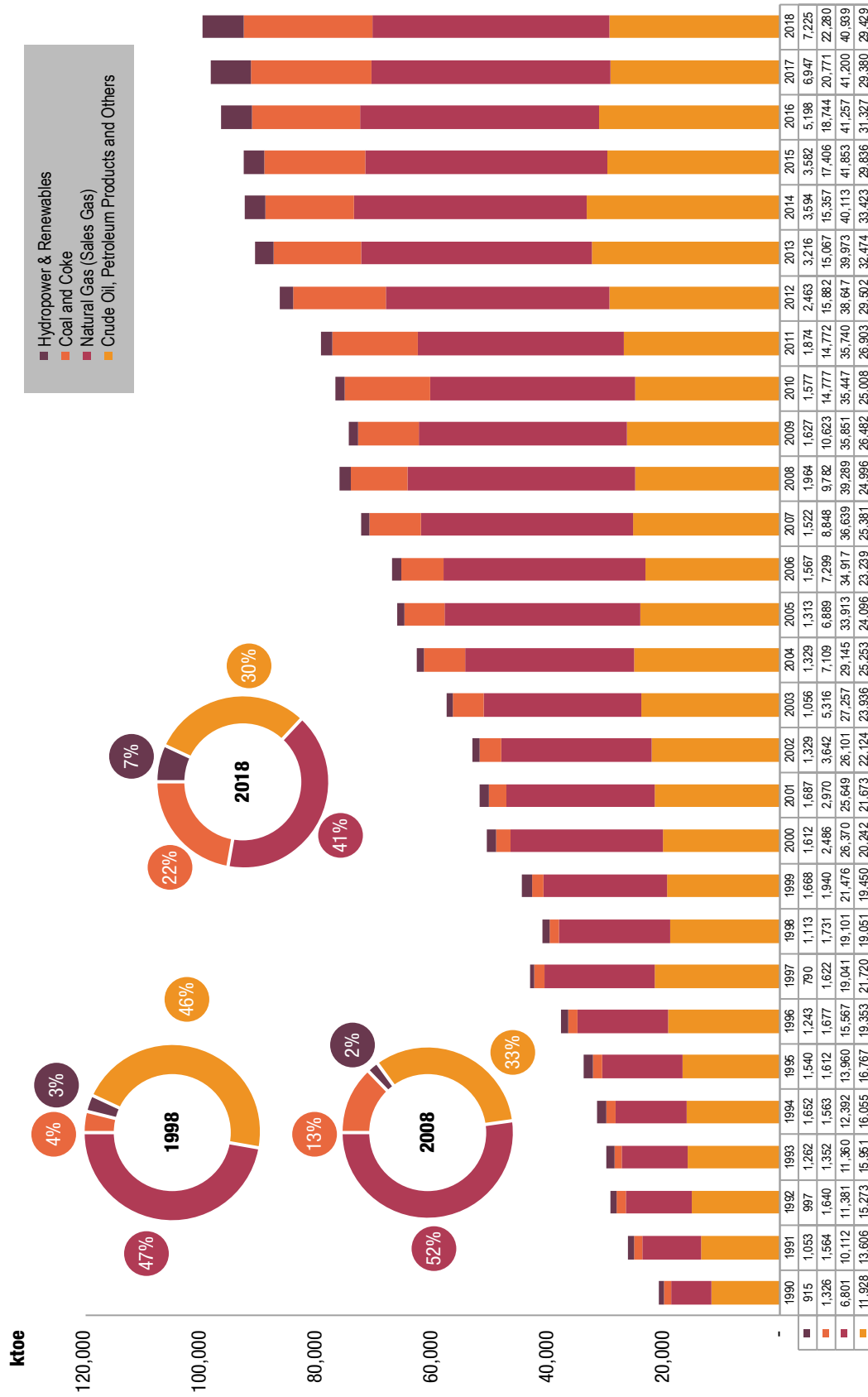
**FIGURE 7: FINAL ENERGY AND ELECTRICITY ELASTICITY**



Note : 1) Final Energy Elasticity =  $\frac{\text{Ratio between growths of energy consumption with economic growth}}{\text{Growth Rate of Energy Consumption (\%)}}$   
 2) Electricity Elasticity =  $\frac{\text{Ratio between growths of electricity consumption with economic growth}}{\text{Growth Rate of Electricity Consumption (\%)}}$   
 3) GDP growth rates at 2015 prices (RM Million) for 1990 until 2014 was estimated by the Energy Commission

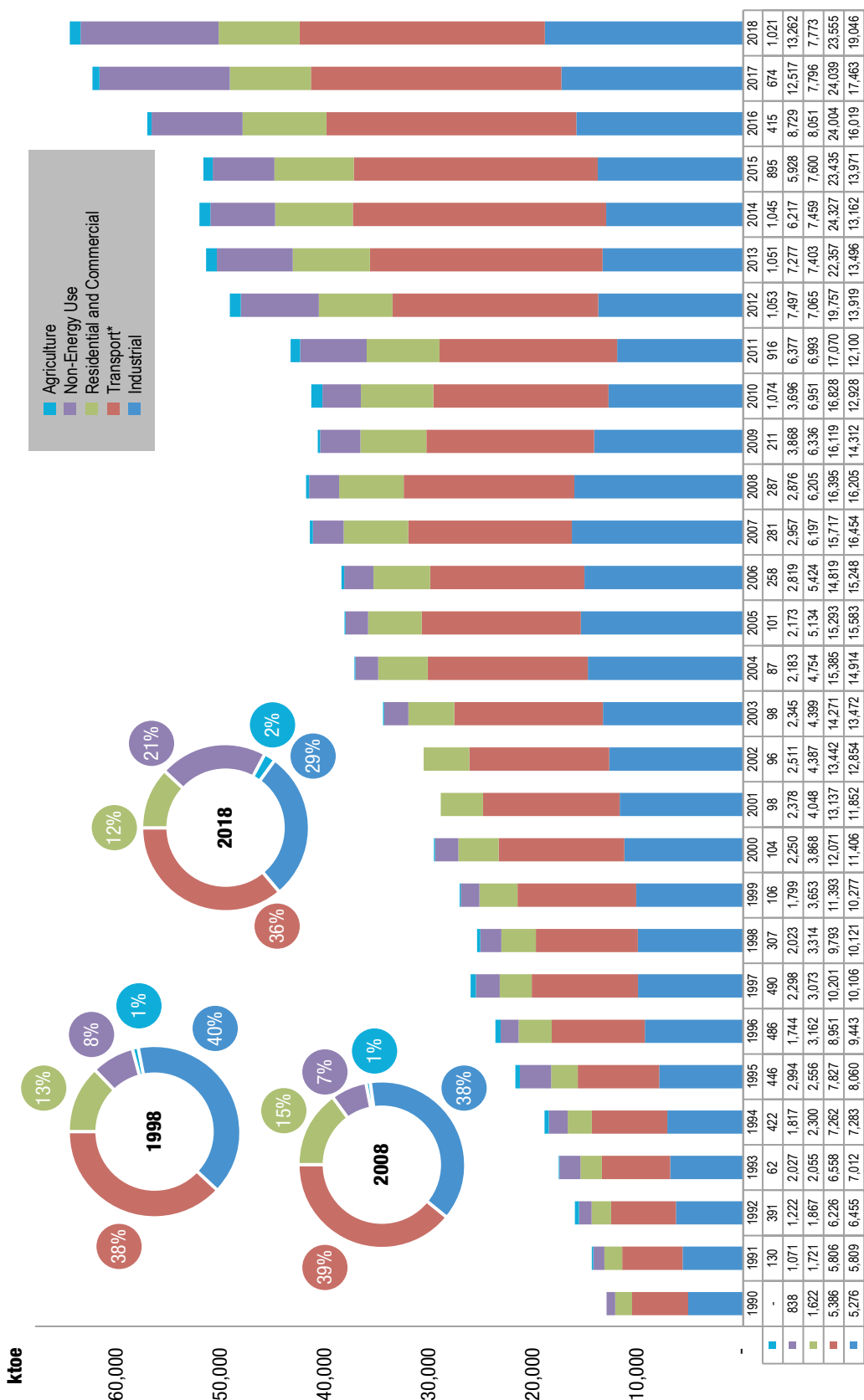


**FIGURE 8: PRIMARY ENERGY SUPPLY**



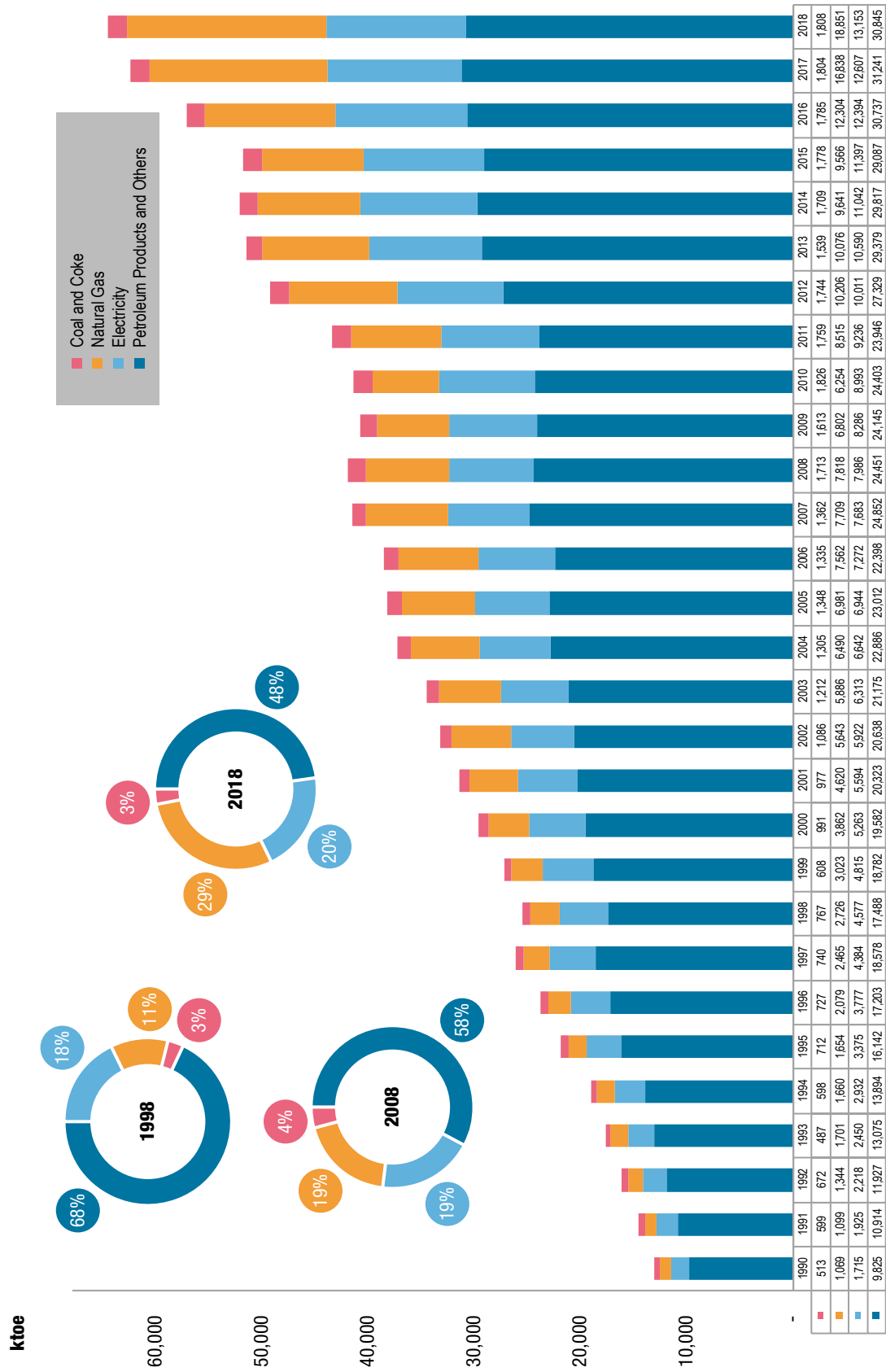
Source : Government agencies, oil and gas companies, power utilities, and IPPs

**FIGURE 9: FINAL ENERGY CONSUMPTION BY SECTORS**



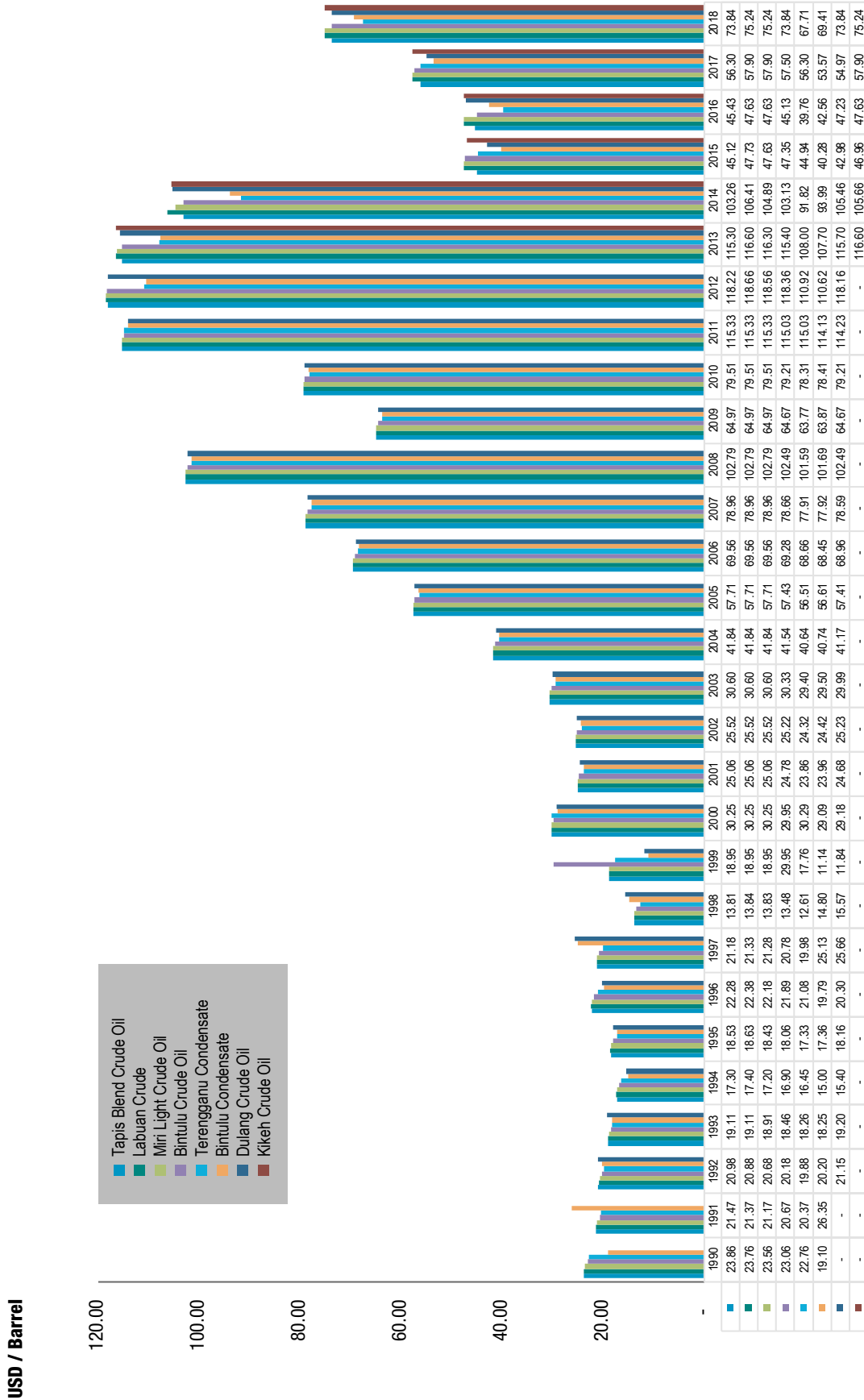
Source : Government agencies, oil and gas companies, power utilities, and IPPs, cement, iron and steel manufacturers  
 Note (\*) : Transport includes international aviation

**FIGURE 10: FINAL ENERGY CONSUMPTION BY FUEL TYPE**



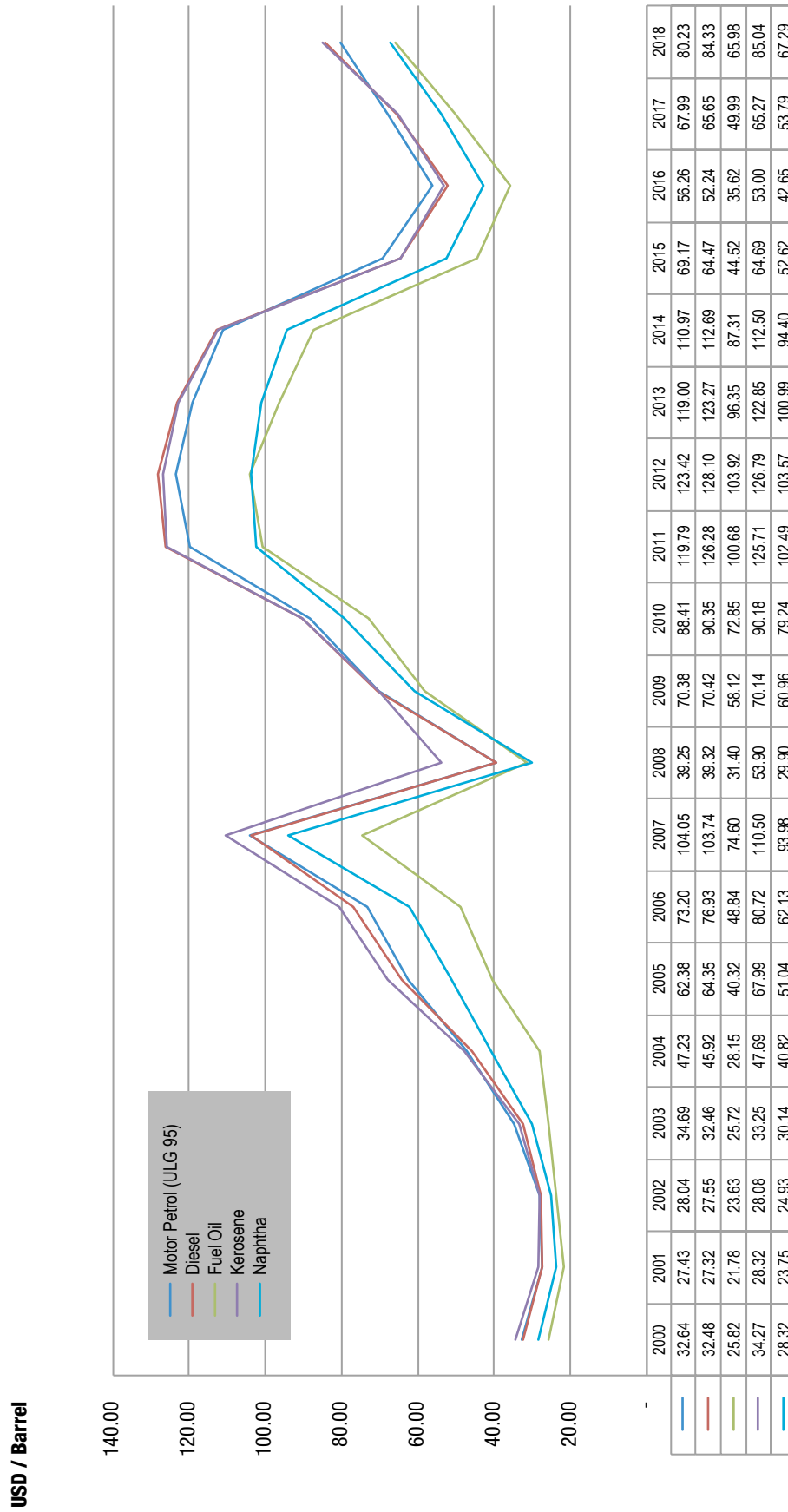
Source : Government agencies, oil and gas companies, power utilities, and IPPs, cement, iron and steel manufacturers

