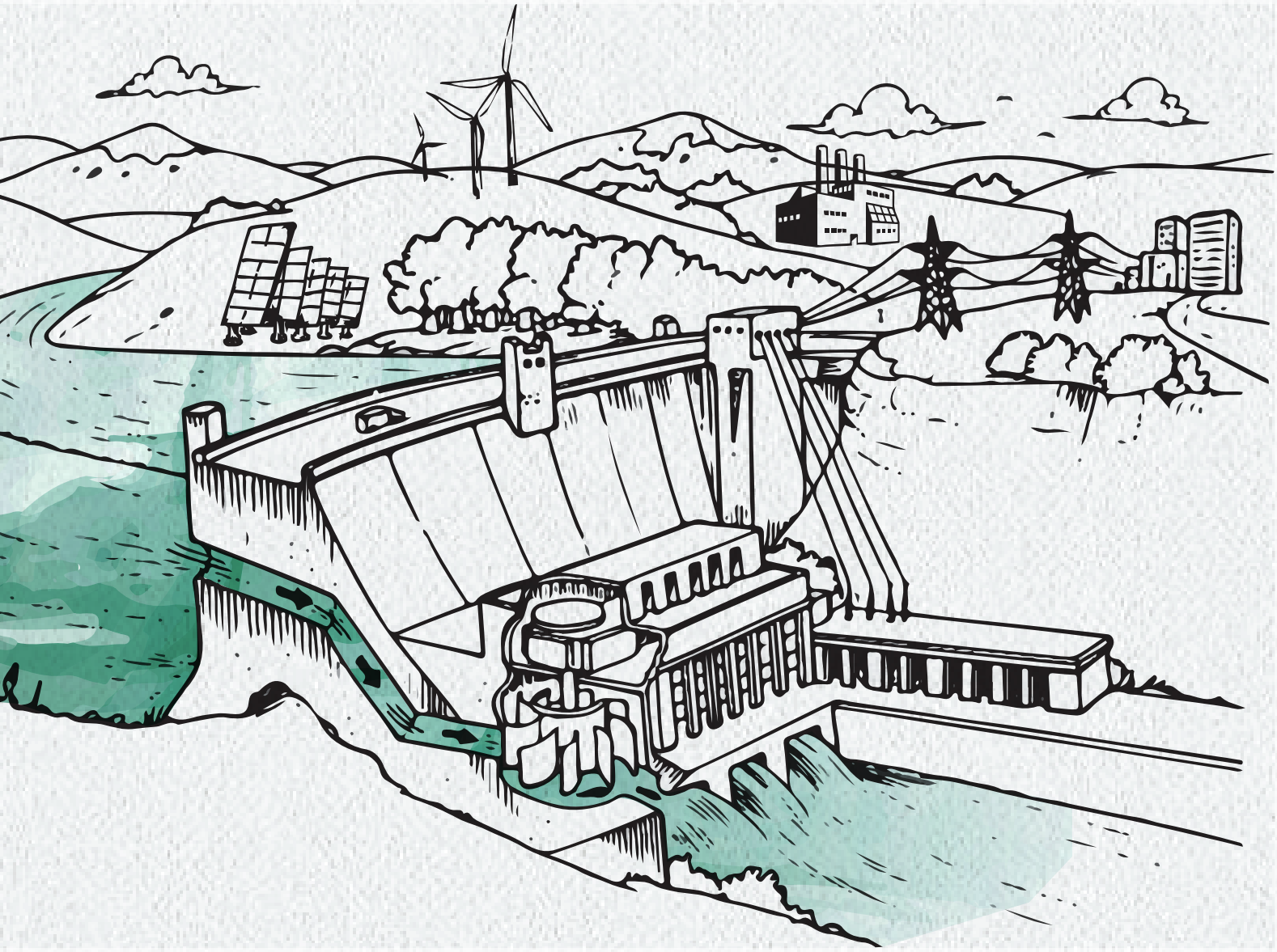
Suruhanjaya Tenaga
Energy Commission



NATIONAL ENERGY BALANCE 2016

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PREFACE

The energy situation in Malaysia has experienced significant changes over the last 3 decades. In particular, the nation has managed to transform its energy mix from being almost totally oil dependent to a more diversified mix of oil, gas, coal and hydro, and today, with increasing share of renewable energy in the mix. These are positive changes, and it reflects the country's evolving energy policies and strategies over the years to meet our national development goals.

2016 has been a challenging year for Malaysia as we grapple with external and internal factors that threatened our economy growth. Low global oil price plus the significant weakening of the Ringgit continued to put tremendous pressure on our economy. Domestically, the Malaysian economy continued to face headwinds from higher costs of living amid soft employment conditions. Nevertheless, despite these challenging environment, the Malaysian economy managed to keep growing with a commendable growth rate of 4.2 percent in 2016 (2015: 5.0 percent).

Our primary energy supply and final energy consumption in 2016 increased by 3.6 percent and 10.4 percent, respectively. This is contrary to 2015's reducing trend in energy supply and consumption, and last year's decoupling of energy supply and consumption from economic growth has proven to be just a temporary phenomenon. The transportation sector continued to be the country's largest consumer of energy with 42.0 percent share, followed by the industry sector with 28.0 percent. The total final energy consumption of the industry sector increased significantly by 14.5 percent to 16,019 ktoe. Correspondingly, the energy intensity of the industry sector increased by 18.1 percent, compared to a reduction of 2.5 percent last year. In terms of final energy consumption by fuel type, natural gas shows a huge jump of 28.6 percent to 12,304 ktoe. Meanwhile, petroleum products consumption showed an increase of 5.7 percent to 30,737 ktoe, and coal and coke posted an increase of 0.4 percent to 1,785 ktoe. Following the trend, electricity consumption recorded an increase of 8.9 percent to 12,392 ktoe in 2016.

Total electricity consumption grew with an annual growth rate of 8.9 percent. The electricity generation mix in 2016 was made up of coal with a share of 44.9 percent (2015: 42.3 percent), followed by natural gas with 40.7 percent (2015:46.6 percent) share, hydro with 13.3 percent (2015: 9.3%), diesel and fuel oil with 0.7 percent (2015: 1.2%), and renewables with 0.4 percent (2015: 0.7%). The electricity generation mix shows that coal has overtaken gas as the dominant fuel. Total installed capacity as at end 2016 was 33,090 MW, an increase of 8.7 percent from 2015. Electricity demand was driven primarily by the industry sector, which constituted 47.0 percent (2015: 45.9%) of total electricity consumption. The commercial and residential sector's electricity consumption were 30.8 percent (2015: 32.2 percent) and 21.6 percent (2015: 21.4 percent), respectively, while the remaining went to the transportation and agriculture sector, with each consuming 0.2 percent and 0.4 percent of the total electricity consumption, respectively.

It is expected that the share of renewables in the electricity generation mix will increase in the upcoming year as some of the generation projects from Large-Scale Solar (LSS) and Net Energy Metering (NEM) initiatives are commissioned. This is in line with the commitment that Malaysia has made in COP21 which is to reduce its greenhouse gas emissions intensity of Gross Domestic Product (GDP) by 45% by year 2030, compared to 2005 levels. In this regard, our electricity intensity has slightly increased from 0.124 GWh/RM million GDP in 2015 to 0.130 GWh/RM million GDP, or an increment of 4.5 percent from the previous year. The increment is driven heavily by the industry sector, especially in Sarawak, as data reported by Sarawak Energy Berhad (SEB) showed that the electricity consumption in the industry sector in Sarawak has increased by 58.8 percent compared to the previous year. This was due to greater demand from Samalaju Industrial Park, located in the Sarawak Corridor of Renewable Energy (SCORE). The industrial park is a thriving 7,000-hectare area dedicated to energy-intensive heavy industry and has been developed to house companies engaged in aluminium smelting, steel, oil refining, silica-based industries, marine engineering and a wide range of industrial and commercial activities.

I would like to take this opportunity to thank everyone involved in the preparation of this report, namely the relevant government agencies, power utilities, independent power producers, oil and gas companies, coal producers as well as cement and iron and steel manufacturers for your continuous support in providing relevant and accurate data for the report.

Thank you.

Datuk Ir. Ahmad Fauzi bin Hasan
Chairman
Energy Commission
Malaysia

INTRODUCTION

Energy is essential for the well-being and economic development of a country. As a nation develops, the need for energy grows in line with the growing population and expanding industrial and commercial sectors. Hence, demand for energy has been in an upward trend in Malaysia as we strive to become a developed economy. As a result, our indigenous resources have been steadily declining, and Malaysia now has to rely more and more on the global markets for its energy supply.

The availability of national energy data and statistics is essential in order for a nation to formulate effective energy policies and regulatory frameworks. Malaysia will continue to develop a comprehensive energy database that is accessible to all interested stakeholders. One of the key elements in the energy database is the supply of and demand for energy. Logically, energy supply should equate energy demand, otherwise there would be a shortage or a surplus. Correspondingly, this indicates the level of energy security of a country. In this regard, the national energy database plays an important role by capturing the flow of energy in and out of the country.

The National Energy Balance (NEB) report presents Malaysia's data and statistics on energy supply and demand situation, as well as other related key energy data. NEB is available for download from the Energy Commission's website for all interested stakeholders. Admittedly, there is still room for improvement in terms of the accuracy, clarity and scope of the data and statistics presented.

It is our responsibility to ensure that the data and statistics are effectively communicated to users. Hence, by harnessing current ICT technologies, the Energy Commission has launched Malaysia Energy Statistics Mobile Application at Le Meridien Hotel in Kuala Lumpur on 21 November 2017 in conjunction with the United Nations Statistics Division (UNSD) Workshop on Energy Statistics for ASEAN Countries. The mobile apps can be downloaded via Apple Appstore and Google Playstore for free. Key energy data and statistics of Malaysia such as on energy supply and consumption, energy prices, energy indicators, etc. are available in the mobile apps, and they can even be accessed offline.

We constantly strive to achieve energy data enhancement so as to be on par with international best practices, where the energy database is comprehensive in scope and up-to-date. In this regard, we have completed a survey to study energy consumption in the commercial sector. The aim of this study is to further analyse the commercial sector's usage of energy. The study breaks down the commercial sector into 12 sub-sectors whereby each sub-sector is studied and analysed for its energy consumption trend and the end uses such as space cooling, water heating, lighting and other equipment use. Through the study, we are able to identify which specific sub-sector is consuming the most energy and for which purposes (out of the four end-uses). The outcome of the study will be useful to policymakers and planners, in particular the government, with insights into the commercial sector's energy consumption trend.

I would like to thank the Honourable Minister and the Ministry of Energy, Green Technology and Water for their continuing support in realising the NEB publication every year. We would also like to acknowledge and thank the data providers for providing data in a timely and systematic manner, and others who have directly or indirectly assisted us in publishing the NEB 2016. We look forward to a greater cooperation and involvement from everyone.

Thank you.

Ir. Azhar bin Omar
Chief Executive Officer
Energy Commission
Malaysia

DATA COMPILATION

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

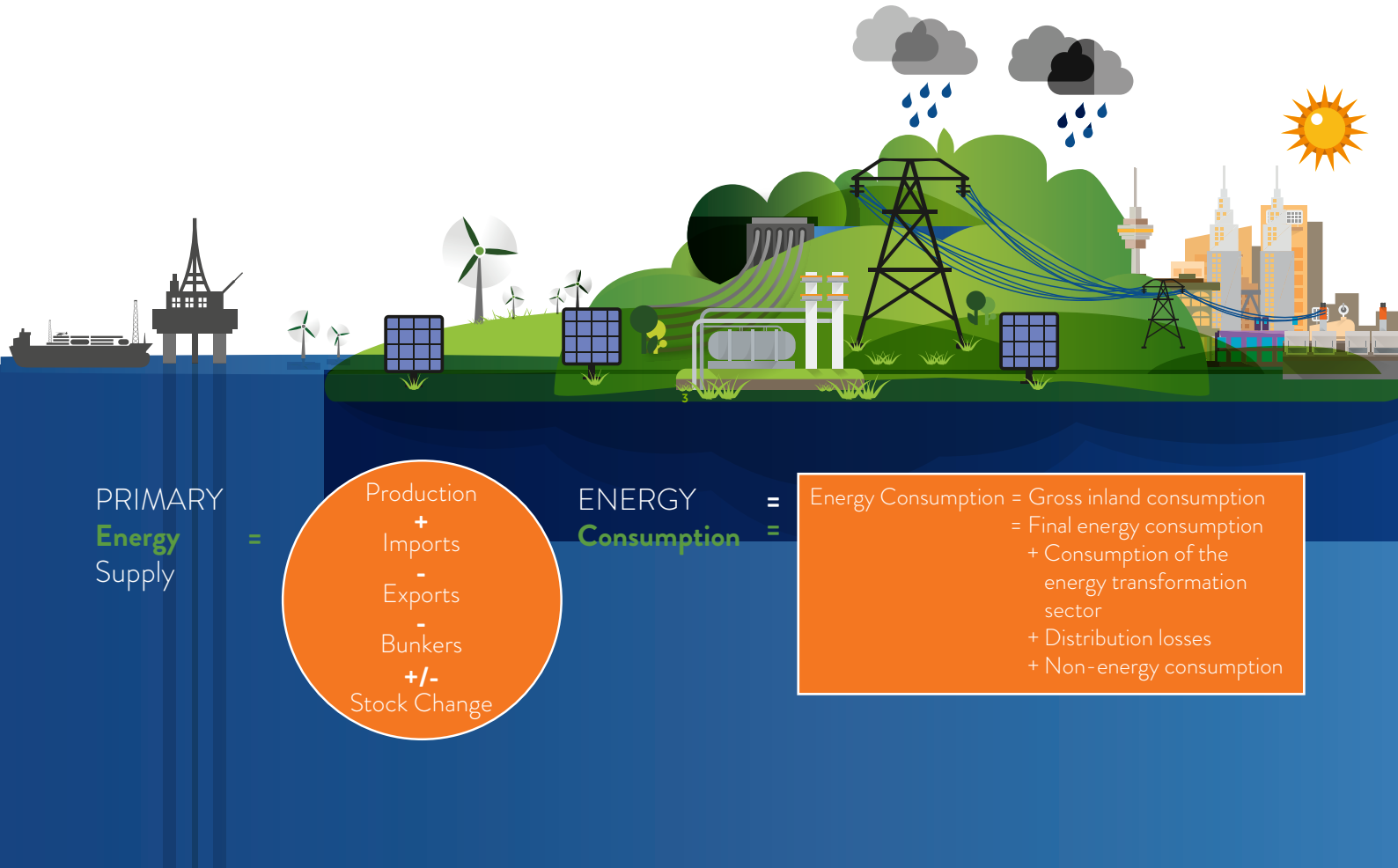
In addition, the statistical discrepancies also act as a balancing tool to minimise possible errors. In the case of oil and oil products, losses in transportation and distribution, as well as statistical errors are included in the statistical discrepancies. However, for electricity, distribution losses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

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

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

Primary Energy Supply = Production + Imports - Exports - Bunkers +/- Stock change

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



EXECUTIVE SUMMARY

ENERGY OVERVIEW

In 2016, the Malaysian economy recorded a growth of 4.2 percent (2015: 5.0 percent) despite considerable external and domestic headwinds. The global economic landscape was challenging given the subdued global demand and low commodity prices.

In line with the economic growth, energy supply and demand for 2016 recorded a strong growth. Total primary energy supply posted an increment of 3.6 percent (2015: -2.5 percent) to settle at 93,395 ktoe. Meanwhile final energy consumption in 2016 posted double-digit growth of 10.5 percent (2015: -0.8 percent). Double-digit growth was last recorded in 2012 at 13.4 percent.

PRIMARY ENERGY SUPPLY

Total primary energy supply was at 93,395 ktoe in 2016, an increase of 3.6 percent compared to the previous year. The increment was contributed by an overall 2.4 percent higher production of crude oil, especially a 15.6 percent higher production from Sabah oil fields. In total, the primary supply of crude oil increased by 11.2 percent to register at 27,757 ktoe in 2016 compared to the previous year at 24,971 ktoe. The total primary supply of coal and coke recorded a growth of 8.5 percent to mark at 18,886 ktoe. The increment was due to a 7.0 percent higher import of coal and coke, as demand from the power sector remained strong. Total primary supply of hydropower and renewables registered a growth of 22.3 percent at 5,202 ktoe in 2016 as compared to the previous year at 4,253 ktoe. The implementation of support initiative in the power sector for renewables such as solar, biomass and biogas through the Feed-in-Tariff (FiT) mechanism has boosted the utilization of renewables in the country. In 2016, the total primary supply of petroleum products and others recorded a decrease of 14.9 percent to settle at 3,570 ktoe. The decline was attributed mainly to higher exports during the period for petroleum products, especially for non-energy products. While for natural gas, the total primary supply declined slightly by 3.5 percent to register at 37,980 ktoe as compared to the previous year at 39,364 ktoe. The downward trend was due to a 1.5 percent higher export of Liquefied Natural Gas (LNG) to settle at 27,457 ktoe.

Analysis by share in total primary energy supply showed that crude oil and petroleum products shares increased slightly from 32.3 percent in 2015 to 33.5 percent in 2016. The share of natural gas decreased to 40.7 percent from 43.6 percent during the same period. Meanwhile, the share of coal and coke registered a growth at 20.2 percent compared to 19.3 percent in 2015. The share of hydro and renewables has also increased from 4.7 percent to 5.6 percent in 2016.

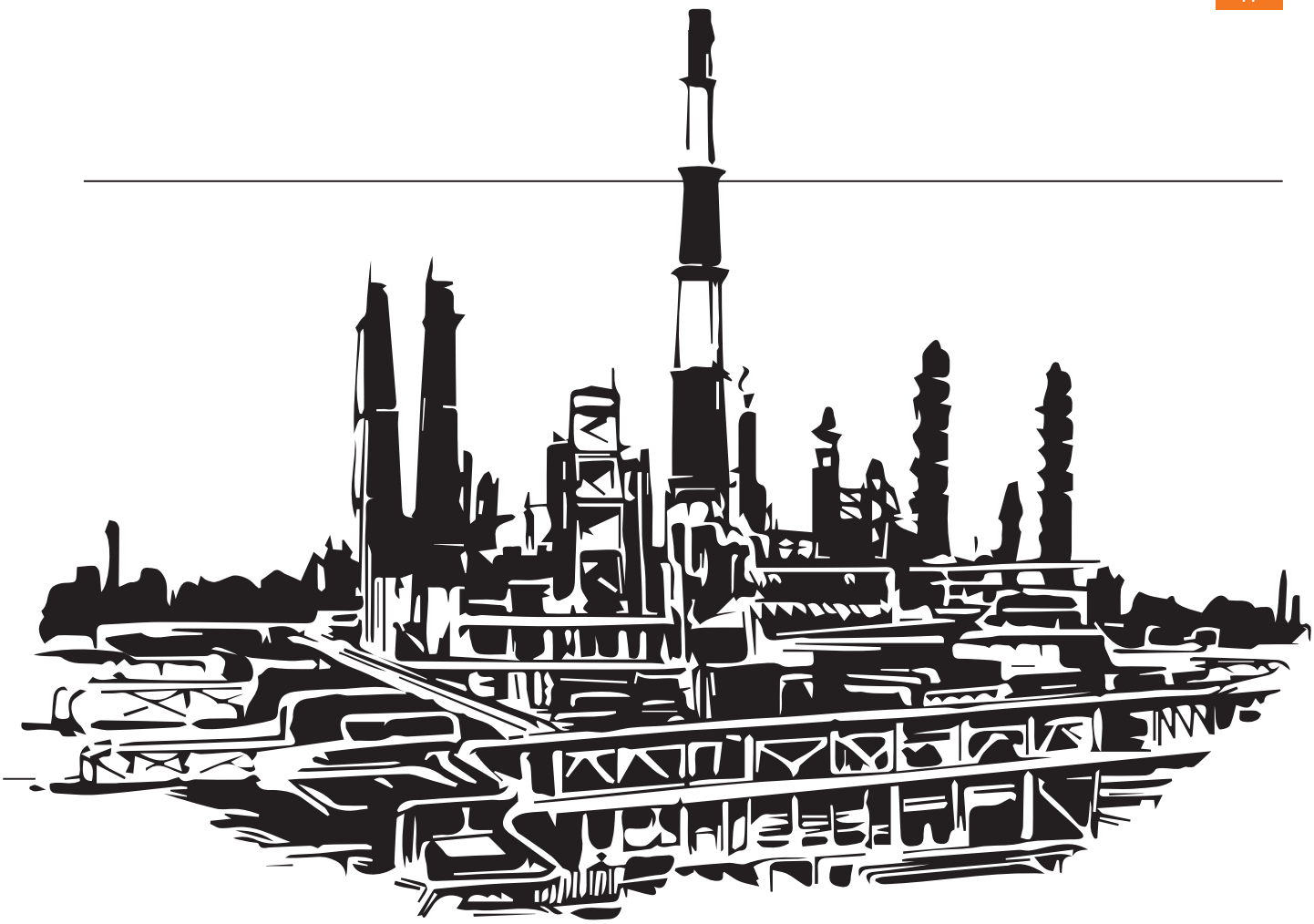
ENERGY TRANSFORMATION

In Malaysia, energy transformation from primary energy to secondary energy is achieved in gas plants, oil refineries and power stations. In general, there are four (4) types of gas plants in Malaysia, namely Malaysian Liquefied Natural Gas (MLNG) plant, Middle Distillate Synthesis (MDS) plant, Gas Processing Plant – Liquefied Petroleum Gas (GPP-LPG) plant and Regasification Gas Terminal (RGT). In the MLNG plant, local natural gas was mainly transformed into LNG for export purposes. In the year 2016, the total export of LNG was recorded at 27,457 ktoe, higher by 1.5 percent compared to previous year at 27,057 ktoe. There was also a small quantity of LPG being produced in the MLNG plant, at around 64 ktoe. The MDS plant is basically a gas-to-liquid plant that transforms natural gas as an input to produce various petroleum products and non-energy outputs. In 2016, the total petroleum products output was around 573 ktoe. These outputs consist of 337 ktoe (58.8 percent) of non-energy products, 162 ktoe (28.3 percent) of diesel and 74 ktoe (12.9 percent) of kerosene. Besides the production of LPG from oil refinery and MLNG plants, LPG was also produced from GPP-LPG plant. In 2016, the LPG produced from GPP-LPG plant was at 1,997 ktoe compared to previous year at 1,155 ktoe. In order to meet rising natural gas demand in Peninsular Malaysia, Malaysia has developed a RGT plant to import LNG. In 2016, 1,275 ktoe of LNG has been imported, mainly from Australia and Brunei Darussalam. This supply of LNG was mainly used by the power and industry sectors.

In 2016, total refinery input was at 27,524 ktoe, comprising of input from local crude oil at 18,170 ktoe (66.0 percent) and imported crude oil at 9,353 ktoe (34.0 percent). This input of crude oil produced a total of 24,888 ktoe of petroleum products, an increase of 2.5 percent from the previous year. The highest share of total petroleum products output in 2016 was Diesel at 40.1 percent or 9,988 ktoe. This was followed by Petrol (20.3 percent), Non-Energy (17.4 percent), ATF and AV Gas (10.2 percent), Fuel Oil (5.9 percent), LPG (5.2 percent) Refinery Gas (0.8 percent) and Kerosene (0.1 percent). Malaysia's total refinery capacity is currently at 566.3 thousand barrels per day (kbpd) including condensates splitter.

ELECTRICITY

As at end 2016, Malaysia's total installed capacity was at 33,023 MW, an increase of 8.5 percent from 30,439 MW in 2015. The increment in capacity was led by the commissioning of new power stations, namely TNB Prai (1,071 MW), TNB Connaught Bridge (375 MW) and Tanjung Bin Energy (1,000 MW) which started their operations on 20th February 2016, 27th February 2016 and 21st March 2016, respectively. Total electricity gross generation in 2016 registered at 156,665 GWh, an increase of 4.3 percent (2015: 150,190 GWh). Total electricity consumption was at 144,024 GWh, an increase of 8.9 percent from the previous year (2015: 132,199 GWh). The peak demand for Peninsular Malaysia was recorded at 17,788 MW in the second quarter of the year (2Q 2016), Sarawak at 3,005 MW (in 4Q 2016) and Sabah at 945



MW (2Q 2016). The calculated reserve margin for Peninsular Malaysia in 2016 was at 30.1 percent, Sarawak at 38.0 percent and Sabah at 35.3 percent.

In Malaysia, energy sources for electricity generation consisted of natural gas, coal, hydro, oil and renewables. The total energy input in power stations increased by 6.7 percent in 2016 to register at 35,348 ktoe compared to the previous year at 33,133 ktoe. Coal and coke remained as the main energy source (before conversion) for electricity generation in the country, with a share of 48.4 percent of total energy inputs or 17,101 ktoe, followed by natural gas at 37.5 percent or 13,260 ktoe, hydropower at 12.7 percent or 4,499 ktoe, diesel and fuel oil at 0.9 percent or 320 ktoe and renewables at 0.5 percent or 168 ktoe. In terms of electricity generation mix (after conversion), in 2016, the share of coal and coke constituted 46.0 percent, followed by natural gas at 39.7 percent, hydropower at 13.3 percent, oil at 0.7 percent and the remaining 0.4 percent by renewables.

The transportation sector recorded the highest growth of 27.9 percent of electricity usage in 2016 when compared to the previous year, to register at 29,294 toe. The higher demand was attributed to the commissioning of the Mass Rapid Transit (MRT) network that becomes the public transportation backbone of the Greater Kuala Lumpur/Klang Valley region. Electricity consumption from the industry sector increased by 12.0 percent to register at 5,822 ktoe (67,664 GWh) compared to the previous year at 5,200 ktoe (60,641 GWh). This increment at 11.5 percent was the highest growth experienced by the country since 2012. The higher electricity consumption in the industry sector was mainly due to greater demand from Sarawak especially through their energy intensive industry activities in Samalaju Industrial Park. In the commercial sector, electricity consumption grew at 4.2 percent to 3,816 ktoe (44,349 GWh) while the residential sector recorded a growth of 8.4 percent at 31,128 GWh. 87.1 percent of electricity consumption in the residential sector was consumed in Peninsular Malaysia, while consumption in Sabah and Sarawak was at 5.9 percent and 7.0 percent, respectively.

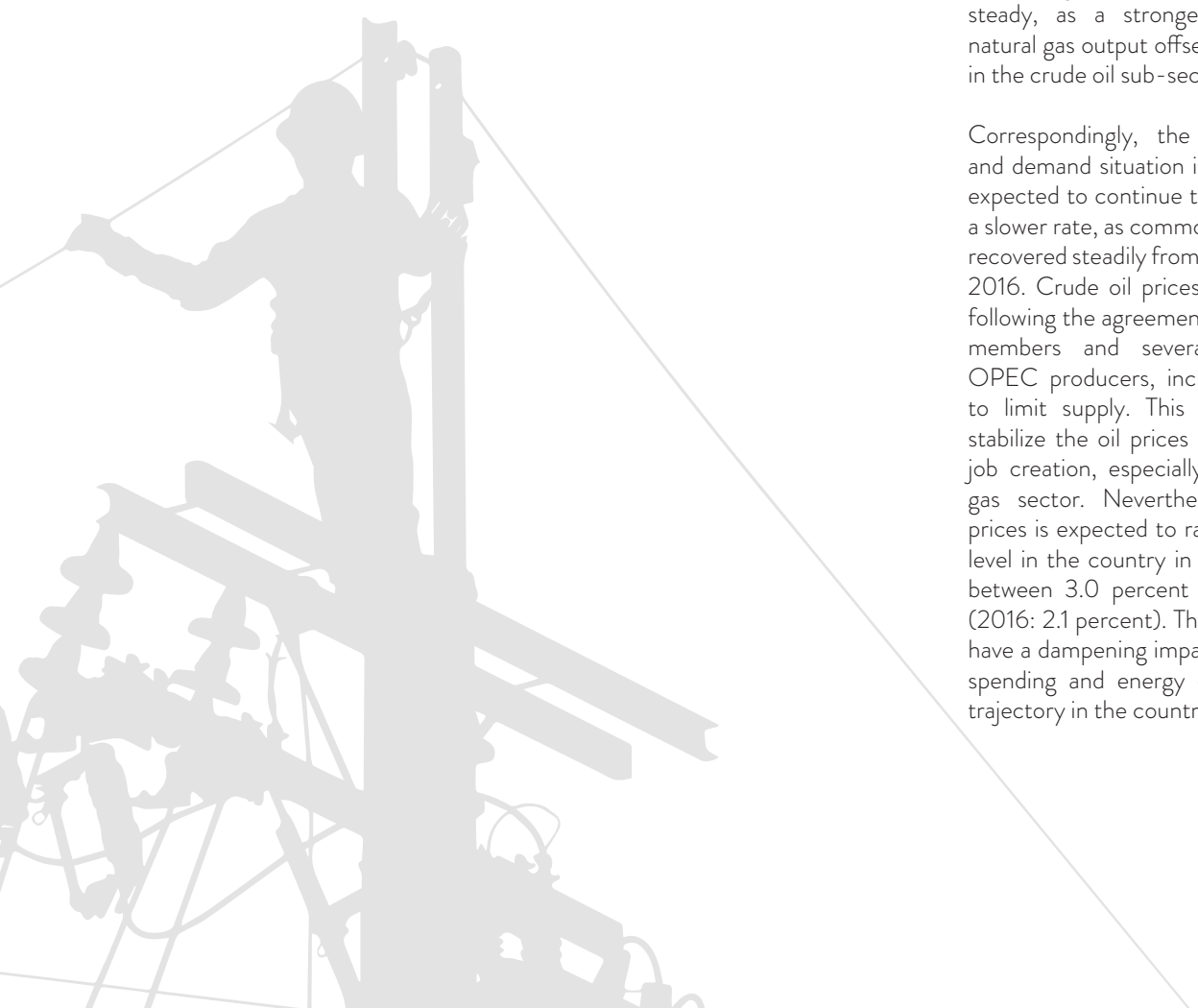
FINAL ENERGY CONSUMPTION

In 2016, Malaysia's total final energy consumption recorded a growth of 10.5 percent to settle at 57,218 ktoe, compared to the previous year at 51,806 ktoe. Major contributor sectors to the growth were the non-energy use sector and industry sector. Final energy consumption for non-energy use increased by 47.3 percent to register at 8,729 ktoe. Higher demand for non-energy use was mainly contributed by natural gas usage that increased by 36.1 percent in 2016. Total final energy consumption in the industry sector increased by 14.5 percent to settle at 16,019 ktoe. The increase was mainly due to higher demand for natural gas in the industry sector of Sabah and Sarawak. After recording a reduction in 2015, total energy consumption in the transportation sector in 2016 increased by 2.4 percent to settle at 24,004 ktoe, compared to the previous year at 23,435 ktoe. Consumption of petrol in the transportation sector was the main contributor to the growth, as petrol recorded an increment of 6.0 percent in 2016. Total energy consumption for the residential sector recorded a growth of 5.6 percent to settle at 3,284 ktoe

in 2016. As for the commercial sector, final energy consumption increased by 7.1 percent to register at 4,765 ktoe, compared to previous year at 4,449 ktoe. Agriculture and fishery sectors recorded a decrease of 37.7 percent and 59.1 percent, respectively.

In measuring the energy efficiency level in the industry sector, the yearly industrial energy intensity is one of the parameters that may be calculated and monitored. In 2016, the industrial energy intensity recorded a significant growth of 18.1 percent to settle at 51 toe/RM million at 2010 prices, compared to the previous year at 43 toe/ RM million at 2010 prices. Consumption of all types of fuels in the industry sector registered double-digit growths except for coal and coke which only increased by 0.4 percent compared to the previous year. The consumption of coal and coke in the industry sector is mainly consumed by the cement industry.

Analysis by fuel type showed that petroleum products maintained its status as the dominant fuel consumed in the country at 53.7 percent of share. It was followed by electricity at 21.7 percent, natural gas at 21.5 percent and coal and coke at 3.1 percent. Consumption of all types of fuels recorded increasing trends when compared with the previous year's performance. The major increases were led by natural gas that grew by 28.6 percent to settle at 12,304 ktoe. Total electricity consumption in 2016 posted an increase of 8.9 percent from the previous year to register at 12,392 ktoe or 144,024 GWh. Final consumption of total petroleum products posted an increase of 5.7 percent to settle at 30,737 ktoe when compared to the previous year at 29,087 ktoe. In 2016, coal and coke final consumption recorded an increase of 0.4 percent to register at 1,785 ktoe. A low growth rate of coal and coke final consumption was attributed to the 10.5 percent lower amount of cement being produced in 2016 when compared to previous year.



CONCLUSION AND OUTLOOK

In 2016, the strong performance of energy supply and demand in the country was in tandem with the economic growth rate experienced by Malaysia for the year. All major sectors and fuel types recorded increasing trends when compared with the previous year.

As for 2017, the gradual improvement in global growth, recovery in global commodity prices and the continued growth of domestic demand are expected to collectively support Malaysia's growth performance. The Malaysian economy is projected to register a sustained growth of 4.3 percent - 4.8 percent in 2017, and all economic sectors are projected to register positive growth. The services and manufacturing sectors would be the key contributors to overall growth. The agriculture sector is expected to rebound as yields recover from the El Niño weather phenomenon. Growth in the mining sector is expected to remain steady, as a stronger expansion in natural gas output offsets a moderation in the crude oil sub-sector.

Correspondingly, the energy supply and demand situation in the country is expected to continue to grow, albeit at a slower rate, as commodity prices have recovered steadily from the lows in early 2016. Crude oil prices have improved following the agreement among OPEC members and several other non-OPEC producers, including Malaysia, to limit supply. This effort will help stabilize the oil prices and to enhance job creation, especially in the oil and gas sector. Nevertheless, higher oil prices is expected to raise the inflation level in the country in 2017, averaging between 3.0 percent to 4.0 percent (2016: 2.1 percent). This is expected to have a dampening impact on consumer spending and energy demand growth trajectory in the country.