**FIGURE 11: OFFICIAL SELLING PRICES OF MALYSIAN CRUDE OIL**



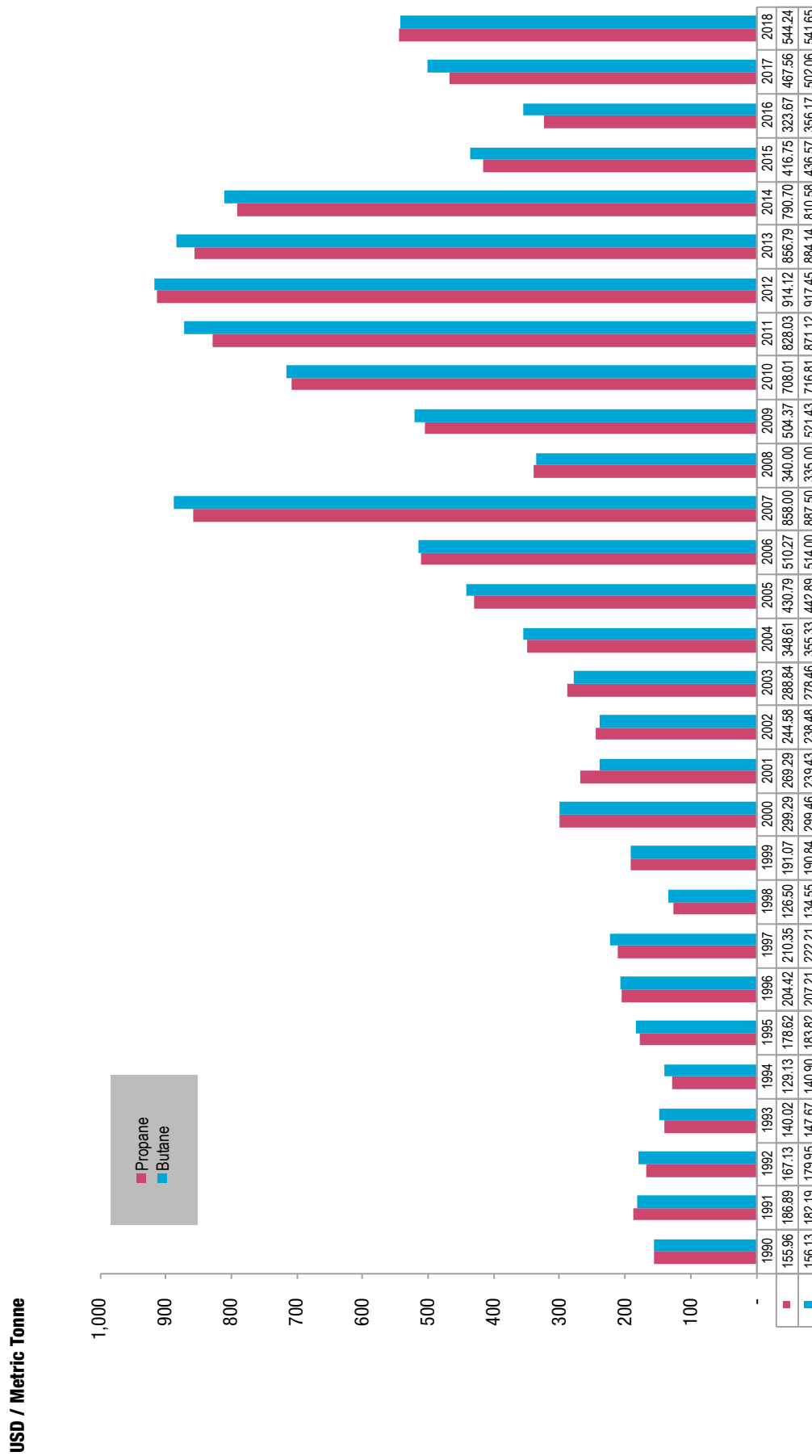
Source : PETRONAS

**FIGURE 12: EX-SINGAPORE PRICES OF MAJOR PETROLEUM PRODUCTS**



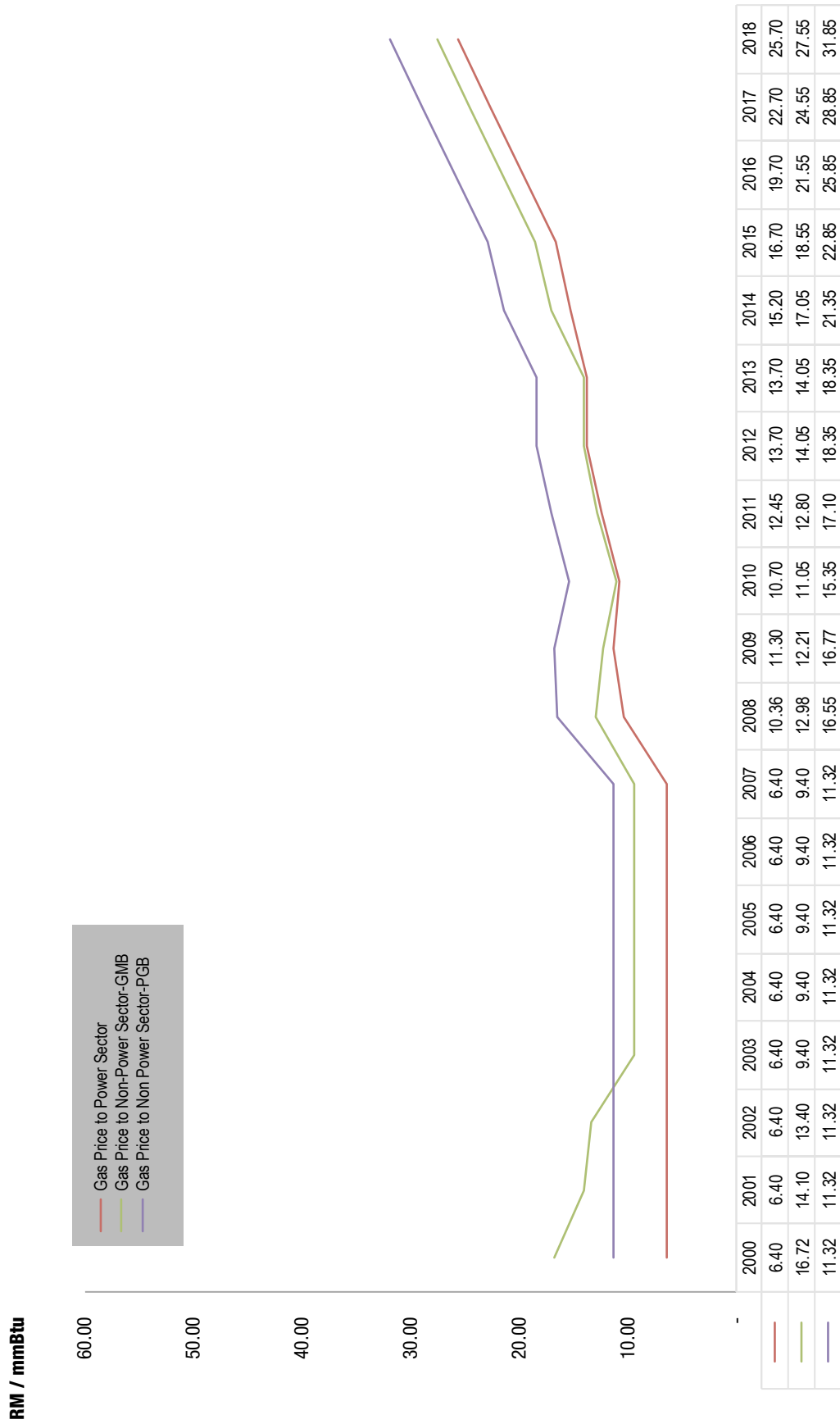
Note : Data shown are prices Ex-Singapore, in USD per Barrel, taken from Industry Sources  
 Source: Platts

**FIGURE 13: ANNUAL LIQUEFIED PETROLEUM GAS (LPG) CONTRACT PRICES – ARAB GULF**



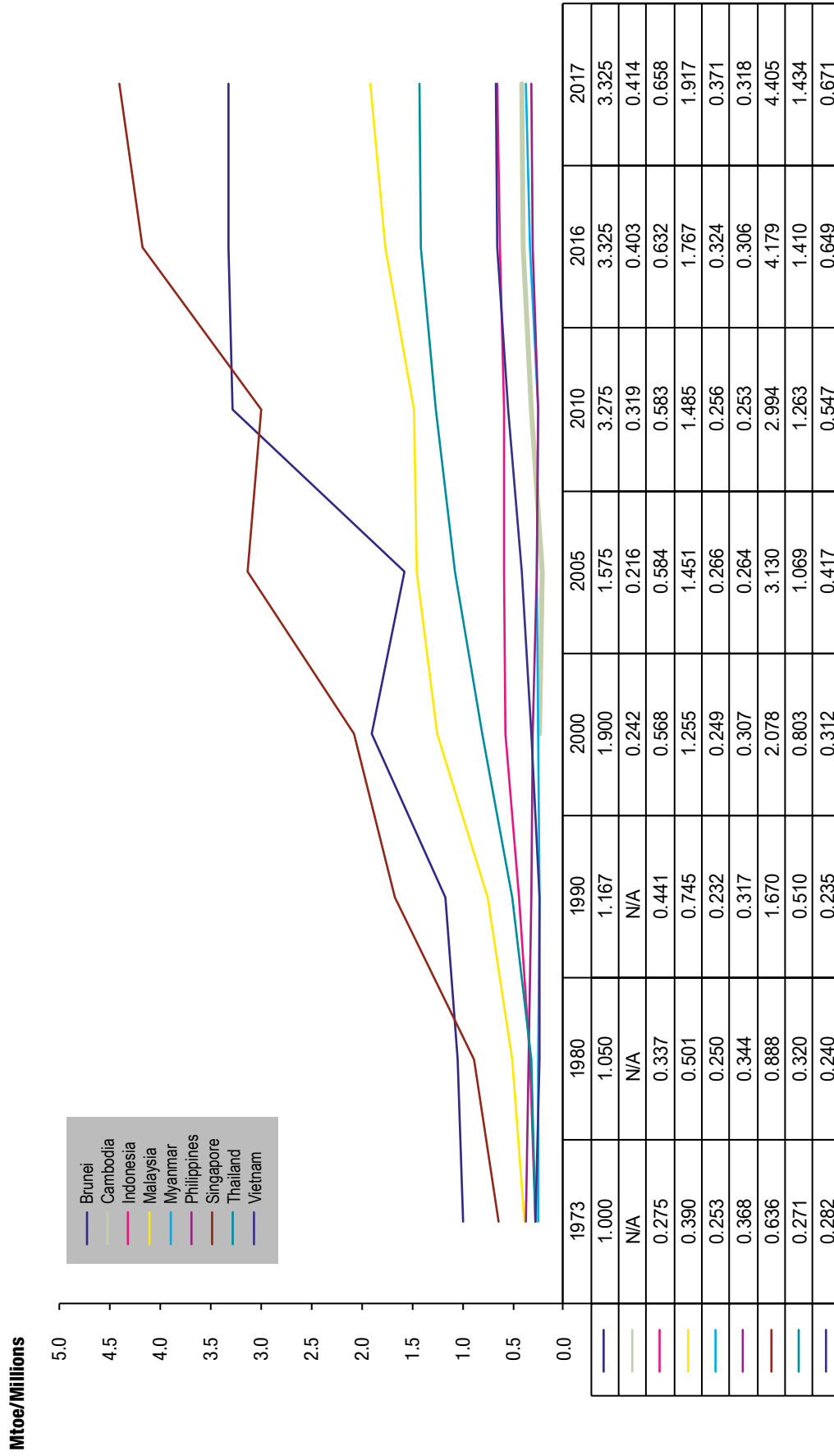
Note : Yearly LPG contract prices - Arab Gulf, in USD per Metric Tonne, taken from Industry Sources  
 Source : Platts

**FIGURE 14: AVERAGE ANNUAL NATURAL GAS PRICE IN MALAYSIA**



Source : Energy Commission

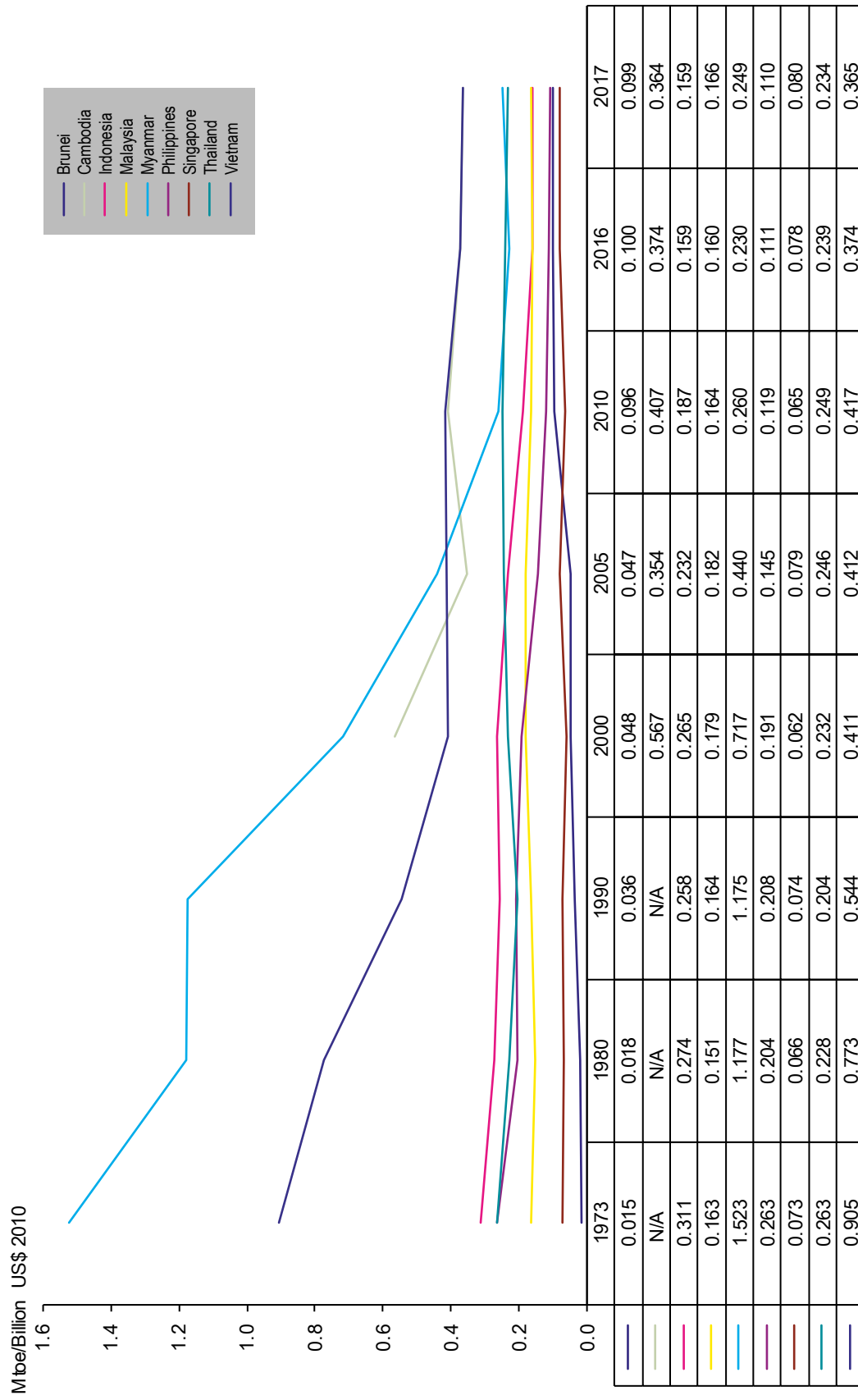
**FIGURE 15: FINAL ENERGY CONSUMPTION PER CAPITA IN ASEAN**



Source : World Energy Balances, 2019 Edition, International Energy Agency (IEA)



**FIGURE 16: FINAL ENERGY INTENSITY IN ASEAN**



Source : World Energy Balances, 2019 Edition, International Energy Agency (IEA)





**OIL**

**TABLE 3: RESOURCES AND PRODUCTION OF OIL AS OF 1 JANUARY 2018**

Region	Reserves (Billion Barrels)			Production (Thousand Barrels per Day)		
	Crude Oil	Condensates	Total	Crude Oil	Condensates	Total
Peninsular Malaysia	1.338	0.274	1.612	170.79	31.07	201.86
Sabah	1.508	0.129	1.637	267.22	8.40	275.62
Sarawak	0.796	0.508	1.304	102.90	72.32	175.22
<b>Total</b>	<b>3.642</b>	<b>0.911</b>	<b>4.553</b>	<b>540.91</b>	<b>111.80</b>	<b>652.70</b>

Source : PETRONAS

**TABLE 4: REFINERY LICENSED CAPACITY**

	Location	Start-up date	Thousand barrels/day
Hengyuan Refining Company (formerly known as Shell Refining Co. (FOM) Bhd)	Port Dickson, Negeri Sembilan	1963	155
Petron Malaysia (previously owned by 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
<b>Total</b>			<b>492</b>

Source : Petron Malaysia, PETRONAS, Hengyuan Refining Company

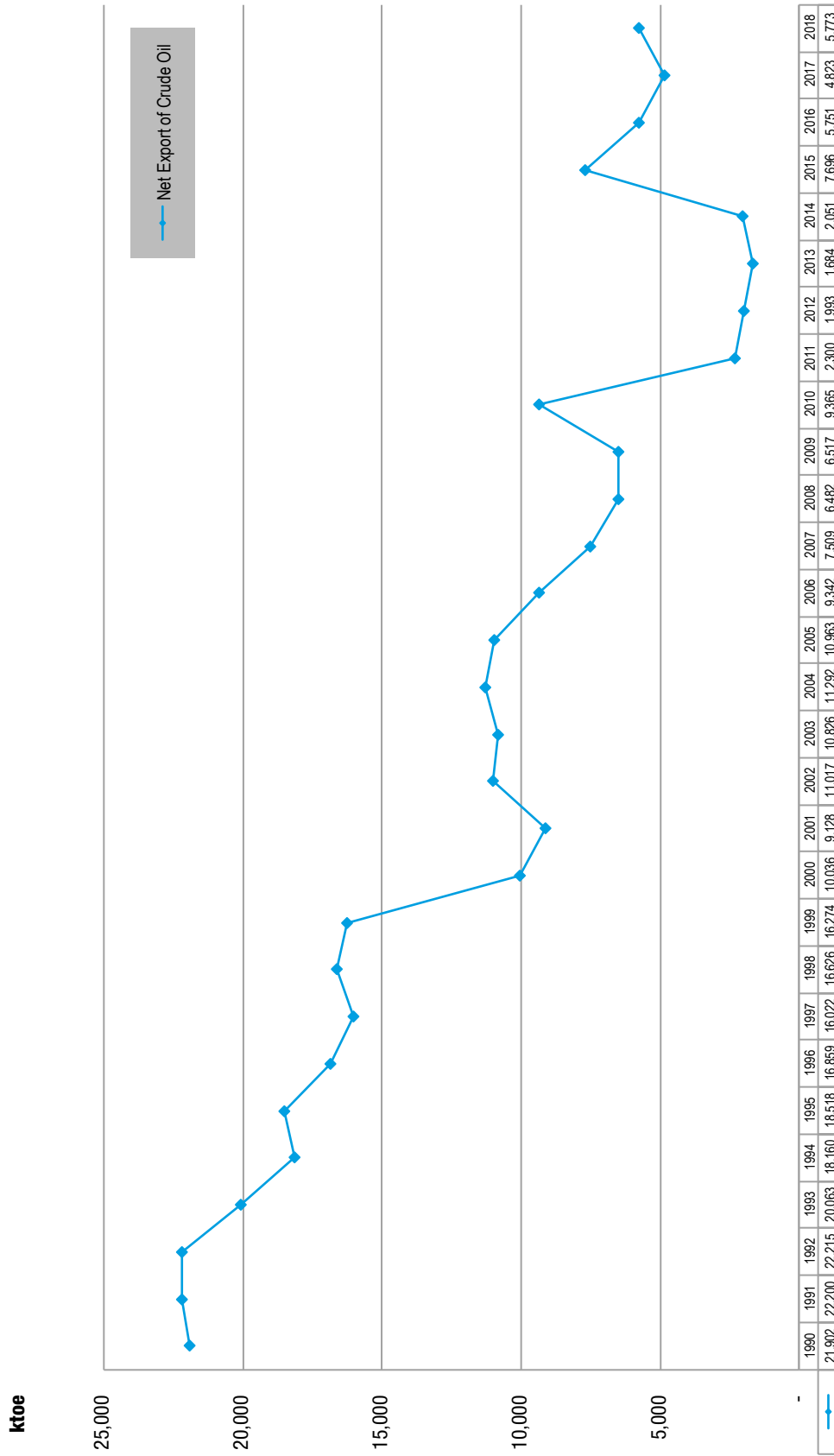
Note : Excludes condensate splitter of 74,300 bpd

**TABLE 5: BREAKDOWN ON SALES OF PETROLEUM PRODUCTS IN THOUSAND BARRELS, 2018**

Petroleum Products	Peninsular Malaysia	Sabah	Sarawak	TOTAL
Petrol	94,666	3,489	3,172	<b>101,327</b>
Diesel	52,735	7,277	5,071	<b>65,083</b>
Fuel Oil	2,515	52	12	<b>2,579</b>
Kerosene	40	0	1	<b>41</b>
LPG	12,136	891	876	<b>13,903</b>
ATF & AV Gas	22,528	333	467	<b>23,328</b>
Non-Energy	4,205	155	331	<b>4,692</b>
<b>Total</b>	<b>188,826</b>	<b>12,197</b>	<b>9,930</b>	<b>210,953</b>

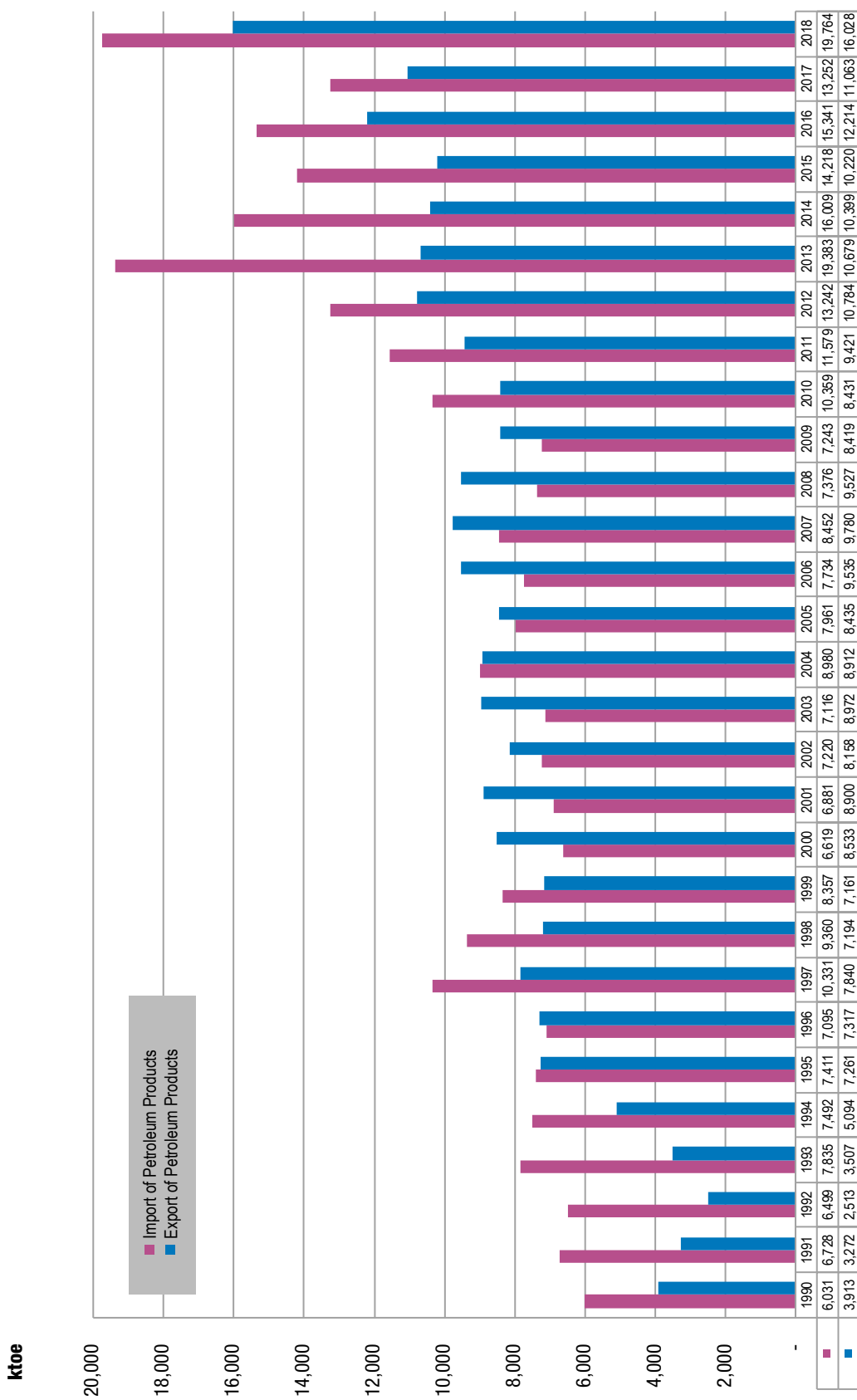
Source : Oil companies

**FIGURE 17: NET EXPORT OF CRUDE OIL**



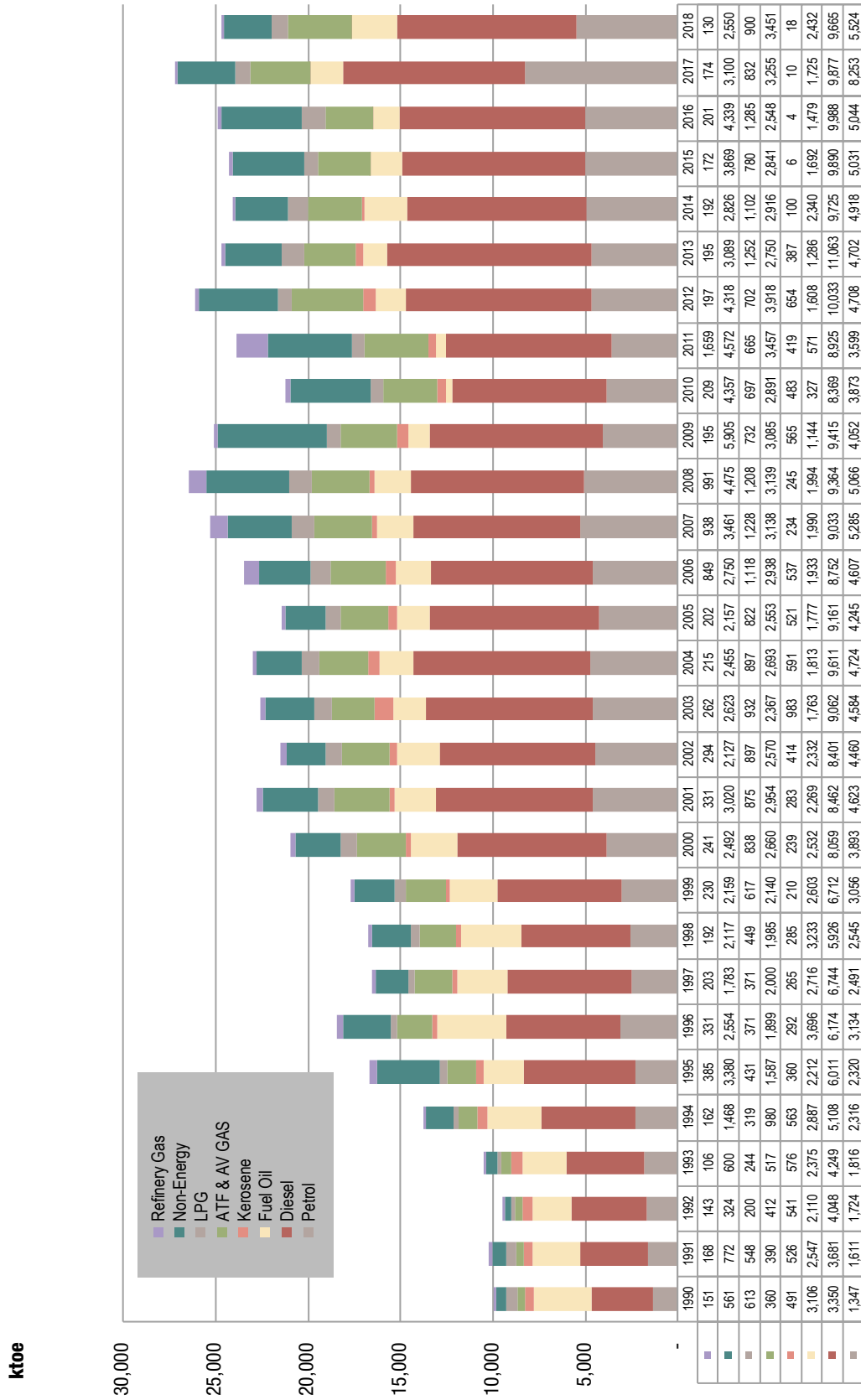
Source : Department of Statistics Malaysia and Oil companies  
 Note : Measurement on ktoe is based on the Energy Commission's calculations

**FIGURE 18: EXPORT AND IMPORT OF PETROLEUM PRODUCTS**



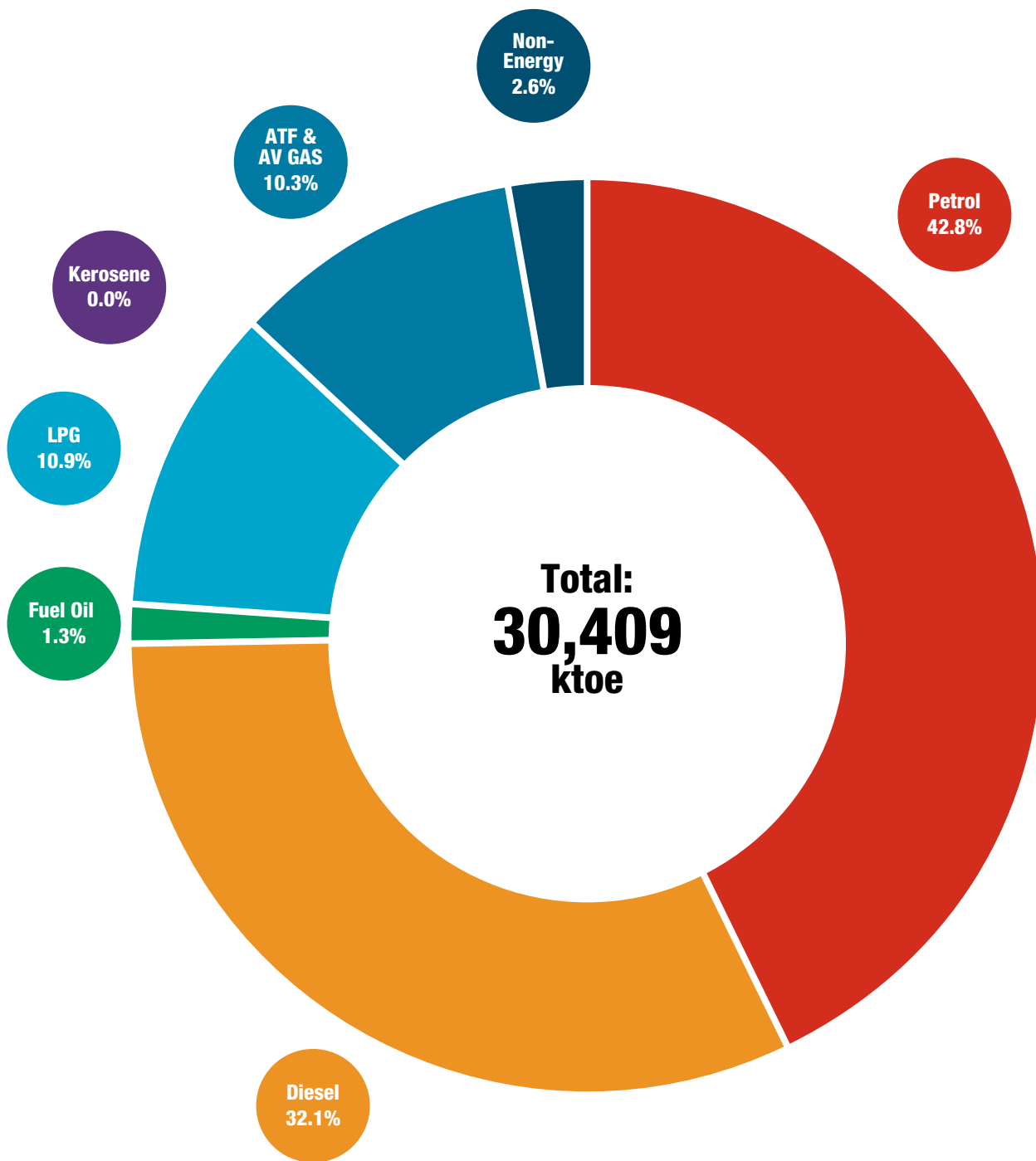
Source : Department of Statistics Malaysia and Oil companies  
 Note : Measurement on ktoe is based on the Energy Commission's calculations

**FIGURE 19: PRODUCTION OF PETROLEUM PRODUCTS FROM REFINERIES**



Source : Oil companies

**FIGURE 20: FINAL CONSUMPTION FOR PETROLEUM PRODUCTS**



Source : Oil companies





# NATURAL GAS

**TABLE 6: RESOURCES AND PRODUCTION OF NATURAL GAS AS OF 1 JANUARY 2018**

Region	Reserves			Production
	Trillion standard cubic feet (Tscf)			Million standard cubic feet per day (MMscfd)
	Associated	Non-Associated	Total	
Peninsular Malaysia	6.422	17.266	23.688	1,807.62
Sabah	2.078	10.504	12.582	494.82
Sarawak	1.507	41.754	43.261	4,103.99
<b>Total</b>	<b>10.007</b>	<b>69.524</b>	<b>79.531</b>	<b>6,406.44</b>

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

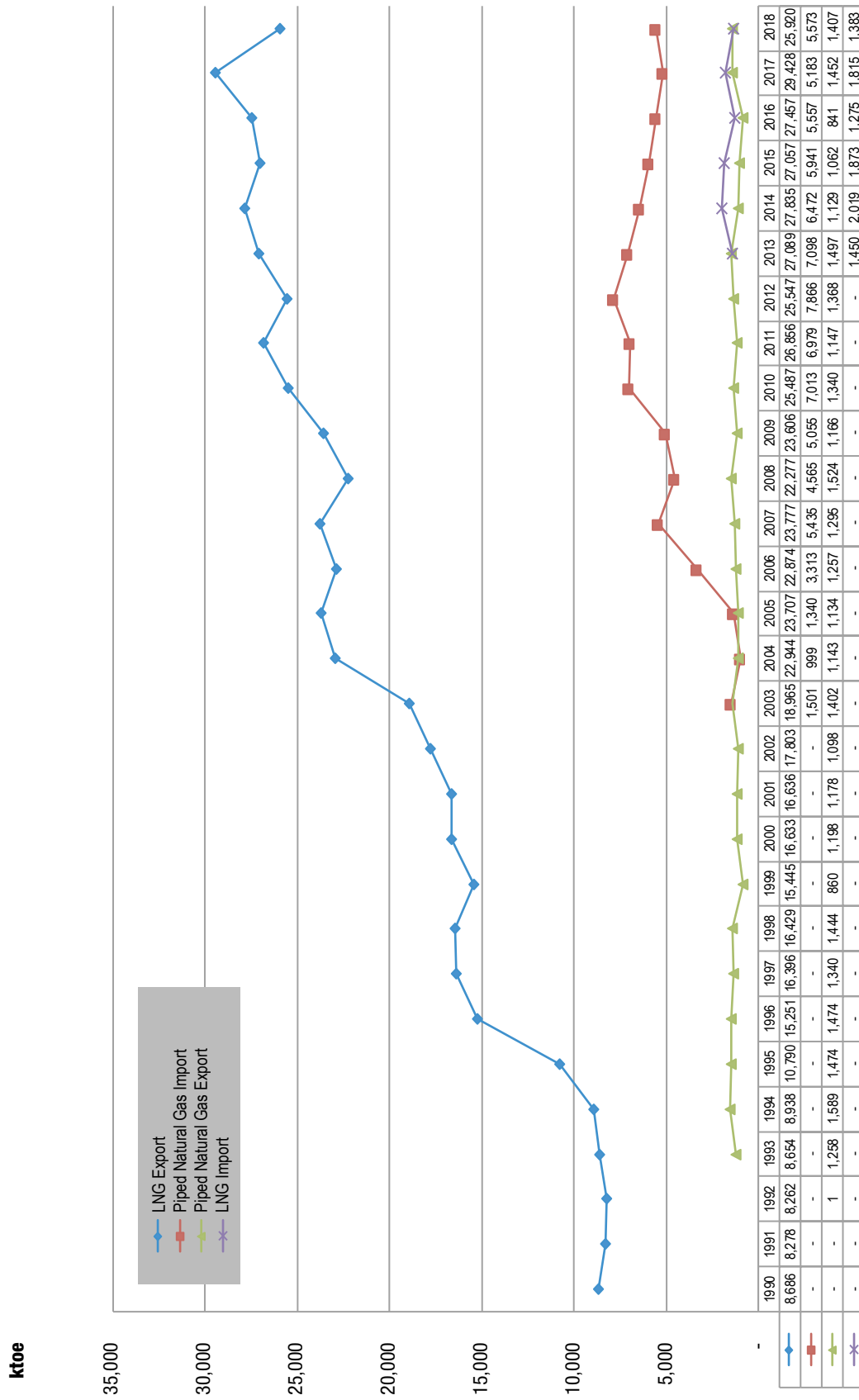
Source : PETRONAS

**TABLE 7: CONSUMPTION OF NATURAL GAS IN MMscf, 2018**

Sectors	Peninsular Malaysia	Sabah	Sarawak	Malaysia
Residential	23	-	-	23
Commercial	881	27	-	908
Industry	197,737	96,179	20,918	314,835
Non-energy	95,066	67,125	236,426	398,617
Transport	4,611	-	-	4,611
Power Stations	355,862	46,881	33,937	436,680
Co-Generation	37,927	-	2,193	40,120
<b>Total</b>	<b>692,107</b>	<b>210,211</b>	<b>293,474</b>	<b>1,195,792</b>