KEY ECONOMIC AND ENERGY DATA

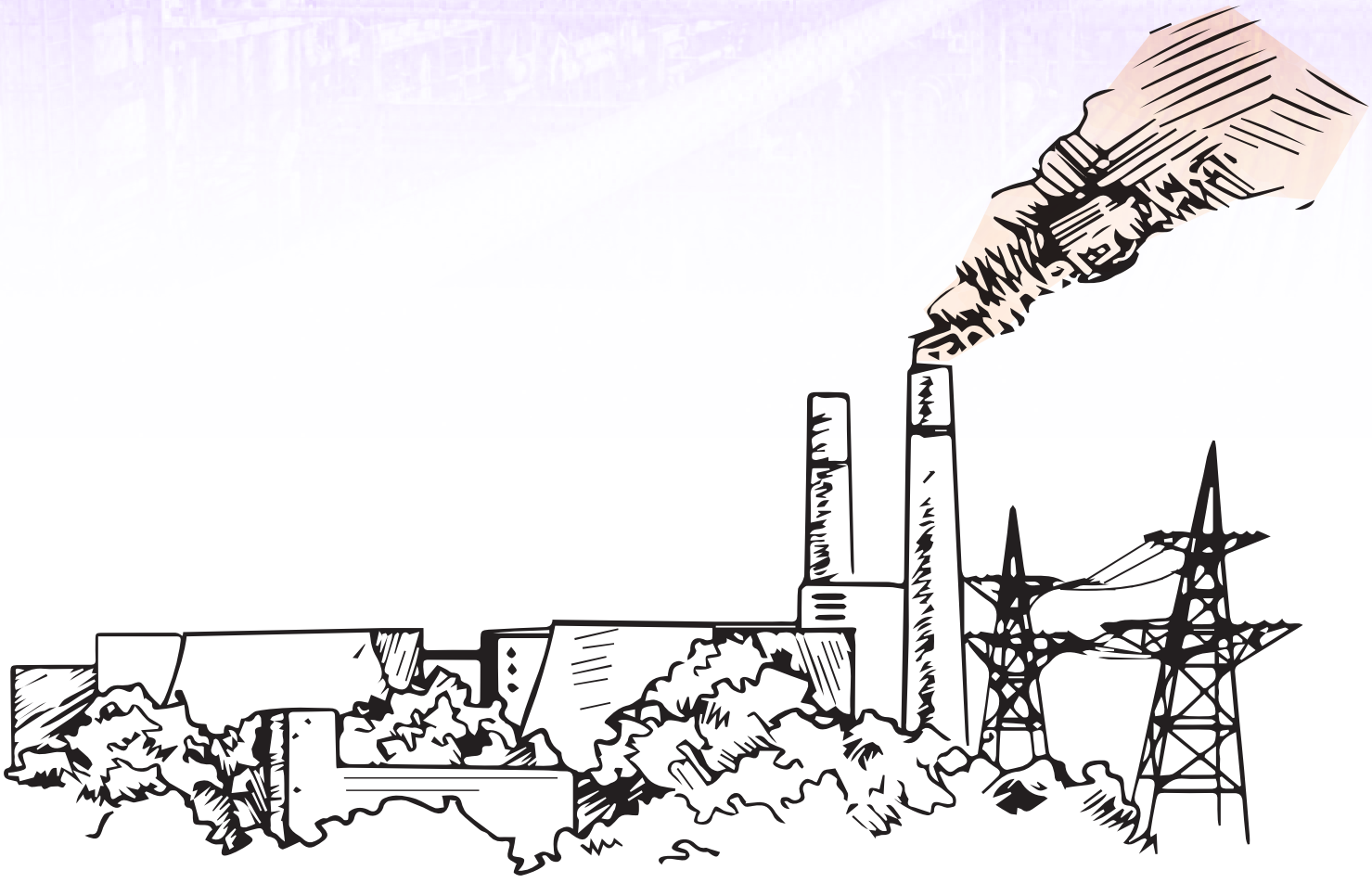


TABLE 1: KEY ECONOMIC AND ENERGY DATA

	2016				
	1Q	2Q	3Q	4Q	TOTAL
GDP at current prices (RM million) *	290,828	298,790	311,858	328,645	**1,230,121**
GDP at 2010 prices (RM million) *	265,151	271,416	281,031	290,629	**1,108,227**
GNI at current prices (RM million) *	284,379	290,525	301,145	319,431	**1,195,480**
Population ('000 people) **	31,522	31,634	31,738	31,842	**31,634**
Primary Energy Supply (ktoe)	22,511	23,566	22,693	24,625	**93,395**
Final Energy Consumption (ktoe)	13,897	14,284	14,403	14,633	**57,218**
Electricity Consumption (ktoe)	2,977	3,177	3,138	3,101	**12,392**
Electricity Consumption (GWh)	34,595	36,923	36,469	36,037	**144,024**
PER CAPITA					
GDP at Current Prices (RM)*	36,905	37,781	39,305	41,285	**38,887**
Primary Energy Supply (toe)	0.714	0.745	0.715	0.773	**2.952**
Final Energy Consumption (toe)	0.441	0.452	0.454	0.460	**1.809**
Electricity Consumption (kWh)	1,098	1,167	1,149	1,132	**4,553**
ENERGY INTENSITY					
Primary Energy Supply (toe/GDP at 2010 prices (RM million))	84.9	86.8	80.7	84.7	**84.3**
Final Energy Consumption (toe/GDP at 2010 prices (RM million))	52.4	52.6	51.3	50.4	**51.6**
Electricity Consumption (toe/GDP at 2010 prices (RM million))	11.2	11.7	11.2	10.7	**11.2**
Electricity Consumption (GWh/GDP at 2010 prices (RM million))	0.130	0.136	0.130	0.124	**0.130**

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

TABLE 2: KEY ECONOMIC AND ENERGY DATA BY REGION

PENINSULAR MALAYSIA	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP at Current Prices (RM million) *	464,431	507,814	562,522	641,175	600,630	672,787	739,349	793,280	835,888	909,988	959,507	1,022,555
GDP at 2010 Prices (RM million) *	537,441	567,920	603,537	634,266	621,915	672,787	709,030	752,858	789,217	838,939	881,462	920,163
Population ('000 people) **	20,785	21,180	21,577	21,970	22,363	22,754	23,099	23,417	23,868	24,281	24,669	24,995
Final Energy Consumption (ktoe)	32,195	34,390	37,921	38,530	34,521	35,593	35,968	36,683	41,859	42,470	43,011	45,872
Electricity Consumption (ktoe)	6,366	6,669	7,030	7,307	7,567	8,145	8,427	8,791	9,108	9,315	9,531	10,026
Electricity Consumption (GWh)	73,987	77,504	81,710	84,924	87,950	94,666	97,939	102,174	105,861	108,259	110,770	116,529
PER CAPITA												
GDP at Current Prices (RM)*	22,344	23,976	26,071	29,185	26,858	29,569	32,008	33,876	35,021	37,478	38,895	40,910
Final Energy Consumption (toe)	1.549	1.624	1.757	1.754	1.544	1.564	1.557	1.567	1.754	1.749	1.744	1.835
Electricity Consumption (kWh)	3,560	3,659	3,787	3,866	3,933	4,161	4,240	4,363	4,435	4,459	4,490	4,662
ENERGY INTENSITY												
Final Energy Consumption (toe/GDP at 2010 prices (RM million))	59.9	60.6	62.8	60.7	55.5	52.9	50.7	48.7	53.0	50.6	48.8	49.9
Electricity Consumption (toe/GDP at 2010 prices (RM million))	11.8	11.7	11.6	11.5	12.2	12.1	11.9	11.7	11.5	11.1	10.8	10.9
Electricity Consumption (GWh/GDP at 2010 prices (RM million))	0.138	0.136	0.135	0.134	0.141	0.141	0.138	0.136	0.134	0.129	0.126	0.127

Note (*): 1. GDP data by States from 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 States from 2005 until 2009 were estimated by Energy Commission
(**): Mid-year population from Department of Statistics Malaysia

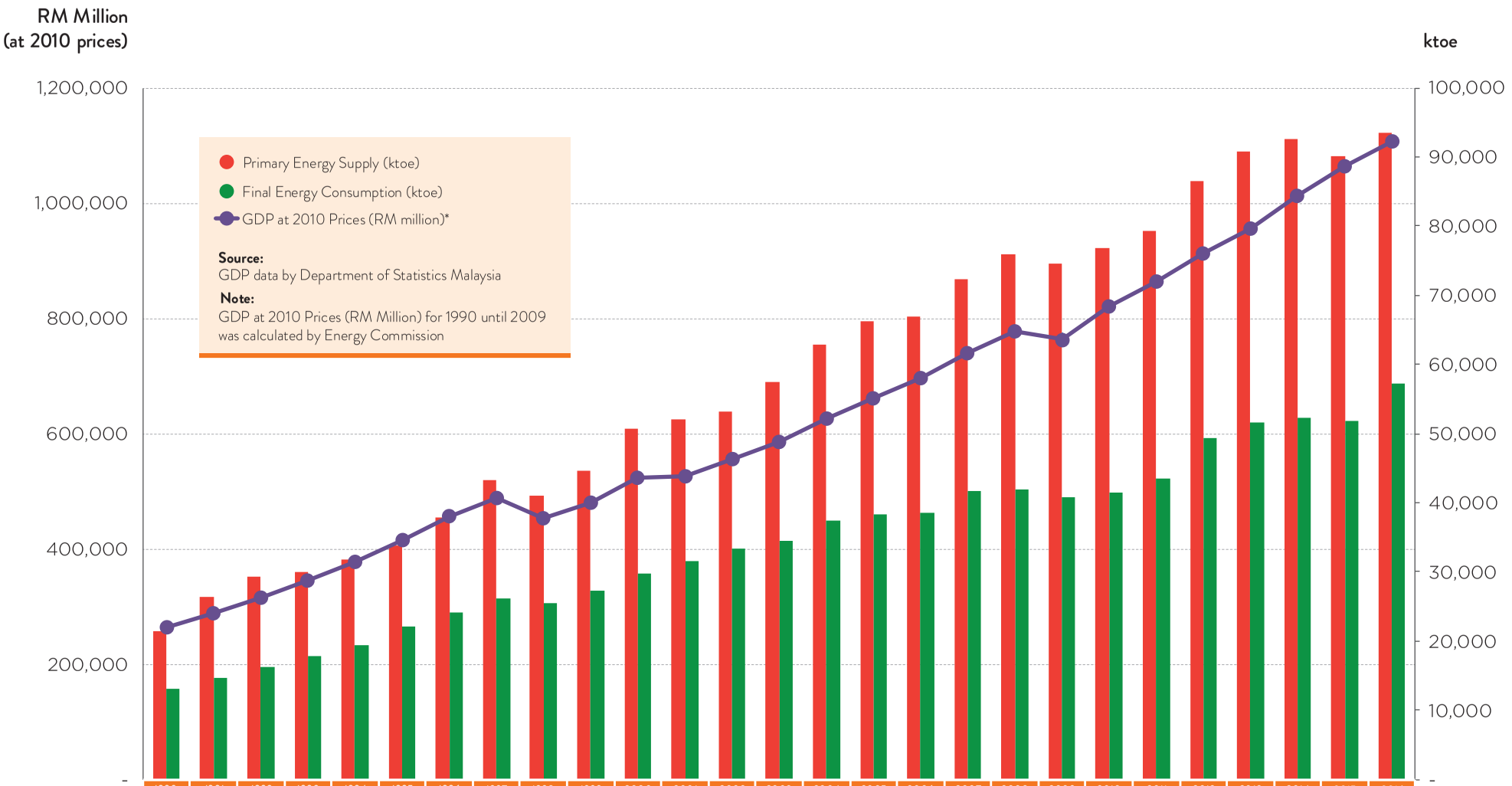
SABAH	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP at Current Prices (RM million) *	36,258	40,649	48,129	60,312	55,102	61,516	69,672	71,347	72,361	77,594	79,098	86,151
GDP at 2010 prices (RM million) *	47,529	50,552	52,235	57,029	59,763	61,516	63,191	65,390	67,775	71,150	75,586	79,285
Population ('000 people) **	2,978	3,045	3,116	3,190	3,267	3,348	3,435	3,523	3,703	3,764	3,816	3,900
Final Energy Consumption (ktoe)	2,806	2,587	2,879	3,068	3,046	2,758	3,466	4,671	4,097	4,128	3,845	5,015
Electricity Consumption (ktoe)	238	255	285	299	329	355	368	425	439	423	499	487
Electricity Consumption (GWh)	2,766	2,969	3,317	3,474	3,818	4,127	4,275	4,943	5,097	4,919	5,805	5,665
PER CAPITA												
GDP at Current Prices (RM)*	12,176	13,350	15,448	18,909	16,864	18,373	20,284	20,250	19,542	20,616	20,730	22,092
Final Energy Consumption (toe)	0.942	0.850	0.924	0.962	0.932	0.824	1.009	1.326	1.106	1.097	1.008	1.286
Electricity Consumption (kWh)	929	975	1,065	1,089	1,169	1,233	1,245	1,403	1,377	1,307	1,521	1,453
ENERGY INTENSITY												
Final Energy Consumption (toe/GDP at 2010 prices (RM million))	59.0	51.2	55.1	53.8	51.0	44.8	54.8	71.4	60.4	58.0	50.9	63.3
Electricity Consumption (toe/GDP at 2010 prices (RM million))	5.0	5.1	5.5	5.2	5.5	5.8	5.8	6.5	6.5	5.9	6.6	6.1
Electricity Consumption (GWh/GDP at 2010 prices (RM million))	0.058	0.059	0.064	0.061	0.064	0.067	0.068	0.076	0.075	0.069	0.077	0.071

Note (*): 1. GDP data by States from Department of Statistics Malaysia
2. GDP for Sabah including WP Labuan
3. GDP data by States from 2005 until 2009 were estimated by Energy Commission
(**): Mid-year population from Department of Statistics Malaysia

SARAWAK	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP at Current Prices (RM million) *	59,218	66,262	74,739	91,739	78,680	87,131	102,713	106,625	110,365	118,862	119,119	121,414
GDP at 2010 prices (RM million) *	75,096	78,434	84,965	85,209	83,521	87,131	92,700	94,013	98,089	102,359	106,307	108,778
Population ('000 people) **	2,282.4	2,324.9	2,366.1	2,408.4	2,450.8	2,487.1	2,527.9	2,570	2,642.5	2,664	2,702	2,739
Final Energy Consumption (ktoe)	3,274	3,330	3,461	3,302	3,277	3,125	4,086	5,358	5,628	5,612	4,951	6,331
Electricity Consumption (ktoe)	339	348	368	380	391	493	445	795	1,043	1,304	1,344	1,878
Electricity Consumption (GWh)	3,940	4,045	4,277	4,416	4,544	5,730	5,172	9,237	12,118	15,152	15,624	21,831
PER CAPITA												
GDP at Current Prices (RM)*	32,902	33,737	35,909	35,380	34,079	35,033	36,671	36,585	37,120	38,423	39,351	39,719
Final Energy Consumption (toe)	1.434	1.432	1.463	1.371	1.337	1.256	1.616	2.085	2.130	2.106	1.833	2.312
Electricity Consumption (kWh)	1,726	1,740	1,808	1,834	1,854	2,304	2,046	3,594	4,586	5,688	5,784	7,971
ENERGY INTENSITY												
Final Energy Consumption (toe/GDP at 2010 prices (RM million))	43.6	42.5	40.7	38.8	39.2	35.9	44.1	57.0	57.4	54.8	46.6	58.2
Electricity Consumption (toe/GDP at 2010 prices (RM million))	4.5	4.4	4.3	4.5	4.7	5.7	4.8	8.5	10.6	12.7	12.6	17.3
Electricity Consumption (GWh/GDP at 2010 prices (RM million))	0.052	0.052	0.050	0.052	0.054	0.066	0.056	0.098	0.124	0.148	0.147	0.201

Note (*): 1. GDP data by States from Department of Statistics Malaysia
2. GDP data by States from 2005 until 2009 were estimated by Energy Commission
(**): Mid-year population from Department of Statistics Malaysia

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



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Primary Energy Supply (ktoe)	21,471	26,335	29,291	29,925	31,662	33,879	37,840	43,173	40,996	44,534	50,710	51,979	53,196	57,565	62,836	66,211	67,021	72,389	76,032	74,583	76,809	79,289	86,495	90,730	92,487	90,188	93,395
Final Energy Consumption (ktoe)	13,146	14,563	16,185	17,728	19,287	22,164	24,181	26,167	25,558	27,228	29,699	31,515	33,289	34,586	37,323	38,285	38,567	41,606	41,968	40,845	41,476	43,455	49,291	51,583	52,209	51,806	57,218
GDP at 2010 Prices (RM million)*	263,488	288,639	314,285	345,384	377,201	414,276	455,715	489,086	453,092	480,901	523,503	526,213	554,581	586,683	626,481	659,885	696,739	740,625	776,410	764,659	821,434	864,920	912,261	955,080	1,012,449	1,063,355	1,108,227

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

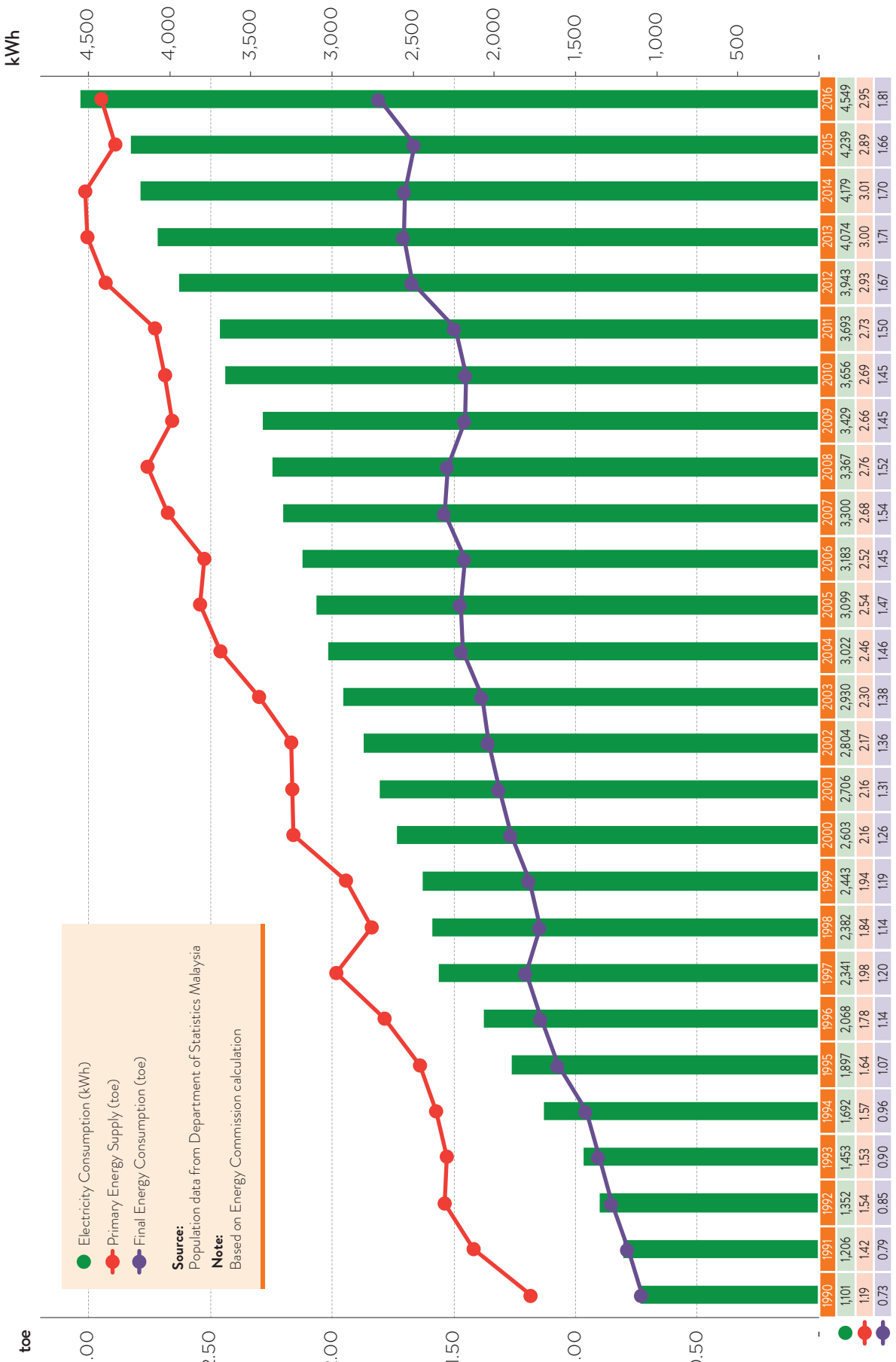
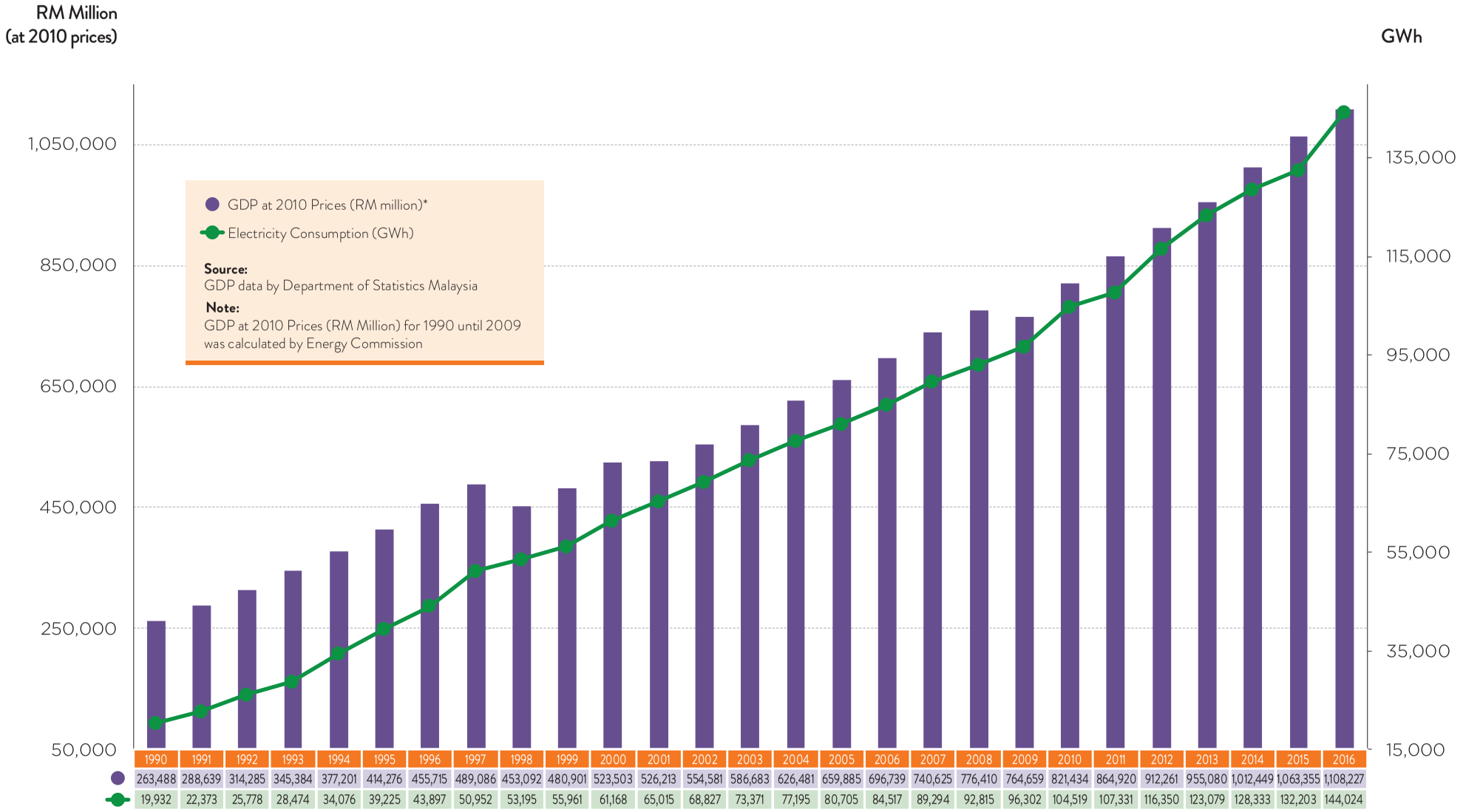
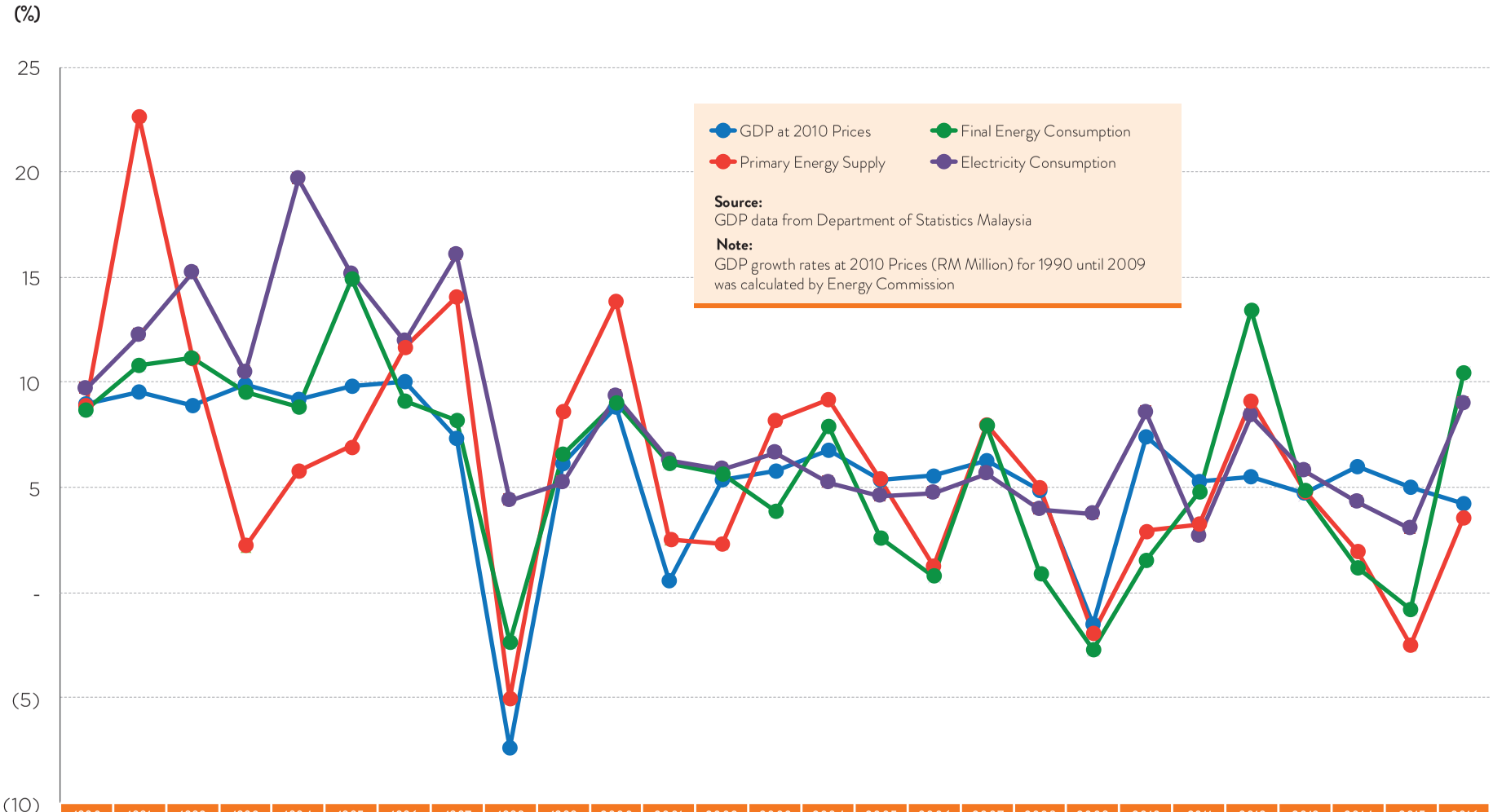


FIGURE 3: TRENDS IN GDP AND ELECTRICITY CONSUMPTION



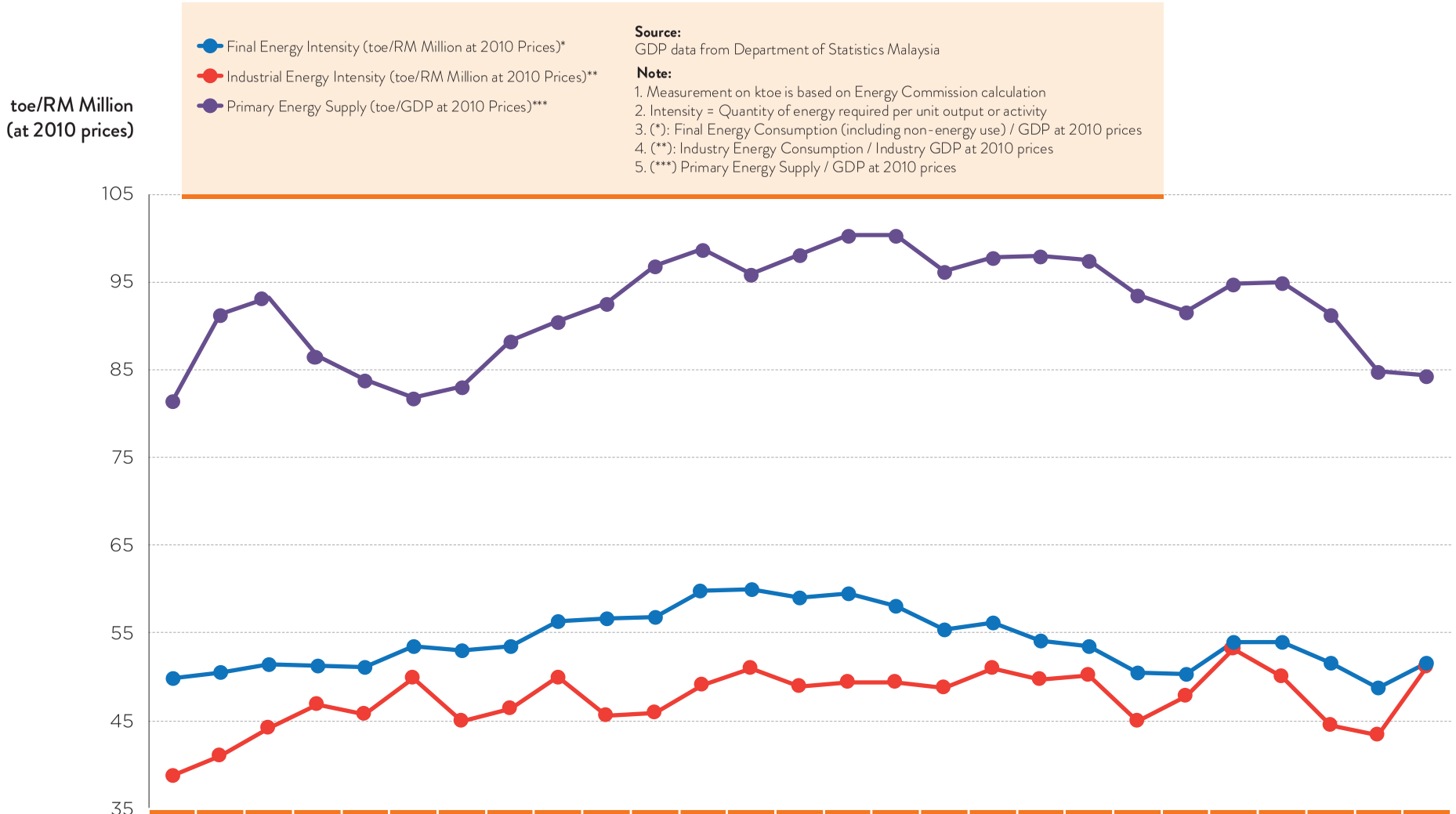
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP at 2010 Prices (RM million)*	263,488	288,639	314,285	345,384	377,201	414,276	455,715	489,086	453,092	480,901	523,503	526,213	554,581	586,683	626,481	659,885	696,739	740,625	776,410	764,659	821,434	864,920	912,261	955,080	1,012,449	1,063,355	1,108,227
Electricity Consumption (GWh)	19,932	22,373	25,778	28,474	34,076	39,225	43,897	50,952	53,195	55,961	61,168	65,015	68,827	73,371	77,195	80,705	84,517	89,294	92,815	96,302	104,519	107,331	116,350	123,079	128,333	132,203	144,024

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



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP at 2010 Prices	9.00	9.55	8.89	9.89	9.21	9.83	10.00	7.32	(7.36)	6.14	8.86	0.52	5.39	5.79	6.78	5.33	5.58	6.30	4.83	(1.51)	7.42	5.29	5.47	4.69	6.01	5.03	4.22
Primary Energy Supply	8.90	22.65	11.22	2.16	5.80	7.00	11.69	14.09	(5.04)	8.63	13.87	2.50	2.34	8.21	9.16	5.37	1.22	8.01	5.03	(1.91)	2.98	3.23	9.09	4.90	1.94	(2.49)	3.56
Final Energy Consumption	8.70	10.78	11.14	9.53	8.79	14.92	9.10	8.21	(2.33)	6.53	9.08	6.11	5.63	3.90	7.91	2.58	0.74	7.88	0.87	(2.68)	1.54	4.77	13.43	4.65	1.21	(0.77)	10.45
Electricity Consumption	9.70	12.24	15.22	10.46	19.67	15.11	11.91	16.07	4.40	5.20	9.30	6.29	5.86	6.60	5.21	4.55	4.72	5.65	3.94	3.76	8.53	2.69	8.40	5.78	4.27	3.02	8.94

FIGURE 5: PRIMARY AND FINAL ENERGY INTENSITY

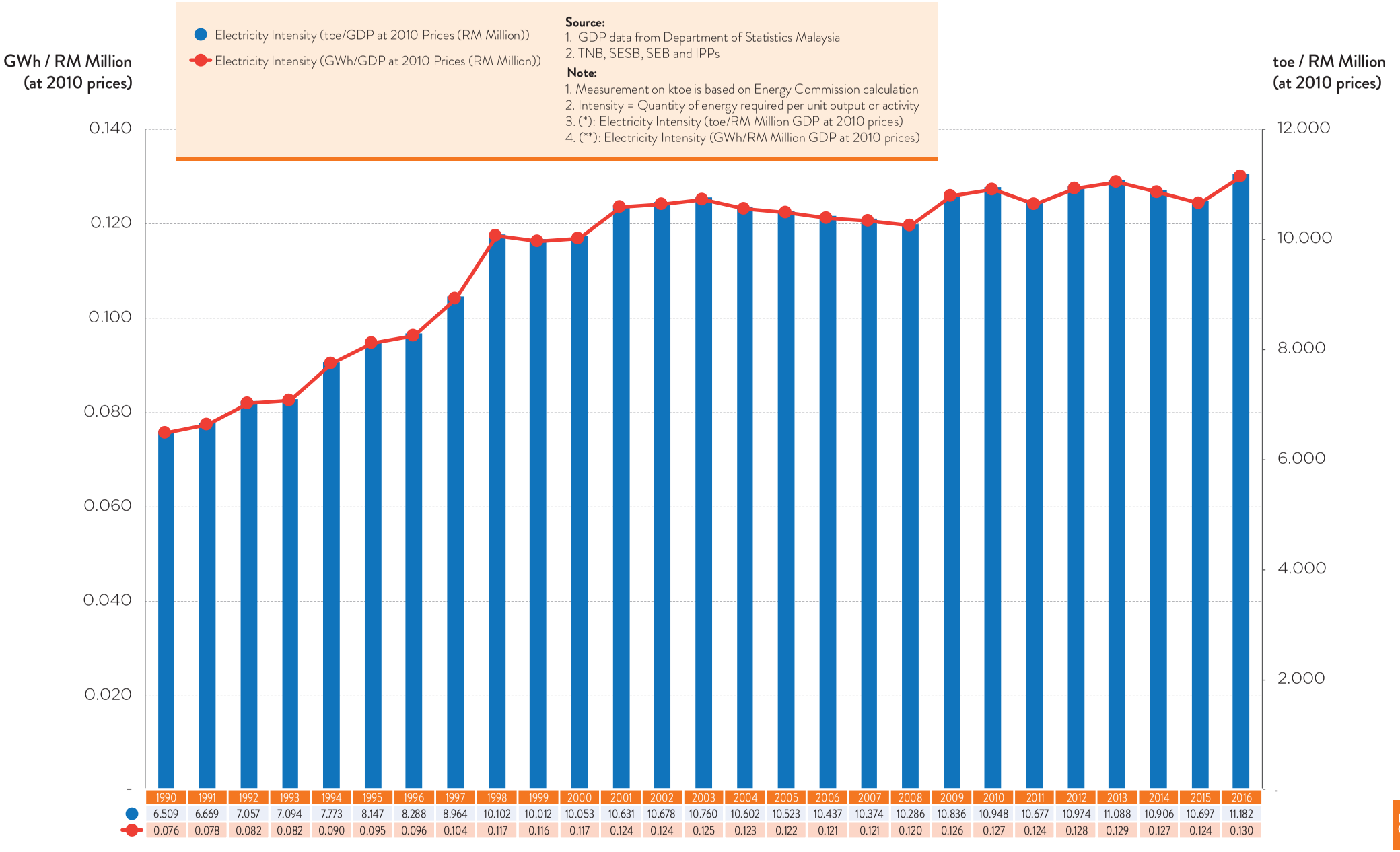


Source:
GDP data from Department of Statistics Malaysia

Note:
1. Measurement on ktoe is based on Energy Commission calculation
2. Intensity = Quantity of energy required per unit output or activity
3. (*): Final Energy Consumption (including non-energy use) / GDP at 2010 prices
4. (**): Industry Energy Consumption / Industry GDP at 2010 prices
5. (***) Primary Energy Supply / GDP at 2010 prices