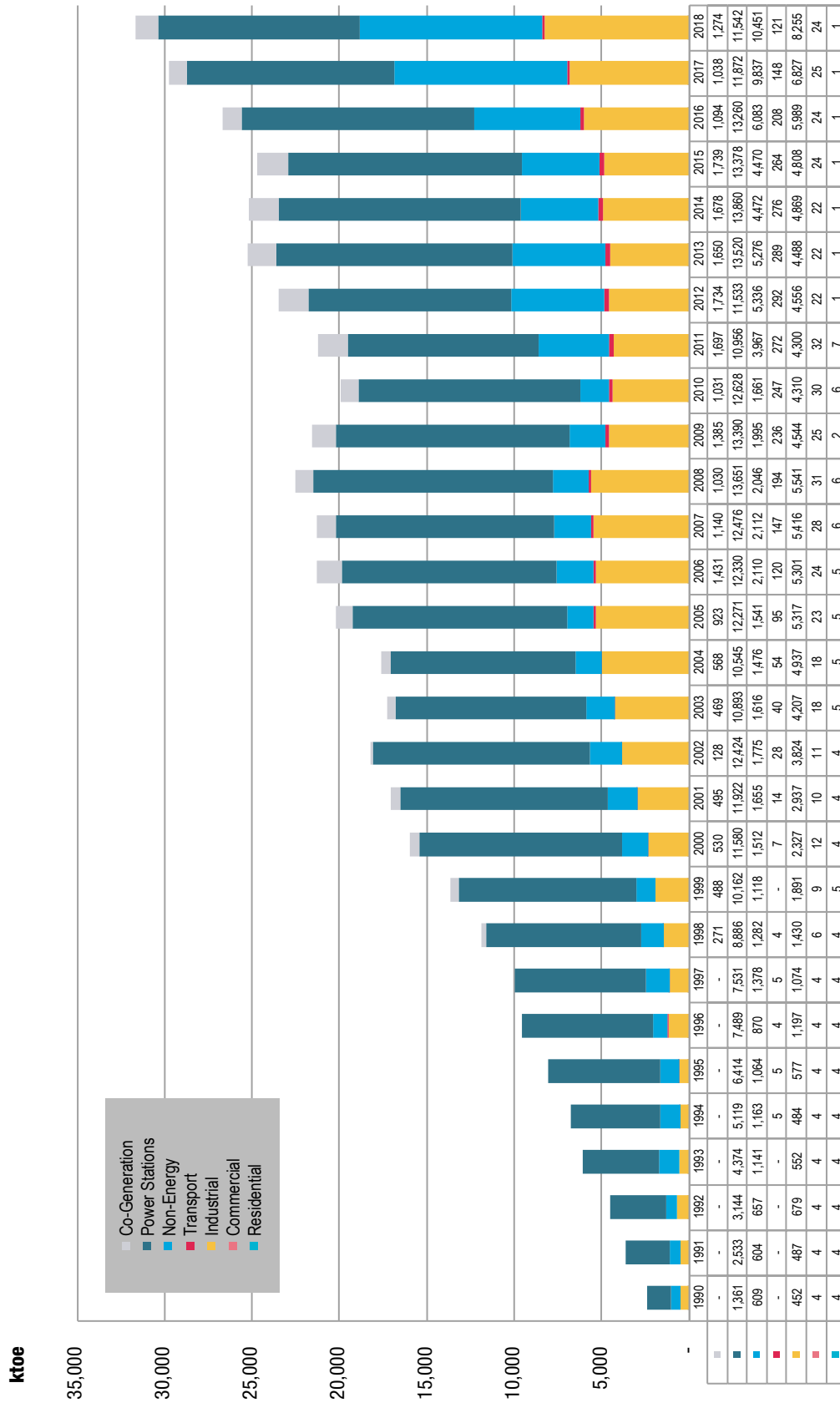
Source : Power utilities, IPPs, PETRONAS and gas distribution companies

**FIGURE 21: EXPORT AND IMPORT OF PIPED NATURAL GAS AND LNG**



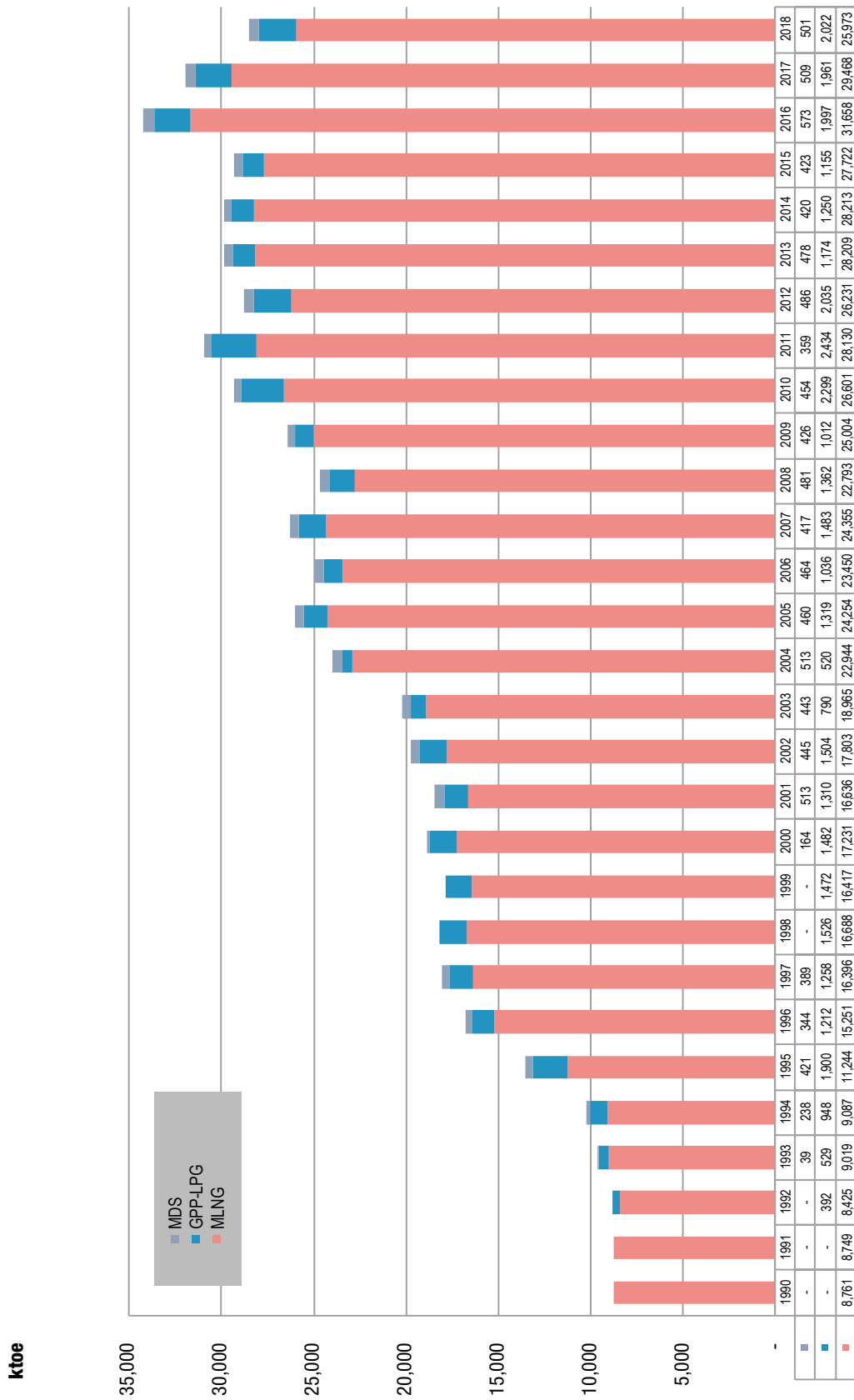
Source : Department of Statistics Malaysia, gas companies and others  
 Note : Measurement in ktoe is based on the Energy Commission's calculations

FIGURE 22: NATURAL GAS CONSUMPTION BY SECTOR



Source: PETRONAS, Gas Companies, Power Utilities, IPPs and Self-Generation Plants

**FIGURE 23: CONVERSION IN GAS PLANTS**



Note : MDS commenced pre-commercialisation operation in year 2000

Source : Oil and gas companies



# COAL



**TABLE 8: RESOURCES AND PRODUCTION OF COAL AS OF 31 DECEMBER 2018**

Location	Resources (Million Tonnes)			Coal Type	Production (metric tonnes)
	Measured	Indicated	Inferred		
<b>SARAWAK</b>					
1. Abok & Silantek, Sri Aman	7.25	10.60	32.40	Coking Coal, Semi-Anthracite and Anthracite	-
2. Merit-Pila, Kapit	170.26	107.02	107.84	Sub-Bituminous	758,801
3. Bintulu	6.00	0.00	14.00	Bituminous (partly coking coal)	-
4. Mukah - Balingian	86.95	170.73	646.53	Lignite, Hydrous Lignite and Sub-Bituminous	1,894,012
5. Tutoh Area	5.58	34.66	162.33	Sub-Bituminous	-
<b>Subtotal</b>	<b>276.04</b>	<b>323.01</b>	<b>963.10</b>		<b>2,652,813</b>
<b>SABAH</b>					
1. Silimpopon	4.80	14.09	7.70	Sub-Bituminous	
2. Labuan			8.90	Sub-Bituminous	
3. Maliau			215.00	Bituminous	
4. Malibau		17.90	25.00		
5. SW Malibau		23.23	-		
6. Pinangan West Middle Block		-	42.60	Bituminous	
<b>Subtotal</b>	<b>4.80</b>	<b>55.22</b>	<b>299.20</b>		
<b>SELANGOR</b>					
1. Batu Arang			17.00	Sub-Bituminous	
<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	<b>17.00</b>		
<b>Total</b>	<b>280.84</b>	<b>378.23</b>	<b>1,279.30</b>		
<b>Total</b>			<b>1,938.37</b>		<b>2,652,813</b>

Source : Department of Mineral and Geosciences Malaysia

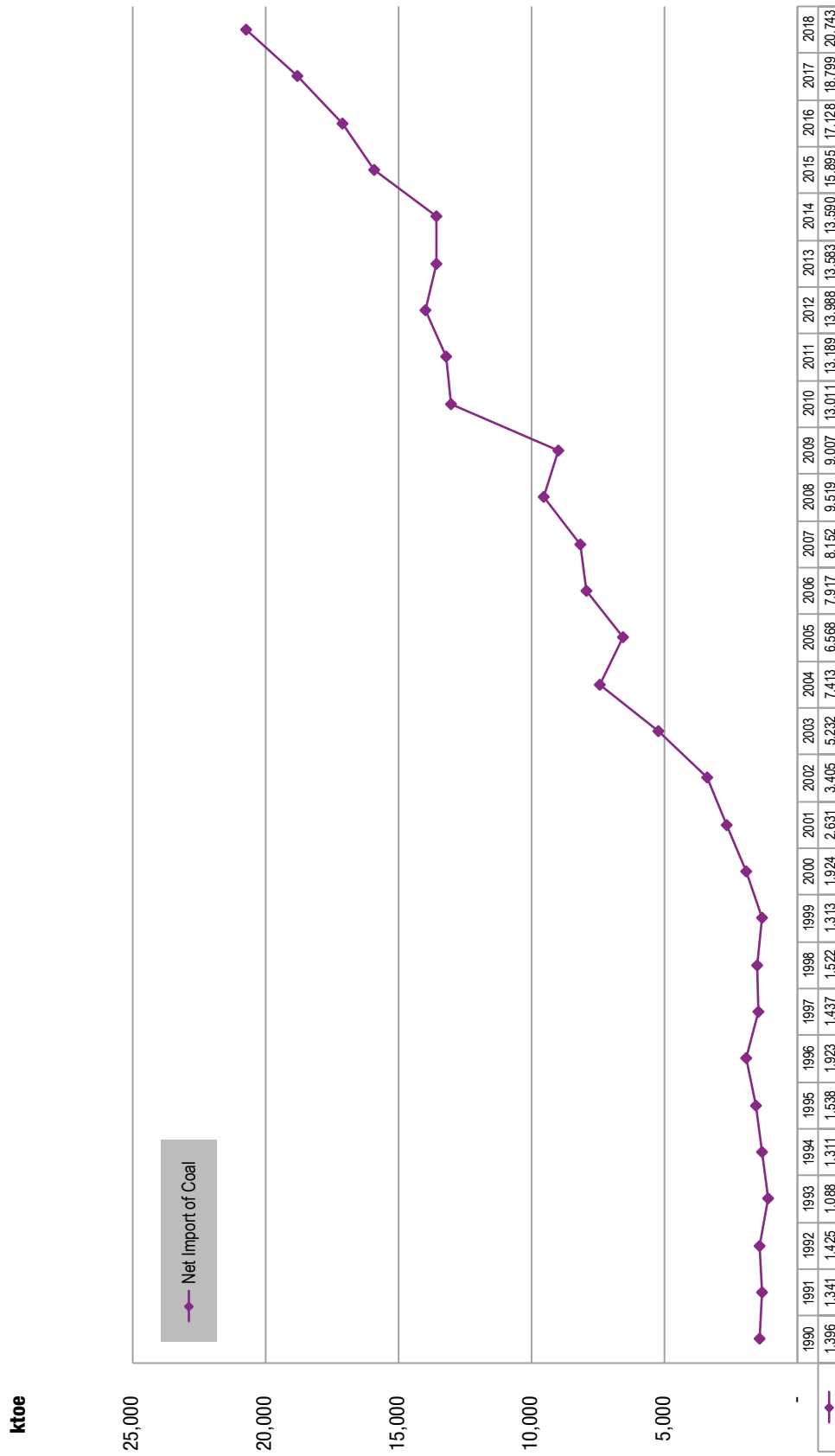
**TABLE 9: CONSUMPTION OF COAL IN METRIC TONNES, 2018**

Sectors	Peninsular Malaysia	Sabah	Sarawak	Malaysia
Industry	2,741,876	-	126,702	2,868,578
Power Stations	30,384,788	-	2,088,670	32,473,458
<b>Total</b>	<b>33,126,664</b>	<b>0</b>	<b>2,215,372</b>	<b>35,342,036</b>

Source : Power Utilities, IPPs, cement, iron and steel manufacturers



**FIGURE 24: NET IMPORT OF COAL**



Source : Department of Statistics Malaysia, Power Utilities, IPPs, cement, iron and steel manufacturers  
 Note : Measurement in ktoe is based on the Energy Commission's calculations

**FIGURE 25: COAL CONSUMPTION BY SECTORS**



Source : Power Utilities, IPPs, cement, iron and steel manufacturers



**ELECTRICITY**

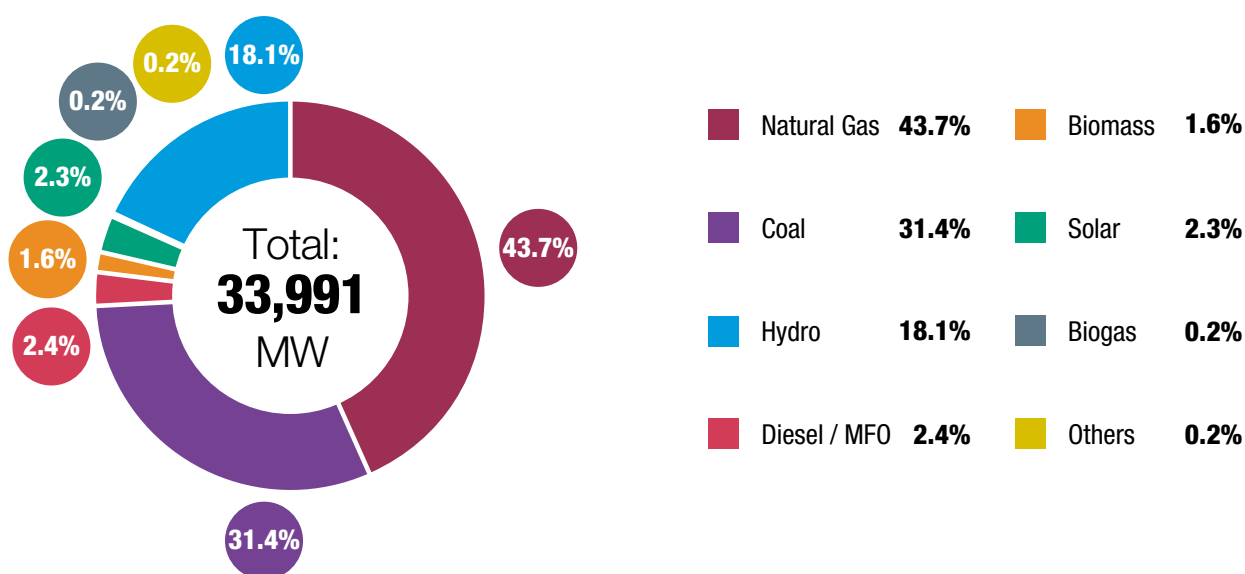
**TABLE 10: INSTALLED CAPACITY AS OF 31 DECEMBER 2018, IN MW**

		Hydro	Natural Gas	Coal	Diesel / MFO	Biomass	Solar	Biogas	Others	Total
Peninsular Malaysia	TNB	2,557.7	2,530.0	0.0	0.0	0.0	0.0	0.0	0.0	5,087.7
	IPPs	20.0	9,276.4	10,180.0	0.0	0.0	0.0	0.0	0.0	19,476.4
	Co-Generation	0.0	821.1	0.0	0.0	12.4	0.0	0.0	54.0	887.6
	Self-Generation	0.0	7.4	0.0	399.0	296.6	71.8	0.0	0.0	774.8
	FIT	43.8	0.0	0.0	0.0	44.9	344.0	60.3	0.0	493.0
	LSS	0.0	0.0	0.0	0.0	0.0	260.5	0.0	0.0	260.5
	NEM	0.0	0.0	0.0	0.0	0.0	9.8	0.0	0.0	9.8
	Subtotal	2,621.5	12,635.0	10,180.0	399.0	353.8	686.1	60.3	54.0	26,989.8
Sabah	SESB	81.8	112.0	0.0	178.9	0.0	21.5	0.0	0.0	394.2
	IPPs	0.0	1,012.6	0.0	0.0	0.0	0.0	0.0	0.0	1,012.6
	Co-Generation	0.0	106.8	0.0	0.0	36.7	0.0	0.0	0.0	143.5
	Self-Generation	0.0	2.8	0.0	111.0	79.9	0.0	10.1	8.7	212.5
	FIT	6.5	0.0	0.0	0.0	50.7	38.9	9.6	0.0	105.7
	LSS	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0
	NEM**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	88.3	1,234.3	0.0	289.9	167.3	110.4	19.7	8.7	1,918.5
Sarawak	SEB	3,458.1	594.6	480.0	113.8	0.0	0.6	0.0	0.0	4,647.1
	Co-Generation	0.0	389.0	0.0	0.0	0.0	0.0	0.0	0.0	389.0
	Self-Generation	0.0	0.0	0.0	9.7	31.3	0.0	0.0	5.1	46.1
	Subtotal	3,458.1	983.6	480.0	123.5	31.3	0.6	0.0	5.1	5,082.2
<b>Total</b>	<b>6,167.9</b>	<b>14,852.9</b>	<b>10,660.0</b>	<b>812.5</b>	<b>552.4</b>	<b>797.1</b>	<b>80.1</b>	<b>67.7</b>	<b>33,990.5</b>	
<b>Share (%)</b>	<b>18.15%</b>	<b>43.7%</b>	<b>31.4%</b>	<b>2.4%</b>	<b>1.6%</b>	<b>2.35%</b>	<b>0.2%</b>	<b>0.2%</b>	<b>100.0%</b>	

Source : Energy Commission, Power Utilities, IPPs, SEDA Malaysia and Ministry of Utilities Sarawak

- Notes : 1. The table excludes plants that are not in operation  
 2. \* The installed capacity of SESB's Diesel and Solar Hybrid is based on their dependable capacity  
 3. \*\* There is a capacity of 0.03 MW solar under NEM scheme in Sabah

**FIGURE 26: INSTALLED CAPACITY AS OF 31 DECEMBER 2018**



Source : Energy Commission, Power Utilities, IPPs, SEDA Malaysia and Ministry of Utilities Sarawak  
 Note : Exclude plants that are not in operation

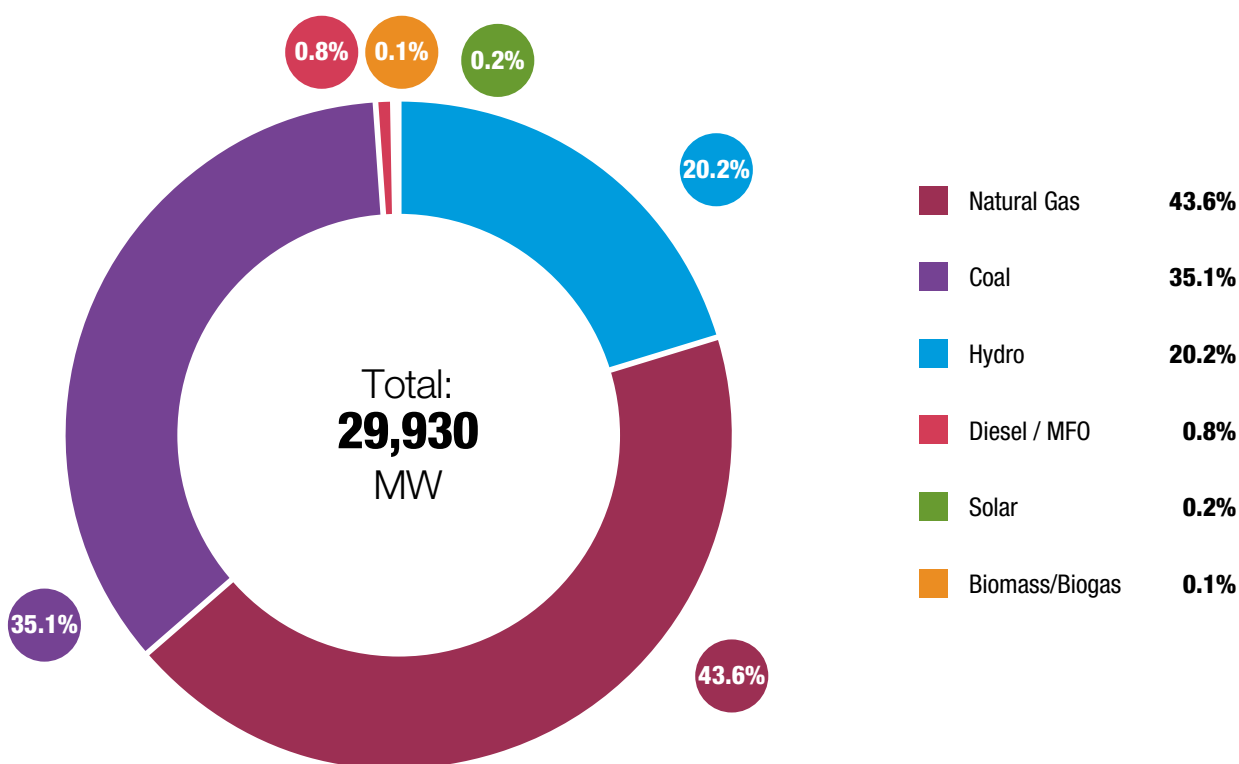
**TABLE 11: AVAILABLE CAPACITY AS OF 31 DECEMBER 2018, IN MW**

		Hydro	Natural Gas	Coal	Diesel / MFO	Biomass/ Biogas	Solar	Total
Peninsular Malaysia	TNB	2,520.7	2,527.0	0.0	0.0	0.0	0.0	5,047.7
	IPPs	0.0	9,101.9	10,076.9	0.0	0.0	0.0	19,178.8
	Subtotal	2,520.7	11,628.9	10,076.9	0.0	0.0	0.0	24,226.5
Sabah	SESB	74.6	103.4	0.0	150.1	0.0	0.0	328.1
	IPPs	0.0	865.0	0.0	0.0	0.0	0.0	865.0
	FIT	6.5	0.0	0.0	0.0	29.6	0.0	36.1
	LSS	0.0	0.0	0.0	0.0	0.0	48.0	48.0
	Subtotal	81.1	968.4	0.0	150.1	29.6	48.0	1,277.2
Sarawak	SEB	3,444.1	465.5	423.0	94.0	0.0	0.0	4,426.6
	Subtotal	3,444.1	465.5	423.0	94.0	0.0	0.0	4,426.6
<b>Total</b>		<b>6,045.9</b>	<b>13,062.8</b>	<b>10,499.9</b>	<b>244.1</b>	<b>29.6</b>	<b>48.0</b>	<b>29,930.3</b>
<b>Share (%)</b>		<b>20.2%</b>	<b>43.6%</b>	<b>35.1%</b>	<b>0.8%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>100.0%</b>

Source : Energy Commission, Power Utilities and IPPs

Note : 1. Available Capacity for Peninsular Malaysia is based on Tested Annual Available Capacity (TAAC),  
 2. Available Capacity for Sabah is based on Dependable Capacity  
 3. Bakun hydro acquisition by SEB in Q3 2017

**FIGURE 27: AVAILABLE CAPACITY AS OF 31 DECEMBER 2018**



Source : Energy Commission, Power Utilities and IPPs

**TABLE 12: INSTALLED CAPACITY OF MAJOR HYDRO POWER STATIONS, 2018**

Station	Installed Capacity (MW)	Total (MW)
<b>Peninsular Malaysia</b>		
1. Terengganu		
- Stesen Janakuasa Sultan Mahmud Kenyir	4 x 100	400.0
- Stesen Janakuasa Hulu Terengganu	2 x 125	250.0
-Stesen Janakuasa Tembat	2 x 7.5	15.00
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
- Stesen Janakuasa Ulu Jelai	2 x 186	372.0
4. Kelantan		
- Pergau	4 x 150	600.0
<b>Subtotal</b>		<b>2,536.1</b>
<b>Sabah</b>		
- Tenom Pangi	3 x 25.0	75.0
Subtotal		75.0
<b>Sarawak</b>		
- Batang Ai	4 x 27.0	108.0
- Bakun	8 x 300.0	2,400.0
- Murum	4 x 236.0	944.0
<b>Subtotal</b>		<b>3,452.0</b>
<b>Total</b>		<b>6,063.1</b>

Source : TNB, SESB and SEB

Notes : Exclude plants that are not in operation or in rehabilitation.

**TABLE 13: INSTALLED CAPACITY OF MINI HYDRO POWER STATIONS, 2018**

Station	Total (MW)
<b>Peninsular Malaysia</b>	
1. Kedah	
- Sg Tawar Besar	0.55
- Sg Mempelam	0.38
- Sg Mahang	0.45
2. Perak	
- Sg Tebing Tinggi	0.15
- Sg Asap	0.11
- Sg Kinjang	0.33
- Sg Bil	0.23
- Sg Kenas	0.50
- Sg Chempias	0.12
- Sg Temelong	0.80
3. Pahang	
- Sg Mentawak	0.50
- Sg. Pertang	0.34
- Sg. Sia	0.52
- Sg Perdak	0.27
- Sg. Sempam	1.24
- Cameron Highlands Scheme	11.9
4. Kelantan	
- Lata Rek	0.25
- Sg Renyok	1.56
- Sg Sok	0.56
5. Terengganu	
- Sg Berang	0.36
- Sg Cheralak	0.48
<b>Subtotal</b>	<b>21.60</b>
<b>Sabah</b>	
- Sayap (Kota Belud)	1.00
- Bombalai (Tawau)	1.00
- Merotai (Tawau)	1.00
- Naradau (Ranau)	1.76
- Carabau (Ranau)	2.00
<b>Subtotal</b>	<b>6.76</b>
<b>Sarawak</b>	
- Sg Pasir	0.40
- Penindin	0.28
- Sebako	0.16
- Lundu	0.14
- Kalamuku 1	0.50
- Kalamuku 2	0.50
- Sg Kota	4.00
- Long Banga*	0.16
<b>Subtotal</b>	<b>6.14</b>
<b>Total</b>	<b>34.50</b>

Source : TNB, SESB and SEB

Notes : 1. \* Micro hydro Project Long Banga owned by SEB  
2. Exclude plants that are not in operation or in rehabilitation.

**TABLE 14: TRANSMISSION NETWORK IN CIRCUIT – KILOMETRES, 2018**

Utility	500 KV	275 KV	132 KV	66 KV
TNB	1,628	9,047	12,407	-
SESB	-	598	2,180	110
SEB	753	2,810	840	-

Source: TNB, SESB and SEB

**TABLE 15: DISTRIBUTION NETWORK IN CIRCUIT – KILOMETRES, 2018**

Utility	Overhead Lines	Underground Cables
TNB	352,565	307,474
SESB	9,465	1,109
SEB	26,236	8,769

Source: TNB, SESB and SEB

**TABLE 16: GROSS GENERATION, CONSUMPTION, AVAILABLE CAPACITY, PEAK DEMAND AND RESERVE MARGIN FOR ELECTRICITY IN MALAYSIA, 2018**

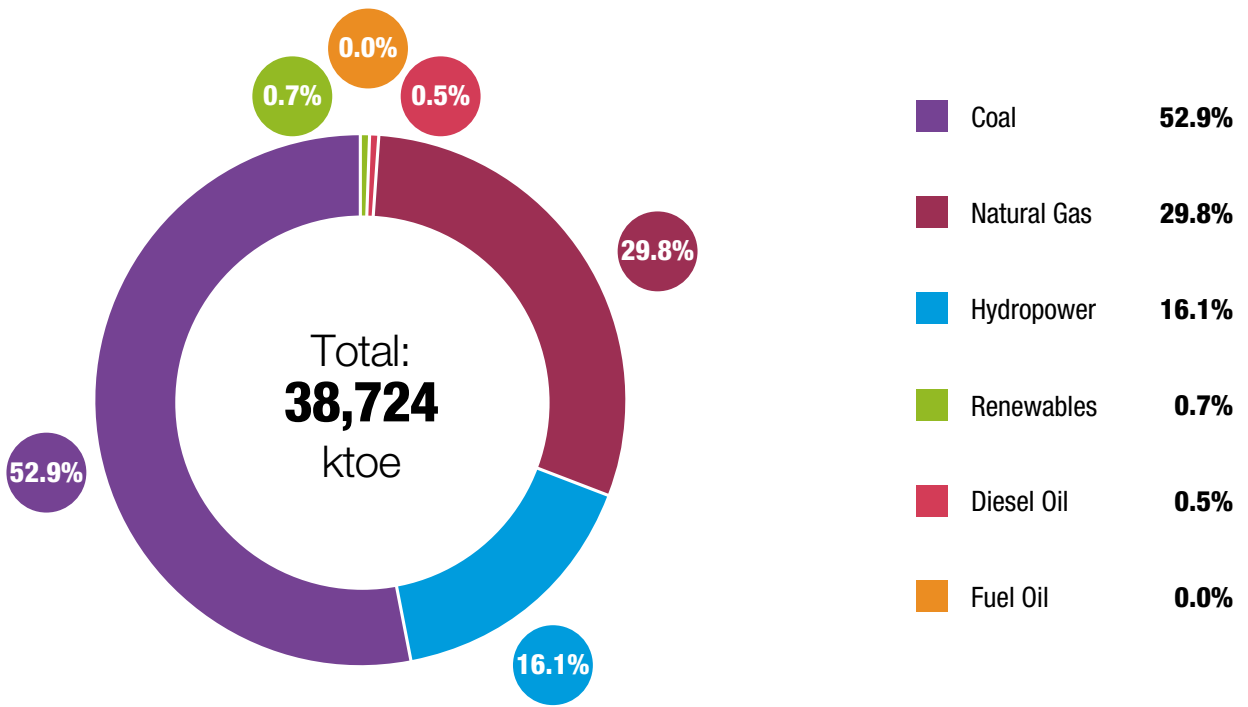
Region	Electricity Gross Generation		Electricity Consumption		Available Capacity	Peak Demand	Reserve Margin
	GWh	%	GWh	%	MW	MW	%
Peninsular Malaysia	133,954	78.5	120,617	78.9	24,227	18,338	32.1
Sarawak	29,655	17.4	26,618	17.4	4,427	3,504	26.3
Sabah	6,969	4.1	5,630	3.7	1,277	955	33.7
<b>Total</b>	<b>170,577</b>	<b>100.0</b>	<b>152,866</b>	<b>100.0</b>	<b>29,801</b>		

Source : TNB, SESB, SEB, IPPs and self-generators

- Notes
1. 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.
  2. Available Capacity for Peninsular Malaysia was based on Tested Annual Available Capacity (TAAC), Available Capacity for Sabah is based on Dependable Capacity
  3. Peak demand for Sarawak is the co-incident peak

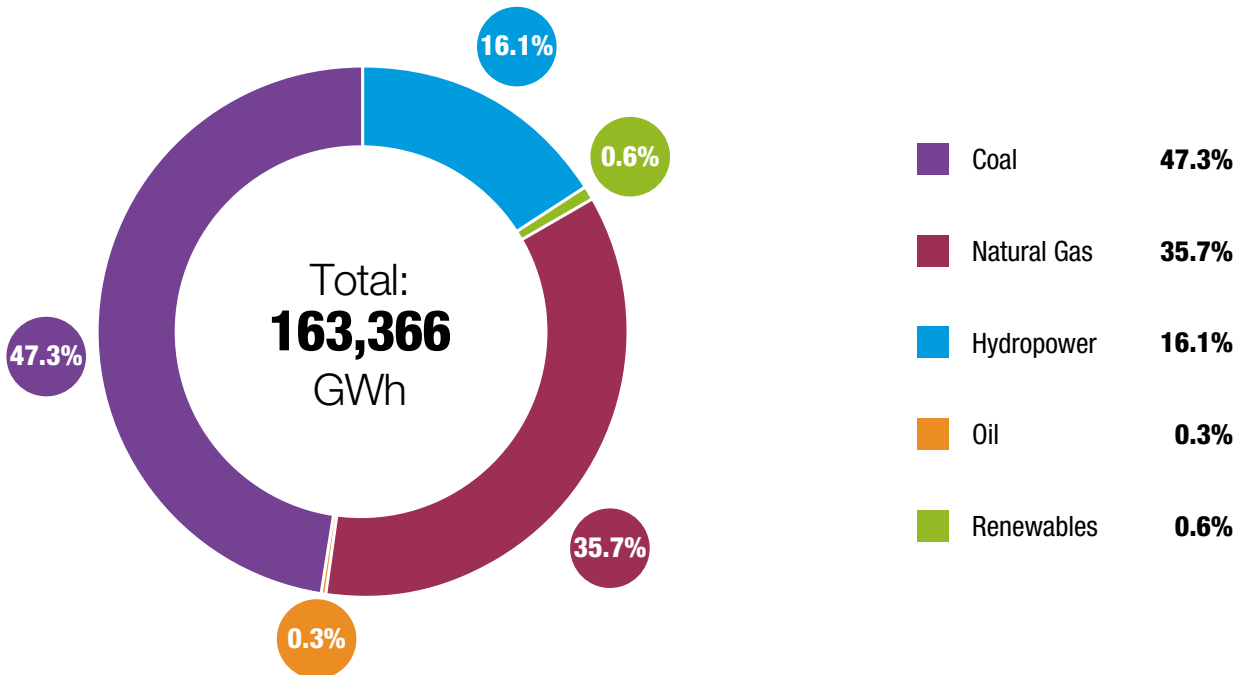


**FIGURE 28: ENERGY INPUT IN POWER STATIONS, 2018**



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

**FIGURE 29: GENERATION MIX BY FUEL TYPES, 2018**



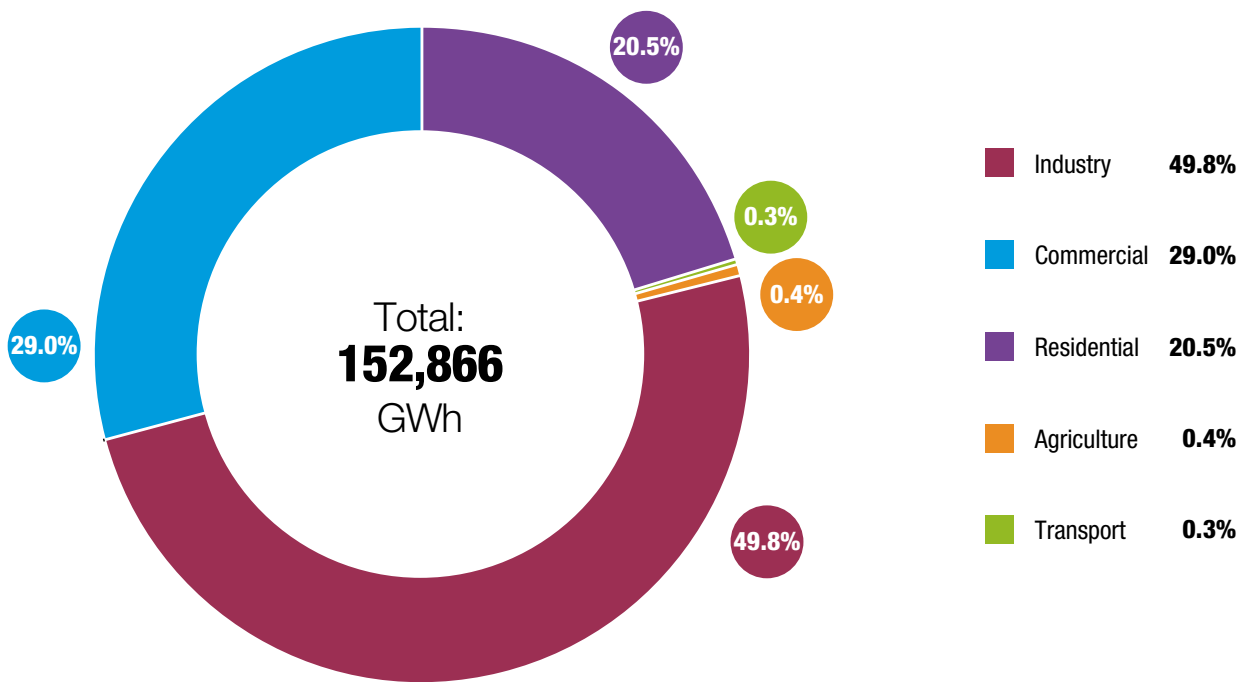
Note : Figures exclude electricity generation for self-generation plants  
 Source : Power utilities and IPPs

**TABLE 17: ELECTRICITY CONSUMPTION BY SECTOR IN GWh, 2018**

Region	Industry		Commercial		Residential		Transport		Agriculture		Total
	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%	
Peninsular Malaysia	53,388	70.2	39,124	88.2	27,006	86.2	482	100.0	617.3	100.0	120,617
Sarawak	21,297	28.0	2,844	6.4	2,478	7.9	-	-	-	-	26,618
Sabah	1,404	1.8	2,377	5.4	1,850	5.9	-	-	-	-	5,630
<b>Total</b>	<b>76,088</b>	<b>100.0</b>	<b>44,345</b>	<b>100.0</b>	<b>31,334</b>	<b>100.0</b>	<b>482</b>	<b>100.0</b>	<b>617</b>	<b>100.0</b>	<b>152,866</b>