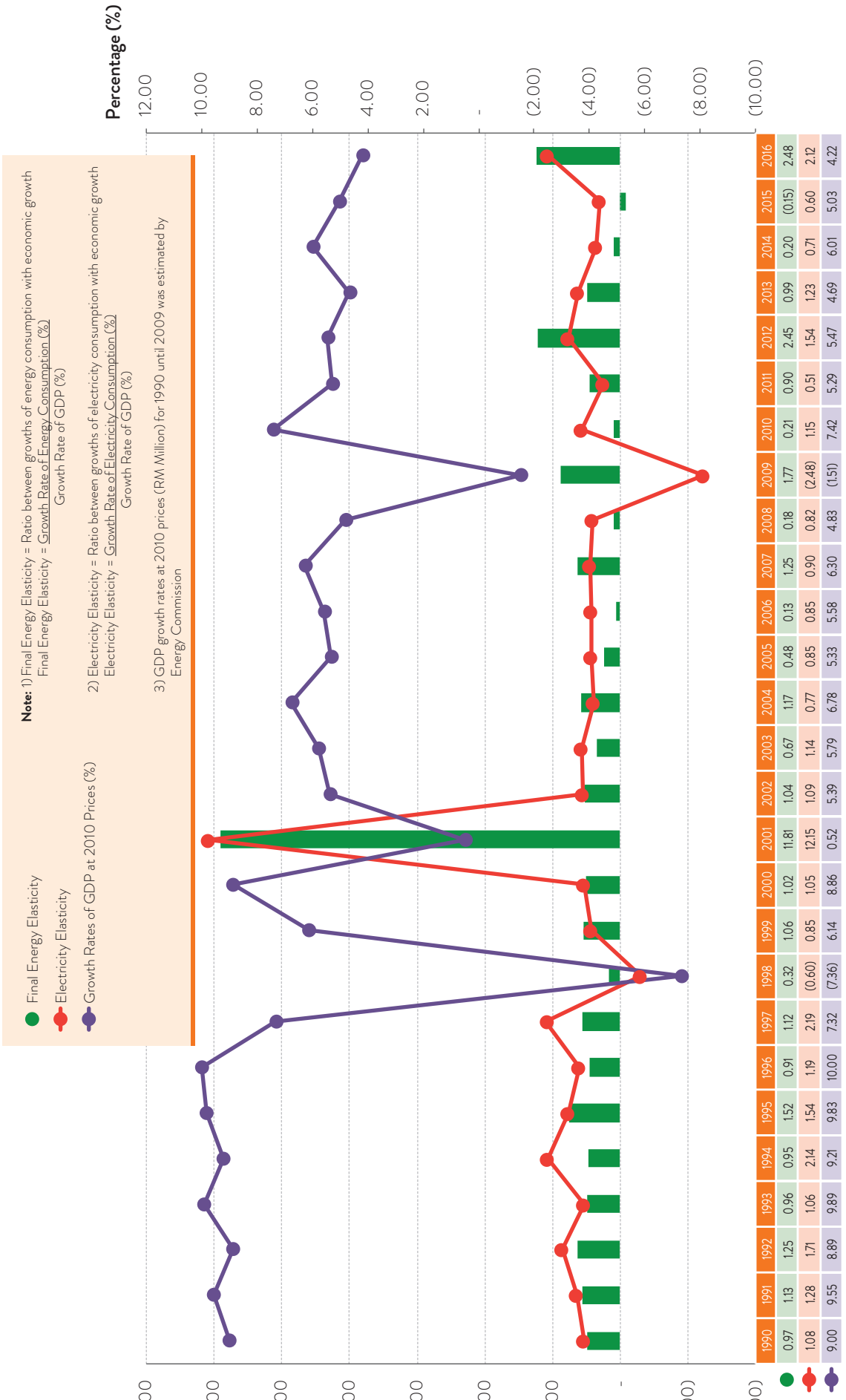
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Final Energy Intensity (toe/RM Million at 2010 Prices)*	49.89	50.45	51.50	51.33	51.13	53.50	53.06	53.50	56.41	56.62	56.73	59.89	60.03	58.95	59.58	58.02	55.35	56.18	54.05	53.42	50.49	50.24	54.03	54.01	51.57	48.72	51.63
Industrial Energy Intensity (toe/RM Million at 2010 Prices)**	38.70	41.01	44.19	46.90	45.66	49.86	44.90	46.30	49.98	45.52	45.92	49.08	51.00	48.84	49.31	49.36	48.70	50.87	49.69	50.21	44.99	47.72	53.12	49.97	44.46	43.33	51.16
Primary Energy Supply (toe/GDP at 2010 Prices)***	81.49	91.24	93.20	86.64	83.94	81.78	83.03	88.27	90.48	92.61	96.87	98.78	95.92	98.12	100.3	100.3	96.19	97.74	97.93	97.54	93.51	91.67	94.81	95.00	91.35	84.81	84.27

FIGURE 6: ELECTRICITY INTENSITY



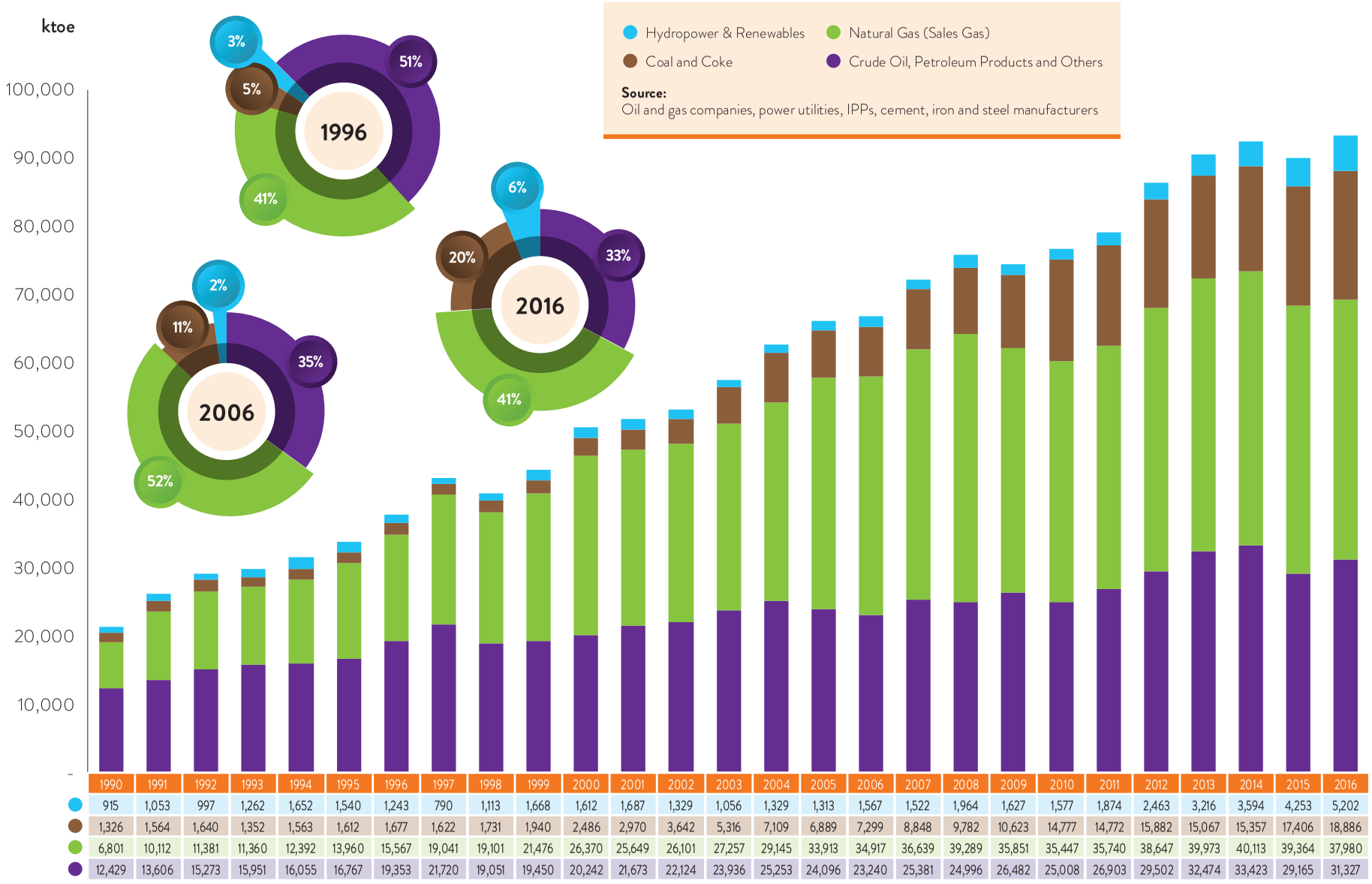
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
●	6.509	6.669	7.057	7.094	7.773	8.147	8.288	8.964	10.102	10.012	10.053	10.631	10.678	10.760	10.602	10.523	10.437	10.374	10.286	10.836	10.948	10.677	10.974	11.088	10.906	10.697	11.182
●	0.076	0.078	0.082	0.082	0.090	0.095	0.096	0.104	0.117	0.116	0.117	0.124	0.124	0.125	0.123	0.122	0.121	0.121	0.120	0.126	0.127	0.124	0.128	0.129	0.127	0.124	0.130

FIGURE 7: FINAL ENERGY AND ELECTRICITY ELASTICITY



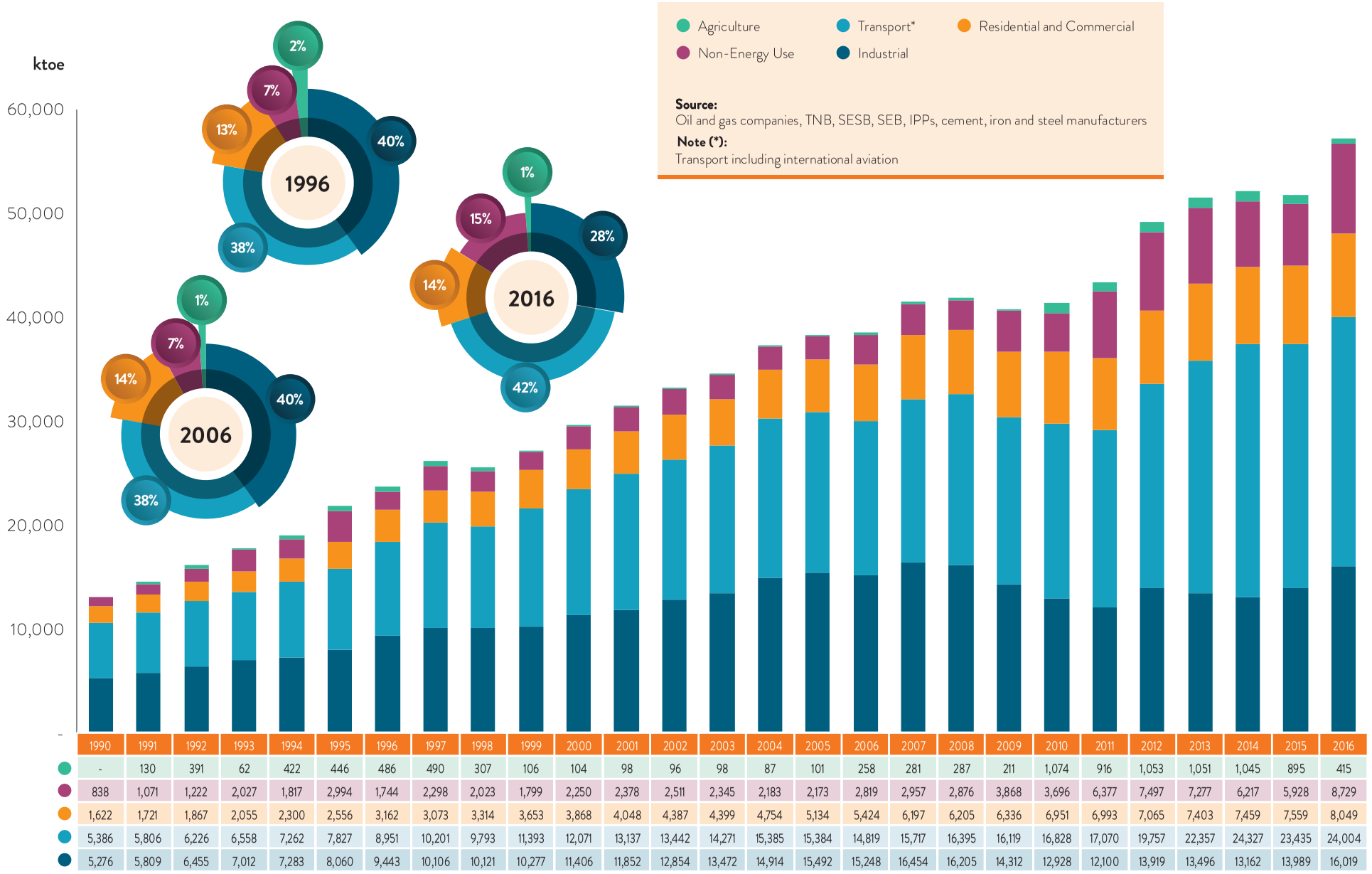
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
●	0.97	1.13	1.25	0.96	0.95	1.52	0.91	1.12	0.32	1.06	1.02	11.81	1.04	0.67	1.17	0.48	0.13	1.25	0.18	1.77	0.21	0.90	2.45	0.99	0.20	(0.15)	2.48
●	1.08	1.28	1.71	1.06	2.14	1.54	1.19	2.19	(0.60)	0.85	1.05	12.15	1.09	1.14	0.77	0.85	0.85	0.90	0.82	(2.48)	1.15	0.51	1.54	1.23	0.71	0.60	2.12
●	9.00	9.55	8.89	9.89	9.21	9.83	10.00	7.32	(7.36)	6.14	8.86	0.52	5.39	5.79	6.78	5.33	5.58	6.30	4.83	(1.51)	7.42	5.29	5.47	4.69	6.01	5.03	4.22

FIGURE 8: PRIMARY ENERGY SUPPLY



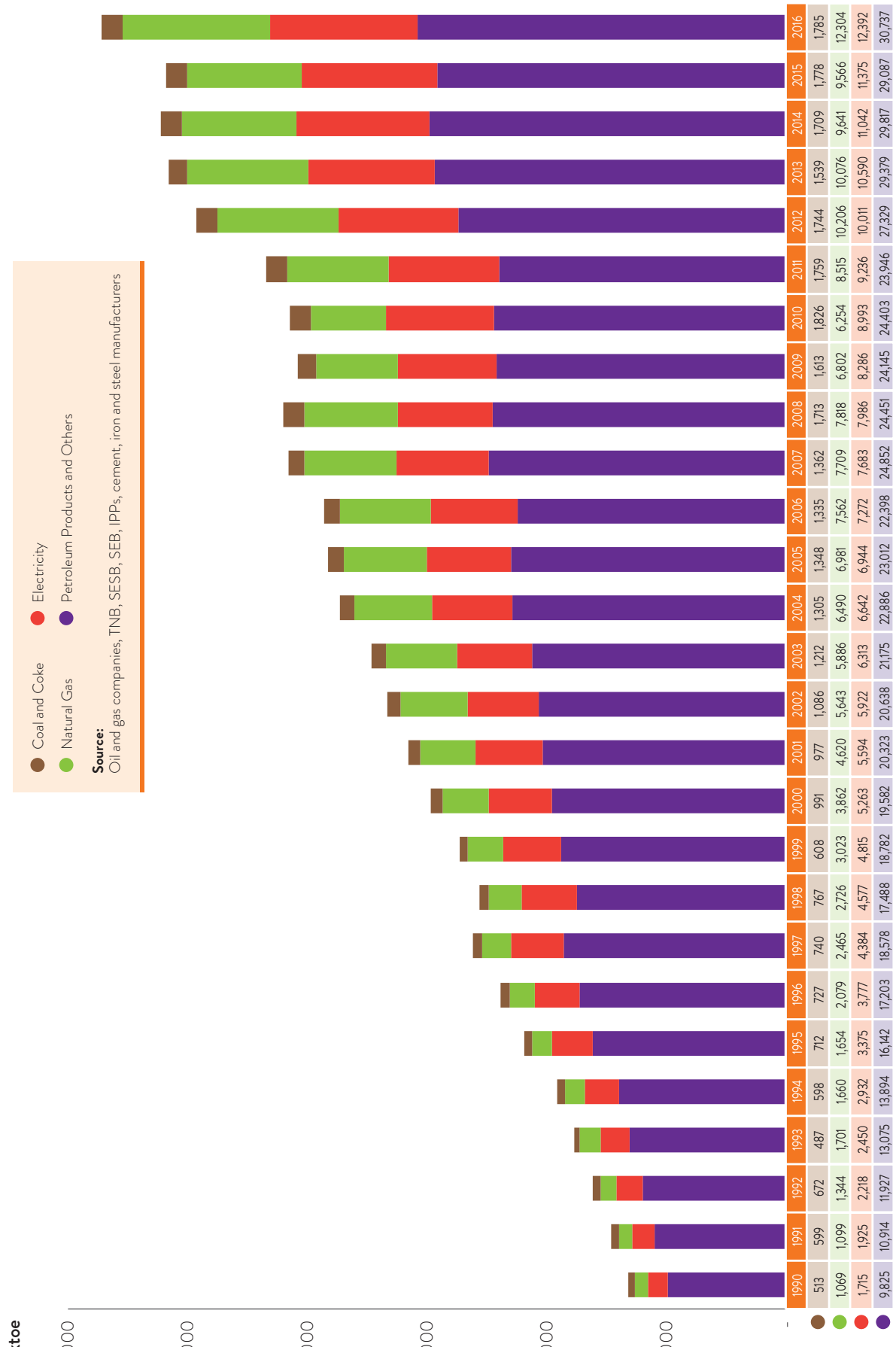
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hydropower & Renewables	915	1,053	997	1,262	1,652	1,540	1,243	790	1,113	1,668	1,612	1,687	1,329	1,056	1,329	1,313	1,567	1,522	1,964	1,627	1,577	1,874	2,463	3,216	3,594	4,253	5,202
Coal and Coke	1,326	1,564	1,640	1,352	1,563	1,612	1,677	1,622	1,731	1,940	2,486	2,970	3,642	5,316	7,109	6,889	7,299	8,848	9,782	10,623	14,777	14,772	15,882	15,067	15,357	17,406	18,886
Natural Gas (Sales Gas)	6,801	10,112	11,381	11,360	12,392	13,960	15,567	19,041	19,101	21,476	26,370	25,649	26,101	27,257	29,145	33,913	34,917	36,639	39,289	35,851	35,447	35,740	38,647	39,973	40,113	39,364	37,980
Crude Oil, Petroleum Products and Others	12,429	13,606	15,273	15,951	16,055	16,767	19,353	21,720	19,051	19,450	20,242	21,673	22,124	23,936	25,253	24,096	23,240	25,381	24,996	26,482	25,008	26,903	29,502	32,474	33,423	29,165	31,327

FIGURE 9: FINAL ENERGY CONSUMPTION BY SECTORS



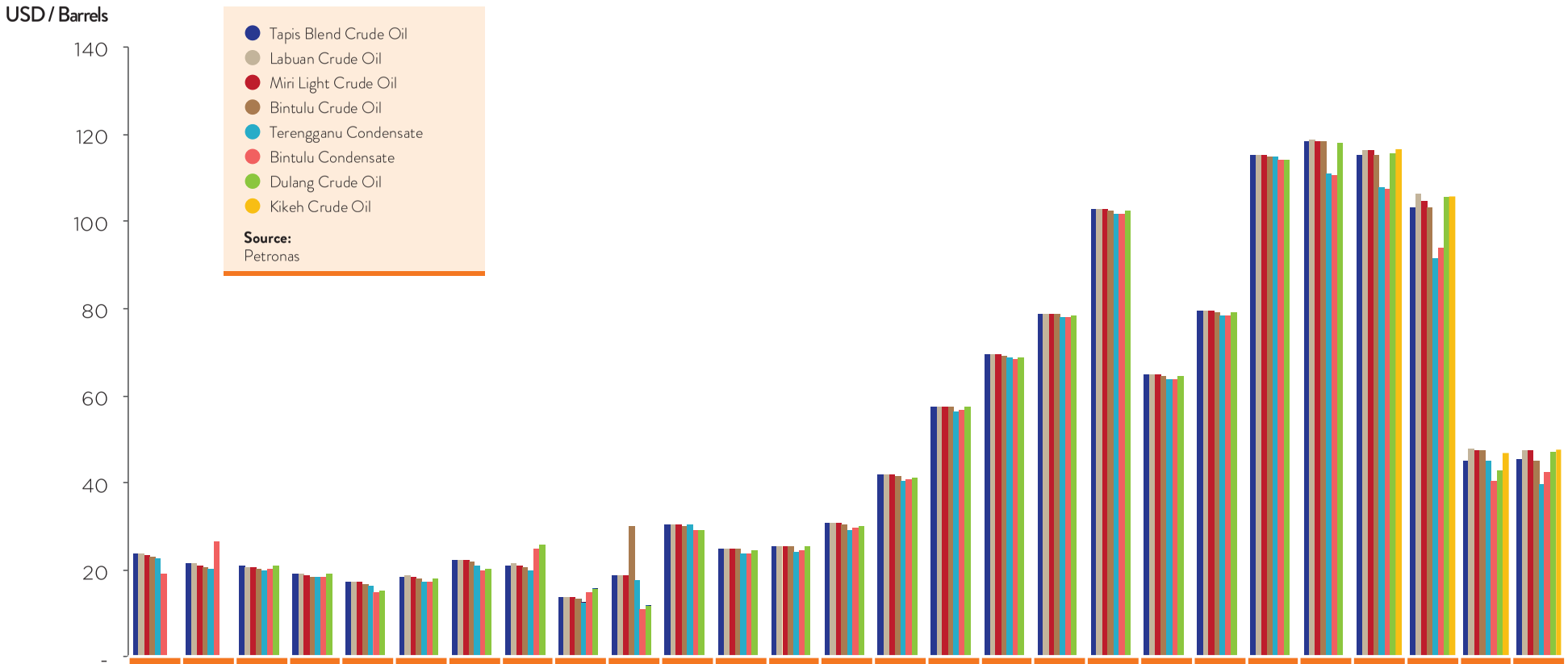
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Agriculture	-	130	391	62	422	446	486	490	307	106	104	98	96	98	87	101	258	281	287	211	1,074	916	1,053	1,051	1,045	895	415
Non-Energy Use	838	1,071	1,222	2,027	1,817	2,994	1,744	2,298	2,023	1,799	2,250	2,378	2,511	2,345	2,183	2,173	2,819	2,957	2,876	3,868	3,696	6,377	7,497	7,277	6,217	5,928	8,729
Residential and Commercial	1,622	1,721	1,867	2,055	2,300	2,556	3,162	3,073	3,314	3,653	3,868	4,048	4,387	4,399	4,754	5,134	5,424	6,197	6,205	6,336	6,951	6,993	7,065	7,403	7,459	7,559	8,049
Transport*	5,386	5,806	6,226	6,558	7,262	7,827	8,951	10,201	9,793	11,393	12,071	13,137	13,442	14,271	15,385	15,384	14,819	15,717	16,395	16,119	16,828	17,070	19,757	22,357	24,327	23,435	24,004
Industrial	5,276	5,809	6,455	7,012	7,283	8,060	9,443	10,106	10,121	10,277	11,406	11,852	12,854	13,472	14,914	15,492	15,248	16,454	16,205	14,312	12,928	12,100	13,919	13,496	13,162	13,989	16,019

FIGURE 10: FINAL ENERGY CONSUMPTION BY TYPE OF FUELS



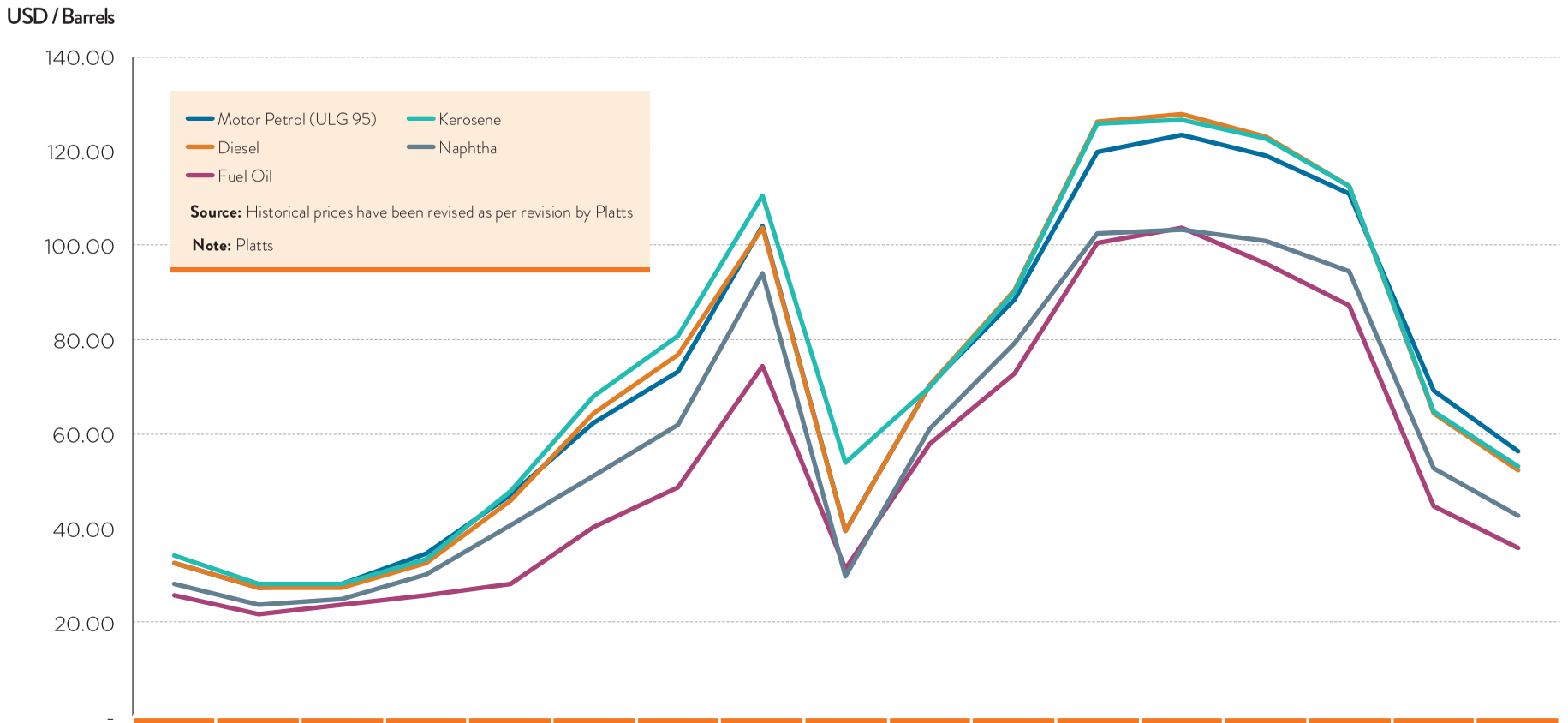
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal and Coke	513	599	672	487	598	712	727	740	767	608	991	977	1,086	1,212	1,305	1,348	1,335	1,362	1,713	1,613	1,826	1,759	1,744	1,539	1,709	1,778	1,785
Natural Gas	1,069	1,099	1,344	1,701	1,660	1,654	2,079	2,465	2,726	3,023	3,862	4,620	5,643	5,886	6,490	6,981	7,562	7,709	7,818	6,802	6,254	8,515	10,206	10,076	9,641	9,566	12,304
Electricity	1,715	1,925	2,218	2,450	2,932	3,375	3,777	4,384	4,577	4,815	5,263	5,594	5,922	6,313	6,642	6,944	7,272	7,683	7,986	8,286	8,993	9,236	10,011	10,590	11,042	11,375	12,392
Petroleum Products and Others	9,825	10,914	11,927	13,075	13,894	16,142	17,203	18,578	17,488	18,782	19,582	20,323	20,638	21,175	22,886	23,012	22,398	24,852	24,451	24,145	24,403	23,946	27,329	29,379	29,817	29,087	30,737

FIGURE 11: OFFICIAL SELLING PRICES OF MALAYSIAN CRUDE OIL



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Tapis Blend Crude Oil	23.86	21.47	20.98	19.11	17.30	18.53	22.28	21.18	13.81	18.95	30.25	25.06	25.52	30.60	41.84	57.71	69.56	78.96	102.79	64.97	79.51	115.33	118.22	115.30	103.26	45.12	45.43
Labuan Crude Oil	23.76	21.37	20.88	19.11	17.40	18.63	22.38	21.33	13.84	18.95	30.25	25.06	25.52	30.60	41.84	57.71	69.56	78.96	102.79	64.97	79.51	115.33	118.66	116.60	106.41	47.73	47.63
Miri Light Crude Oil	23.56	21.17	20.68	18.91	17.20	18.43	22.18	21.28	13.83	18.95	30.25	25.06	25.52	30.60	41.84	57.71	69.56	78.96	102.79	64.97	79.51	115.33	118.56	116.30	104.89	47.63	47.63
Bintulu Crude Oil	23.06	20.67	20.18	18.46	16.90	18.06	21.89	20.78	13.48	29.95	29.95	24.78	25.22	30.33	41.54	57.43	69.28	78.66	102.49	64.67	79.21	115.03	118.36	115.44	103.13	47.35	45.13
Terengganu Condensate	22.76	20.37	19.88	18.26	16.45	17.33	21.08	19.98	12.61	17.76	30.29	23.86	24.32	29.40	40.64	56.51	68.66	77.91	101.59	63.77	78.31	115.03	110.92	108.00	91.82	44.94	39.76
Bintulu Condensate	19.10	26.35	20.20	18.25	15.00	17.36	19.79	25.13	14.80	11.14	29.09	23.96	24.42	29.50	40.74	56.61	68.45	77.92	101.69	63.87	78.41	114.13	110.62	107.70	93.99	40.28	42.56
Dulang Crude Oil	-	-	21.15	19.20	15.40	18.16	20.30	25.66	15.57	11.84	29.18	24.68	25.23	29.99	41.17	57.41	68.96	78.59	102.49	64.67	79.21	114.23	118.16	115.70	105.46	42.98	47.23
Kikeh Crude Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	116.60	105.66	46.96	47.63

FIGURE 12: EX-SINGAPORE PRICES OF MAJOR PETROLEUM PRODUCTS



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	32.64	27.43	28.04	34.69	47.23	62.38	73.20	104.05	39.25	70.38	88.41	119.79	123.42	119.00	110.97	69.17	56.26
	32.48	27.32	27.55	32.46	45.92	64.35	76.93	103.74	39.32	70.42	90.35	126.28	128.10	123.27	112.69	64.47	52.24
	25.82	21.78	23.63	25.72	28.15	40.32	48.84	74.60	31.40	58.12	72.85	100.68	103.92	96.35	87.31	44.52	35.62
	34.27	28.32	28.08	33.25	47.69	67.99	80.72	110.50	53.90	70.14	90.18	125.71	126.79	122.85	112.50	64.69	53.00
	28.32	23.75	24.93	30.14	40.82	51.04	62.13	93.98	29.90	60.96	79.24	102.49	103.57	100.99	94.40	52.62	42.65

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

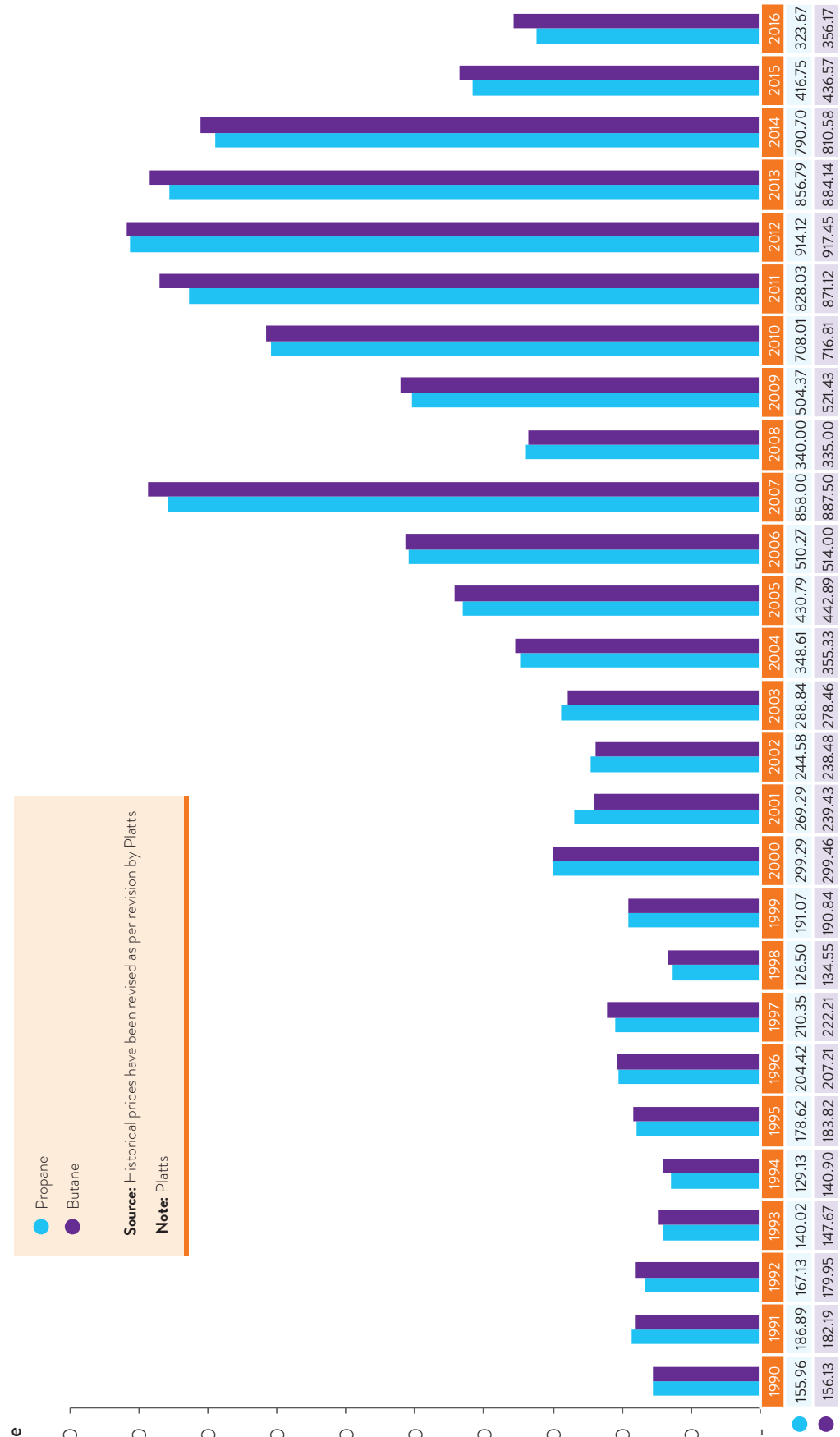
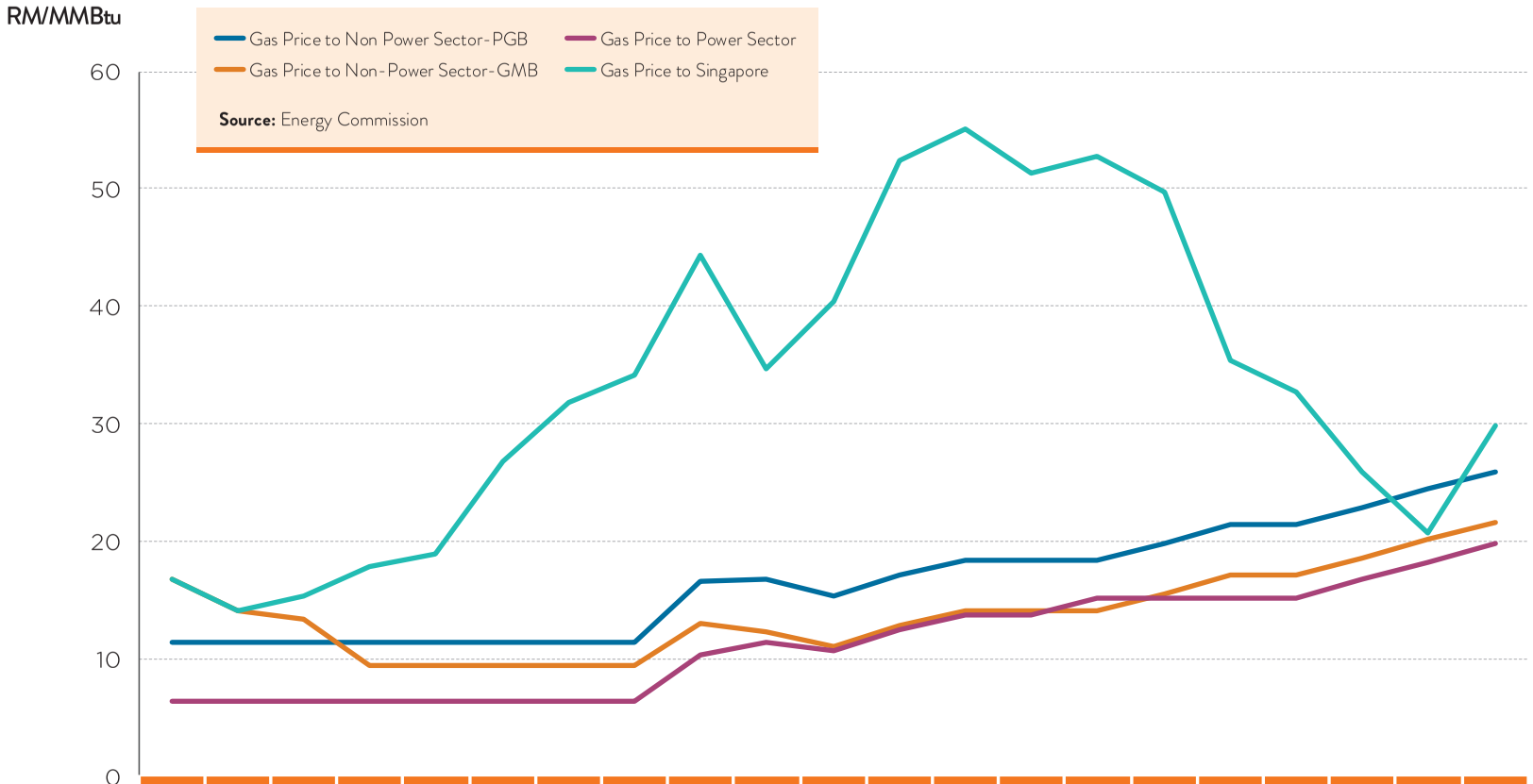
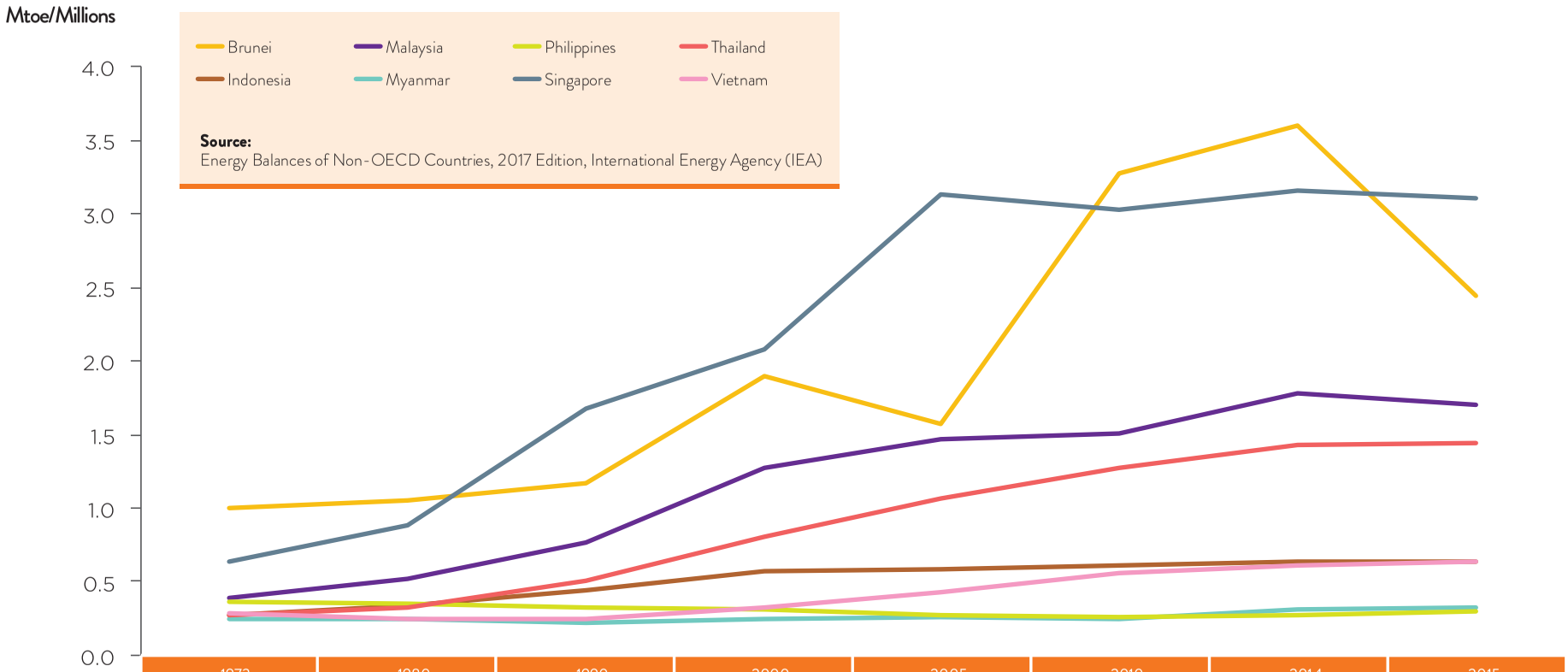