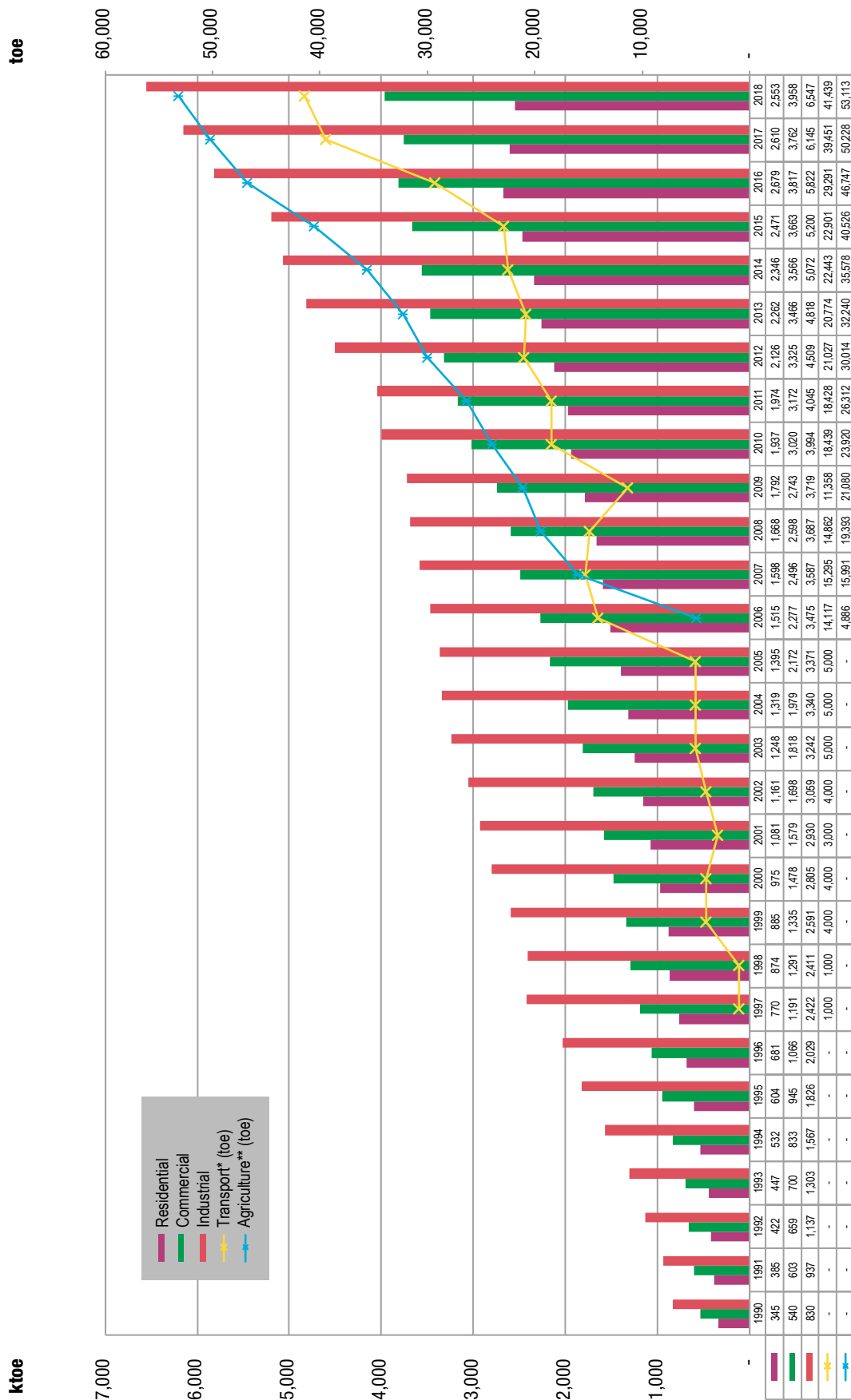
Source : Power utilities, IPPs and Self-Generators

**FIGURE 30: ELECTRICITY CONSUMPTION BY SECTOR IN 2018**



Source : Power utilities, IPPs and Self-Generators

**FIGURE 31: ELECTRICITY CONSUMPTION BY SECTOR IN 2018**



Source: TNB, SEB, SESS, Co-Generators and Land Public Transport Agency

Note (\*): From 2006 until 2018 data were collected directly from train operators

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

**TABLE 18: ELECTRICITY GENERATION AND INSTALLED CAPACITY OF RENEWABLE ENERGY BY PUBLIC LICENSEE BY REGION IN 2018**

Region	Type of Prime Mover	Installed Capacity (MW)	Unit Generated (MWh)
Peninsular Malaysia	Major Hydro - TNB	2,536.1	4,915,100
	Mini Hydro - TNB	21.6	49,440
	Mini Hydro - IPP	20.0	78,330
	Mini Hydro-FIT	43.8	49,934
	Solar - FIT	344.0	378,999
	Solar - LSS	467.3	98,840
	Solar - NEM	9.8	6,860
	Biogas - FIT	60.3	182,518
	Biomass - FIT	44.9	94,185
	<b>Subtotal</b>	<b>3,547.8</b>	<b>5,854,206</b>
Sabah	Major Hydro - SESB	75.0	350,395
	Mini Hydro-SESB	6.8	10,230
	Mini Hydro - FIT	6.5	9,020
	Solar - SESB	21.5	15,490
	Solar - FIT	38.9	51,507
	Solar - LSS, NEM	50.0	37,870
	Biogas - FIT	9.6	41,912
	Biomass - FIT	50.7	103,599
	Biomass - Co-Gen	29.2	16,460
	<b>Subtotal</b>	<b>288.2</b>	<b>636,483</b>
Sarawak	Major Hydro - SEB	3,452.0	21,029,940
	Mini Hydro -SEB	6.1	14,400
	Solar	0.6	3,830
	<b>Subtotal</b>	<b>3,458.7</b>	<b>21,048,170</b>
<b>Grand Total</b>	<b>7,294.7</b>	<b>27,538,859</b>	

Source : Energy Commission, TNB, SESB, SEB, Ministry of Utilities Sarawak and SEDA Malaysia

Note : Public Licensee is the licensee that generates electricity not only for its own use but to supply to others

**TABLE 19: ELECTRICITY GENERATION AND INSTALLED CAPACITY OF RENEWABLE ENERGY BY PRIVATE LICENSEE BY REGION IN 2018**

Region	Type of Prime Mover	Installed Capacity (MW)	Unit Generated (MWh)
Peninsular Malaysia	Biomass - Co-Gen	12.4	13,310
	Biomass - Self-Gen	296.6	255,790
	Solar - Self-Gen	71.8	59,380
	<b>Subtotal</b>	<b>380.7</b>	<b>328,480</b>
Sabah	Biomass - Co-Gen	87.0	-
	Biomass - Self-Gen	79.9	136,610
	Biogas - Self-Gen	10.1	18,020
	<b>Subtotal</b>	<b>177.0</b>	<b>154,630</b>
	Biomass - Self-Gen	16.6	79,490
	<b>Subtotal</b>	<b>16.6</b>	<b>79,490</b>
<b>Grand Total</b>		<b>574.3</b>	<b>562,600</b>

Source : Energy Commission, TNB, SESB, SEB and Ministry of Utilities Sarawak

Note : Private Licensee is the licensee that generates electricity for its own use only



# KEY ENERGY STATISTICS



**TABLE 20: PRIMARY ENERGY SUPPLY IN KTOE**

	Crude Oil	Petroleum Products & Others	Natural Gas	Coal and Coke	Hydropower & Renewables	Total	Annual Growth Rate (%)	Share (%)			
								Crude Oil and Petroleum Products & Others	Natural Gas	Coal and Coke	Hydropower & Renewables
1990	8,783	3,145	6,801	1,326	915	20,970	8.9	56.9	32.4	6.3	4.4
1991	9,443	4,163	10,112	1,564	1,053	26,335	25.6	51.7	38.4	5.9	4.0
1992	10,175	5,098	11,381	1,640	997	29,291	11.2	52.1	38.9	5.6	3.4
1993	10,135	5,816	11,360	1,352	1,262	29,925	2.2	53.3	38.0	4.5	4.2
1994	13,605	2,450	12,392	1,563	1,652	31,662	5.8	50.7	39.1	4.9	5.2
1995	16,159	608	13,960	1,612	1,540	33,879	7.0	49.5	41.2	4.8	4.5
1996	18,255	1,098	15,567	1,677	1,243	37,840	11.7	51.1	41.1	4.4	3.3
1997	17,917	3,803	19,041	1,622	790	43,173	14.1	50.3	44.1	3.8	1.8
1998	17,132	1,919	19,101	1,731	1,113	40,996	(5.0)	46.5	46.6	4.2	2.7
1999	17,643	1,807	21,476	1,940	1,668	44,534	8.6	43.7	48.2	4.4	3.7
2000	21,673	(1,431)	26,370	2,486	1,612	50,710	13.9	39.9	52.0	4.9	3.2
2001	23,590	(1,917)	25,649	2,970	1,687	51,979	2.5	41.7	49.3	5.7	3.2
2002	22,647	(523)	26,101	3,642	1,329	53,196	2.3	41.6	49.1	6.8	2.5
2003	25,344	(1,408)	27,257	5,316	1,056	57,565	8.2	41.6	47.3	9.2	1.8
2004	25,335	(82)	29,145	7,109	1,329	62,836	9.2	40.2	46.4	11.3	2.1
2005	24,339	(243)	33,913	6,889	1,313	66,211	5.4	36.4	51.2	10.4	2.0
2006	24,910	(1,671)	34,917	7,299	1,567	67,022	1.2	34.7	52.1	10.9	2.3
2007	26,571	(1,190)	36,639	8,848	1,522	72,390	8.0	35.1	50.6	12.2	2.1
2008	26,776	(1,780)	39,289	9,782	1,964	76,031	5.0	32.9	51.7	12.9	2.6
2009	26,386	96	35,851	10,623	1,627	74,583	(1.9)	35.5	48.1	14.2	2.2
2010	22,487	2,521	35,447	14,777	1,577	76,809	3.0	32.6	46.1	19.2	2.1
2011	24,679	2,224	35,740	14,772	1,874	79,289	3.2	33.9	45.1	18.6	2.4
2012	28,053	1,449	38,647	15,882	2,463	86,494	9.1	34.1	44.7	18.4	2.8
2013	27,154	5,320	39,973	15,067	3,216	90,730	4.9	35.8	44.1	16.6	3.5
2014	26,765	6,658	40,113	15,357	3,594	92,487	1.9	36.1	43.4	16.6	3.9
2015	24,971	4,865	41,853	17,406	3,582	92,677	0.2	32.2	45.2	18.8	3.9
2016	27,757	3,570	41,257	18,744	5,198	96,525	4.2	32.5	42.7	19.4	5.4
2017	27,471	1,909	41,200	20,771	6,947	98,298	1.8	29.9	41.9	21.1	7.1
2018	25,735	3,694	40,939	22,280	7,225	99,873	1.6	29.5	41.0	22.3	7.2



**TABLE 21: 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	-	(1,914)	1,924
2001	9,128	16,636	1,163	-	(2,019)	2,631
2002	11,017	17,803	1,098	3	(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	9,342	22,873	(2,404)	200	(1,798)	7,917
2007	7,509	23,777	(4,140)	195	(1,329)	8,152
2008	6,482	22,277	(3,041)	41	(1,609)	9,519
2009	6,517	23,606	(3,889)	8	(1,177)	9,007
2010	9,365	26,857	(4,183)	(32)	1,930	13,011
2011	2,300	26,856	(5,832)	(31)	2,159	13,189
2012	1,993	25,547	(6,498)	(7)	2,458	13,988
2013	1,684	25,639	(5,602)	(16)	7,400	13,583
2014	2,051	25,816	(5,343)	-	5,611	13,590
2015	7,696	25,145	(4,879)	(1)	3,998	15,895
2016	5,751	26,182	(4,716)	57	3,128	17,128
2017	4,823	27,613	(3,731)	96	2,189	18,799
2018	5,773	24,537	(4,167)	128	3,735	20,743

**TABLE 22: CONVERSION IN GAS PLANTS IN KTOE**

	Input:	Gas Plants			
	Natural Gas	MLNG	GPP - LPG	MDS	RGT
1990	9,797	8,761	na	na	na
1991	11,715	8,749	na	na	na
1992	11,681	8,425	392	na	na
1993	13,005	9,019	529	39	na
1994	14,634	9,087	948	238	na
1995	17,088	11,244	1,900	421	na
1996	20,822	15,251	1,212	344	na
1997	24,945	16,396	1,258	389	na
1998	23,138	16,688	1,526	na	na
1999	24,116	16,417	1,472	na	na
2000	26,093	17,231	1,482	164	na
2001	25,703	16,636	1,310	513	na
2002	25,571	17,803	1,504	445	na
2003	27,940	18,965	790	443	na
2004	33,176	22,944	520	513	na
2005	36,447	24,254	1,319	460	na
2006	35,378	23,450	1,036	464	na
2007	38,141	24,355	1,483	417	na
2008	38,193	22,793	1,362	481	na
2009	37,098	25,004	1,012	426	na
2010	40,246	26,601	2,299	454	na
2011	40,737	28,130	2,434	359	na
2012	40,042	26,231	2,035	486	na
2013	39,678	28,209	1,174	478	na
2014	39,193	28,213	1,250	420	na
2015	40,773	39,957	1,826	862	1,873
2016	39,665	31,658	1,997	573	1,277
2017	32,980	25,920	2,022	501	1,815
2018	32,980	25,920	2,022	501	1,383

Note : na means not applicable  
Middle Distillate Synthesis (MDS) commenced pre-commercialisation operation in year 2000  
MLNG plant produced LPG in the year 2003  
RGT means Regasification Gas Terminal

**TABLE 23: CONVERSION IN REFINERIES IN KTOE**

	Input:		Total Input	Output								Total Output
	Local Crude Oil	Imported Crude Oil & Others		Petrol	Diesel	Fuel Oil	Kerosene	ATF & AV GAS	LPG	Non-Energy	Refinery Gas	
1990	8,072	2,342	10,414	1,347	3,350	3,106	491	360	613	561	151	9,979
1991	8,476	2,113	10,589	1,611	3,681	2,547	526	390	548	772	168	10,243
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	3,224	19,606	2,491	6,744	2,716	265	2,000	371	1,783	203	16,573
1998	15,942	1,347	17,289	2,545	5,926	3,233	285	1,985	449	2,117	192	16,732
1999	14,595	4,437	19,032	3,056	6,712	2,603	210	2,140	617	2,159	230	17,727
2000	15,421	6,743	22,164	3,893	8,059	2,532	239	2,660	838	2,492	241	20,954
2001	13,299	10,546	23,845	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	8,322	25,449	4,584	9,062	1,763	983	2,367	932	2,623	262	22,576
2004	16,810	8,764	25,574	4,724	9,611	1,813	591	2,693	897	2,455	215	22,999
2005	18,216	6,271	24,487	4,245	9,161	1,777	521	2,553	822	2,157	202	21,438
2006	16,797	8,113	24,910	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	5,812	26,497	4,052	9,415	1,144	565	3,085	732	5,905	195	25,093
2010	14,003	8,706	22,709	3,873	8,369	327	483	2,891	697	4,357	209	21,206
2011	14,874	9,904	24,777	3,599	8,925	571	419	3,457	665	4,572	1,659	23,867
2012	17,213	10,347	27,560	4,708	10,033	1,608	654	3,918	702	4,318	197	26,138
2013	17,365	9,289	26,654	4,702	11,063	1,286	387	2,750	1,252	3,089	195	24,724
2014	16,351	10,066	26,417	4,918	9,725	2,340	100	2,916	1,102	2,826	192	24,119
2015	17,249	7,327	24,575	5,031	9,890	1,692	6	2,841	780	3,869	172	24,281
2016	18,170	9,353	27,524	5,044	9,988	1,479	4	2,548	1,285	4,339	201	24,888
2017	17,647	9,605	27,252	8,253	9,877	1,725	10	3,255	832	3,100	174	27,226
2018	16,144	9,409	25,553	5,524	9,665	2,432	18	3,451	900	2,550	130	24,669

**TABLE 24: 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*	Coal	Renewables			Fuel and Diesel Oil	Natural Gas	Hydro	Coal & Coke	Renewables	
1990	2,873	116	1,361	915	813	-	6,078	21.2	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	1,113	964	-	13,368	12.6	18.0	66.5	8.3	7.2	-	5,013
1999	950	172	10,162	1,668	1,332	-	14,284	6.9	7.9	71.1	11.7	9.3	-	5,409
2000	592	191	11,580	1,612	1,495	-	15,470	8.3	5.1	74.9	10.4	9.7	-	5,731
2001	730	278	11,922	1,687	1,994	-	16,611	7.4	6.1	71.8	10.2	12.0	-	5,940
2002	1,363	476	12,424	1,329	2,556	-	18,148	9.3	10.1	68.5	7.3	14.1	-	6,191
2003	289	340	10,893	1,056	4,104	-	16,682	(8.1)	3.8	65.3	6.3	24.6	-	6,568
2004	274	272	10,545	1,329	5,327	-	17,747	6.4	3.1	59.4	7.5	30.0	-	6,716
2005	275	298	12,271	1,313	5,541	-	19,698	11.0	2.9	62.3	6.7	28.1	-	6,706
2006	171	617	12,524	1,567	5,964	-	20,843	5.8	3.8	60.1	7.5	28.6	-	7,240
2007	199	314	12,549	1,522	7,486	-	22,070	5.9	2.3	56.9	6.9	33.9	-	8,385
2008	181	299	13,651	1,964	8,069	-	24,164	9.5	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
2010	125	415	12,628	1,577	12,951	-	27,696	12.5	1.9	45.6	5.7	46.8	-	9,404
2011	1,103	981	10,977	1,850	13,013	-	27,924	0.8	7.5	39.3	6.6	46.6	-	10,193
2012	550	811	11,533	2,150	14,138	80	29,262	4.8	4.7	39.4	7.3	48.3	0.3	11,032
2013	392	623	13,520	2,688	13,527	208	30,958	5.8	3.3	43.7	8.7	43.7	0.7	11,630
2014	269	622	13,860	3,038	13,648	171	31,608	2.1	2.8	43.8	9.6	43.2	0.5	12,227
2015	101	279	13,378	3,582	15,627	166	33,134	4.8	1.1	40.4	10.8	47.2	0.5	12,393
2016	155	165	13,260	4,499	17,101	168	35,348	6.7	0.9	37.5	12.7	48.4	0.5	12,944
2017	99	147	11,872	6,240	18,967	184	37,509	6.1	0.7	31.7	16.6	50.6	0.5	13,375
2018	17	187	11,542	6,230	20,472	276	38,723	3.2	0.5	29.8	16.1	52.9	0.7	13,939

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

**TABLE 25: FINAL ENERGY CONSUMPTION BY SECTORS IN KTOE**

	Industrial	Transport	Residential and Commercial	Non-Energy Use	Agriculture	Total	Annual Growth Rate (%)	Industrial including Agriculture & Non-Energy	Industry GDP*	Industry Energy Intensity (toe/RM Million at 2015 Prices)
1990	5,276	5,386	1,622	838	-	13,122	11.0	6,114	170,501	35.86
1991	5,809	5,806	1,721	1,071	130	14,537	10.8	7,010	184,477	38.00
1992	6,455	6,226	1,867	1,222	391	16,161	11.2	8,068	197,050	40.94
1993	7,012	6,558	2,055	2,027	62	17,714	9.6	9,101	209,410	43.46
1994	7,283	7,262	2,300	1,817	422	19,084	7.7	9,522	225,040	42.31
1995	8,060	7,827	2,556	2,994	446	21,883	14.7	11,500	248,922	46.20
1996	9,443	8,951	3,162	1,744	486	23,786	8.7	11,673	280,536	41.61
1997	10,106	10,201	3,073	2,298	490	26,168	10.0	12,894	300,541	42.90
1998	10,121	9,793	3,314	2,023	307	25,558	(2.3)	12,451	268,834	46.31
1999	10,277	11,393	3,653	1,799	106	27,228	6.5	12,182	288,835	42.18
2000	11,406	12,071	3,868	2,250	104	29,699	9.1	13,760	323,348	42.55
2001	11,852	13,137	4,048	2,378	98	31,513	6.1	14,328	315,054	45.48
2002	12,854	13,442	4,387	2,511	96	33,290	5.6	15,461	327,133	47.26
2003	13,472	14,271	4,399	2,345	98	34,585	3.9	15,915	351,628	45.26
2004	14,914	15,385	4,754	2,183	87	37,323	7.9	17,184	376,085	45.69
2005	15,583	15,293	5,134	2,173	101	38,284	2.6	17,857	388,442	45.97
2006	15,248	14,819	5,424	2,819	258	38,568	0.7	18,325	406,056	45.13
2007	16,454	15,717	6,197	2,957	281	41,606	7.9	19,692	417,734	47.14
2008	16,205	16,395	6,205	2,876	287	41,968	0.9	19,368	420,639	46.04
2009	14,312	16,119	6,336	3,868	211	40,846	(2.7)	18,391	395,287	46.53
2010	12,928	16,828	6,951	3,696	1,074	41,477	1.5	17,698	424,530	41.69
2011	12,100	17,070	6,993	6,377	916	43,456	4.8	19,393	438,593	44.22
2012	13,919	19,757	7,065	7,497	1,053	49,291	13.4	22,469	456,449	49.23
2013	13,496	22,357	7,403	7,277	1,051	51,584	4.7	21,824	471,292	46.31
2014	13,162	24,327	7,459	6,217	1,045	52,210	1.2	20,424	495,773	41.20
2015	13,971	23,435	7,600	5,928	895	51,829	(0.7)	20,794	518,360	40.12
2016	16,019	24,004	8,051	8,729	415	57,219	10.4	25,164	532,752	47.23
2017	17,463	24,039	7,796	12,517	674	62,489	9.2	30,654	559,204	54.82
2018	19,046	23,555	7,773	13,262	1,021	64,658	3.5	33,329	573,670	58.10