FIGURE 14: AVERAGE ANNUAL NATURAL GAS PRICE IN MALAYSIA



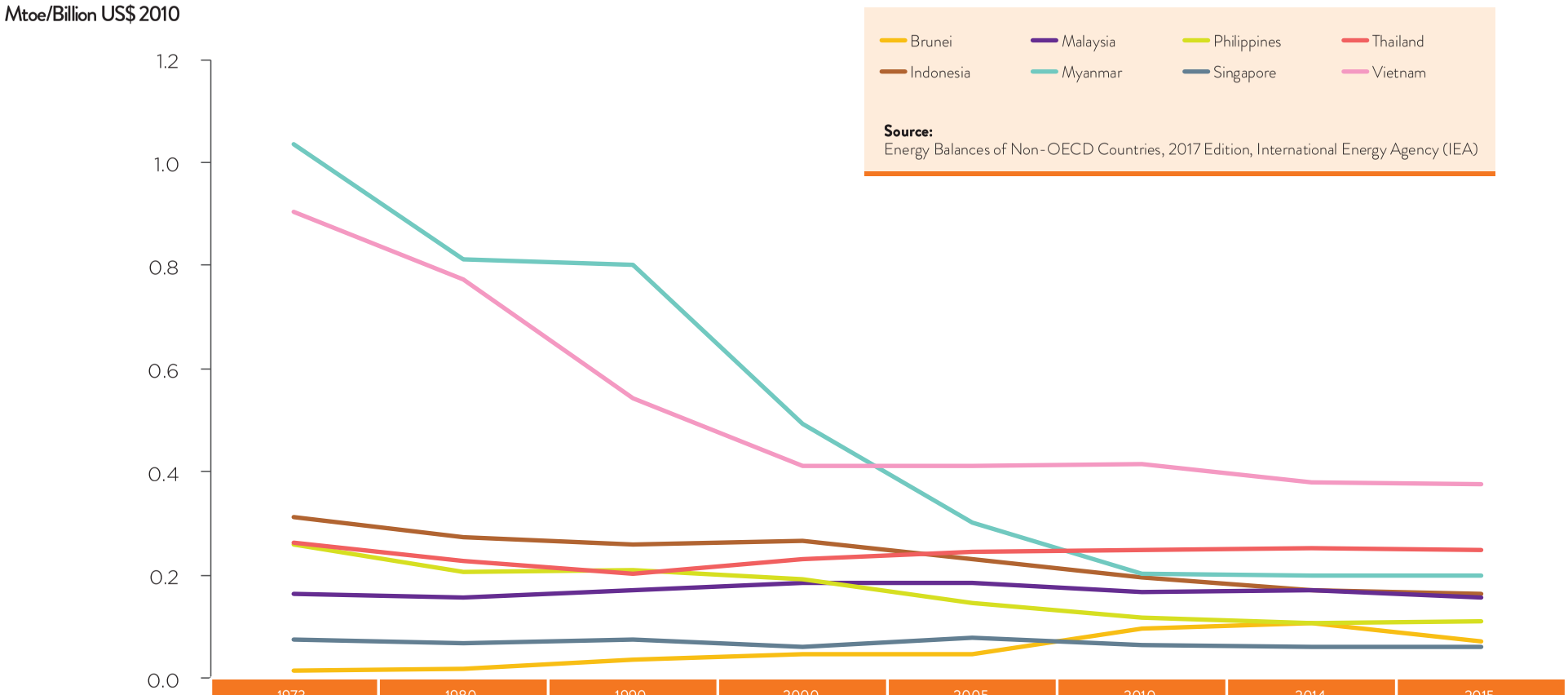
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 (Jan-Apr)	2014 (May-Oct)	2014 (Nov-Dec)	2015 (Jan-Jun)	2015 (Jul-Dec)	2016 (Jan-Jun)	2016 (Jul-Dec)
Gas Price to Non Power Sector-PGB	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	16.5	16.7	15.35	17.10	18.35	18.35	18.35	19.85	21.35	21.35	22.85	24.35	25.85
Gas Price to Non-Power Sector-GMB	16.7	14.1	13.4	9.40	9.40	9.40	9.40	9.40	12.9	12.2	11.05	12.80	14.05	14.05	14.05	15.55	17.05	17.05	18.55	20.05	21.55
Gas Price to Power Sector	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	10.3	11.3	10.70	12.45	13.70	13.70	15.20	15.20	15.20	15.20	16.70	18.20	19.70
Gas Price to Singapore	16.7	14.1	15.3	17.7	18.9	26.7	31.7	34.1	44.4	34.5	40.42	52.47	55.08	51.36	52.75	49.64	35.29	32.62	25.80	20.66	29.88

FIGURE 15: FINAL ENERGY CONSUMPTION PER CAPITA IN ASEAN



	1973	1980	1990	2000	2005	2010	2014	2015
Brunei	1.000	1.050	1.167	1.900	1.575	3.275	3.600	2.450
Indonesia	0.275	0.337	0.440	0.568	0.586	0.610	0.637	0.632
Malaysia	0.391	0.519	0.764	1.272	1.473	1.512	1.782	1.702
Myanmar	0.245	0.242	0.224	0.240	0.258	0.241	0.307	0.329
Philippines	0.364	0.349	0.317	0.307	0.265	0.255	0.272	0.294
Singapore	0.636	0.888	1.670	2.078	3.130	3.031	3.155	3.113
Thailand	0.271	0.320	0.510	0.807	1.061	1.273	1.427	1.442
Vietnam	0.286	0.243	0.243	0.323	0.426	0.555	0.605	0.634

FIGURE 16: FINAL ENERGY INTENSITY IN ASEAN



Source:
Energy Balances of Non-OECD Countries, 2017 Edition, International Energy Agency (IEA)

	1973	1980	1990	2000	2005	2010	2014	2015
Brunei	0.015	0.018	0.036	0.048	0.047	0.096	0.105	0.072
Indonesia	0.311	0.273	0.258	0.265	0.232	0.195	0.172	0.165
Malaysia	0.165	0.156	0.170	0.183	0.185	0.167	0.170	0.156
Myanmar	1.036	0.812	0.803	0.492	0.303	0.201	0.198	0.200
Philippines	0.260	0.207	0.208	0.191	0.145	0.119	0.108	0.111
Singapore	0.073	0.066	0.074	0.062	0.079	0.065	0.062	0.060
Thailand	0.263	0.228	0.204	0.232	0.246	0.249	0.253	0.250
Vietnam	0.905	0.773	0.544	0.411	0.411	0.416	0.379	0.377

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OIL

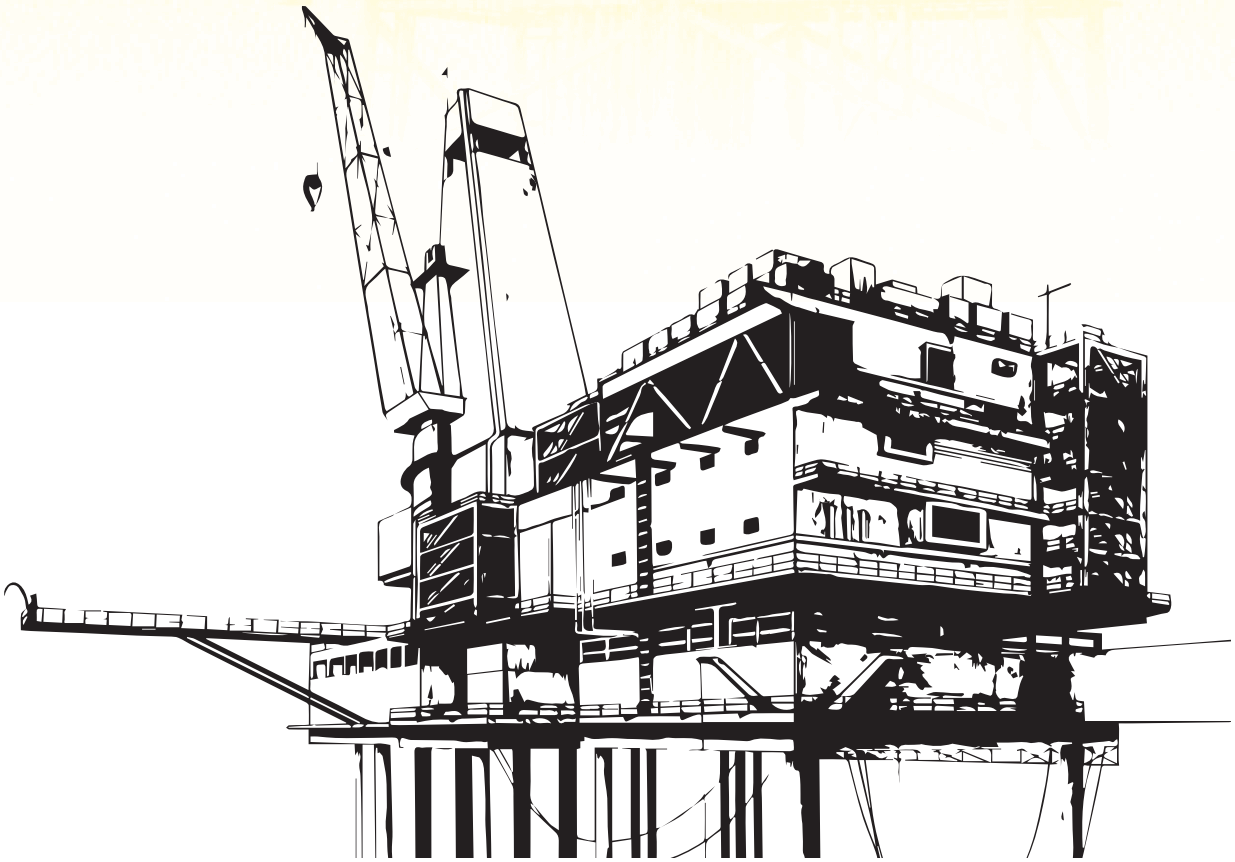


TABLE 3: PRODUCTION AND RESERVES OF OIL AS OF 1ST JANUARY 2016

	RESERVES BILLION BARRELS			PRODUCTION THOUSAND BARRELS PER DAY		
REGION	CRUDE OIL	CONDENSATES	TOTAL	CRUDE OIL	CONDENSATES	TOTAL
Peninsular Malaysia	1.400	0.335	1.735	210.60	29.80	240.40
Sabah	1.813	0.111	1.925	232.37	13.56	245.93
Sarawak	0.948	0.421	1.370	118.29	62.21	180.50
TOTAL	**4.162**	**0.868**	**5.030**	**561.26**	**105.57**	**666.84**

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
TOTAL			492

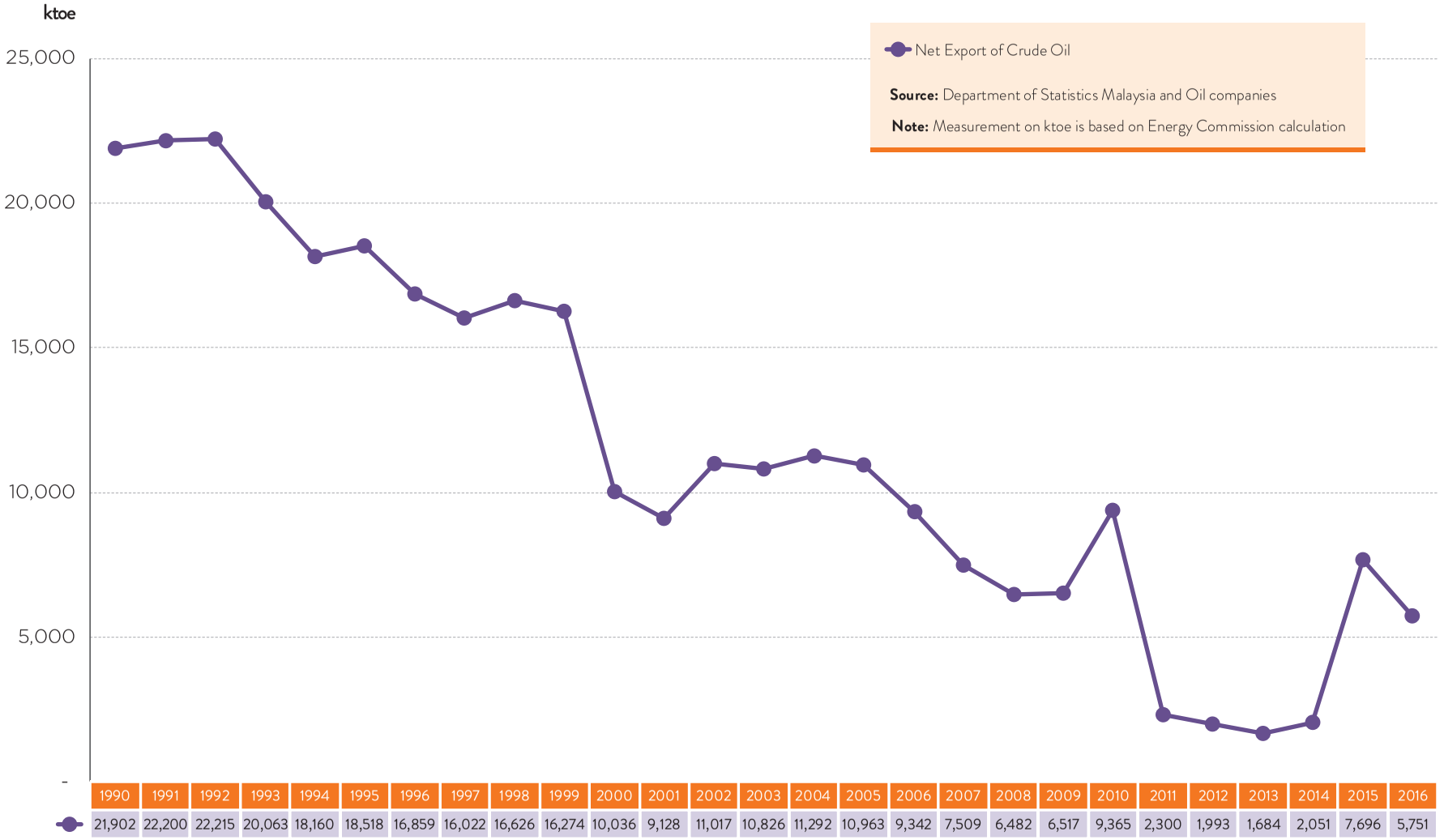
Source: PETRON, PETRONAS & SHELL **Note** (*) : Excludes condensate splitter of 74,300 bpd

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

PETROLEUM PRODUCTS	PENINSULAR MALAYSIA	SABAH	SARAWAK	TOTAL
Petrol	98,150	4,976	4,909	108,035
Diesel	53,731	7,521	9,346	70,597
Fuel Oil	3,477	15	2	3,494
Kerosene	35	0	2	37
LPG	14,492	882	837	16,211
ATF & AV Gas	22,417	237	328	22,982
Non-Energy	3,277	310	503	4,090
TOTAL	**195,579**	**13,941**	**15,926**	**225,446**

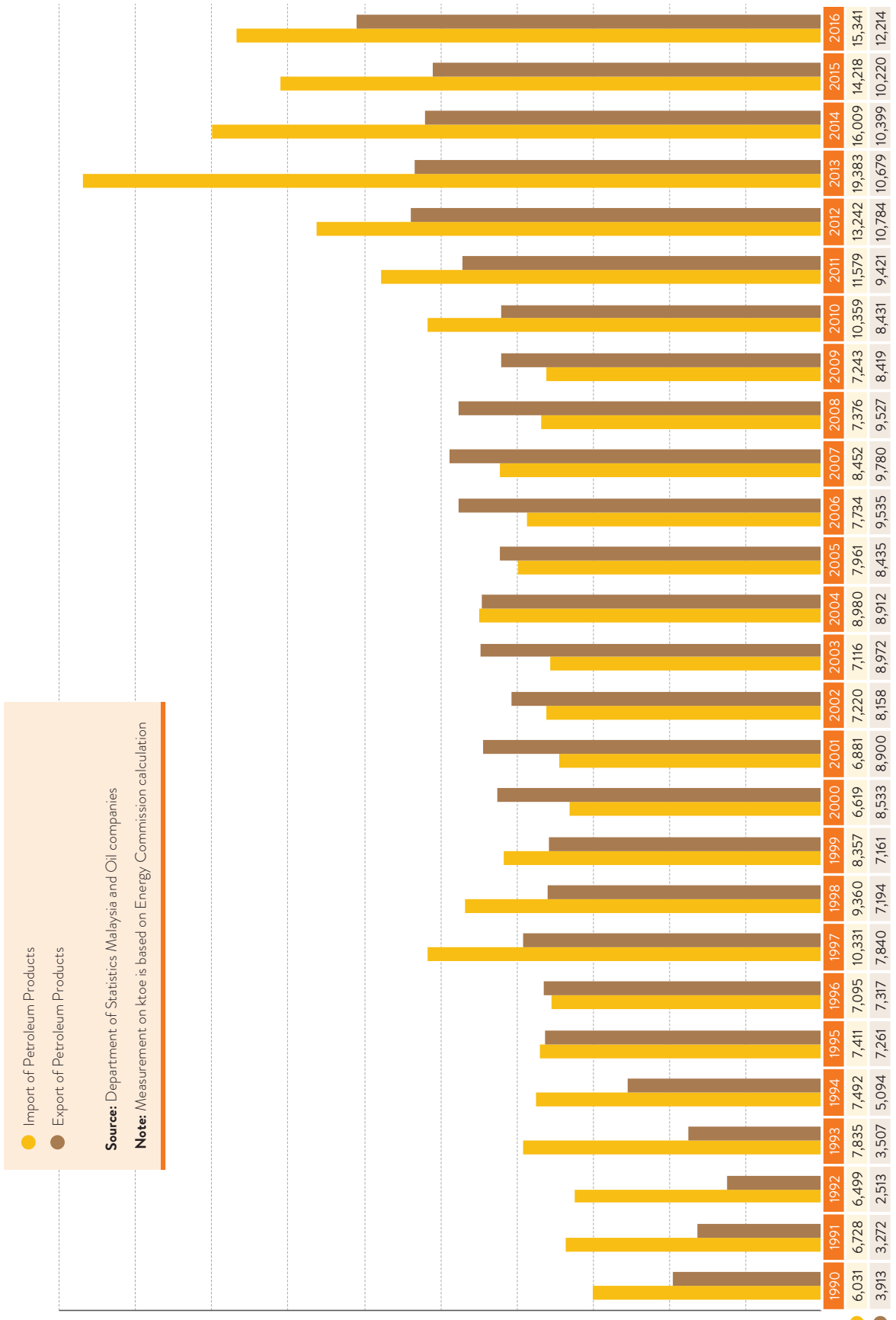
Source: Oil companies

FIGURE 17: NET EXPORT OF CRUDE OIL



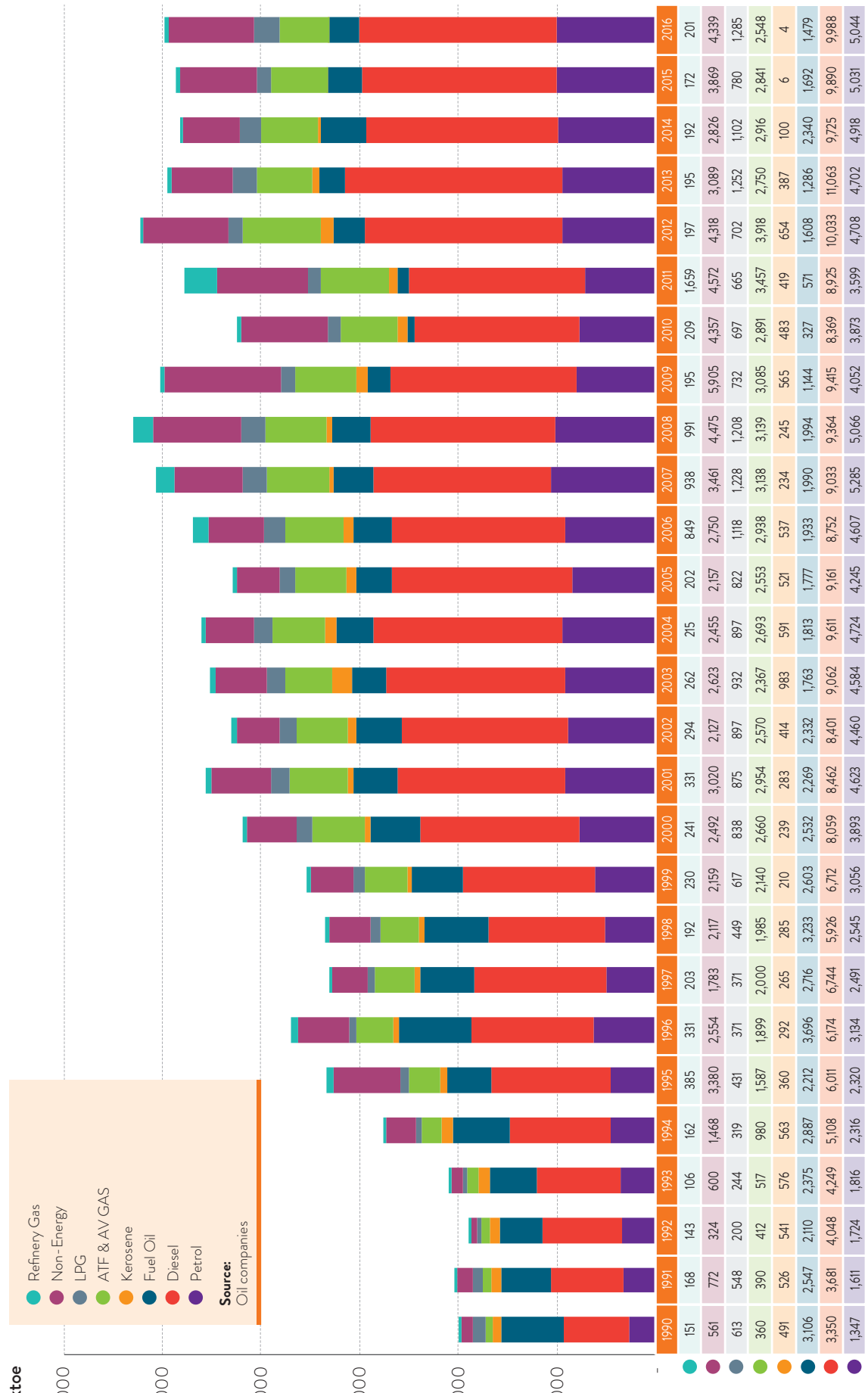
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
21,902	22,200	22,215	20,063	18,160	18,518	16,859	16,022	16,626	16,274	10,036	9,128	11,017	10,826	11,292	10,963	9,342	7,509	6,482	6,517	9,365	2,300	1,993	1,684	2,051	7,696	5,751

FIGURE 18: EXPORT AND IMPORT OF PETROLEUM PRODUCTS



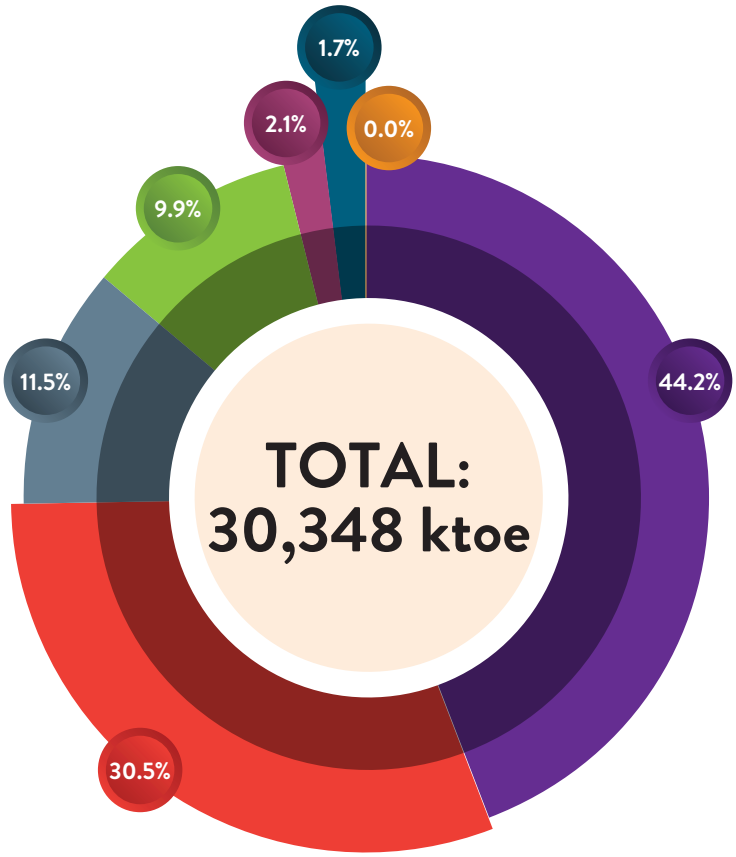
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Import of Petroleum Products	6,031	6,728	6,499	7,835	7,492	7,411	7,095	10,331	9,360	8,357	6,619	6,881	7,220	7,116	8,980	7,961	7,734	8,452	7,376	7,243	10,359	11,579	13,242	19,383	16,009	14,218	15,341
Export of Petroleum Products	3,913	3,272	2,513	3,507	5,094	7,261	7,317	7,840	7,194	7,161	8,533	8,900	8,158	8,972	8,912	8,435	9,535	9,780	9,527	8,419	8,431	9,421	10,784	10,679	10,399	10,220	12,214

FIGURE 19: PRODUCTION OF PETROLEUM PRODUCTS FROM REFINERIES



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Refinery Gas	151	168	143	106	162	385	331	203	192	230	241	331	294	262	215	202	849	938	991	195	209	1,659	197	195	192	172	201
Non-Energy	561	772	324	600	1,468	3,380	2,554	1,783	2,117	2,159	2,492	3,020	2,127	2,623	2,455	2,157	2,750	3,461	4,475	5,905	4,357	4,572	4,318	3,089	2,826	3,869	4,339
LPG	613	548	200	244	319	431	371	371	449	617	838	875	897	932	897	822	1,118	1,228	1,208	732	697	665	702	1,252	1,102	780	1,285
ATF & AV GAS	360	390	412	517	980	1,587	1,899	2,000	1,985	2,140	2,660	2,954	2,570	2,367	2,693	2,553	2,938	3,138	3,139	3,085	2,891	3,457	3,918	2,750	2,916	2,841	2,548
Kerosene	491	526	541	576	563	360	292	265	285	210	239	283	414	983	591	521	537	234	245	565	483	419	654	387	100	6	4
Fuel Oil	3,106	2,547	2,110	2,375	2,887	2,212	3,696	2,716	3,233	2,603	2,532	2,269	2,332	1,763	1,813	1,777	1,933	1,990	1,994	1,144	327	571	1,608	1,286	2,340	1,692	1,479
Diesel	3,350	3,681	4,048	4,249	5,108	6,011	6,174	6,744	5,926	6,712	8,059	8,462	8,401	9,062	9,611	9,161	8,752	9,033	9,364	9,415	8,369	8,925	10,033	11,063	9,725	9,890	9,988
Petrol	1,347	1,611	1,724	1,816	2,316	2,320	3,134	2,491	2,545	3,056	3,893	4,623	4,460	4,584	4,724	4,245	4,607	5,285	5,066	4,052	3,873	3,599	4,708	4,702	4,918	5,031	5,044

FIGURE 20: FINAL CONSUMPTION FOR PETROLEUM PRODUCTS



Petrol	44.2%
Diesel	30.5%
LPG	11.5%
ATF & AV GAS	9.9%
Non-Energy	2.1%
Fuel Oil	1.7%
Kerosene	0.0%

Source:
Oil companies

NATURAL GAS

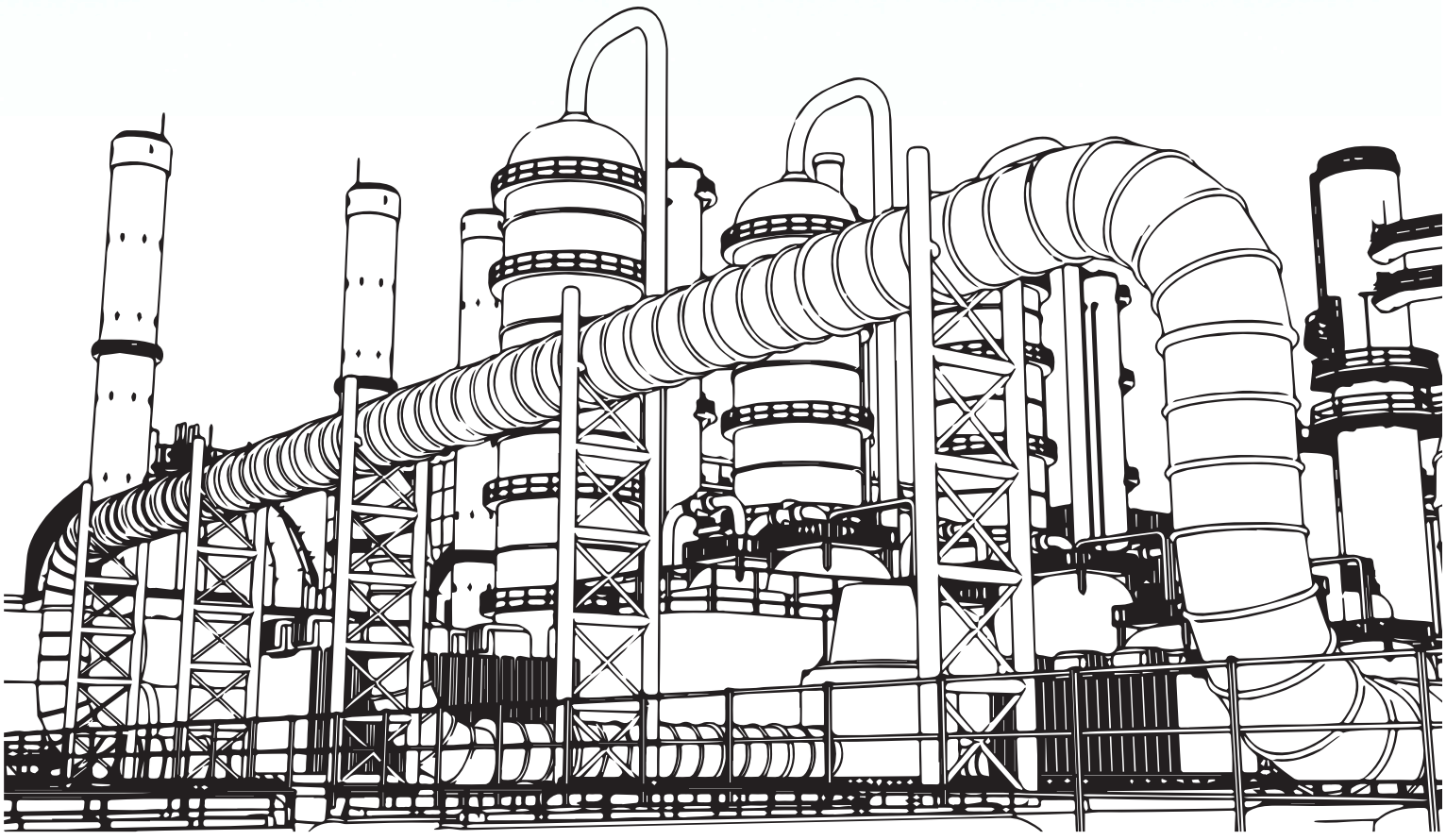


TABLE 6: RESERVES AND PRODUCTION OF NATURAL GAS AS OF 1ST JANUARY 2016

REGION	RESERVES			PRODUCTION
	TRILLION STANDARD CUBIC FEET (TSCF)			MILLION STANDARD CUBIC FEET PER DAY (MMSCFD)
	ASSOCIATED	NON-ASSOCIATED	TOTAL	
Peninsular Malaysia	6.793	20.428	27.221	1,951.82
Sabah	2.521	10.915	13.436	558.39
Sarawak	1.770	45.336	47.106	4,026.05
TOTAL	**11.084**	**76.679**	**87.763**	**6,536.26**

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

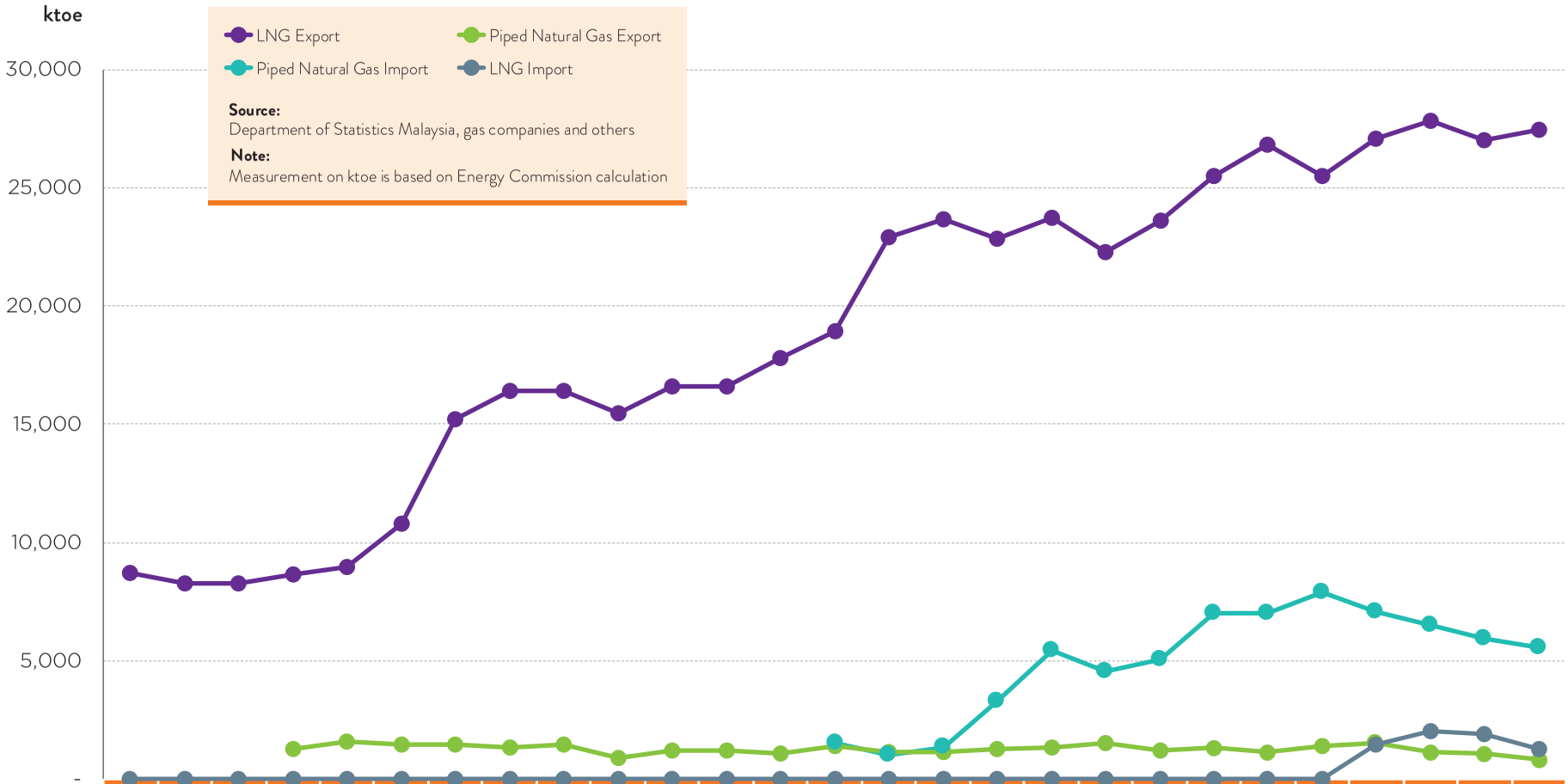
Source: PETRONAS

TABLE 7: CONSUMPTION OF NATURAL GAS IN MMSCF

SECTORS	PENINSULAR MALAYSIA	SABAH	SARAWAK	MALAYSIA
Residential	21	0	0	21
Commercial	877	24	0	901
Industry	177,055	30,996	20,355	228,406
Non-Energy	97,617	70,096	64,304	232,017
Transport	7,935	0	0	7,935
Power Stations	413,336	60,825	33,035	507,197
Co-Generation	39,169	0	5,467	44,636
TOTAL	**736,011**	**161,942**	**123,161**	**1,021,113**

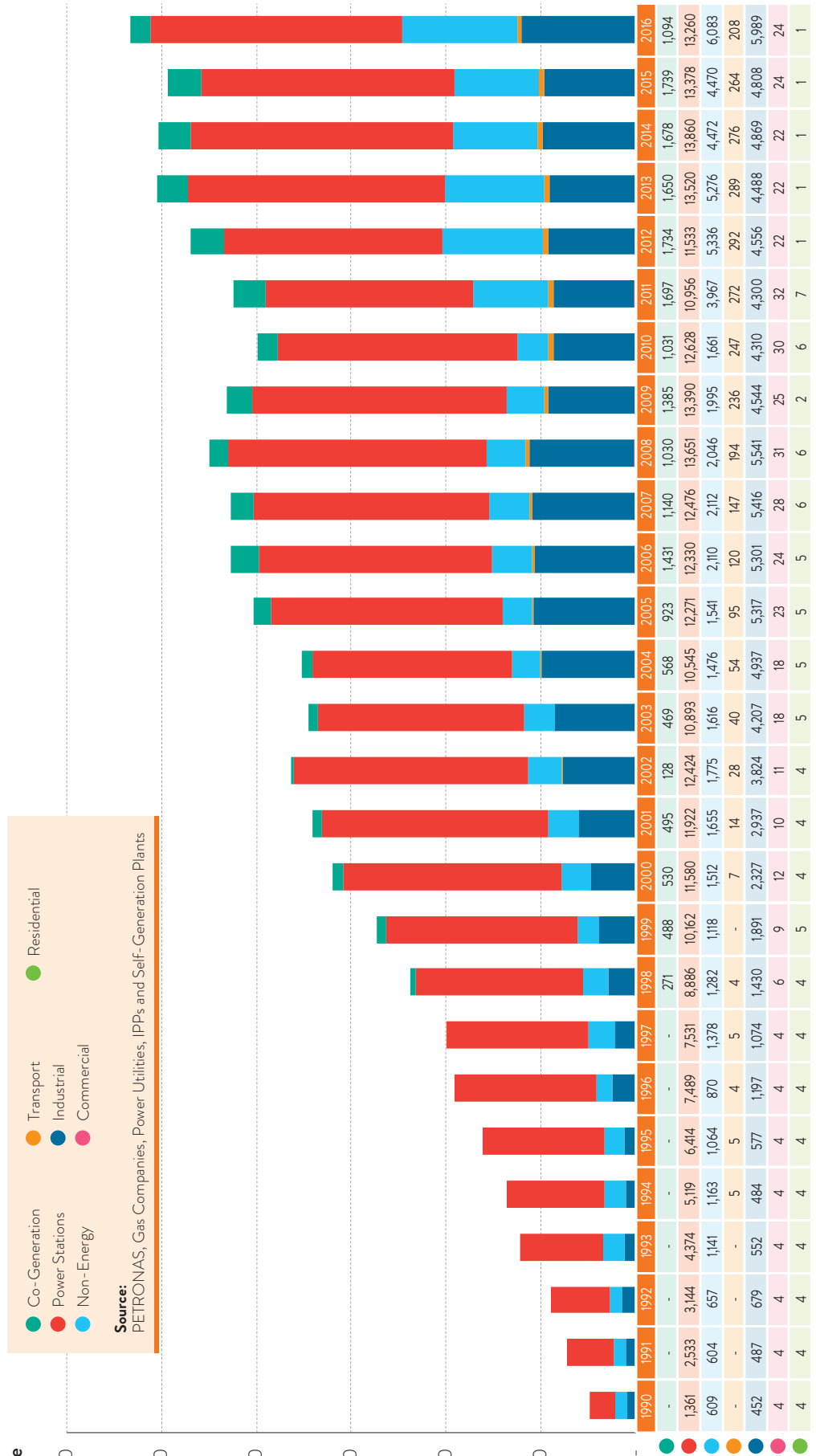
Source: Power utilities, IPPs, PETRONAS and gas distribution companies

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



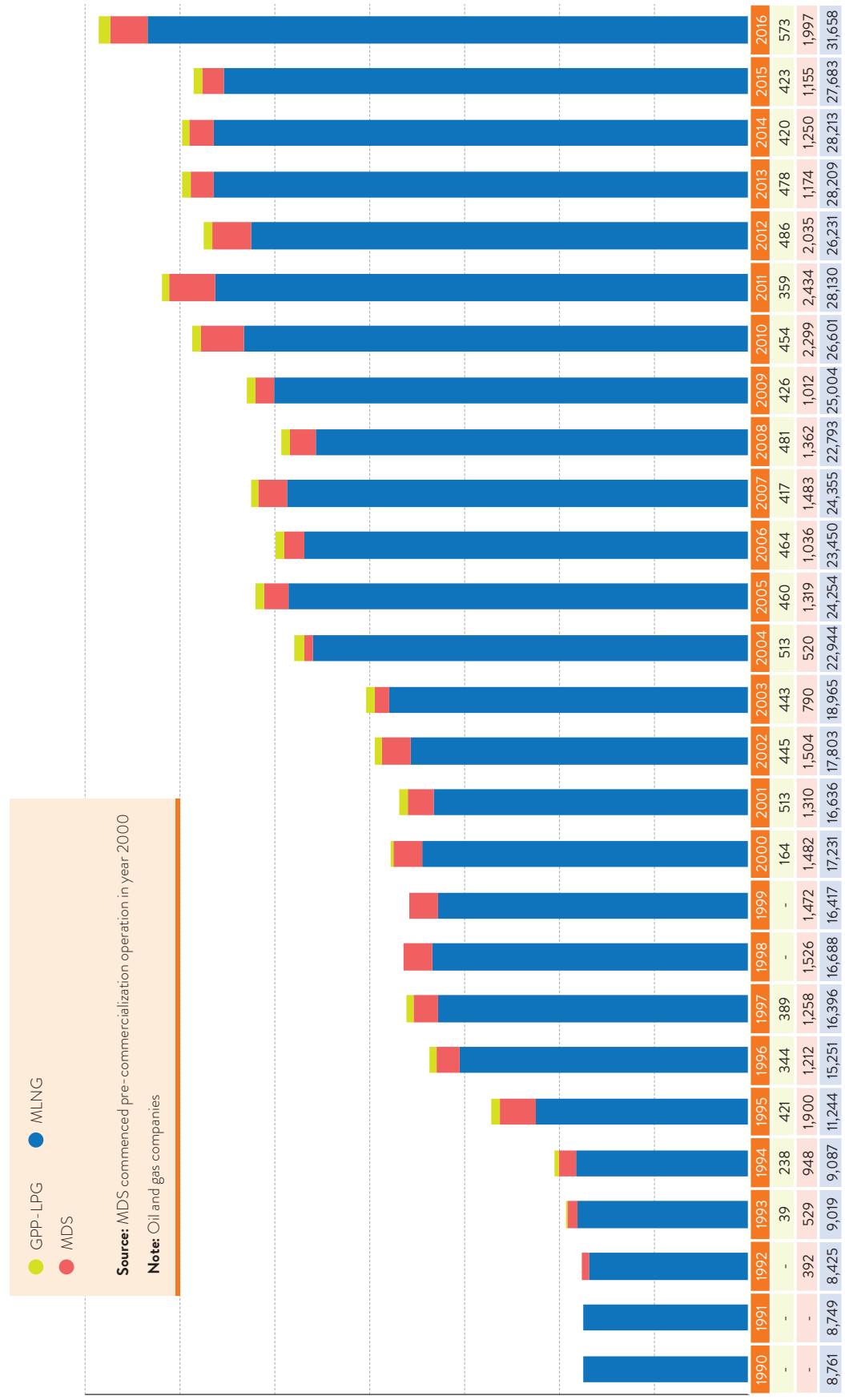
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LNG Export	8,686	8,278	8,262	8,654	8,938	10,790	15,251	16,396	16,429	15,445	16,633	16,636	17,803	18,965	22,944	23,707	22,874	23,777	22,277	23,606	25,487	26,856	25,547	27,089	27,835	27,057	27,457
Piped Natural Gas Import	-	-	-	-	-	-	-	-	-	-	-	-	-	1,501	999	1,340	3,313	5,435	4,565	5,055	7,013	6,979	7,866	7,098	6,472	5,941	5,557
Piped Natural Gas Export	-	-	1	1,258	1,589	1,474	1,474	1,340	1,444	860	1,198	1,178	1,098	1,402	1,143	1,134	1,257	1,295	1,524	1,166	1,340	1,147	1,368	1,497	1,129	1,062	841
LNG Import	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,450	2,019	1,873	1,275

FIGURE 22: NATURAL GAS CONSUMPTION BY SECTORS



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Co-Generation	-	-	-	-	-	-	-	-	271	488	530	495	128	469	568	923	1,431	1,140	1,030	1,385	1,031	1,697	1,734	1,650	1,678	1,739	1,094
Power Stations	1,361	2,533	3,144	4,374	5,119	6,414	7,489	7,531	8,886	10,162	11,580	11,922	12,424	10,893	10,545	12,271	12,330	12,476	13,651	13,390	12,628	10,956	11,533	13,520	13,860	13,378	13,260
Non-Energy	609	604	657	1,141	1,163	1,064	870	1,378	1,282	1,118	1,512	1,655	1,775	1,616	1,476	1,541	2,110	2,112	2,046	1,995	1,661	3,967	5,336	5,276	4,472	4,470	6,083
Transport	-	-	-	-	5	5	4	5	4	-	7	14	28	40	54	95	120	147	194	236	247	272	292	289	276	264	208
Industrial	452	487	679	552	484	577	1,197	1,074	1,430	1,891	2,327	2,937	3,824	4,207	4,937	5,317	5,301	5,416	5,541	4,544	4,310	4,300	4,556	4,488	4,869	4,808	5,989
Commercial	4	4	4	4	4	4	4	4	6	9	12	10	11	18	18	23	24	28	31	25	30	32	22	22	22	24	24
Residential	4	4	4	4	4	4	4	4	4	5	4	4	4	5	5	5	5	6	6	2	6	7	1	1	1	1	1

FIGURE 23: CONVERSION IN GAS PLANTS



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GPP-LPG	-	-	-	39	238	421	344	389	-	-	164	513	445	443	513	460	464	417	481	426	454	359	486	478	420	423	573
MDS	-	-	392	529	948	1,900	1,212	1,258	1,526	1,472	1,482	1,310	1,504	790	520	1,319	1,036	1,483	1,362	1,012	2,299	2,434	2,035	1,174	1,250	1,155	1,997
MLNG	8,761	8,749	8,425	9,019	9,087	11,244	15,251	16,396	16,688	16,417	17,231	16,636	17,803	18,965	22,944	24,254	23,450	24,355	22,793	25,004	26,601	28,130	26,231	28,209	28,213	27,683	31,658

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COAL

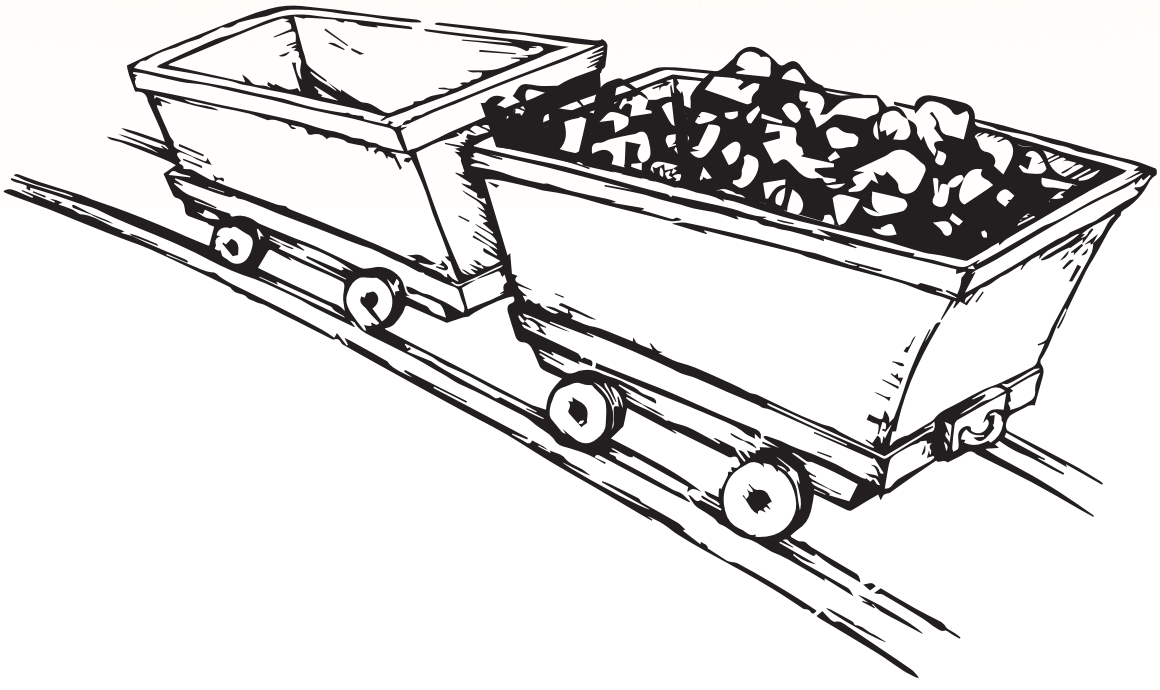


TABLE 8: RESOURCES AND PRODUCTION OF COAL AS OF 31ST DECEMBER 2016

LOCATION	RESOURCES (MILLION TONNES)			COAL TYPE	PRODUCTION (METRIC TONNES)
	MEASURED	INDICATED	INFERRED		
SARAWAK					
1. Abok & Silantek, Sri Aman	7.25	10.60	32.40	Coking Coal, Semi-Anthracite and Anthracite	15,655
2. Merit-Pila, Kapit	170.26	107.02	107.84	Sub-Bituminous	781,507
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	1,617,603
5. Tutoh Area	5.58	34.66	162.33	Sub-Bituminous	
SUBTOTAL	**276.04**	**323.01**	**963.10**		**2,414,765**
SABAH					
1. Salimpopon	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	-
SUBTOTAL	**4.80**	**55.22**	**299.20**		-
SELANGOR					
1. Batu Arang	-	-	17.00	Sub-Bituminous	-
SUBTOTAL	**0.00**	**0.00**	**17.00**		-
TOTAL	**280.84**	**378.23**	**1,279.30**		
GRAND TOTAL			**1,938.37**		**2,414,765**

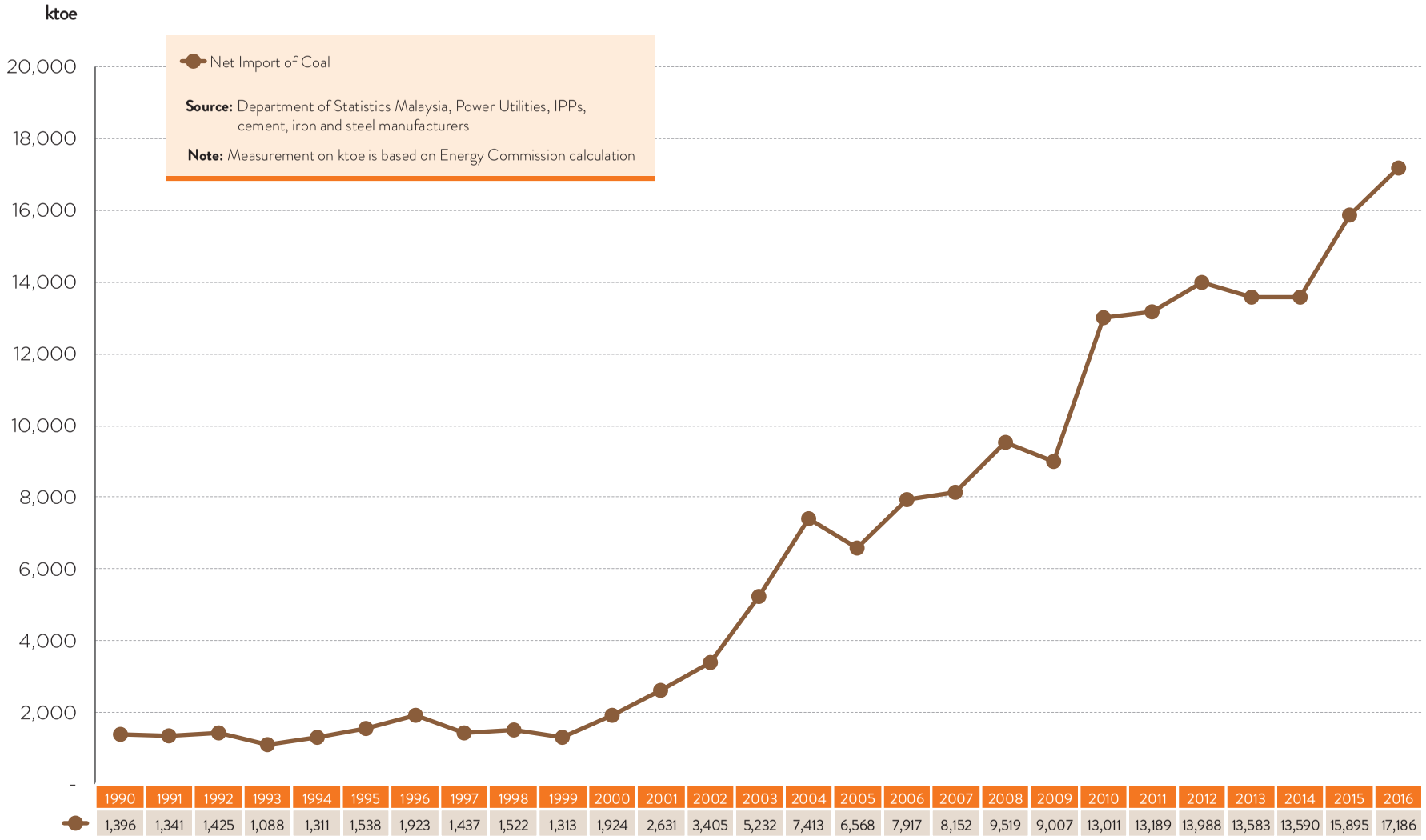
Source: Department of Mineral and Geosciences Malaysia

TABLE 9: CONSUMPTION OF COAL IN METRIC TONNES

SECTORS	PENINSULAR MALAYSIA	SABAH	SARAWAK	MALAYSIA
Industry	2,680,875	-	149,957	2,830,832
Power Stations	24,988,989	-	2,138,043	27,127,032
TOTAL	**27,669,864**	**0**	**2,288,000**	**29,957,864**

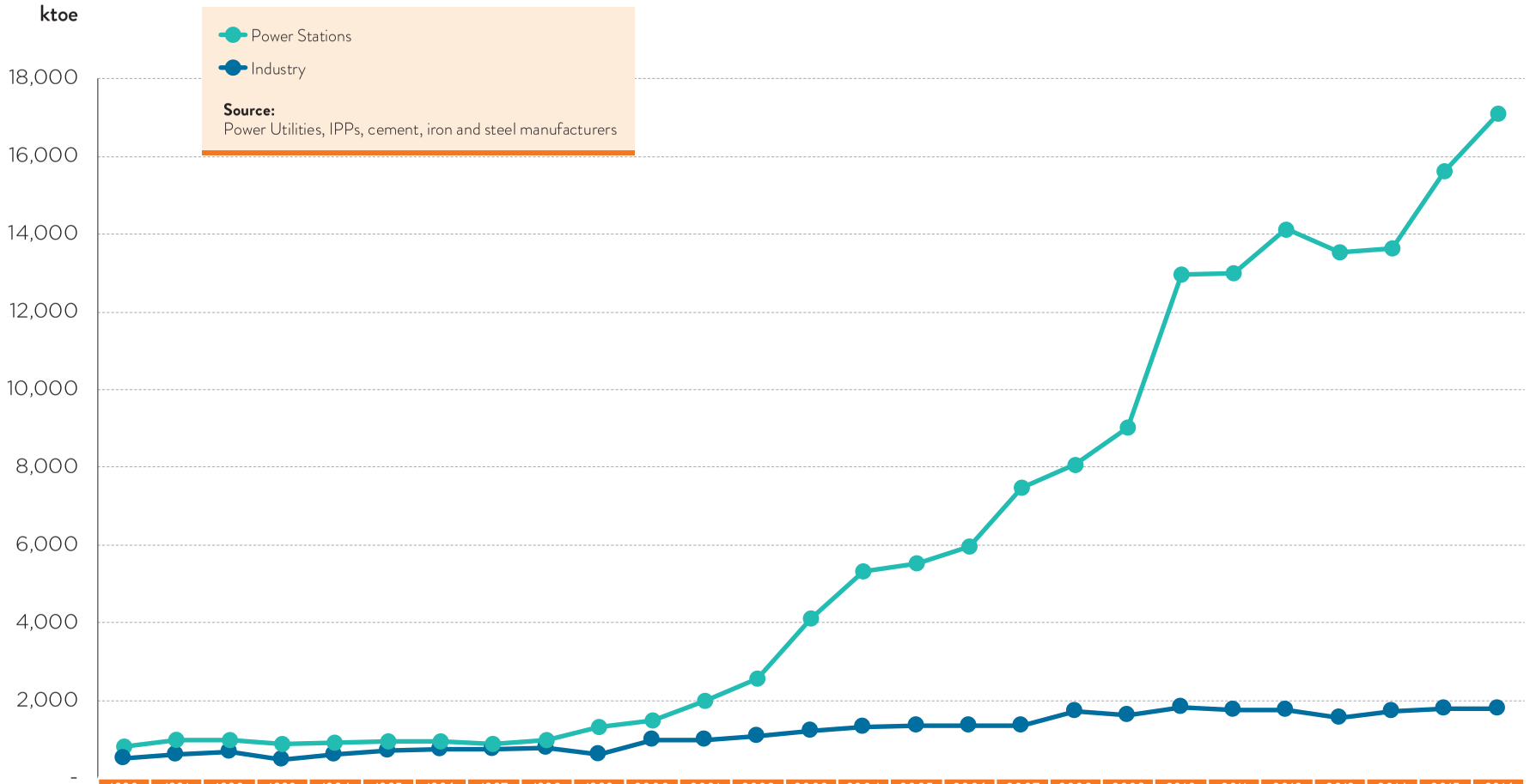
Source: Power Utilities, IPPs, cement, iron and steel manufacturers

FIGURE 24: NET IMPORT OF COAL



1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1,396	1,341	1,425	1,088	1,311	1,538	1,923	1,437	1,522	1,313	1,924	2,631	3,405	5,232	7,413	6,568	7,917	8,152	9,519	9,007	13,011	13,189	13,988	13,583	13,590	15,895	17,186

FIGURE 25: COAL CONSUMPTION BY SECTORS



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Power Stations	813	963	968	884	925	957	950	882	964	1,332	1,495	1,994	2,556	4,104	5,327	5,541	5,964	7,486	8,069	9,010	12,951	13,013	14,138	13,527	13,648	15,627	17,101
Industry	513	599	672	487	598	712	727	740	767	608	991	977	1,086	1,212	1,305	1,348	1,335	1,361	1,713	1,613	1,826	1,759	1,744	1,539	1,709	1,778	1,785

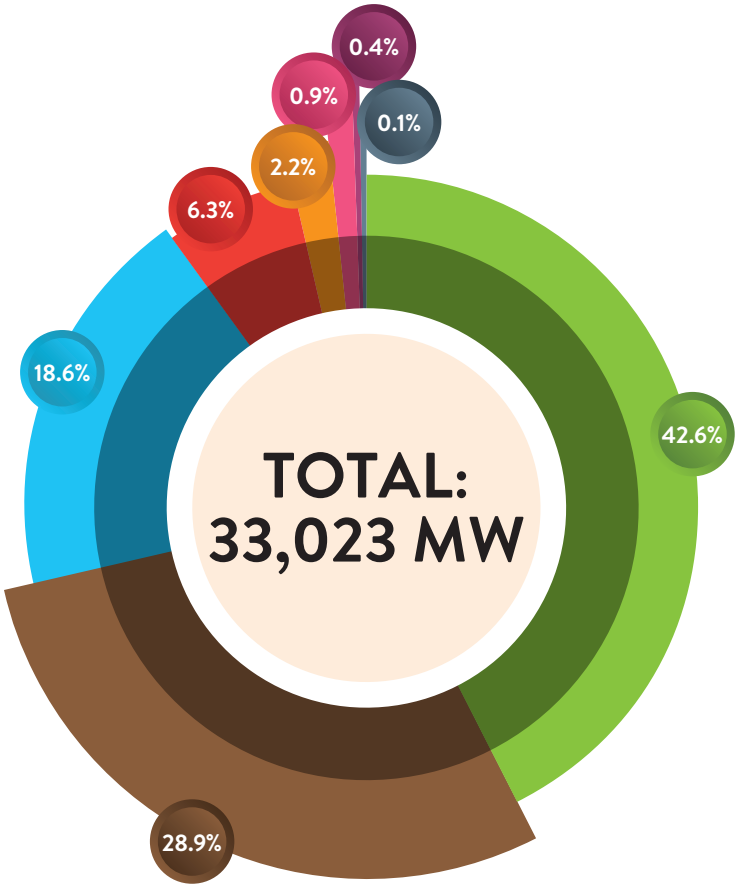
ELECTRICITY

TABLE 10: INSTALLED CAPACITY AS OF 31ST DECEMBER 2016, IN MW

		HYDRO	NATURAL GAS	COAL	DIESEL / MFO	BIOMASS	SOLAR	BIOGAS	OTHERS	TOTAL
PENINSULAR MALAYSIA	TNB	2,536.1	3,577.0	0.0	0.0	0.0	0.0	0.0	0.0	**6,113.1**
	IPPs	20.0	7,401.8	9,066.0	564.0	0.0	0.0	0.0	0.0	**17,051.8**
	Co-Generation	0.0	897.4	0.0	79.2	12.4	0.0	0.0	25.0	**1,014.0**
	Self-Generation	2.1	12.0	0.0	522.5	300.4	3.8	0.0	42.9	**883.9**
	FiT	23.8	0.0	0.0	0.0	26.5	260.0	27.7	0.0	**338.0**
	SUBTOTAL	**2,582.0**	**11,888.2**	**9,066.0**	**1,165.7**	**339.3**	**263.9**	**27.7**	**67.9**	**25,400.8**
SABAH	SESB	79.0	112.0	0.0	180.9	0.0	0.0	0.0	0.0	**371.9**
	IPPs	6.8	1,012.6	0.0	101.9	0.0	0.0	0.0	0.0	**1,121.3**
	Co-Generation	0.0	65.0	0.0	0.0	116.2	0.0	0.0	0.0	**181.2**
	Self-Generation	0.0	13.0	0.0	516.4	189.0	1.1	3.2	44.2	**766.9**
	FiT	6.5	0.0	0.0	0.0	48.9	24.3	3.2	0.0	**82.9**
	SUBTOTAL	**92.3**	**1,202.7**	**0.0**	**799.2**	**354.1**	**25.4**	**6.4**	**44.2**	**2,524.3**
SARAWAK	SEB	1,053.8	594.6	480.0	113.8	0.0	0.3	0.0	0.0	**2,242.5**
	IPPs	2,400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**2,400.0**
	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	11.6	49.0	0.0	0.5	5.1	**66.2**
	SUBTOTAL	**3,453.8**	**983.6**	**480.0**	**125.4**	**49.0**	**0.3**	**0.5**	**5.1**	**5,097.7**
	TOTAL	**6,128.1**	**14,074.5**	**9,546.0**	**2,090.3**	**742.4**	**289.6**	**34.6**	**117.3**	**33,022.7**
	SHARE (%)	**18.6%**	**42.6%**	**28.9%**	**6.3%**	**2.2%**	**0.9%**	**0.1%**	**0.4%**	**100.0%**

Source: Power Utilities, IPPs and SEDA Malaysia **Note**: Excluding plants that are not in operation

FIGURE 26: SHARE OF INSTALLED CAPACITY AS OF 31ST DECEMBER, 2016



Natural Gas	42.6%
Coal	28.9%
Hydro	18.6%
Diesel / MFO	6.3%
Biomass	2.2%
Solar	0.9%
Others	0.4%
Biogas	0.1%

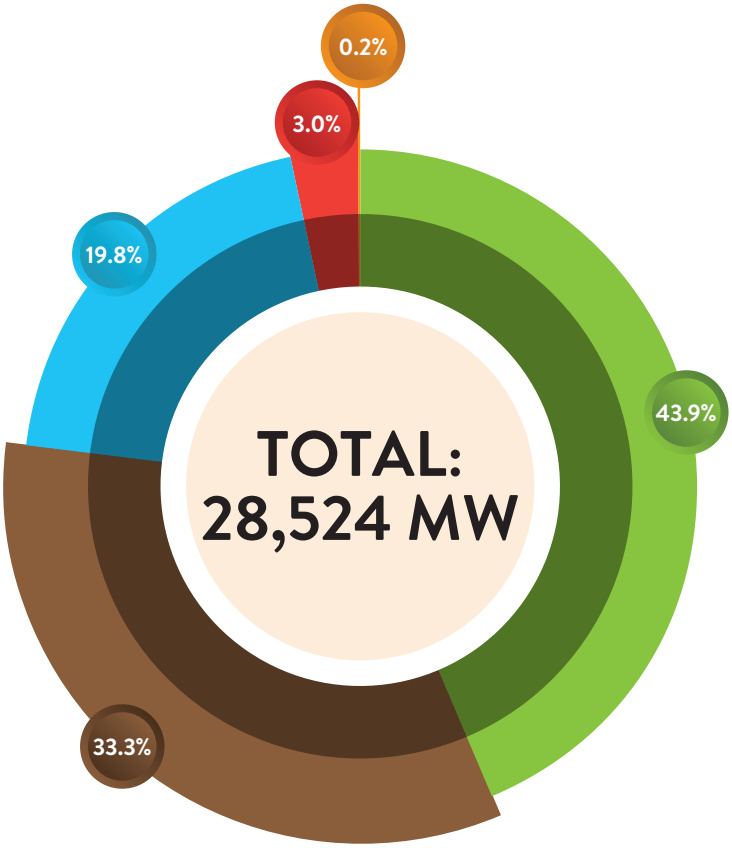
Source:
Power Utilities and IPPs

TABLE 11: AVAILABLE CAPACITY AS OF 31ST DECEMBER 2016, IN MW

		HYDRO	NATURAL GAS	COAL	DIESEL / MFO	BIOMASS	TOTAL
PENINSULAR MALAYSIA	TNB	2,517.0	3,563.0	0.0	0.0	0.0	**6,080.0**
	IPPs	0.0	7,401.8	9,066.0	564.0	0.0	**17,031.8**
	SUBTOTAL	**2,517.0**	**10,964.8**	**9,066.0**	**564.0**	**0.0**	**23,111.8**
SABAH*	SESB	78.2	104.5	0.0	147.9	0.0	**330.6**
	IPPs	0.0	863.2	0.0	36.0	0.0	**899.2**
	FiT	6.5	0.0	0.0	0.0	48.9	**55.4**
	SUBTOTAL	**84.7**	**967.7**	**0.0**	**183.9**	**48.9**	**1,285.2**
SARAWAK	SEB	1,033.7	576.0	423.0	94.0	0.0	**2,126.7**
	IPPs	2,000.0	0.0	0.0	0.0	0.0	**2,000.0**
	SUBTOTAL	**3,033.7**	**576.0**	**423.0**	**94.0**	**0.0**	**4,126.7**
	TOTAL	**5,635.4**	**12,508.5**	**9,489.0**	**841.9**	**48.9**	**28,523.7**

Source: Power Utilities and IPPs **Note**: * Dependable Capacity

FIGURE 27: AVAILABLE CAPACITY AS OF 31ST DECEMBER 2016



Natural Gas	43.9%
Coal	33.3%
Hydro	19.8%
Diesel / MFO	3.0%
Biomass	0.2%

Source:
Power Utilities and IPPs

TABLE 12: INSTALLED CAPACITY OF MAJOR HYDRO POWER STATIONS

STATION	INSTALLED CAPACITY (MW)	TOTAL (MW)
PENINSULAR MALAYSIA		
1. TERENGGANU		
- Stesen Janakuasa Sultan Mahmud Kenyir	4 x 100	400
- Stesen Janakuasa Hulu Terengganu	2 x 125 + 2 x 7.5	265
2. PERAK		
- Stesen Janakuasa Temenggor	4 x 87	348
- Stesen Janakuasa Bersia	3 x 24	72
- Stesen Janakuasa Kenering	3 x 40	120
- 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
3. PAHANG		
- Stesen Janakuasa Sultan Yussuf, Jor	4 x 25	100
- Stesen Janakuasa Sultan Idris II, Woh	3 x 50	150
- Cameron Highland Scheme*		11.9
- Stesen Janakuasa Ulu Jelai	2 x 186	372
4. KELANTAN		
- Pergau	4 x 150	600
- Kenerong Upper	2 x 6	12
- Kenerong Lower	2 x 4	8
SUBTOTAL		**2,568.00**
SABAH		
- Tenom Pangi	3 x 22	66
SUBTOTAL		**66**
SARAWAK		
- Batang Ai	4 x 27	108
- Bakun	8 x 300	2,400.00
- Murum	4 x 236	944
SUBTOTAL		**3,452.00**
TOTAL		**6,086.00**

Source: TNB, SESB and SEB **Note** (*): Cameron Highland Scheme includes Odak, Habu, Kg. Raja, Kg. Terla and Robinson Falls stations