Note (\*) : 1. Defined as total GDP for Agriculture, Forestry and Fishing, Mining and Quarrying, Manufacturing and Construction  
2. Industry GDP for year 1990-2014 was calculated by the Energy Commission

**TABLE 26: FINAL ENERGY CONSUMPTION BY TYPE OF FUEL IN KTOE**

	Petroleum Products and Others	Electricity	Gas for Non-Energy	Gas for Heating	Natural Gas	Coal and Coke	Total	Total (excl. Non-Energy)	Annual Growth Rate (%)
1990	9,825	1,715	609	460	1,069	513	13,122	12,513	8.2
1991	10,914	1,925	604	495	1,099	599	14,537	13,933	11.3
1992	11,927	2,218	657	687	1,344	672	16,161	15,504	11.3
1993	13,075	2,450	1,141	560	1,701	487	17,713	16,572	6.9
1994	13,894	2,932	1,163	497	1,660	598	19,084	17,921	8.1
1995	16,142	3,375	1,064	590	1,654	712	21,883	20,819	16.2
1996	17,203	3,777	870	1,209	2,079	727	23,786	22,916	10.1
1997	18,578	4,384	1,378	1,087	2,465	740	26,167	24,789	8.2
1998	17,488	4,577	1,282	1,444	2,726	767	25,558	24,276	(2.1)
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	2,350	3,862	991	29,698	28,186	8.0
2001	20,323	5,594	1,655	2,965	4,620	977	31,514	29,859	5.9
2002	20,638	5,922	1,775	3,868	5,643	1,086	33,289	31,514	5.5
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	22,398	7,272	2,120	5,442	7,562	1,335	38,567	36,447	(0.8)
2007	24,852	7,683	2,112	5,597	7,709	1,362	41,606	39,494	8.4
2008	24,451	7,986	2,046	5,772	7,818	1,713	41,968	39,922	1.1
2009	24,145	8,286	1,995	4,807	6,802	1,613	40,846	38,851	(2.7)
2010	24,403	8,993	1,661	4,593	6,254	1,826	41,476	39,815	2.5
2011	23,946	9,236	3,906	4,609	8,515	1,759	43,456	39,550	(0.7)
2012	27,329	10,011	5,336	4,870	10,206	1,744	49,290	43,954	11.1
2013	29,379	10,590	5,276	4,800	10,076	1,539	51,584	46,308	5.4
2014	29,817	11,042	4,472	5,168	9,641	1,709	52,209	47,737	3.1
2015	29,087	11,397	4,470	5,096	9,566	1,778	51,829	47,359	(0.8)
2016	30,737	12,394	6,083	6,221	12,304	1,785	57,219	51,136	8.0
2017	31,241	12,607	9,837	7,001	16,838	1,804	62,490	52,653	3.0
2018	30,845	13,153	10,451	8,400	18,851	1,808	64,658	54,207	3.0

**TABLE 27: FINAL CONSUMPTION FOR PETROLEUM PRODUCTS IN KTOE**

	Diesel	Petrol	Fuel Oil	LPG	Kerosene	ATF & AV GAS	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	1,770	1,215	197	1,335	746	17,203
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	8,116	6,827	1,497	1,392	99	1,762	630	20,323
2002	8,042	6,948	1,589	1,542	92	1,785	639	20,637
2003	8,539	7,360	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	24,146
2010	8,388	9,560	478	2,920	19	2,380	657	24,402
2011	8,712	8,155	414	2,892	19	2,553	1,178	23,923
2012	9,410	10,843	768	2,892	38	2,521	743	27,215
2013	9,568	12,656	329	2,946	31	2,998	662	29,190
2014	10,161	12,705	246	2,632	23	3,158	592	29,517
2015	9,377	12,804	498	2,261	4	3,134	621	28,699
2016	9,254	13,411	513	3,497	5	3,019	650	30,348
2017	9,388	13,437	579	3,514	5	3,220	719	30,862
2018	9,756	13,041	387	3,309	6	3,121	789	30,409

**TABLE 28: SELECTED ENERGY AND ECONOMIC INDICATORS (1990-2018)**

	GDP at Current Prices (RM Million)*	GDP at 2015 Prices (RM million)*	Population ('000 people)*	Primary Energy Supply (ktoe)	Final Energy Consumption (ktoe)	Electricity Consumption (ktoe)	Electricity Consumption (GWh)	Average Annual Growth (%)		
								GDP at 2015 Prices	Primary Energy Supply	Final Energy Consumption
1990	128,658	291,458	18,102	21,471	13,146	1,715	19,932	9.00	8.90	8.70
1991	145,991	319,278	18,547	26,335	14,563	1,925	22,373	9.55	22.65	10.78
1992	162,800	347,647	19,068	29,291	16,185	2,218	25,778	8.89	11.22	11.14
1993	186,042	382,046	19,602	29,925	17,728	2,450	28,474	9.89	2.16	9.53
1994	211,181	417,240	20,142	31,662	19,287	2,932	34,076	9.21	5.80	8.79
1995	240,365	458,251	20,682	33,879	22,164	3,375	39,225	9.83	7.00	14.92
1996	274,138	504,089	21,223	37,840	24,181	3,777	43,897	10.00	11.69	9.10
1997	304,458	541,002	21,769	43,173	26,167	4,384	50,952	7.32	14.09	8.21
1998	306,022	501,187	22,334	40,996	25,558	4,577	53,195	(7.36)	(5.04)	(2.33)
1999	324,952	531,948	22,910	44,534	27,228	4,815	55,961	6.14	8.63	6.53
2000	370,817	579,073	23,495	50,710	29,699	5,263	61,168	8.86	13.87	9.08
2001	366,841	582,071	24,031	51,979	31,515	5,594	65,015	0.52	2.50	6.11
2002	398,714	613,450	24,543	53,196	33,289	5,922	68,827	5.39	2.34	5.63
2003	435,708	648,960	25,038	57,565	34,586	6,313	73,371	5.79	8.21	3.90
2004	493,223	692,981	25,542	62,836	37,323	6,642	77,195	6.78	9.16	7.91
2005	543,578	729,932	26,046	66,211	38,285	6,944	80,705	5.33	5.37	2.58
2006	596,784	770,698	26,550	67,021	38,567	7,272	84,517	5.58	1.22	0.74
2007	665,340	819,242	27,058	72,389	41,606	7,683	89,294	6.30	8.01	7.88
2008	769,949	858,826	27,568	76,032	41,968	7,986	92,815	4.83	5.03	0.87
2009	712,857	845,828	28,082	74,583	40,845	8,286	96,302	(1.51)	(1.91)	(2.68)
2010	821,434	908,629	28,589	76,809	41,476	8,993	104,519	7.42	2.98	1.54
2011	911,733	956,731	29,062	79,289	43,455	9,235	107,331	5.29	3.23	4.77
2012	971,252	1,009,097	29,510	86,495	49,291	10,011	116,350	5.47	9.09	13.43
2013	1,018,614	1,056,462	30,214	90,730	51,583	10,590	123,079	4.69	4.90	4.65
2014	1,106,443	1,119,920	30,709	92,487	52,209	11,042	128,333	6.01	1.94	1.21
2015	1,176,941	1,176,941	31,186	92,677	51,829	11,397	132,464	5.09	0.21	(0.73)
2016	1,249,698	1,229,312	31,634	96,525	57,219	12,394	144,042	4.45	4.15	10.40
2017	1,372,310	1,300,769	32,023	98,298	62,489	12,607	146,521	5.81	1.84	9.21
2018	1,447,451	1,362,815	32,382	99,873	64,658	13,153	152,866	4.77	1.60	3.47

Source (\*) : GDP and Population data from Department of Statistics, Malaysia

Note : GDP at 2010 Prices (RM Million) for 1990 until 2014 was calculated by the Energy Commission



Electricity Consumption	Per Capita				Energy Intensity				Energy Elasticity	
	GDP at Current Prices (RM)	Primary Energy Supply (toe)	Final Energy Consumption (toe)	Electricity Consumption (kWh)	Primary Energy Intensity (toe/GDP at 2015 Prices (RM Million))	Final Energy Intensity (toe/GDP at 2015 Prices (RM Million))	Electricity Intensity (toe/GDP at 2015 Prices (RM Million))	Electricity Intensity (GWh/GDP at 2015 Prices (RM Million))	Final Energy	Electricity
9.70	7,107	1.19	0.73	1,101	73.67	45.10	5.88	0.068	0.97	1.08
12.24	7,871	1.42	0.79	1,206	82.48	45.61	6.03	0.070	1.13	1.28
15.22	8,538	1.54	0.85	1,352	84.26	46.56	6.38	0.074	1.25	1.71
10.46	9,491	1.53	0.90	1,453	78.33	46.40	6.41	0.075	0.96	1.06
19.67	10,485	1.57	0.96	1,692	75.88	46.23	7.03	0.082	0.95	2.14
15.11	11,622	1.64	1.07	1,897	73.93	48.37	7.36	0.086	1.52	1.54
11.91	12,917	1.78	1.14	2,068	75.07	47.97	7.49	0.087	0.91	1.19
16.07	13,986	1.98	1.20	2,341	79.80	48.37	8.10	0.094	1.12	2.19
4.40	13,702	1.84	1.14	2,382	81.80	50.99	9.13	0.106	0.32	-0.60
5.20	14,184	1.94	1.19	2,443	83.72	51.19	9.05	0.105	1.06	0.85
9.30	15,783	2.16	1.26	2,603	87.57	51.29	9.09	0.106	1.02	1.05
6.29	15,265	2.16	1.31	2,705	89.30	54.14	9.61	0.112	11.81	12.15
5.86	16,246	2.17	1.36	2,804	86.72	54.27	9.65	0.112	1.04	1.09
6.60	17,402	2.30	1.38	2,930	88.70	53.29	9.73	0.113	0.67	1.14
5.21	19,310	2.46	1.46	3,022	90.67	53.86	9.58	0.111	1.17	0.77
4.55	20,870	2.54	1.47	3,099	90.71	52.45	9.51	0.111	0.48	0.85
4.72	22,478	2.52	1.45	3,183	86.96	50.04	9.44	0.110	0.13	0.85
5.65	24,589	2.68	1.54	3,300	88.36	50.79	9.38	0.109	1.25	0.90
3.94	27,929	2.76	1.52	3,367	88.53	48.87	9.30	0.108	0.18	0.82
3.76	25,385	2.66	1.45	3,429	88.18	48.29	9.80	0.114	1.77	-2.48
8.53	28,733	2.69	1.45	3,656	84.53	45.65	9.90	0.115	0.21	1.15
2.69	31,372	2.73	1.50	3,693	82.87	45.42	9.65	0.112	0.90	0.51
8.40	32,913	2.93	1.67	3,943	85.72	48.85	9.92	0.115	2.45	1.54
5.78	33,713	3.00	1.71	4,074	85.88	48.83	10.02	0.117	0.99	1.23
4.27	36,031	3.01	1.70	4,179	82.58	46.62	9.86	0.115	0.20	0.71
3.22	37,739	2.97	1.66	4,248	78.74	44.04	9.68	0.113	-0.14	0.63
8.74	39,505	3.05	1.81	4,553	78.52	46.55	10.08	0.117	2.34	1.96
1.72	42,854	3.07	1.95	4,576	75.57	48.04	9.69	0.113	1.58	0.30
4.33	44,699	3.08	2.00	4,721	73.28	47.44	9.65	0.112	0.73	0.91

**TABLE 29: ENERGY BALANCE TABLE IN 2018 (KILO TONNES OF OIL EQUIVALENT)**

COMMERCIAL ENERGY BALANCE FOR MALAYSIA 2018 (KILO TONNES OF OIL EQUIVALENT)									
ENERGY SOURCE	NATURAL GAS	LNG	CRUDE OIL (1/)	OTHERS (2/)	TOTAL PETROLEUM PRODUCTS	PETROLEUM PRODUCTS			
						PETROL	DIESEL	FUEL OIL	LPG
<b>PRIMARY SUPPLY</b>									
1. Primary Production	68,253	0	31,996	0	0	0	0	0	0
2. Gas Flaring, Reinjection & Use	-6,944	0	0	0	0	0	0	0	0
3. Imports	5,573	1,383	9,239	38	19,764	10,643	6,857	102	535
4. Exports	-1,407	-25,920	-15,012	-1	-16,029	-3,090	-7,240	-1,364	-456
5. Bunkers	0	0	0	0	-419	0	-100	-319	0
6. Stock Change	0	0	-450	0	469	9	814	-521	111
7. Statistical Discrepancy	0	0	-38	0	0	0	0	0	0
<b>8. Primary Supply</b>	<b>65,476</b>	<b>-24,537</b>	<b>25,735</b>	<b>36</b>	<b>3,786</b>	<b>7,563</b>	<b>332</b>	<b>-2,102</b>	<b>190</b>
<b>TRANSFORMATION</b>									
9. Gas Plants									
9.1 MLNG	-31,105	25,920	0	0	53	0	0	0	53
9.2 MDS	-1,103	0	0	0	501	0	125	0	0
9.3 GPP-LPG (3&4/)	-2,154	0	0	0	2,022	0	0	0	2,022
9.4 RGT	1,383	-1,383	0	0	0	0	0	0	0
<b>Subtotal</b>	<b>-32,980</b>	<b>24,537</b>	<b>0</b>	<b>0</b>	<b>2,576</b>	<b>0</b>	<b>125</b>	<b>0</b>	<b>2,075</b>
10. Refineries									
	0	0	-27,252	-63	27,226	8,253	9,877	1,725	832
11. Power Stations & Self-Generation									
11.1 Hydro Stations	0	0	0	0	0	0	0	0	0
11.2 Thermal Stations	-11,542	0	0	0	-204	0	-187	-17	0
11.3 Self-Generation (5/)	-1,274	0	0	0	-154	0	-154	0	0
<b>Subtotal</b>	<b>-12,816</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-358</b>	<b>0</b>	<b>-341</b>	<b>-17</b>	<b>0</b>
12. Losses & Own Use									
	-830	0	-182	0	-607	0	0	-16	0
13. Statistical Discrepancy									
	0	0	0	0	343	-46	-24	90	144
<b>14. Secondary Supply</b>	<b>-46,625</b>	<b>24,537</b>	<b>-25,735</b>	<b>-36</b>	<b>26,623</b>	<b>5,479</b>	<b>9,424</b>	<b>2,489</b>	<b>3,119</b>
<b>FINAL USE</b>									
15. Residential									
	1	0	0	0	789	0	0	0	785
16. Commercial									
	24	0	0	0	448	0	70	35	343
17. Industry									
	8,255	0	0	0	2,436	130	1,799	347	159
18. Transport									
	121	0	0	0	22,957	12,843	6,993	0	0
19. Agriculture									
	0	0	0	0	299	0	294	5	0
20. Fishery									
	0	0	0	0	669	68	601	0	0
21. Non-Energy Use									
	10,451	0	0	0	2,811	0	0	0	2,022
<b>22. Total Final Use</b>	<b>18,851</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30,409</b>	<b>13,041</b>	<b>9,756</b>	<b>387</b>	<b>3,309</b>
<b>ELECTRICITY OUTPUT</b>									
<b>Main Activity Producer</b>									
Gross Electricity Generation - GWh	58,416	0	0	0	392	0	354	38	0
<b>Autoproducer</b>									
Gross Electricity Generation - GWh	5,637	0	0	0	537	0	537	0	0

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

2/ Others Refer to Non-Crude Energy Forms (consist of Imported Light Diesel, Slop 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, Performance and Statistical Information on Electricity Supply Industry in Malaysia 2018.

Note : Total may not necessarily add up due to rounding

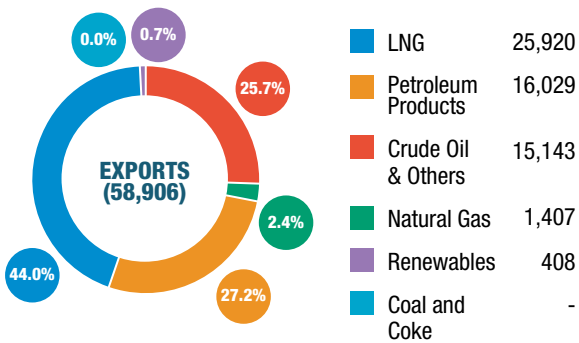
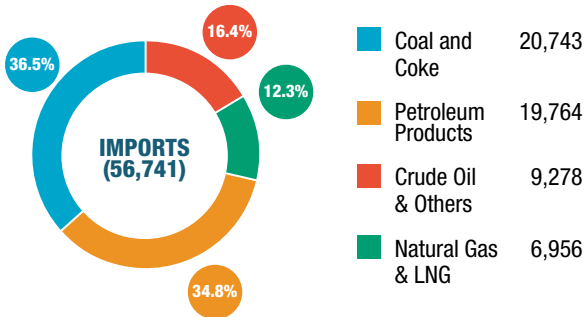
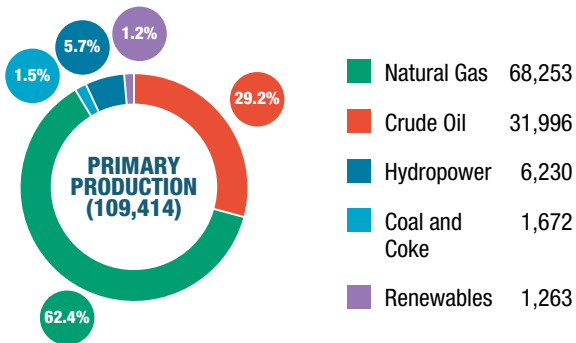
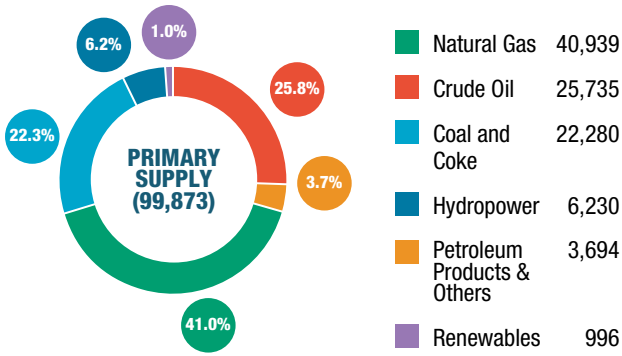
KEROSENE	ATF & AV GAS	NON ENERGY	REFINERY GAS	COAL & COKE	HYDRO POWER	SOLAR	BIOMASS	BIOGAS	BIODIESEL	ELECTRICITY	TOTAL
0	0	0	0	1,672	6,230	172	241	147	703	0	109,414
0	0	0	0	0	0	0	0	0	0	0	-6,944
0	533	1,093	0	20,743	0	0	0	0	0	2	56,741
-51	-827	-3,000	0	0	0	0	0	0	-408	-130	-58,906
0	0	0	0	0	0	0	0	0	0	0	-419
-8	1	63	0	214	0	0	0	0	140	0	374
0	0	0	0	-349	0	0	0	0	0	0	-387
<b>-60</b>	<b>-293</b>	<b>-1,844</b>	<b>0</b>	<b>22,280</b>	<b>6,230</b>	<b>172</b>	<b>241</b>	<b>147</b>	<b>436</b>	<b>-128</b>	<b>99,873</b>
0	0	0	0	0	0	0	0	0	0	0	-5,132
53	0	323	0	0	0	0	0	0	0	0	-602
0	0	0	0	0	0	0	0	0	0	0	-132
0	0	0	0	0	0	0	0	0	0	0	0
<b>53</b>	<b>0</b>	<b>323</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-5,867</b>
18	3,451	2,550	130	0	0	0	0	0	0	0	-920
0	0	0	0	0	-6,230	0	0	0	0	2,265	-3,964
0	0	0	0	-20,472	0	-155	-57	-64	0	11,674	-20,820
0	0	0	0	0	0	-17	-184	-82	0	616	-1,096
<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-20,472</b>	<b>-6,230</b>	<b>-172</b>	<b>-241</b>	<b>-147</b>	<b>0</b>	<b>14,555</b>	<b>-25,880</b>
0	0	-461	-130	0	0	0	0	0	0	-1,214	-2,832
-6	-37	221	0	0	0	0	0	0	0	-60	283
<b>65</b>	<b>3,414</b>	<b>2,633</b>	<b>0</b>	<b>-20,472</b>	<b>-6,230</b>	<b>-172</b>	<b>-241</b>	<b>-147</b>	<b>0</b>	<b>13,281</b>	<b>-35,215</b>
4	0	0	0	0	0	0	0	0	0	2,553	3,343
0	0	0	0	0	0	0	0	0	0	3,958	4,431
2	0	0	0	1,808	0	0	0	0	0	6,547	19,046
0	3,121	0	0	0	0	0	0	0	436	41	23,555
0	0	0	0	0	0	0	0	0	0	53	352
0	0	0	0	0	0	0	0	0	0	0	669
0	0	789	0	0	0	0	0	0	0	0	13,262
<b>6</b>	<b>3,121</b>	<b>789</b>	<b>0</b>	<b>1,808</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>436</b>	<b>13,153</b>	<b>64,658</b>
0	0	0	0	77,286	26,325	573	198	224	0	0	163,415
0	0	0	0	0	0	59	642	287	0	0	7,163