TABLE 13: INSTALLED CAPACITY OF MINI HYDRO POWER STATIONS

STATION	TOTAL (MW)
1. KEDAH	
- Sg Tawar Besar	0.552
- Sg Mempelam	0.381
- Sg Mahang	0.454
2. PERAK	
- Sg Tebing Tinggi	0.152
- Sg Asap	0.110
- Sg Kinjang	0.325
- Sg Bil	0.225
- Sg Kenas	0.500
- Sg Chempias	0.120
- Sg Temelong	0.800
3. PAHANG	
- Sg Sempam G2	1.250
- Sg Pertang	0.340
- Sg Perdak	0.342
- Sg Sia	0.520
4. KELANTAN	
- Sg Renyok G1	0.800
- Sg Renyok G2	0.800
- Sg Sok	0.560
- Sg Rek	0.252
5. TERENGGANU	
- Sg Berang	0.364
- Sg Cheralak	0.480
SUBTOTAL	**9.327**
SABAH	
- Melangkap (Kota Belud)	1.000
- Sayap (Kota Belud)	1.000
- Bombalai (Tawau)	1.000
- Merotai (Tawau)	1.000
- Kiau (Kota Belud)	0.350
- Naradau (Ranau)	1.760
- Kedamaian (Kota Belud)	2.103
- Pengapuyan (Kota Marudu)	4.830
SUBTOTAL	**13.043**
SARAWAK	
- Sg Pasir	0.760
- Penindin	0.352
- Sebako	0.333
- Lundu	0.352
- Kalamuku 1	0.500
- Kalamuku 2	0.500
- Sg Keijin	0.500
- Sg Kota 1	2.000
- Sg Kota 2	2.000
SUBTOTAL	**7.297**
TOTAL	**29.667**

Source: TNB, SESB and SEB

TABLE 14: TRANSMISSION NETWORK IN CIRCUIT – KILOMETRES

UTILITY	500 KV	275 KV	132 KV	66 KV
TNB	784	9,518	12,175	-
SESB	-	598	2,075.5	119
SEB	-	1,331	388	-

Source: TNB, SESB and SEB

TABLE 15: DISTRIBUTION NETWORK IN CIRCUIT – KILOMETRES

UTILITY	OVERHEAD LINES	UNDERGROUND CABLES
TNB	532,403	697,159
SESB	9,394	1,374
SEB	10,906	4,908

Source: TNB, SESB and SEB

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

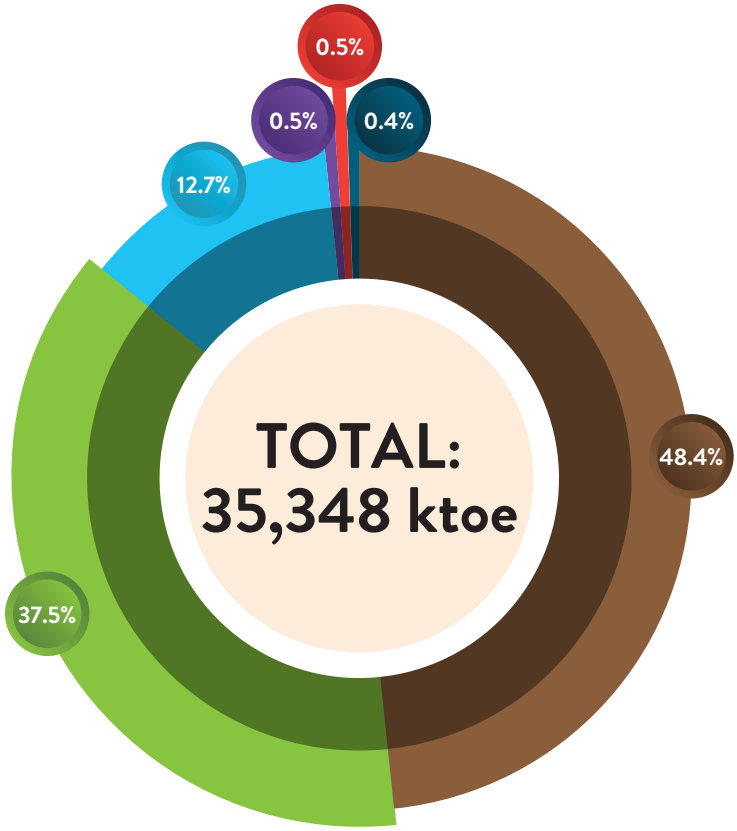
REGION	ELECTRICITY GROSS GENERATION		ELECTRICITY CONSUMPTION		AVAILABLE CAPACITY**	PEAK DEMAND	RESERVE MARGIN
	GWh	%	GWh	%	MW	MW	%
PENINSULAR MALAYSIA	125,588	80.2	116,529	80.9	23,112	17,788	29.9
SABAH	6,858	4.4	5,665	3.9	1,285	945	36.0
SARAWAK	24,218	15.5	21,831	15.2	4,127	3,040	35.7
TOTAL	**156,665**	**100**	**144,024**	**100**	**28,524**		

Source: TNB and IPPs, SESB and SEB

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

(**): Available Capacity for Peninsular Malaysia was based on Tested Annual Available Capacity (TAAC), Available Capacity for Sabah was based on Dependable Capacity

FIGURE 28: ENERGY INPUT IN POWER STATIONS, 2016

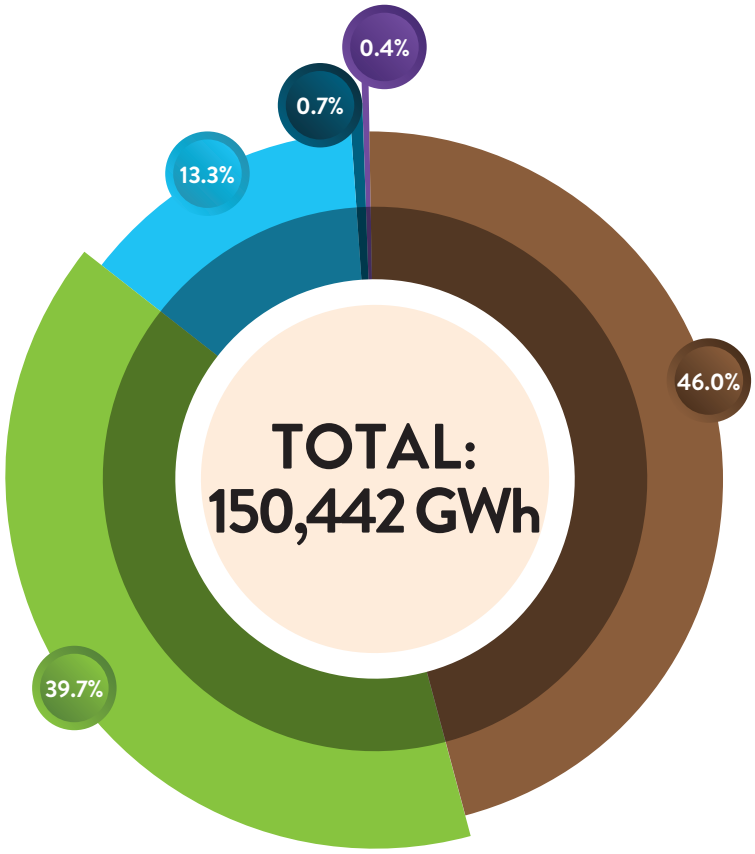


Coal	48.4%
Natural Gas	37.5%
Hydropower	12.7%
Renewables	0.5%
Diesel Oil	0.5%
Fuel Oil	0.4%

Note: Figures exclude fuel consumption for self-generation plants

Source: Power utilities and IPPs

FIGURE 29: GENERATION MIX BY FUEL TYPES, 2016



Coal	46.0%
Natural Gas	39.7%
Hydropower	13.3%
Oil	0.7%
Renewables	0.4%

Note: Figures exclude electricity generation for self-generation plants

Source: Power utilities and IPPs

TABLE 17: ELECTRICITY CONSUMPTION BY SECTORS IN GWh

REGION	INDUSTRY		COMMERCIAL		RESIDENTIAL		TRANSPORT		AGRICULTURE		TOTAL
	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%	GWh
PENINSULAR MALAYSIA	49,043	72.5	39,484	89.0	27,119	87.1	340	100.0	543.3	100.0	**116,529**
SARAWAK	17,140	25.3	2,513	5.7	2,178	7.0	-	-	-	-	**21,831**
SABAH	1,482	2.2	2,352	5.3	1,831	5.9	-	-	-	-	**5,665**
TOTAL	**67,664**	**100.0**	**44,349**	**100.0**	**31,128**	**100.0**	**340**	**100.0**	**543**	**100.0**	144,024

Source: Power utilities, IPPs and Self-Generators

FIGURE 30: ELECTRICITY CONSUMPTION BY SECTORS IN 2016

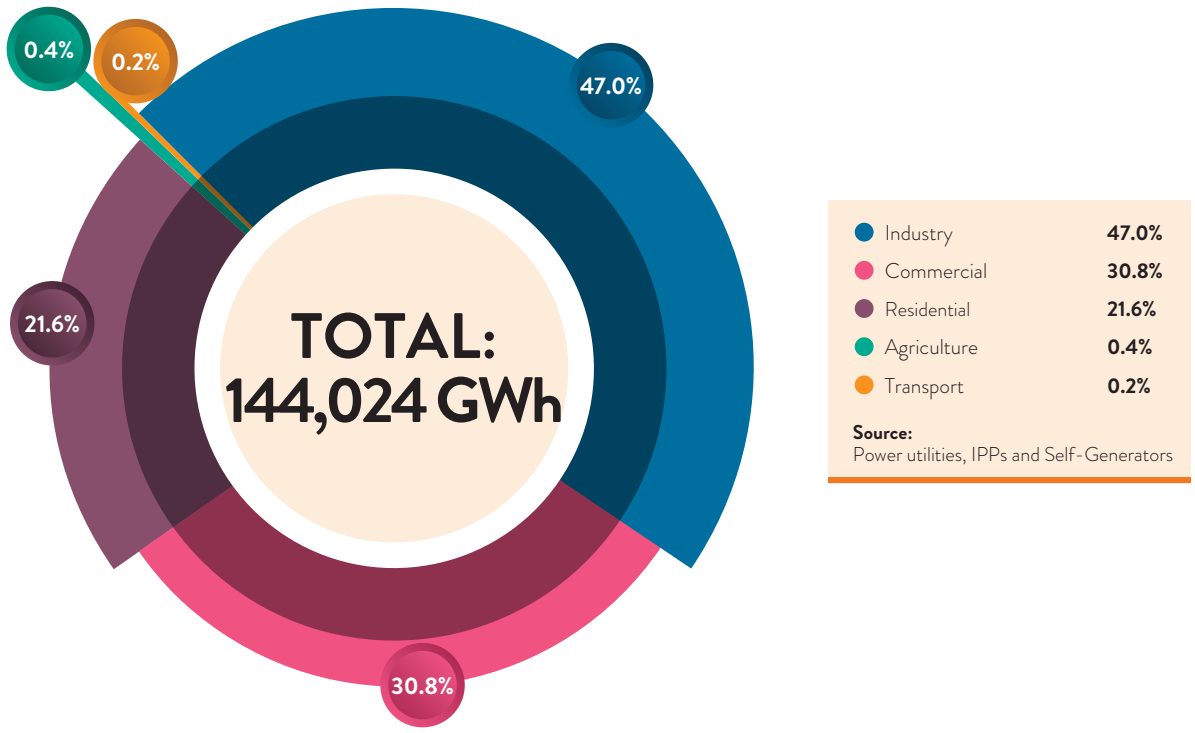
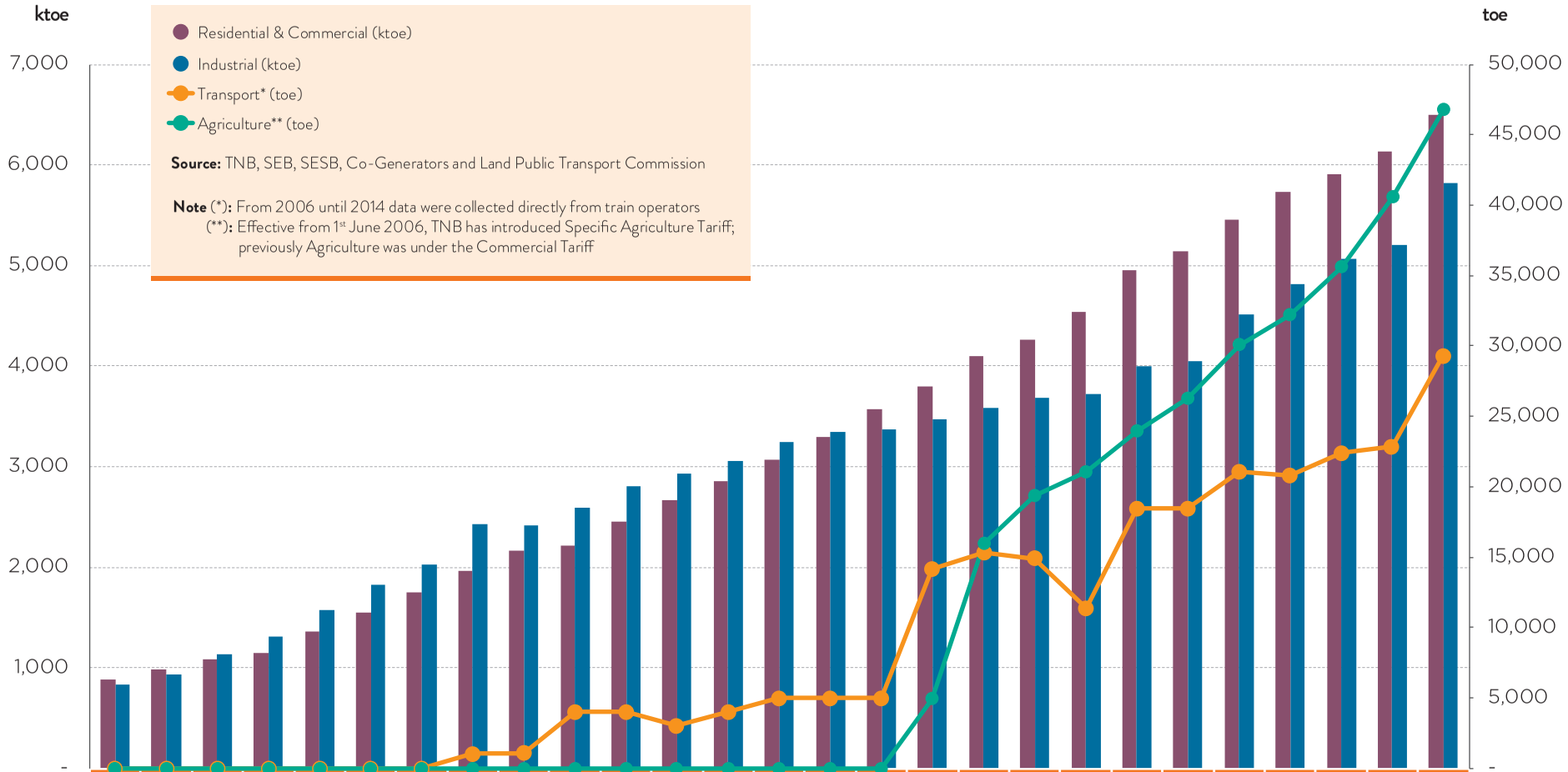


FIGURE 31: ELECTRICITY CONSUMPTION BY SECTORS



Source: TNB, SEB, SESB, Co-Generators and Land Public Transport Commission

Note (*): From 2006 until 2014 data were collected directly from train operators
(**): Effective from 1st June 2006, TNB has introduced Specific Agriculture Tariff; previously Agriculture was under the Commercial Tariff

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Residential & Commercial (ktoe)	885	988	1,081	1,147	1,365	1,549	1,747	1,961	2,165	2,220	2,453	2,660	2,859	3,066	3,298	3,567	3,792	4,094	4,266	4,535	4,957	5,146	5,451	5,728	5,912	6,134	6,494
Industrial (ktoe)	830	937	1,137	1,303	1,567	1,826	2,029	2,422	2,411	2,591	2,805	2,930	3,059	3,242	3,340	3,371	3,475	3,587	3,687	3,719	3,994	4,045	4,509	4,818	5,072	5,200	5,822
Transport* (toe)	-	-	-	-	-	-	-	1,000	1,000	4,000	4,000	3,000	4,000	5,000	5,000	5,000	14,117	15,295	14,862	11,358	18,439	18,428	21,027	20,774	22,443	22,901	29,291
Agriculture** (toe)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,886	15,991	19,393	21,080	23,920	26,312	30,014	32,240	35,578	40,526	46,747

TABLE 18: ELECTRICITY GENERATION AND INSTALLED CAPACITY OF RENEWABLE ENERGY BY PUBLIC LICENSEE BY REGION IN 2016

REGION	TYPE OF PRIME MOVER	INSTALLED CAPACITY (MW)	UNIT GENERATED (MWh)
PENINSULAR MALAYSIA	Mini Hydro - FiT	23.8	25,071
	Mini Hydro - Cameron Highlands Scheme	11.9	28,006
	Mini Hydro - TNB	4.8	9,307
	Solar - Non-FiT	0.5	144
	Solar - FiT	260.0	277,188
	Biogas - FiT	27.7	42,766
	Biomass - FiT	26.5	32,179
	SUBTOTAL	**355.2**	**414,661**
SABAH	Mini Hydro-SESB	4.1	5,130
	Mini Hydro - FiT	6.5	4,687
	Solar - FiT	24.3	33,158
	Biogas - FiT	3.2	19,041
	Biomass - FiT	48.9	165,392
	Biomass - Co-Gen	29.2	36,490
	SUBTOTAL	**116.2**	**263,898**
SARAWAK	Mini Hydro -SEB	1.7	3,820
	Solar	0.3	120
	SUBTOTAL	**2.0**	**3,940**
	GRAND TOTAL	**473.5**	**682,499**

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

Note: Public Licence is the licensee that generates for his own use and for supply to other persons

TABLE 19: ELECTRICITY GENERATION AND INSTALLED CAPACITY OF RENEWABLE ENERGY BY PRIVATE LICENSEE BY REGION IN 2016

REGION	TYPE OF PRIME MOVER	INSTALLED CAPACITY (MW)	UNIT GENERATED (MWh)
PENINSULAR MALAYSIA	Biomass - Co-Gen	5.5	8,460
	Biomass - Self-Gen	351.8	102,620
	Biogas - Self-Gen	4.9	7,140
	Solar - Self-Gen	1.0	120
	Mini Hydro - Self-Gen	2.1	5,280
	SUBTOTAL	**365.3**	**123,620**
SABAH	Biomass - Co-Gen	7.5	18,380
	Biomass - Self-Gen	135.8	191,050
	Biogas - Self-Gen	3.4	4,720
	SUBTOTAL	**146.7**	**214,150**
SARAWAK	Biomass	49.0	111,865
	SUBTOTAL	**49.0**	**111,865**
	GRAND TOTAL	**561.0**	**449,635**

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

Note: Private Licence is the licensee that generates for his own use only

KEY ENERGY STATISTICS

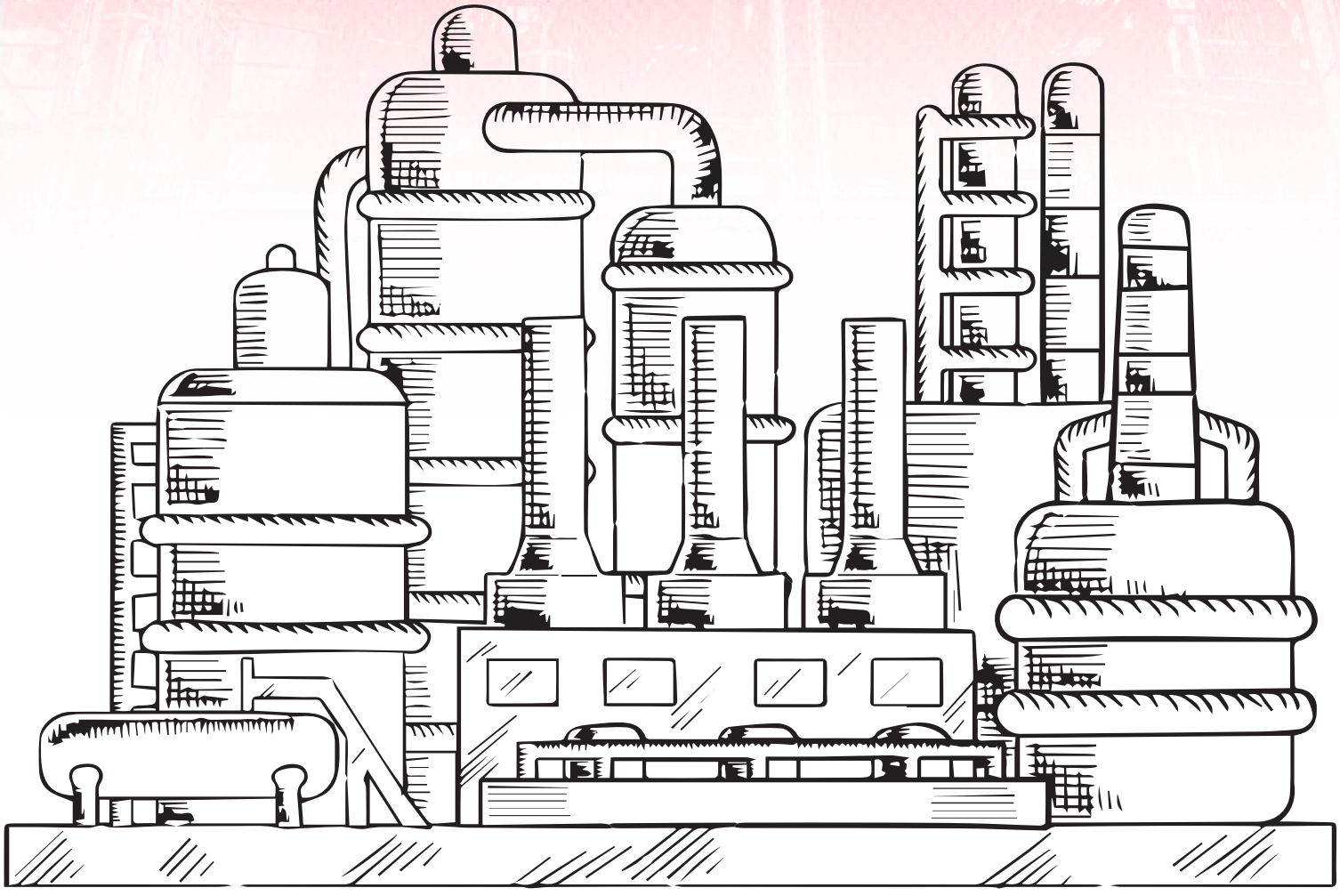


TABLE 20: PRIMARY ENERGY SUPPLY IN KTOE

	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**	22.7	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	(1,670)	34,917	7,299	1,567	**67,023**	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	4,194	39,364	17,406	4,253	**90,188**	(2.5)	32.3	43.6	19.3	4.7
2016	27,757	3,570	37,980	18,886	5,202	**93,395**	3.6	33.5	40.7	20.2	5.6

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	25,184	(4,879)	(1)	3,998	15,895
2016	5,751	26,182	(4,716)	57	3,128	17,186

TABLE 22: CONVERSION IN GAS PLANTS IN KTOE

	INPUT	GAS PLANTS		
	NATURAL GAS	MLNG	GPP - LPG	MDS
1990	9,797	8,761	na	na
1991	11,715	8,749	na	na
1992	11,681	8,425	392	na
1993	13,005	9,019	529	39
1994	14,634	9,087	948	238
1995	17,088	11,244	1,900	421
1996	20,822	15,251	1,212	344
1997	24,945	16,396	1,258	389
1998	23,138	16,688	1,526	na
1999	24,116	16,417	1,472	na
2000	26,093	17,231	1,482	164
2001	25,703	16,636	1,310	513
2002	25,571	17,803	1,504	445
2003	27,940	18,965	790	443
2004	33,176	22,944	520	513
2005	36,447	24,254	1,319	460
2006	35,378	23,450	1,036	464
2007	38,141	24,355	1,483	417
2008	38,193	22,793	1,362	481
2009	37,098	25,004	1,012	426
2010	40,246	26,601	2,299	454
2011	40,737	28,130	2,434	359
2012	40,042	26,231	2,035	486
2013	39,678	28,209	1,174	478
2014	39,193	28,213	1,250	420
2015	38,323	27,683	1,155	423
2016	36,389	31,658	1,997	573

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

TABLE 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	**24,576**	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**

TABLE 24: CONVERSION IN POWER STATIONS (EXCLUDE CO-GENERATION & PRIVATE LICENSED PLANTS) IN KTOE

	INPUT:						TOTAL INPUT	ANNUAL GROWTH RATE (%)	INPUT SHARE (%)					OUTPUT:
	FUEL OIL	DIESEL OIL	NATURAL GAS	HYDRO POWER	COAL	RENEWABLES			FUEL AND DIESEL OIL	NATURAL GAS	HYDRO POWER*	COAL & COKE	RENEWABLES	TOTAL ELECTRICITY GENERATED
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	**33,133**	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**

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

TABLE 25: FINAL ENERGY CONSUMPTION BY SECTORS IN KTOE

	INDUSTRY	TRANSPORT	RESIDENTIAL AND COMMERCIAL	NON-ENERGY USE	AGRICULTURE	TOTAL	ANNUAL GROWTH RATE (%)	INDUSTRY INCLUDING AGRICULTURE & NON-ENERGY	INDUSTRY GDP*	INDUSTRY ENERGY INTENSITY (TOE/RM MILLION AT 2010 PRICES)
1990	5,276	5,386	1,622	838	-	**13,122**	11.0	6,114	157,991	39
1991	5,809	5,806	1,721	1,071	130	**14,537**	10.8	7,010	170,942	41
1992	6,455	6,226	1,867	1,222	391	**16,161**	11.2	8,068	182,592	44
1993	7,012	6,558	2,055	2,027	62	**17,714**	9.6	9,101	194,045	47
1994	7,283	7,262	2,300	1,817	422	**19,084**	7.7	9,522	208,528	46
1995	8,060	7,827	2,556	2,994	446	**21,883**	14.7	11,500	230,658	50
1996	9,443	8,951	3,162	1,744	486	**23,786**	8.7	11,673	259,952	45
1997	10,106	10,201	3,073	2,298	490	**26,168**	10.0	12,894	278,490	46
1998	10,121	9,793	3,314	2,023	307	**25,558**	(2.3)	12,451	249,109	50
1999	10,277	11,393	3,653	1,799	106	**27,228**	6.5	12,182	267,643	46
2000	11,406	12,071	3,868	2,250	104	**29,699**	9.1	13,760	299,623	46
2001	11,852	13,137	4,048	2,378	98	**31,513**	6.1	14,328	291,938	49
2002	12,854	13,442	4,387	2,511	96	**33,290**	5.6	15,461	303,130	51
2003	13,472	14,271	4,399	2,345	98	**34,585**	3.9	15,915	325,828	49
2004	14,914	15,385	4,754	2,183	87	**37,323**	7.9	17,184	348,491	49
2005	15,492	15,384	5,134	2,173	101	**38,284**	2.6	17,766	359,941	49
2006	15,248	14,819	5,424	2,819	258	**38,568**	0.7	18,325	376,262	49
2007	16,454	15,717	6,197	2,957	281	**41,606**	7.9	19,692	387,084	51
2008	16,205	16,395	6,205	2,876	287	**41,968**	0.9	19,368	389,775	50
2009	14,312	16,119	6,336	3,868	211	**40,846**	(2.7)	18,391	366,284	50
2010	12,928	16,828	6,951	3,696	1,074	**41,477**	1.5	17,698	393,381	45
2011	12,100	17,070	6,993	6,377	916	**43,456**	4.8	19,393	406,412	48
2012	13,919	19,757	7,065	7,497	1,053	**49,291**	13.4	22,469	422,958	53
2013	13,496	22,357	7,403	7,277	1,051	**51,584**	4.7	21,824	436,712	50
2014	13,162	24,327	7,459	6,217	1,045	**52,210**	1.2	20,424	459,397	44
2015	13,989	23,435	7,559	5,928	895	**51,806**	(0.8)	20,812	480,290	43
2016	16,019	24,004	8,049	8,729	415	**57,218**	10.4	25,164	491,856	51

Note (*): 1. Defined as total GDP for Agriculture, Forestry and Fishing, Mining and Quarrying, Manufacturing and Construction

2. Industrial GDP for year 1990-2009 was calculated by Energy Commission

TABLE 26: FINAL ENERGY CONSUMPTION BY TYPE OF FUELS IN KTOE

	PETROLEUM PRODUCTS AND OTHERS	ELECTRICITY	*GAS FOR NON-ENERGY*	*GAS FOR HEATING*	NATURAL GAS	COAL AND COKE	TOTAL	TOTAL (EXCL. NON-ENERGY USE)	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	11,375	*4,470*	*5,096*	9,566	1,778	**51,806**	**47,336**	(0.8)
2016	30,737	12,392	*6,083*	*6,221*	12,304	1,785	**57,218**	**51,135**	8.0

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	6,287	1,497	1,392	99	1,762	630	**19,783**
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**

TABLE 28: SELECTED ENERGY AND ECONOMIC INDICATORS (1990-2016)

	GDP AT CURRENT PRICES (RM MILLION)*	GDP AT 2010 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 2010 PRICES	PRIMARY ENERGY SUPPLY	FINAL ENERGY CONSUMPTION
1990	128,658	263,488	18,102	21,471	13,146	1,715	19,932	9.00	8.90	8.70
1991	145,991	288,639	18,547	26,335	14,563	1,925	22,373	9.55	22.65	10.78
1992	162,800	314,285	19,068	29,291	16,185	2,218	25,778	8.89	11.22	11.14
1993	186,042	345,384	19,602	29,925	17,728	2,450	28,474	9.89	2.16	9.53
1994	211,181	377,201	20,142	31,662	19,287	2,932	34,076	9.21	5.80	8.79
1995	240,365	414,276	20,682	33,879	22,164	3,375	39,225	9.83	7.00	14.92
1996	274,138	455,715	21,223	37,840	24,181	3,777	43,897	10.00	11.69	9.10
1997	304,458	489,086	21,769	43,173	26,167	4,384	50,952	7.32	14.09	8.21
1998	306,022	453,092	22,334	40,996	25,558	4,577	53,195	(7.36)	(5.04)	(2.33)
1999	324,952	480,901	22,910	44,534	27,228	4,815	55,961	6.14	8.63	6.53
2000	370,817	523,503	23,495	50,710	29,699	5,263	61,168	8.86	13.87	9.08
2001	366,841	526,213	24,031	51,979	31,515	5,594	65,015	0.52	2.50	6.11
2002	398,714	554,581	24,543	53,196	33,289	5,922	68,827	5.39	2.34	5.63
2003	435,708	586,683	25,038	57,565	34,586	6,313	73,371	5.79	8.21	3.90
2004	493,223	626,481	25,542	62,836	37,323	6,642	77,195	6.78	9.16	7.91
2005	543,578	659,885	26,046	66,211	38,285	6,944	80,705	5.33	5.37	2.58
2006	596,784	696,739	26,550	67,021	38,567	7,272	84,517	5.58	1.22	0.74
2007	665,340	740,625	27,058	72,389	41,606	7,683	89,294	6.30	8.01	7.88
2008	769,949	776,410	27,568	76,032	41,968	7,986	92,815	4.83	5.03	0.87
2009	712,857	764,659	28,082	74,583	40,845	8,286	96,302	(1.51)	(1.91)	(2.68)
2010	821,434	821,434	28,589	76,809	41,476	8,993	104,519	7.42	2.98	1.54
2011	911,733	864,920	29,062	79,289	43,455	9,235	107,331	5.29	3.23	4.77
2012	971,252	912,261	29,510	86,495	49,291	10,011	116,350	5.47	9.09	13.43
2013	1,018,614	955,080	30,214	90,730	51,583	10,590	123,079	4.69	4.90	4.65
2014	1,106,443	1,012,449	30,709	92,487	52,209	11,042	128,333	6.01	1.94	1.21
2015	1,157,723	1,063,355	31,186	90,188	51,806	11,375	132,203	5.03	(2.49)	(0.77)
2016	1,230,120	1,108,227	31,661	93,395	57,218	12,392	144,024	4.22	3.56	10.45

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

	PER CAPITA				ENERGY INTENSITY				ENERGY ELASTICITY	
ELECTRICITY CONSUMPTION	GDP AT CURRENT PRICES (RM)	PRIMARY ENERGY SUPPLY (TOE)	FINAL ENERGY CONSUMPTION (TOE)	ELECTRICITY CONSUMPTION (kWh)	PRIMARY ENERGY SUPPLY (TOE/GDP AT 2010 PRICES (RM MILLION))	FINAL ENERGY CONSUMPTION (TOE/ GDP AT 2010 PRICES (RM MILLION))	ELECTRICITY CONSUMPTION (TOE/ GDP AT 2010 PRICES (RM MILLION))	ELECTRICITY CONSUMPTION (GWH/ GDP AT 2010 PRICES (RM MILLION))	FINAL ENERGY	ELECTRICITY
9.70	7,107	1.19	0.73	1,101	81.49	49.89	6.51	0.076	0.97	1.08
12.24	7,871	1.42	0.79	1,206	91.24	50.45	6.67	0.078	1.13	1.28
15.22	8,538	1.54	0.85	1,352	93.20	51.50	7.06	0.082	1.25	1.71
10.46	9,491	1.53	0.90	1,453	86.64	51.33	7.09	0.082	0.96	1.06
19.67	10,485	1.57	0.96	1,692	83.94	51.13	7.77	0.090	0.95	2.14
15.11	11,622	1.64	1.07	1,897	81.78	53.50	8.15	0.095	1.52	1.54
11.91	12,917	1.78	1.14	2,068	83.03	53.06	8.29	0.096	0.91	1.19
16.07	13,986	1.98	1.20	2,341	88.27	53.50	8.96	0.104	1.12	2.19
4.40	13,702	1.84	1.14	2,382	90.48	56.41	10.10	0.117	0.32	(0.60)
5.20	14,184	1.94	1.19	2,443	92.61	56.62	10.01	0.116	1.06	0.85
9.30	15,783	2.16	1.26	2,603	96.87	56.73	10.05	0.117	1.02	1.05
6.29	15,266	2.16	1.31	2,706	98.78	59.89	10.63	0.124	11.81	12.15
5.86	16,246	2.17	1.36	2,804	95.92	60.03	10.68	0.124	1.04	1.09
6.60	17,402	2.30	1.38	2,930	98.12	58.95	10.76	0.125	0.67	1.14
5.21	19,311	2.46	1.46	3,022	100.30	59.58	10.60	0.123	1.17	0.77
4.55	20,870	2.54	1.47	3,099	100.34	58.02	10.52	0.122	0.48	0.85
4.72	22,478	2.52	1.45	3,183	96.19	55.35	10.44	0.121	0.13	0.85
5.65	24,589	2.68	1.54	3,300	97.74	56.18	10.37	0.121	1.25	0.90
3.94	27,929	2.76	1.52	3,367	97.93	54.05	10.29	0.120	0.18	0.82
3.76	25,385	2.66	1.45	3,429	97.54	53.42	10.84	0.126	1.77	(2.48)
8.53	28,733	2.69	1.45	3,656	93.51	50.49	10.95	0.127	0.21	1.15
2.69	31,372	2.73	1.50	3,693	91.67	50.24	10.68	0.124	0.90	0.51
8.40	32,913	2.93	1.67	3,943	94.81	54.03	10.97	0.128	2.45	1.54
5.78	33,713	3.00	1.71	4,074	95.00	54.01	11.09	0.129	0.99	1.23
4.27	36,030	3.01	1.70	4,179	91.35	51.57	10.91	0.127	0.20	0.71
3.02	37,123	2.89	1.66	4,239	84.81	48.72	10.70	0.124	(0.15)	0.60
8.94	38,853	2.95	1.81	4,549	84.27	51.63	11.18	0.130	2.48	2.12

Note (*): GDP at 2010 Prices (RM Million) for 1990 until 2009 was calculated by Energy Commission

TABLE 29: ENERGY BALANCE TABLE IN 2016 (KILO TONNES OF OIL EQUIVALENT)

COMMERCIAL ENERGY BALANCE FOR MALAYSIA 2016 (THOUSAND TONNES OF OIL EQUIVALENT)

ENERGY SOURCE	NATURAL GAS	LNG	CRUDE OIL (1/)	OTHERS (2/)	TOTAL PETROLEUM PRODUCTS	PETROLEUM			
						PETROL	DIESEL	FUEL OIL	LPG
PRIMARY SUPPLY									
1. Primary Production	62,723	0	33,234	0	**0**	0	0	0	0
2. Gas Flaring, Reinjection & Use	-3,277	0	0	0	**0**	0	0	0	0
3. Imports	5,557	1,275	10,854	34	**15,342**	8,552	3,896	51	490
4. Exports	-841	-27,457	-16,605	-34	**-12,214**	-458	-4,805	-605	-355
5. Bunkers	0	0	0	0	**-298**	0	-1	-296	0
6. Stock Change	0	0	71	0	**797**	274	101	39	30
7. Statistical Discrepancy	0	0	203	0	**0**	0	0	0	0
8. Primary Supply	**64,162**	**-26,182**	**27,757**	**0**	**3,627**	**8,368**	**-808**	**-812**	**165**
TRANSFORMATION									
9. Gas Plants									
9.1 MLNG	-34,268	31,594	0	0	**64**	0	0	0	64
9.2 MDS	-1,181	0	0	0	**573**	0	162	0	0
9.3 GPP-LPG (3&4/)	-2,217	0	0	0	**1,997**	0	0	0	1,997
9.4 RGT	1,277	-1,277	0	0	**0**	0	0	0	0
SUBTOTAL	**-36,389**	**30,316**	**0**	**0**	**2,634**	**0**	**162**	**0**	**2,061**
10. Refineries	0	0	-27,524	-0	**24,888**	5,044	9,988	1,479	1,285
11. Power Stations & Self-Generation									
11.1 Hydro Stations	0	0	0	0	**0**	0	0	0	0
11.2 Thermal Stations	-13,260	0	0	0	**-320**	0	-165	-155	0
11.3 Self-Generation (5/)	-1,094	0	0	0	**-46**	0	-46	0	0
SUBTOTAL	**-14,354**	**0**	**0**	**0**	**-366**	**0**	**-211**	**-155**	**0**
12. Losses & Own Use	-1,116	-4,134	-233	0	**-552**	0	0	-27	0
13. Statistical Discrepancy	0	-0	0	0	**117**	-1	123	27	-13
14. Secondary Supply	**-51,858**	**26,182**	**-27,757**	**-0**	**26,722**	**5,043**	**10,062**	**1,325**	**3,333**
FINAL USE									
15. Residential	1	0	0	0	**606**	0	0	0	602
16. Commercial	24	0	0	0	**926**	0	151	14	760
17. Industry	5,989	0	0	0	**2,424**	109	1,695	479	138
18. Transport	208	0	0	0	**23,378**	13,302	7,044	14	0
19. Agriculture	0	0	0	0	**97**	0	92	5	0
20. Fishing	0	0	0	0	**271**	0	271	0	0
21. Non-Energy Use	6,083	0	0	0	**2,646**	0	0	0	1,997
22. Total Final Use	**12,304**	**0**	**0**	**0**	**30,348**	**13,411**	**9,254**	**513**	**3,497**
ELECTRICITY OUTPUT									
Main Activity Producer									
Gross Electricity Generation - GWh	59,672	0	0	0	**1,028**	0	328	700	0
Autoproducer									
Gross Electricity Generation - GWh	5,562	0	0	0	**156**	0	156	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 Refinary Intake.
3/ GPP-LPG Extracts Liquid Products i.e Condensates, Ethane, Butane, Propane from Natural Gas, Ethane is Not included under LPG production.
4/ Butane and Propane as MTBE Feedstocks are Presented as Non-Energy use under LPG column. Ethane is Presented under Natural Gas Column.
5/ Estimated figures based from the Energy Commission, Statistics of Electricity Supply Industry in Malaysia 2016.

Note: Total may not necessarily add up due to rounding

PRODUCTS				COAL & COKE	HYDRO POWER	SOLAR	BIOMASS	BIOGAS	BIODIESEL	ELECTRICITY	TOTAL
KEROSENE	ATF & AV GAS	NON-ENERGY	REFINERY GAS								
0	0	0	0	1,522	4,499	92	202	21	509	0	**102,801**
0	0	0	0	0	0	0	0	0	0	0	**-3,277**
0	1,450	903	0	17,171	0	0	0	0	0	3	**50,235**
-76	-1,068	-4,847	0	-15	0	0	0	0	-85	-60	**-57,310**
0	0	-0	0	0	0	0	0	0	0	0	**-298**
13	100	239	0	245	0	0	0	0	-35	0	**1,077**
0	0	0	0	62	0	0	0	0	0	0	**265**
-63	**482**	**-3,705**	**0**	**18,886**	**4,499**	**92**	**202**	**21**	**389**	**-57**	**93,395**
0	0	0	0	0	0	0	0	0	0	0	**-2,610**
74	0	337	0	0	0	0	0	0	0	0	**-608**
0	0	0	0	0	0	0	0	0	0	0	**-220**
0	0	0	0	0	0	0	0	0	0	0	**0**
74	**0**	**337**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-3,438**
4	2,548	4,339	201	0	0	0	0	0	0	0	**-2,636**
0	0	0	0	0	-4,499	0	0	0	0	1,722	**-2,776**
0	0	0	0	-17,101	0	-92	-58	-18	0	11,222	**-19,627**
0	0	0	0	0	0	-0	-144	-3	0	535	**-751**
0	**0**	**0**	**0**	**-17,101**	**-4,499**	**-92**	**-202**	**-21**	**0**	**13,480**	**-23,155**
0	0	-324	-201	0	0	0	0	0	0	-869	**-7,185**
-10	-12	3	0	0	0	0	0	0	0	-162	**-44**
68	**2,537**	**4,355**	**-0**	**-17,101**	**-4,499**	**-92**	**-202**	**-21**	**0**	**12,449**	**-36,178**
3	0	0	0	0	0	0	0	0	0	2,678	**3,284**
0	0	0	0	0	0	0	0	0	0	3,816	**4,765**
2	0	0	0	1,785	0	0	0	0	0	5,822	**16,019**
0	3,019	0	0	0	0	0	0	0	389	29	**24,004**
0	0	0	0	0	0	0	0	0	0	47	**144**
0	0	0	0	0	0	0	0	0	0	0	**271**
0	0	650	0	0	0	0	0	0	0	0	**8,729**
5	**3,019**	**650**	**0**	**1,785**	**0**	**0**	**0**	**0**	**389**	**12,392**	**57,218**
0	0	0	0	69,153	20,019	310	198	62	0	0	**150,442**
0	0	0	0	0	5	0	488	12	0	0	**6,223**

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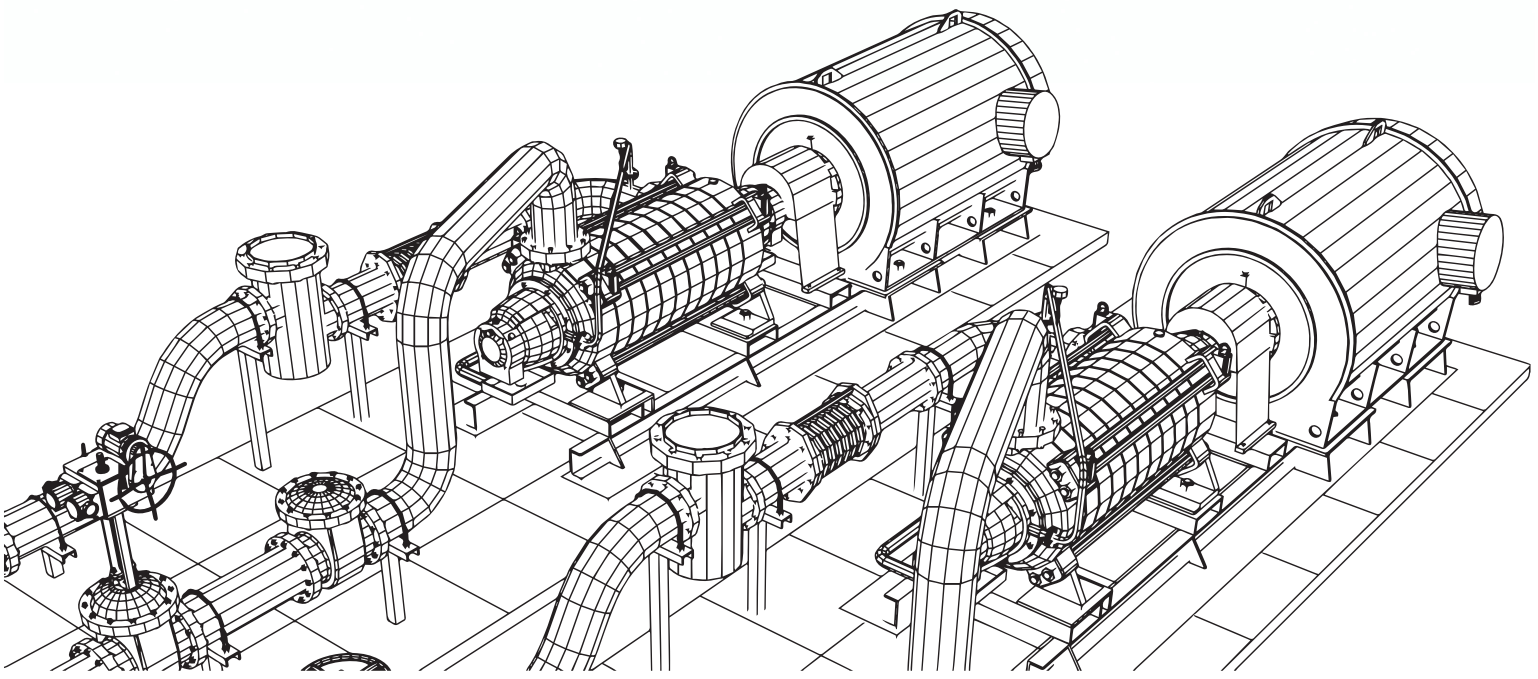
ENERGY FLOW CHART



PRIMARY SUPPLY

PRIMARY SUPPLY* (93,395)

1 NATURAL GAS (37,980) — 40.7%
2 CRUDE OIL (27,757) — 29.7%
3 COAL & COKE (18,886) — 20.2%
4 HYDROPOWER (4,499) — 4.8%
5 PETROLEUM PRODUCTS & OTHERS (3,570) — 3.8%
6 RENEWABLES (704) — 0.8%

PRIMARY PRODUCTION (102,801)

1 NATURAL GAS (62,723) — 61.0%
2 CRUDE OIL (33,234) — 32.3%
3 HYDROPOWER (4,499) — 4.4%
4 COAL & COKE (1,522) — 1.5%
5 RENEWABLES (824) — 0.8%

IMPORTS (50,235)

1 COAL & COKE (17,171) — 34.2%
2 PETROLEUM PRODUCTS (15,342) — 30.5%
3 CRUDE OIL & OTHERS (10,891) — 21.7%
4 NATURAL GAS & LNG (6,831) — 13.6%

EXPORTS (57,310)

1 LNG (27,457) — 47.9%
2 CRUDE OIL & OTHERS (16,698) — 29.1%
3 PETROLEUM PRODUCTS (12,214) — 21.3%
4 NATURAL GAS (841) — 1.5%
5 RENEWABLES (85) — 0.1%
6 COAL & COKE (15) — 0.0%

TRANSFORMATION

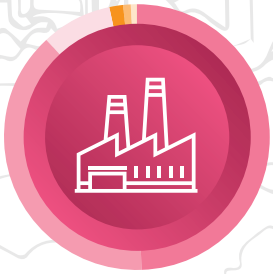
GAS PLANT INPUT

34,268 LNG
2,217 GPP-LPG
1,181 MDS

OIL REFINERIES INPUT

18,170 LOCAL
9,353 IMPORT

POWER STATIONS & SELF GENERATION INPUT



17,101 COAL & COKE
14,354 NATURAL GAS
4,499 HYDRO
315 RENEWABLES
211 DIESEL
155 FUEL OIL

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

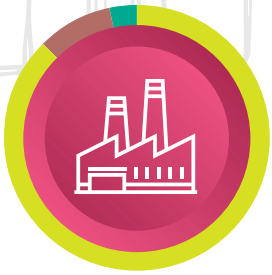
GAS PLANT OUTPUT

31,594	LNG
1,997	LPG
337	NON-ENERGY
162	DIESEL
74	KEROSENE
64	LPG (FROM LNG)

OIL REFINERIES OUTPUT

9,988	DIESEL
5,044	PETROL
4,339	NON-ENERGY
2,548	ATF & AV GAS
1,479	FUEL OIL
201	REFINERY GAS
4	KEROSENE

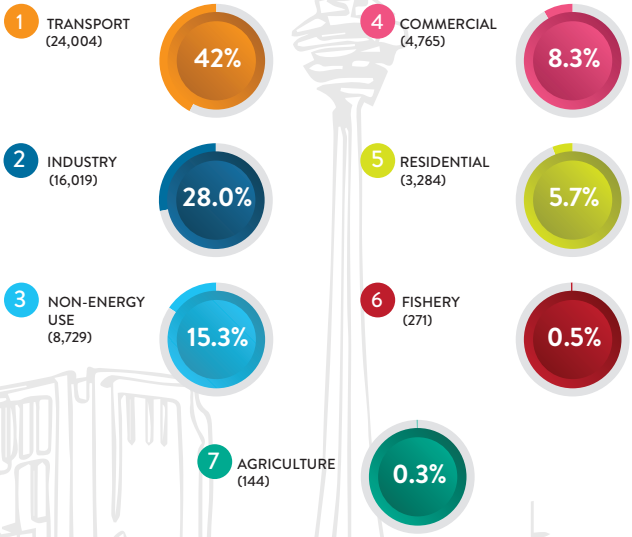
POWER STATIONS & SELF GENERATION OUTPUT



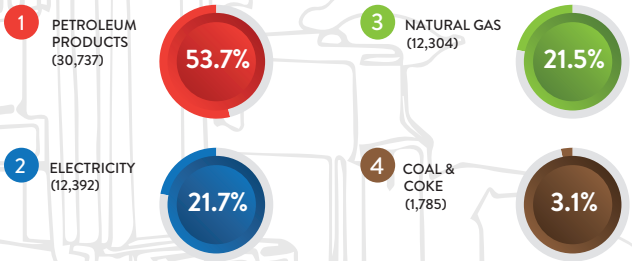
11,222	THERMAL
1,722	HYDRO
535	SELF-GENERATION

FINAL USE

FINAL USE BY SECTOR (57,218)



FINAL USE BY FUEL (57,218)



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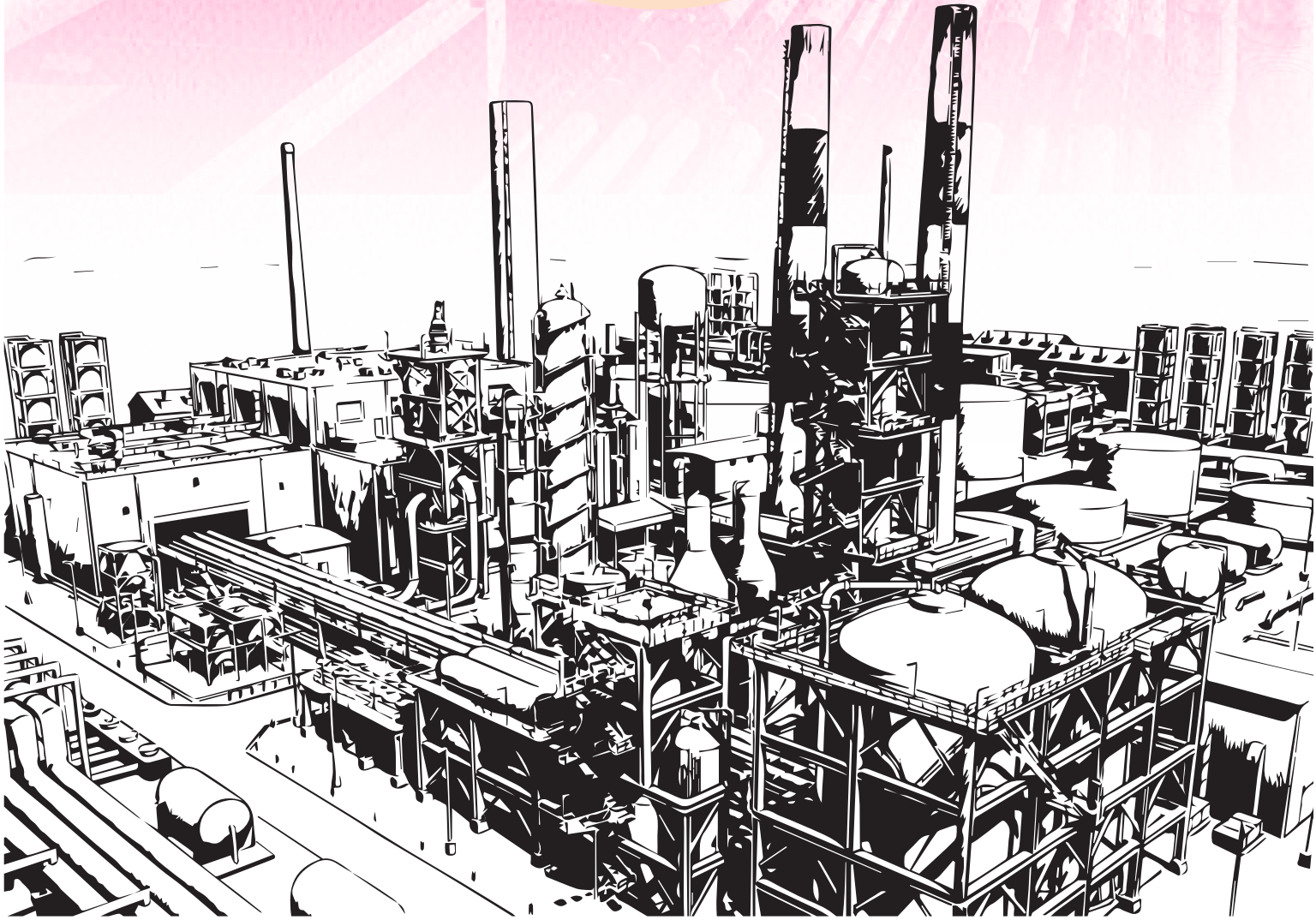
MANUFACTURING INDUSTRY IN PENINSULAR MALAYSIA



INTRODUCTION

A survey was conducted with **520 manufacturing companies** in Peninsular Malaysia to understand the energy consumption pattern of manufacturing industry in Peninsular Malaysia. Monthly data of energy consumption was collected for the year 2010 to 2013 for eight types of energy; electricity, natural gas, petrol, diesel, fuel oil, LPG, kerosene and coal.

Manufacturing industry sub-sectors included are; Iron and Steel, Chemical (including Petro-Chemical), Non Ferrous Metals, Non Metallic Mineral Products, Transportation Equipment, Machinery, Food, Beverages and Tobacco, Pulp, Paper and Printing, Wood and Wood Products, Textiles and Leather and Not Elsewhere Specified (Industry). This is in accordance to the breakdown of the manufacturing sub-sectors by the International Energy Agency (IEA) and APEC format of classification of the Industry sector. The gathered data on energy consumption in the manufacturing industry will then be an input to the National Energy Balance (NEB).

MANUFACTURING SUB-SECTORS

LOCATION OF MANUFACTURING COMPANIES

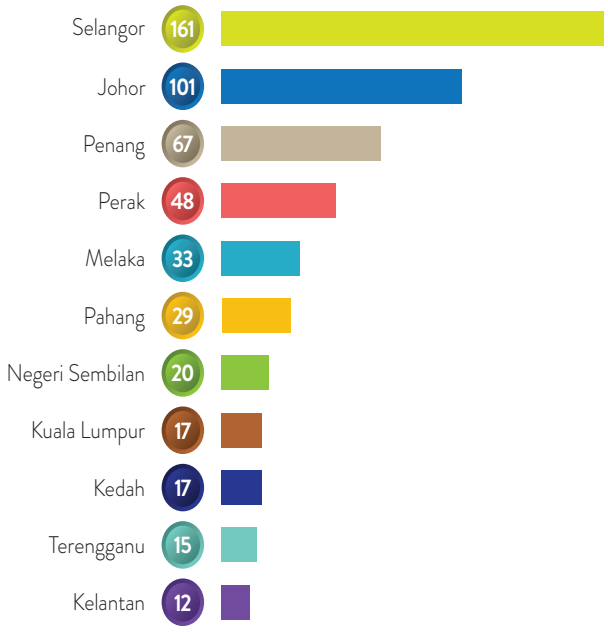


TABLE 30: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2010

YEAR: 2010 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,463	-	363	59	143	-	-	558	**2,586**
Chemical	378	21	132	68	7	-	-	470	**1,077**
Non Ferrous Metals	20	-	-	-	-	-	-	277	**297**
Non Metallic Mineral Products	114	-	65	71	-	-	1,716	514	**2,480**
Transportation Equipment	29	-	407	-	1	5	-	241	**682**
Machinery	2	24	35	-	-	-	-	127	**188**
Food, Beverages and Tobacco	1,227	15	32	9	1	-	-	196	**1,481**
Pulp, Paper and Printing	192	7	154	-	-	-	-	504	**857**
Wood and Wood Products	40	3	61	89	-	-	-	234	**426**
Textile and Leather	132	4	206	7	2	-	-	255	**606**
Not Elsewhere Specified	50	3	8	24	60	-	-	292	**437**
TOTAL	**3,646**	**76**	**1,465**	**326**	**214**	**5**	**1,716**	**3,669**	**11,117**

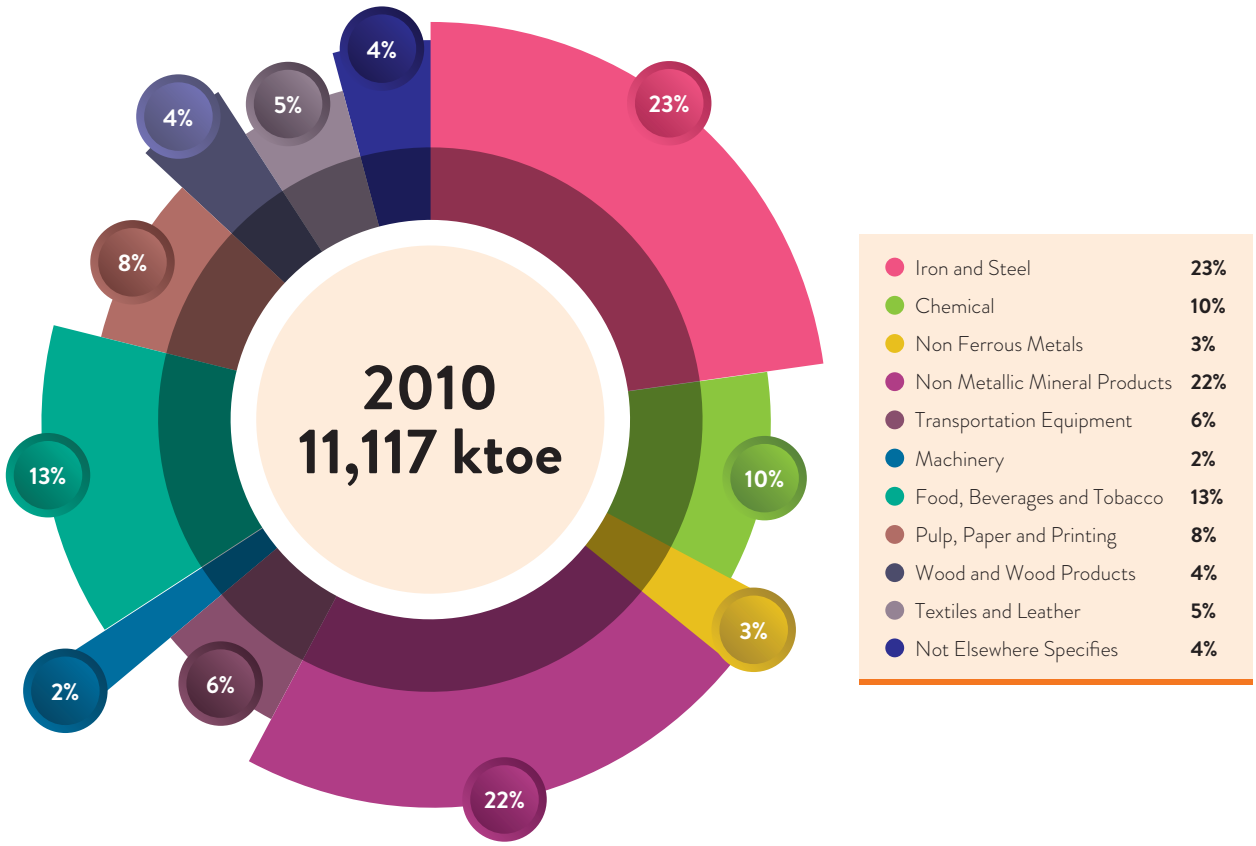
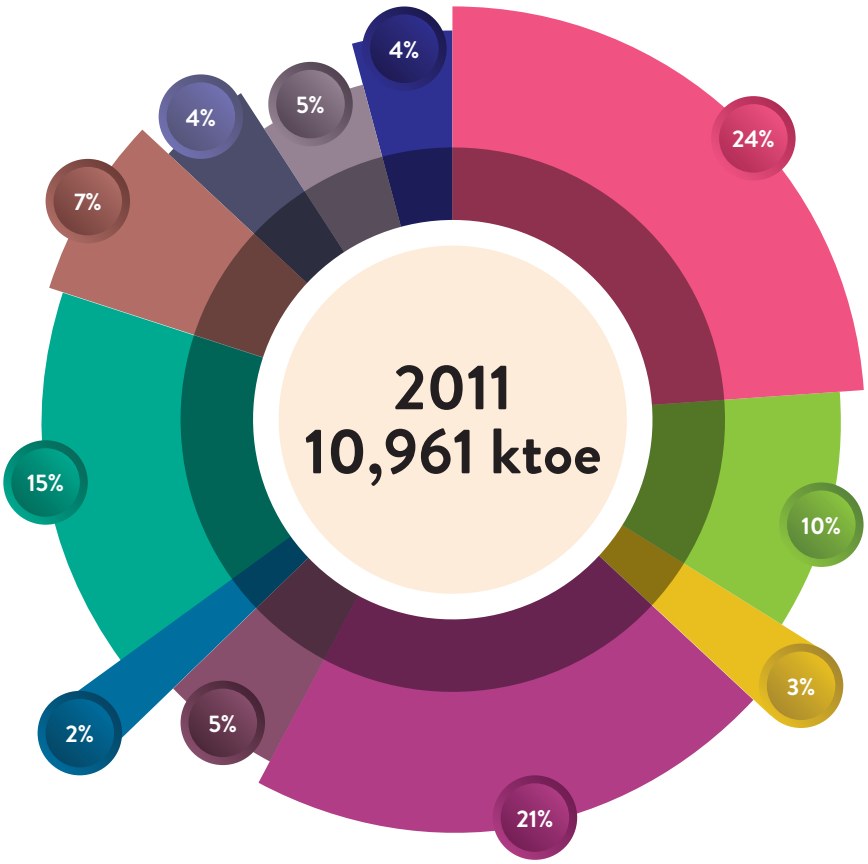


TABLE 31: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2011

YEAR: 2011 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,673	-	230	34	121	-	-	559	**2,617**
Chemical	429	37	88	62	6	-	-	501	**1,125**
Non Ferrous Metals	57	-	-	-	-	-	-	296	**353**
Non Metallic Mineral Products	126	-	45	59	-	-	1,565	525	**2,320**
Transportation Equipment	45	-	296	-	2	8	-	243	**593**
Machinery	2	43	19	-	-	-	-	125	**188**
Food, Beverages and Tobacco	1,347	27	16	10	1	-	-	204	**1,605**
Pulp, Paper and Printing	150	13	61	-	-	-	-	539	**763**
Wood and Wood Products	56	6	40	74	-	-	-	215	**390**
Textile and Leather	151	8	91	6	1	-	-	275	**533**
Not Elsewhere Specified	62	8	5	20	69	-	-	311	**474**
TOTAL	**4,099**	**141**	**890**	**264**	**200**	**8**	**1,565**	**3,794**	**10,961**



Iron and Steel	24%
Chemical	10%
Non Ferrous Metals	3%
Non Metallic Mineral Products	21%
Transportation Equipment	5%
Machinery	2%
Food, Beverages and Tobacco	15%
Pulp, Paper and Printing	7%
Wood and Wood Products	4%
Textiles and Leather	5%
Not Elsewhere Specifies	4%

TABLE 32: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2012

YEAR: 2012 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,724	-	337	50	84	-	-	576	**2,770**
Chemical	511	53	132	160	4	-	-	520	**1,380**
Non Ferrous Metals	107	-	-	-	-	-	-	294	**401**
Non Metallic Mineral Products	114	-	66	123	-	-	1,589	543	**2,435**
Transportation Equipment	51	-	461	-	1	12	-	267	**792**
Machinery	2	65	31	-	-	-	-	138	**236**
Food, Beverages and Tobacco	1,416	26	31	22	1	-	-	212	**1,708**
Pulp, Paper and Printing	191	20	113	-	-	-	-	546	**871**
Wood and Wood Products	56	8	43	154	-	-	-	220	**482**
Textile and Leather	141	10	99	13	1	-	-	265	**528**
Not Elsewhere Specified	64	6	10	42	26	-	-	322	**471**
TOTAL	**4,379**	**188**	**1,322**	**564**	**117**	**12**	**1,589**	**3,903**	**12,073**

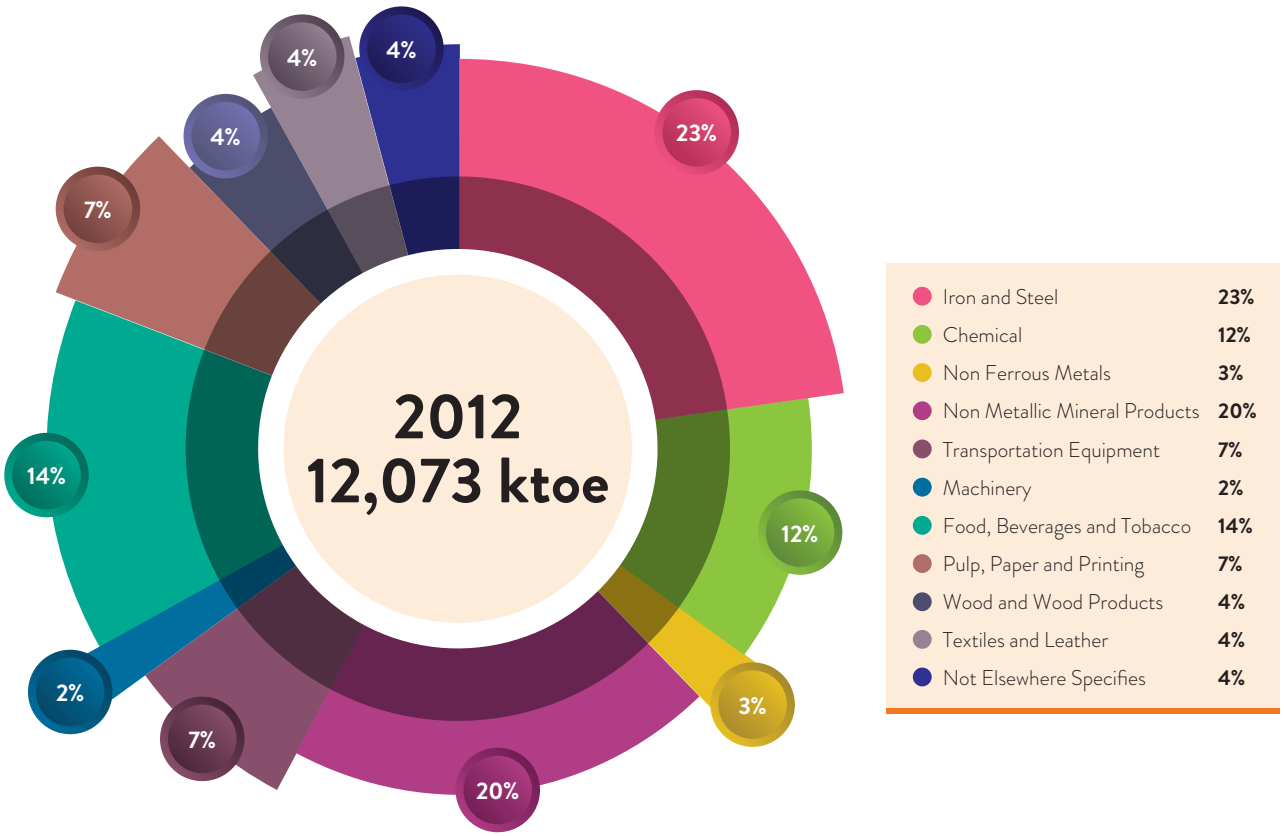


TABLE 33: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2013

YEAR: 2013 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,702	-	402	22	107	-	-	612	**2,845**
Chemical	568	64	157	67	6	-	-	536	**1,397**
Non Ferrous Metals	74	-	-	-	-	-	-	303	**377**
Non Metallic Mineral Products	116	-	59	52	-	-	1,387	560	**2,173**
Transportation Equipment	55	-	528	-	1	13	-	271	**869**
Machinery	3	69	36	-	-	-	-	150	**258**
Food, Beverages and Tobacco	1,429	60	37	11	2	-	-	220	**1,758**
Pulp, Paper and Printing	128	21	90	-	-	-	-	443	**682**
Wood and Wood Products	17	7	49	29	-	-	-	280	**381**
Textile and Leather	143	12	41	6	1	-	-	270	**473**
Not Elsewhere Specified	61	8	15	18	30	-	-	335	**467**
TOTAL	**4,296**	**240**	**1,414**	**204**	**145**	**13**	**1,387**	**3,979**	**11,679**

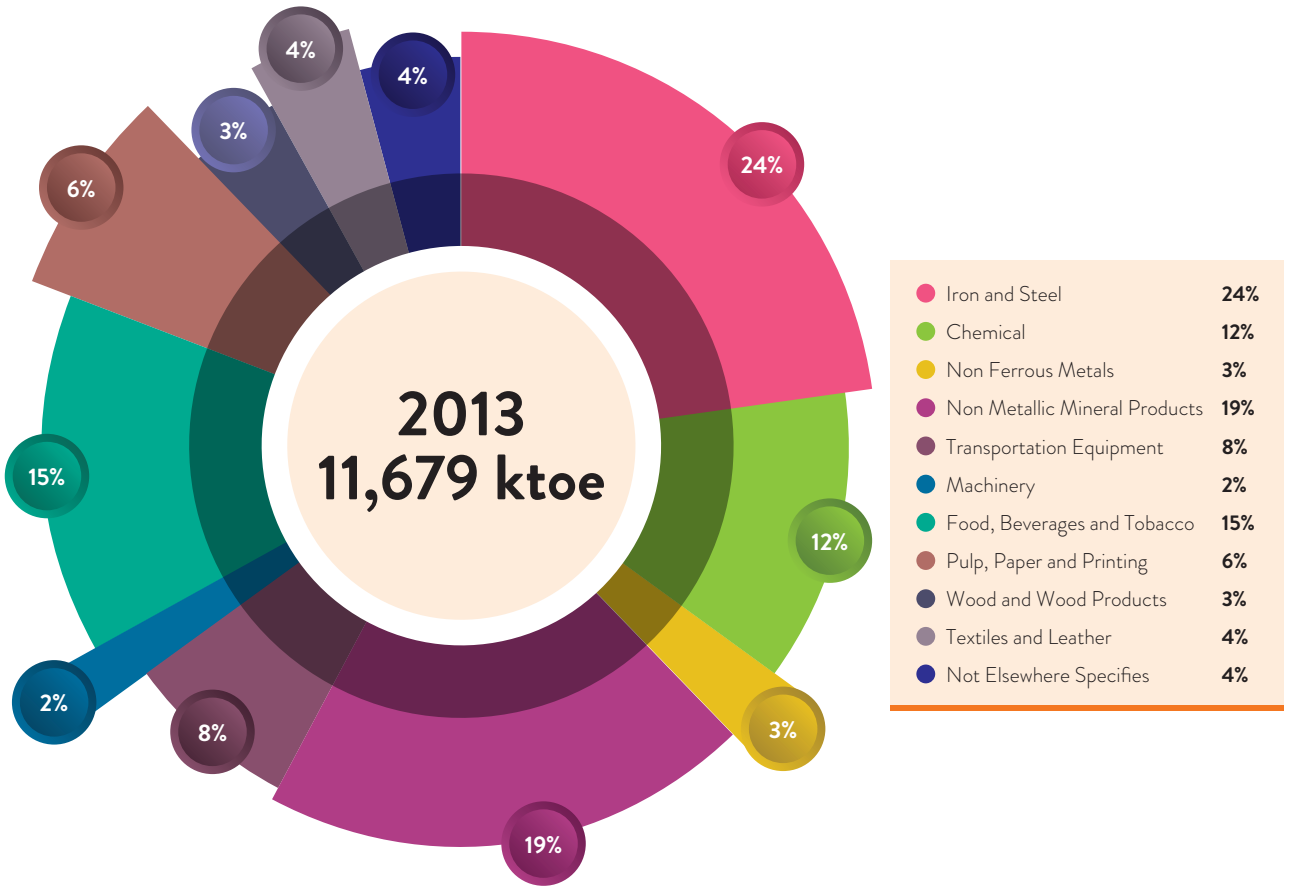


TABLE 34: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2014

YEAR: 2014 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,849	-	174	25	78	-	-	619	**2,744**
Chemical	617	65	68	73	4	-	-	542	**1,368**
Non Ferrous Metals	80	-	-	-	-	-	-	306	**386**
Non Metallic Mineral Products	126	-	25	57	-	-	1,541	566	**2,315**
Transportation Equipment	60	-	229	-	-	10	-	274	**574**
Machinery	3	69	16	-	-	-	-	152	**239**
Food, Beverages and Tobacco	1,552	60	16	12	1	-	-	222	**1,863**
Pulp, Paper and Printing	139	21	39	-	-	-	-	448	**647**
Wood and Wood Products	18	7	21	31	-	-	-	283	**361**
Textile and Leather	156	12	18	7	1	-	-	273	**465**
Not Elsewhere Specified	66	8	6	20	22	-	-	339	**461**
TOTAL	**4,665**	**241**	**614**	**225**	**106**	**10**	**1,541**	**4,023**	**11,424**