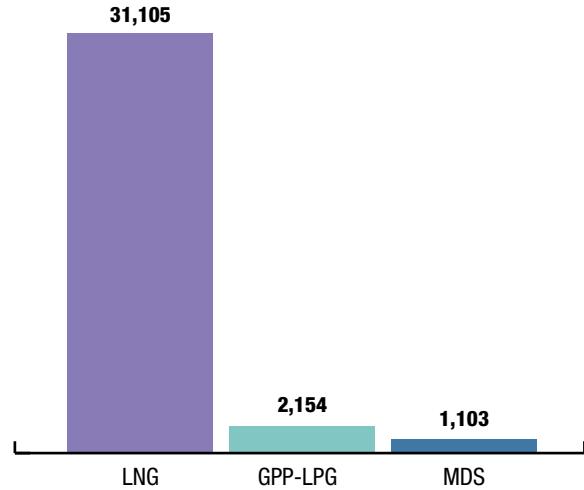
# ENERGY FLOW CHART

## PRIMARY SUPPLY

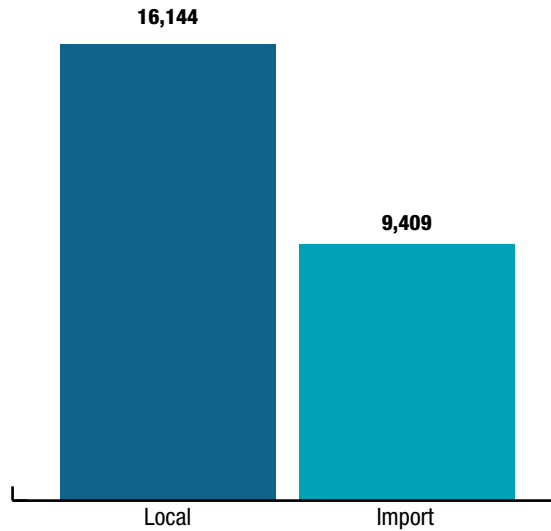


## TRANSFORMATION

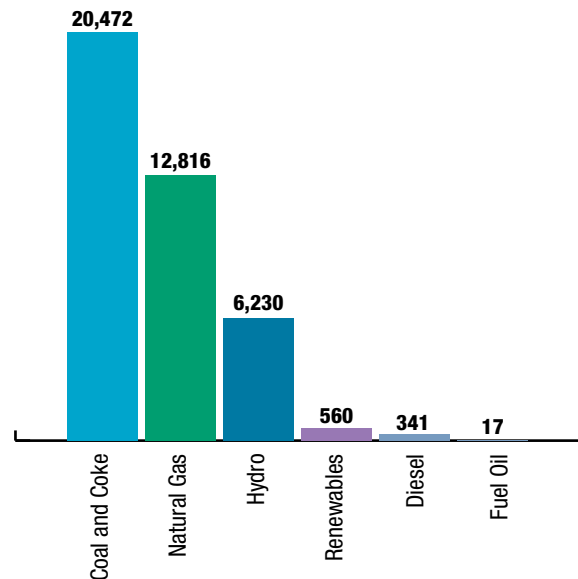
### GAS PLANT INPUT



### OIL REFINERIES INPUT

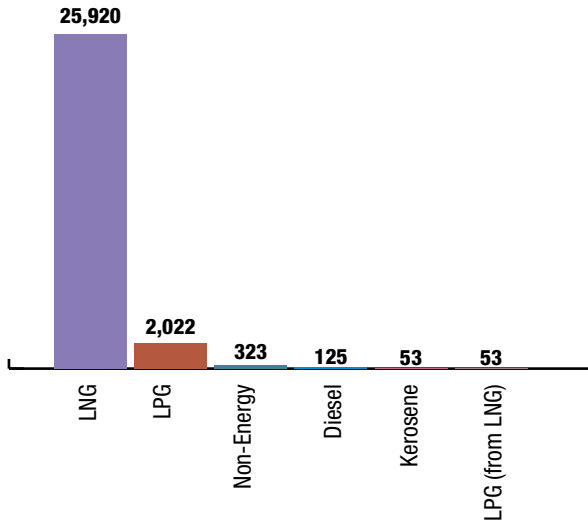


### POWER STATIONS & SELF GENERATION INPUT

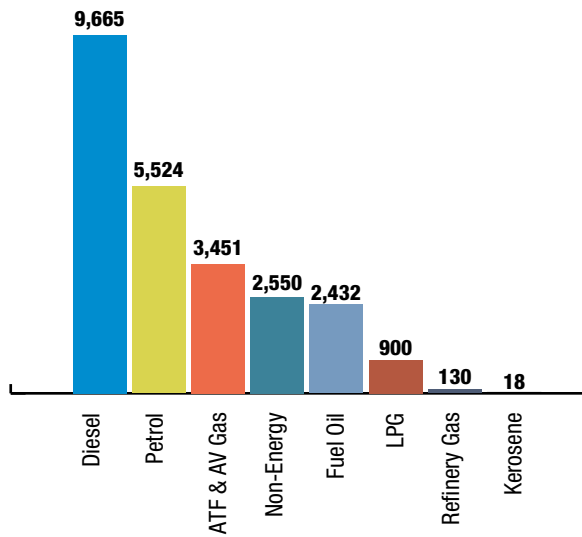


Note \* : Primary Supply = Primary Production - Flaring + Imports - Exports - Bunkers (+-) Stock Change (+-) Statistical Discrepancy

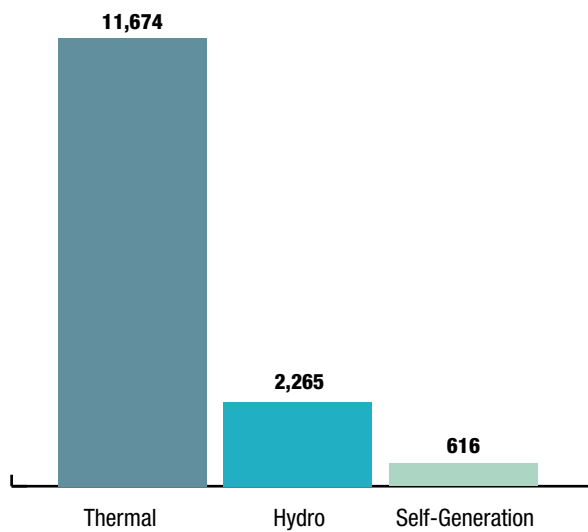
### GAS PLANT OUTPUT



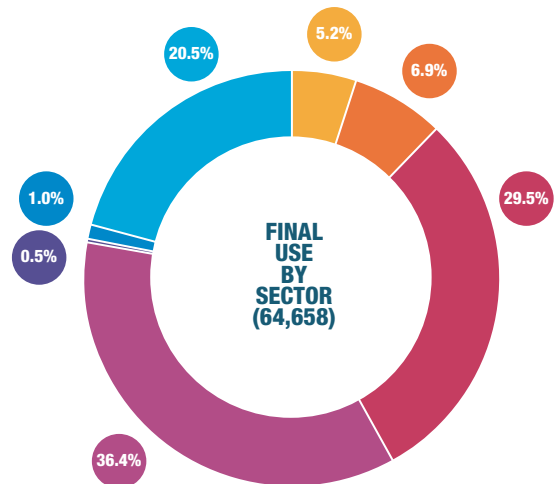
### OIL REFINERIES OUTPUT



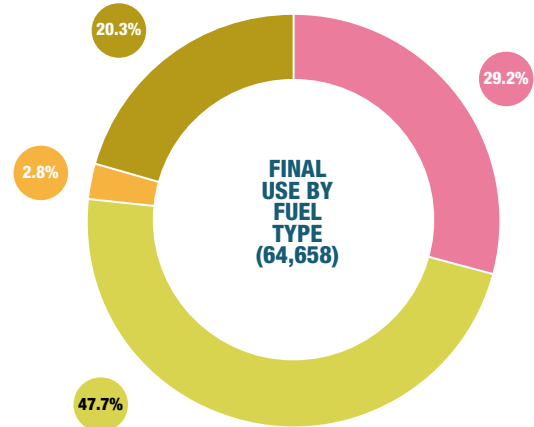
### POWER STATIONS & SELF GENERATION OUTPUT



### FINAL USE



Transport	23,555	Residential	3,343
Industry	19,046	Fishery	669
Non-Energy Use	13,262	Agriculture	352
Commercial	4,431		



Petroleum Products	30,845	Electricity	13,153
Natural Gas	18,851	Coal and Coke	1,808

## 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 “tonnes oil equivalent” (1 toe= 41.84 Gigajoules) was chosen as the final unit for presentation in the Energy Balance.

### ENERGY BALANCE FORMAT

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

<b>Primary Supply</b>	Refers to supply of energy that has not undergone the transformations / conversion process within the country.
<b>Primary Production (1)</b>	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.
<b>Gas Flaring, Reinjection &amp; Use (2)</b>	Refers to the quantity of gas flared, reinjected into the gas fields and use for production purpose.
<b>Imports (3) and Exports (4)</b>	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 sign and export a negative sign.
<b>Bunkers (5)</b>	Refer to the amount of fuels delivered to ocean-going ships of all flags engaged in international traffic.
<b>Stock Change (6)</b>	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 industry consumers. At this stage, however, only oil companies' stock are taken into account. A negative sign indicates net increase while a positive sign indicates net decrease in stocks.
<b>Total</b>	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.
<b>Gas Plants (9)</b>	Shows the input of natural gas into the lng, mds and gpp-lpg plants and their respective outputs.
<b>Refineries (10), power stations and Co-generation &amp; Private licensees (11)</b>	Show the input of any energy product (negative sign) for the purpose of converting it to one or more secondary products (positive sign).
<b>Losses and Own Use (12)</b>	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.
<b>Secondary Supply (14)</b>	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.
<b>Residential and Commercial (15 &amp; 16)</b>	Not only refers to energy used within households and commercial establishments but includes government buildings and institutions.
<b>Industry (17)</b>	Is a very broad-based sector ranging from manufacturing to mining and construction. Diesel sales through distributors are assumed to be to industry consumers.
<b>Transport (18)</b>	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.
<b>Agriculture (19)</b>	Covers agriculture and forestry.
<b>Fishery (20)</b>	May involve the capture of wild fish or raising fish through fish farming or aquaculture.
<b>Non-Energy Use (21)</b>	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 industry feedstocks
<b>Final use (22)</b>	Refer to the quantity of energy of all kinds delivered to the final user.

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 ON ELECTRICITY

<b>Reserve Margin</b>	<p>Total capacity margin is defined as the amount of installed generation available over and above system peak load.</p> $\text{Reserve Margin} = \frac{\text{Installed Capacity} - \text{Peak Demand}}{\text{Peak Demand}}$
<b>Peak Demand</b>	The maximum power consumption 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.
<b>Installed Capacity</b>	Installed capacity is defined as the maximum possible capacity (nameplate rating) that can be provided by the plant.
<b>Dependable Capacity</b>	The maximum capacity, modified for ambient limitations for a specified period of time, such as a month or a season.
<b>Available Capacity</b>	Available capacity refers to the Latest Tested Net Capacity. It is the dependable capacity, modified for equipment limitation at any time.
<b>Unit Generated (Gross Generation)</b>	The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatt-hours (kWh) or megawatt hours (MWh)
<b>Unit Sent Out From Station(s) (Net Generation)</b>	The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries.

## NOTES ON COAL

<b>Measured Reserves</b>	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.
<b>Indicated Reserves</b>	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.
<b>Inferred Reserves</b>	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.

## NOTES ON GDP

<b>GDP Definition</b>	GDP can be measured by using three approaches namely Production, Expenditure and Income Approach. Conceptually, GDP by these three approaches produce the same results.
<b>Production Approach</b>	GDP based on Production Approach is defined as value of total production of goods and services produced in the economy after deducting value of intermediate consumption. This approach is also known as value added approach.
<b>Expenditure Approach</b>	GDP based on Expenditure Approach is the summation of Private Final Consumption, Government Final Consumption, Gross Fixed Capital Formation, Changes in Inventories and Valuables, Exports of goods and services minus Imports of goods and services. This approach measures value of goods and services used by final users on goods and services produced by resident.
<b>Income Approach</b>	<p>GDP based on Income Approach is the summation of all incomes accruing the production in economy. Thus, this method enables factors of income and the return to factors of production to be measured by economic activity. The income components are Compensation of Employees, Gross Operating Surplus and Taxes Less Subsidies on Production and Imports.</p> <p>GDP by Income Approach is calculated as follows:</p> $\text{GDP by Income Approach} = \text{CE} + \text{GOS} + (\text{T} - \text{S})$ <p>where;</p> <ul style="list-style-type: none"> <li>CE = Compensation of Employees</li> <li>GOS = Gross Operating Surplus</li> <li>(T - S) = Taxes Less Subsidies on Production and Imports</li> </ul>

## NOTES ON GNI

<b>Definition</b>	The Gross national income (GNI) consists of: the personal consumption expenditure, the gross private investment, the government consumption expenditures, the net income from assets abroad (net income receipts), and the gross exports of goods and services, after deducting two components: the gross imports of goods and services, and the indirect business taxes. The GNI is similar to the gross national product (GNP), except that in measuring the GNP one does not deduct the indirect business taxes.
<b>Measuring GNI</b>	<p>As GNI is an add up of Net Income from abroad and the GDP, one can calculate the GNI by the following formula:</p> $\text{GNI} = \text{GDP} + (\text{FL} - \text{DL}) + \text{NCI}$ <p>When FL and DL are respectively the foreign and domestic income from labor, and NCI the net capital inflow. For example, if country A's nominal GDP is \$20,000, the domestic income from labour is \$3,000 and the foreign income from labour is \$5,000, and the country received a \$10,000 donation from another country's charity organisation, the GNI of country A would be \$32,000.</p>

## CONVERSION COEFFICIENTS AND EQUIVALENCE

TJ/1000 Tonnes<sup>1</sup>

<b>Hard coal</b>	29.3076	<b>Lignite/brown coal</b>	11.2834
<b>Coke/oven coke</b>	26.3768	<b>Peat</b>	9.525
<b>Gas coke</b>	26.3768	<b>Charcoal</b>	28.8888
<b>Brown coal coke</b>	19.6361	<b>Fuelwood 2</b>	13.4734
<b>Pattern fuel briquettes</b>	29.3076	<b>Lignite briquettes</b>	19.6361

Natural Gas Products (TJ/1000 Tonnes)

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

Electricity

<b>Electricity</b>	3.6 TJ/GWh	<b>Methane</b>	1,131.31 GJ/mscf
--------------------	------------	----------------	------------------

Petroleum Products (TJ/1000 Tonnes)

<b>Crude Petroleum (imported)</b>	42.6133	<b>Gas Oil/Diesel</b>	42.4960
<b>Crude Petroleum (domestic)</b>	43.3000	<b>Residual Fuel Oil</b>	41.4996
<b>Plant Condensate</b>	44.3131	<b>Naphtha</b>	44.1289
<b>Aviation Gasoline (AV GAS)</b>	43.9614	<b>White/Industry Spirit</b>	43.2078
<b>Liquefied Petroleum Gas (LPG)</b>	45.5440	<b>Lubricants</b>	42.1401
<b>Petrol</b>	43.9614	<b>Bitumen (Asphalt)</b>	41.8000
<b>Natural Gas</b>	44.8992	<b>Petroleum Waxes</b>	43.3334
<b>Aviation Turbine Fuel (ATF)</b>	43.1994	<b>Petroleum Coke</b>	36.4000
<b>Kerosene</b>	43.1994	<b>Other Petroleum Products</b>	42.4960

1,000 Tonnes Oil Equivalent (toe) = 41.84 TJ

Note : 1. Unless otherwise indicated  
2. Assuming 9.7 TJ/1000 cu m

Crude Oil and Petroleum Products (Barrels to Tonnes)

<b>Product</b>	<b>Barrels/tonne</b>
<b>Crude Oil - Import</b>	7.33
<b>- Local</b>	7.60
<b>Petrol</b>	8.55
<b>Diesel</b>	7.50
<b>Fuel Oil</b>	6.60
<b>Kerosene</b>	7.90
<b>Liquefied Petroleum Gas (LPG)</b>	11.76
<b>Aviation Turbine Fuel (ATF)</b>	7.91
<b>Aviation Gasoline (AV GAS)</b>	9.05
<b>Non-Energy</b>	6.50

## DEFINITION

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

<b>Natural Gas</b>	A mixture of gaseous hydrocarbons (mainly methane), which occur in either gas fields or in association with crude oil in oil fields.
<b>LNG</b>	Natural gas that is liquefied for ocean transportation and export.
<b>Crude Oil</b>	A natural product that is extracted from mineral deposits and consists essentially of many different non-aromatic hydrocarbons (paraffinic, cyclonic, etc.)
<b>Aviation Gasoline (AV GAS)</b>	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.
<b>Liquefied Petroleum Gas (LPG)</b>	Commercial LPG consists essentially of a mixture of propane and butane gases which are held in the liquid state by pressure or refrigeration.
<b>Petrol</b>	Petroleum distillate used as fuel in spark-ignition internal combustion engines. Distillation range is within 30°C and 250°C.
<b>Aviation Turbine Fuel (ATF)</b>	Fuel for use in aviation gas turbines mainly refined from kerosene. Distillation range within 150°C and 250°C.
<b>Kerosene</b>	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.
<b>Diesel (or Gas Oil)</b>	Distillation falls within 200°C to 340°C. Diesel fuels for high-speed diesel engines (i.e. automotive) are 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.
<b>Fuel Oil</b>	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.
<b>Non-Energy Products</b>	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 a distillation range within 380°C to 500°C.
<b>Refinery Gas</b>	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.
<b>Coal and Coke</b>	Solid fuels consisting essentially of carbon, hydrogen and oxygen sulphur. Coal in the energy balances 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.
<b>Hydropower</b>	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.
<b>Electricity Production</b>	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 Supply and Market Regulation Department. Figures for 'fuel input' into power stations & co-generation plants were only available for TNB, SEB, SESB, IPPs as well as GDC Sdn Bhd. Estimates were made using average conversion efficiency to obtain the fuel input into private installations.



**SURUHANJAYA TENAGA (ENERGY COMMISSION)**

No. 12, Jalan Tun Hussein, Precinct 2,  
62100 Putrajaya, Malaysia.

**T** : (03) 8870 8500

**F** : (03) 8888 8637

**W** : [www.st.gov.my](http://www.st.gov.my)