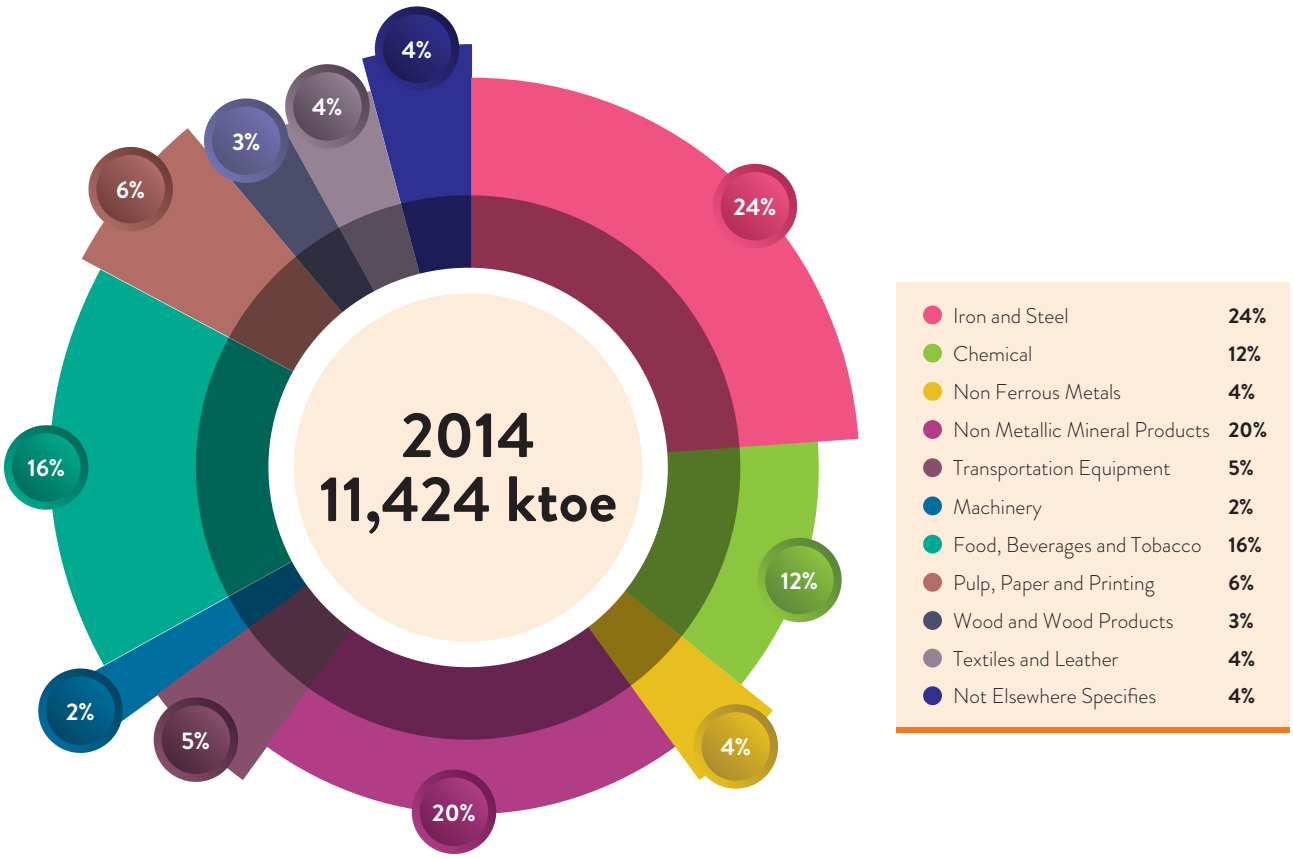


TABLE 35: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2015

YEAR: 2015 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,845	-	299	51	80	-	-	629	**2,905**
Chemical	615	44	117	152	4	-	-	551	**1,483**
Non Ferrous Metals	80	-	-	-	-	-	-	312	**391**
Non Metallic Mineral Products	125	-	44	118	-	-	1,693	576	**2,556**
Transportation Equipment	60	-	393	-	0	3	-	279	**736**
Machinery	3	47	27	-	-	-	-	154	**231**
Food, Beverages and Tobacco	1,549	41	28	24	1	-	-	226	**1,868**
Pulp, Paper and Printing	139	14	67	-	-	-	-	456	**676**
Wood and Wood Products	18	5	36	65	-	-	-	288	**413**
Textile and Leather	155	8	31	14	1	-	-	277	**486**
Not Elsewhere Specified	66	5	11	41	23	-	-	345	**491**
TOTAL	**4,656**	**164**	**1,052**	**465**	**110**	**3**	**1,693**	**4,093**	**12,236**

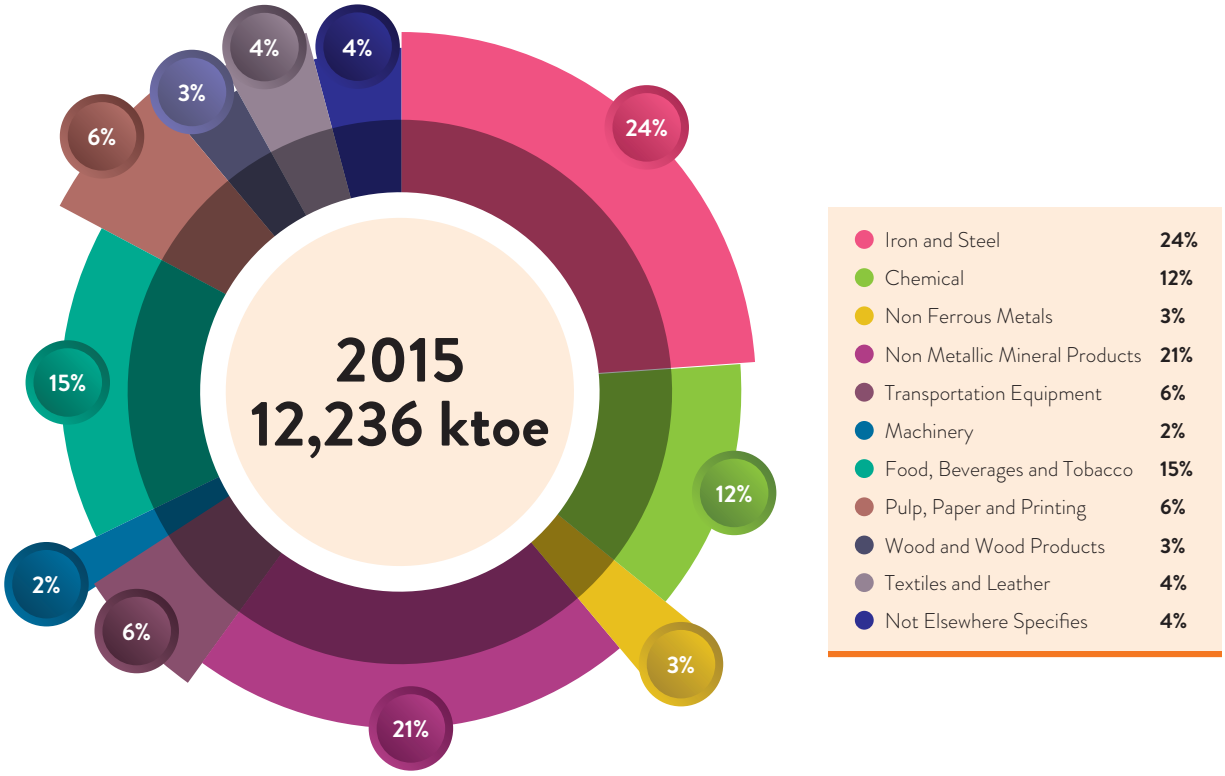
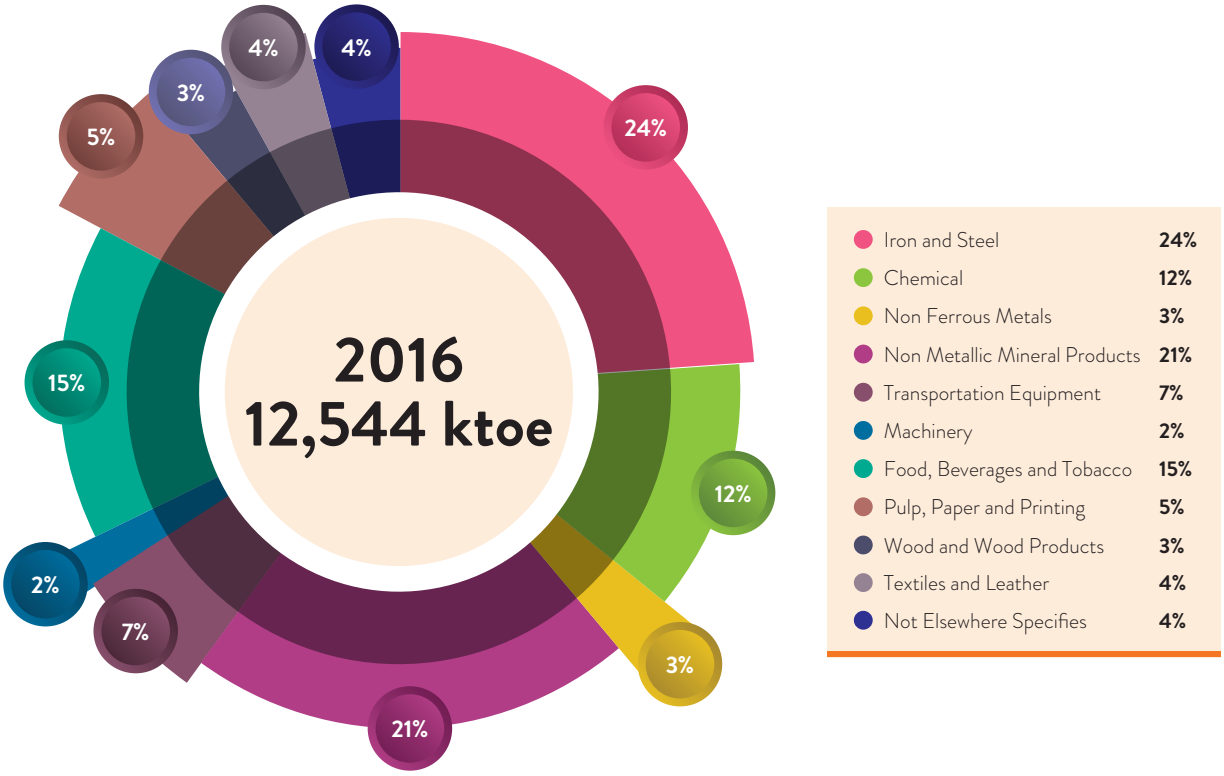


TABLE 36: FINAL ENERGY CONSUMPTION BY SUB-SECTORS IN MANUFACTURING SECTOR, 2016

YEAR: 2016 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,840	-	367	52	91	-	-	649	**2,998**
Chemical	614	27	143	156	5	-	-	568	**1,512**
Non Ferrous Metals	80	-	-	-	-	-	-	321	**401**
Non Metallic Mineral Products	125	-	54	121	-	-	1,690	594	**2,584**
Transportation Equipment	60	-	482	-	1	2	-	287	**832**
Machinery	3	29	33	-	-	-	-	159	**224**
Food, Beverages and Tobacco	1,544	25	34	25	1	-	-	233	**1,862**
Pulp, Paper and Printing	138	9	82	-	-	-	-	470	**699**
Wood and Wood Products	18	3	45	67	-	-	-	297	**430**
Textile and Leather	155	5	38	14	1	-	-	286	**498**
Not Elsewhere Specified	66	3	14	42	26	-	-	355	**506**
TOTAL	**4,642**	**99**	**1,290**	**477**	**124**	**2**	**1,690**	**4,220**	**12,544**



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RESIDENTIAL SECTOR IN PENINSULAR MALAYSIA

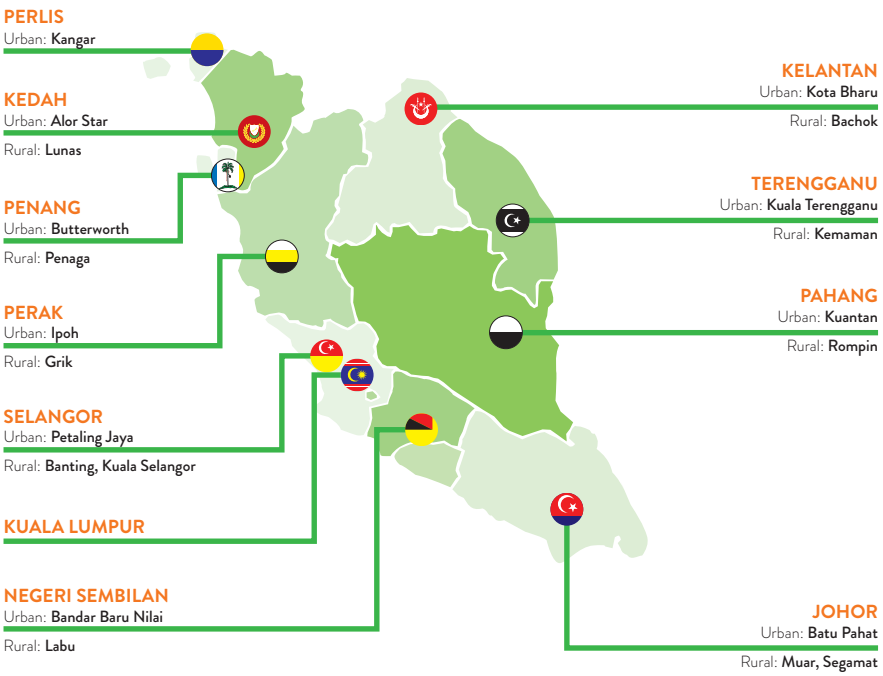
INTRODUCTION

Energy Commission has successfully conducted a survey with 2,000 households in Peninsular Malaysia with the aim to have an in-depth understanding of energy consumption pattern within households. There are many variables and factors that affect a household's energy consumption of which were not properly identified before. This survey enabled us to have a better view of where, when and how the energy is consumed within households.

The number of samples is calculated based on the actual number of households in Malaysia. Hence, 2,000 households were selected across Peninsular Malaysia for this survey. The samples were broken down to four (4) main regions, namely Central, South, East Coast, and North, and then further broken down to ten (10) types of houses. The energy consumption for each household is categorised into fuel types (natural gas, LPG, kerosene and electricity) and five (5) end-uses as described by the IEA (International Energy Agency).

Overall, electricity, LPG and natural gas are the major form of energy used in households in Peninsular Malaysia, where electricity accounted for more than 80% of energy consumption. Electricity consumption is distributed evenly among the four regions of Peninsular Malaysia, whereas LPG showed a slightly bigger contribution from the central region. In terms of end-uses, appliances have the biggest share in energy consumption, followed by air-conditioning system, cooking, lighting, and water heating. Appliances category covers a wide range of items which explains the high percentage of appliances in household's energy consumption.

LOCATIONS



2,000 households

10 types of house

5 categories

53 electrical appliances

Historical trend from **2011** to **2014**

TABLE 37: FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2011

YEAR: 2011 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	242	**242**
Water Heating	-	-	-	52	**52**
Lighting	-	-	9	173	**181**
Cooking	-	693	-	86	**779**
Appliances	-	-	-	1,173	**1,173**
TOTAL	**-**	**693**	**9**	**1,726**	**2,427**

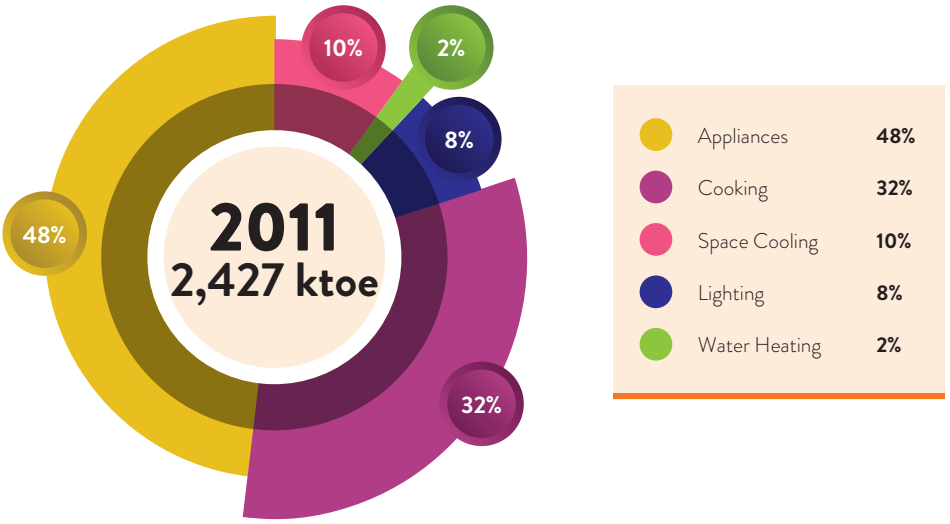


TABLE 38: FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2012

YEAR: 2012 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	259	**259**
Water Heating	-	-	-	56	**56**
Lighting	-	-	5	185	**190**
Cooking	1	593	-	93	**686**
Appliances	-	-	-	1,260	**1,260**
TOTAL	**1**	**593**	**5**	**1,853**	**2,451**

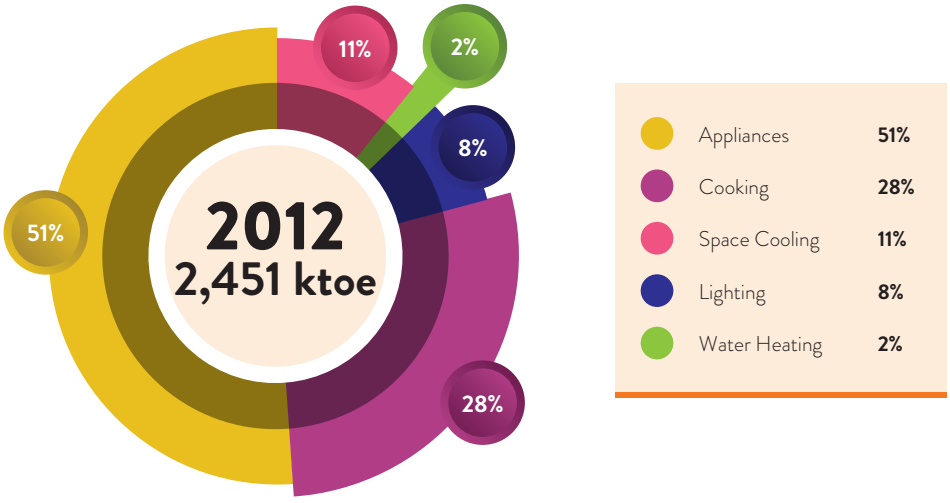


TABLE 39: FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2013

YEAR: 2013 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	276	276
Water Heating	-	-	-	59	59
Lighting	-	-	1	197	198
Cooking	1	596	-	99	695
Appliances	-	-	-	1,340	1,340
TOTAL	1	596	1	1,971	2,568

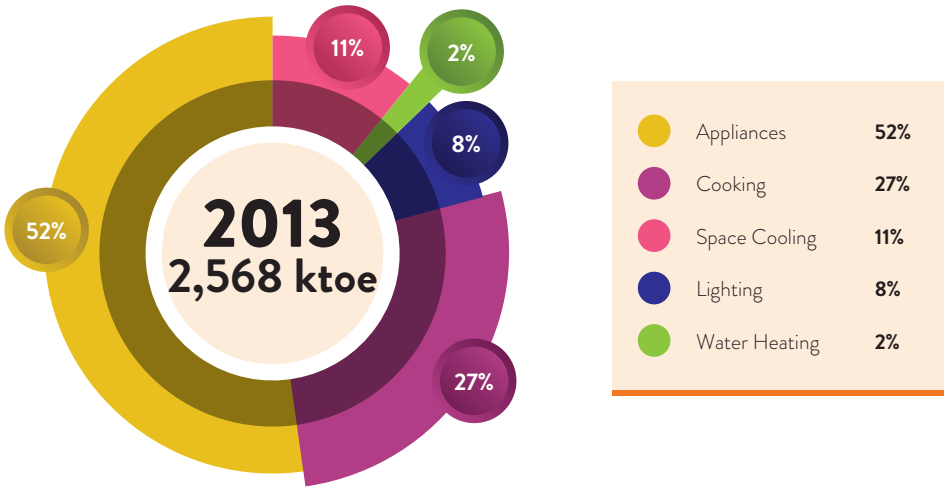


TABLE 40: FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2014

YEAR: 2014 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	286	286
Water Heating	-	-	-	61	61
Lighting	-	-	4	204	209
Cooking	1	571	-	102	674
Appliances	-	-	-	1,388	1,388
TOTAL	1	571	4	2,041	2,617

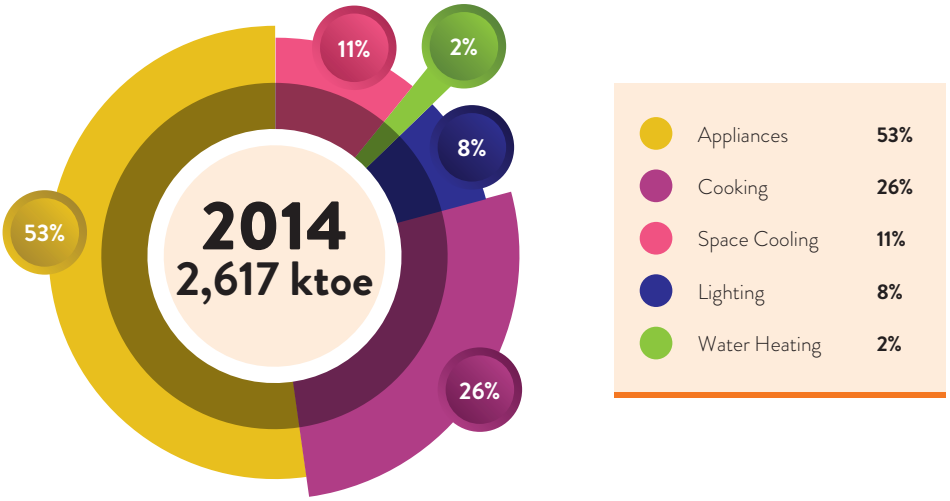


TABLE 41: FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2015

YEAR: 2015 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	296.24	**296**
Water Heating	-	-	-	63.48	**63**
Lighting	-	-	0	211.60	**212**
Cooking	1	602	-	105.80	**708**
Appliances	-	-	-	1,438.88	**1,439**
TOTAL	**1**	**602**	**0**	**2,116**	**2,719**

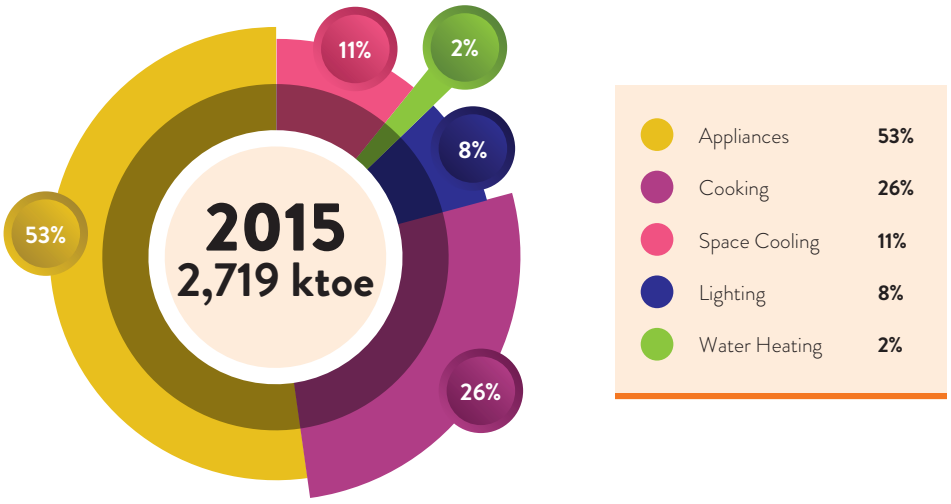
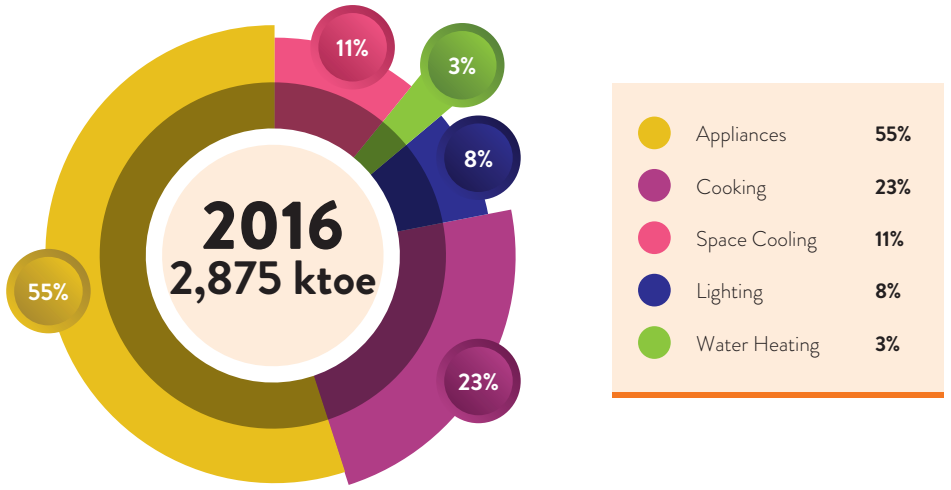


TABLE 42: FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2016

YEAR: 2016 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	327	**327**
Water Heating	-	-	-	70	**70**
Lighting	-	-	3	233	**236**
Cooking	1	538	-	117	**655**
Appliances	-	-	-	1,586	**1,586**
TOTAL	**1**	**538**	**3**	**2,333**	**2,875**



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COMMERCIAL SECTOR IN PENINSULAR MALAYSIA

INTRODUCTION

In Malaysia, studies on commercial energy consumption are scanty and far between. Therefore, a broader and more comprehensive survey to identify the energy consumption of the commercial sector will be conducted, for which an appropriate set of questionnaires will be developed.

The commercial sector encompasses substantial number of economic activities within the private and public sectors. Activities within the commercial sector can be grouped into 12 main categories, based on definition by the International Energy Agency (IEA) as outlined below;

1. Wholesale and Retail Trade	7. Travel Agencies and Tour Operators
2. Transportation and Storage	8. Public Administration
3. Accommodation and Food Service	9. Education
4. Information and Communication	10. Human Health and Social Work
5. Selected Services	11. Arts, Entertainment and Recreation
6. Professional, Scientific and Technical	12. Other Services

To amass robust data for analysis, the sampling would be representative of the 12 commercial sectors and all together cross-referenced with each 12 states in Peninsular Malaysia as represented by each state's services sector gross domestic product (GDP). The collation of data from the business premises sought from these states would allow the energy consumption categorized by fuel type for the commercial sector in Peninsular Malaysia to be determined.

PENINSULAR MALAYSIA

REACHED	5,000	TARGET	5,000	PROGRESS	100%

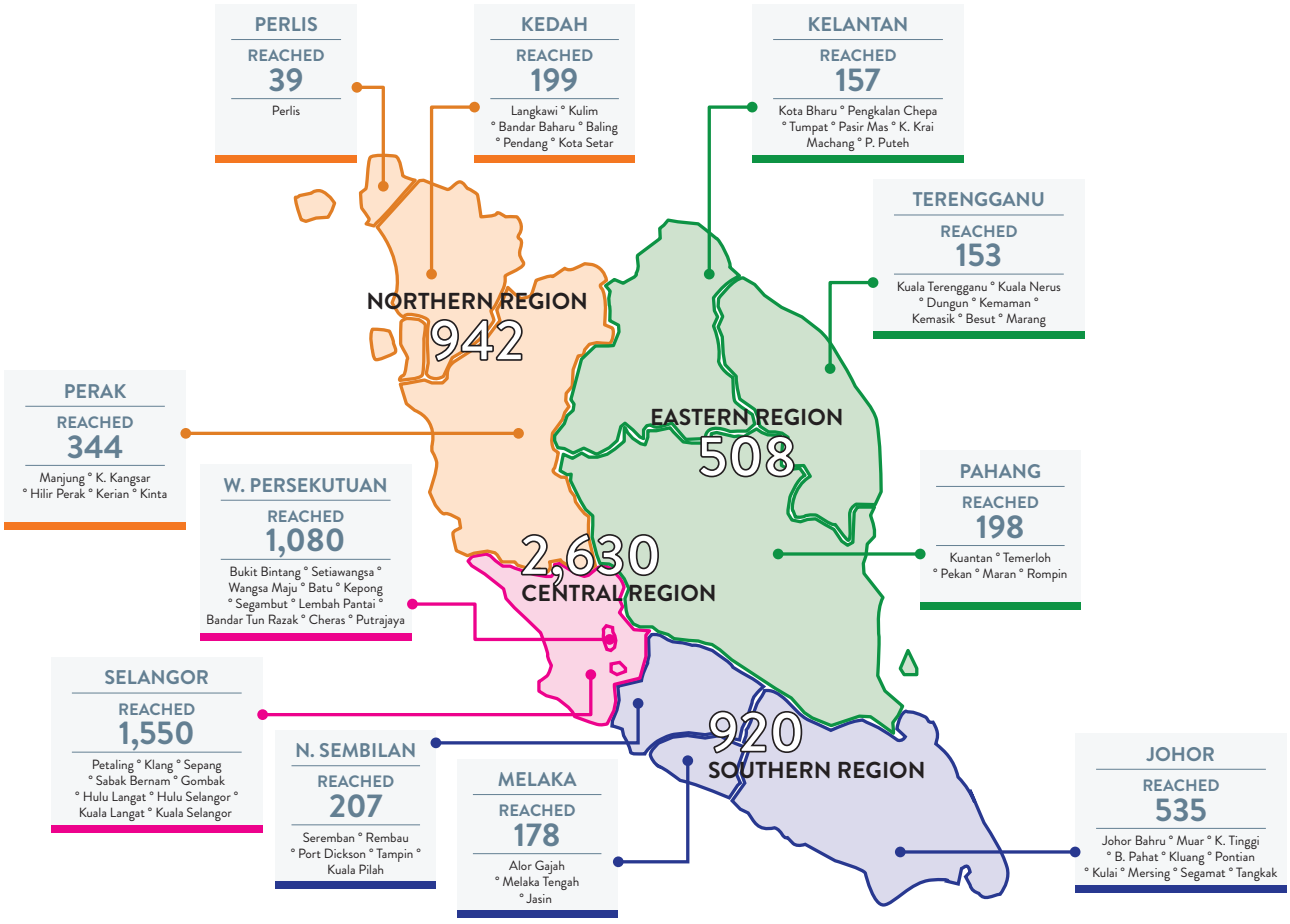


TABLE 43: FINAL ELECTRICITY CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2014

UNIT: GWh	CATEGORY	SPACE COOLING	WATER HEATING	LIGHTING	OTHER USE	TOTAL
C1	Wholesale & Retail Trade	1,923.81	41.19	1,015.04	1,139.45	**4,119.50**
C2	Transportation & Storage	872.02	5.28	396.76	683.13	**1,957.39**
C3	Accommodation & Food Service	572.58	115.59	301.09	498.20	**1,487.60**
C4	Information & Communication	1,500.61	137.00	692.94	1,443.62	**3,774.17**
C5	Selected Services	2,063.48	-	1,139.83	1,709.25	**4,913.05**
C6	Professional, Scientific & Technical	176.63	-	107.83	248.04	**532.50**
C7	Travel Agencies & Tour	7.86	0.01	2.66	8.44	**18.96**
C8	Public Administration	2,677.69	238.75	1,289.03	2,061.06	**6,266.53**
C9	Education	1,217.47	-	612.46	1,036.05	**2,865.98**
C10	Human Health & Social Activities	1,926.96	182.28	1,002.54	1,378.32	**4,489.65**
C11	Arts, Entertainment & Recreation	311.89	36.82	203.38	258.85	**810.94**
C12	Other Service Activities	1,690.76	183.37	976.23	1,454.02	**4,304.38**
	TOTAL	**14,941.75**	**940.29**	**7,739.79**	**11,918.43**	**35,540.66**

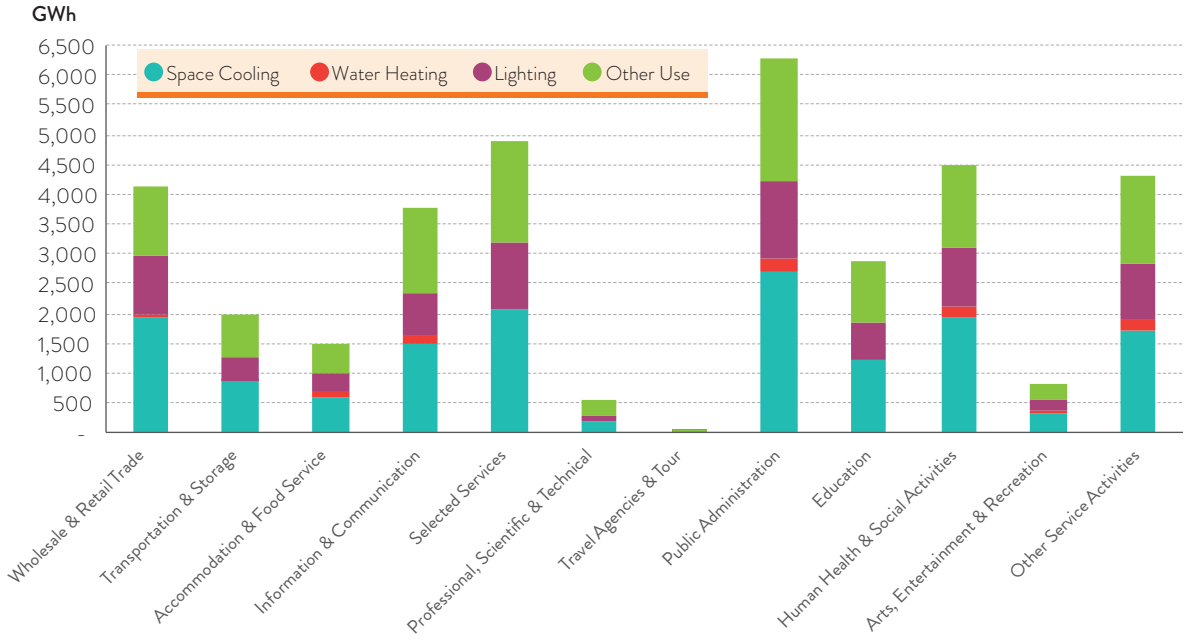
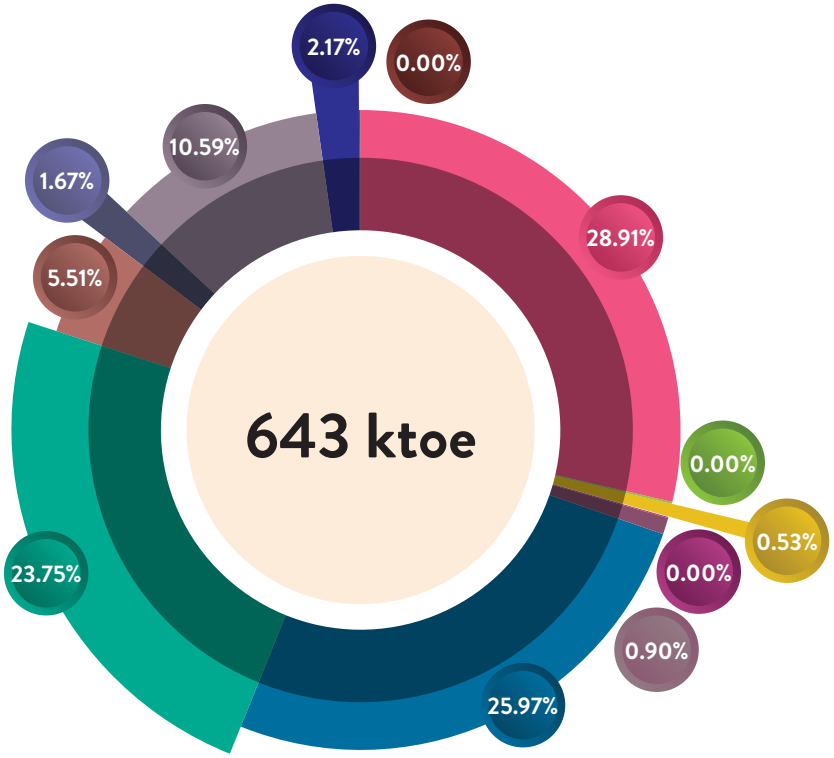


TABLE 44: FINAL LPG CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2014

UNIT: ktoe	CATEGORY	OTHER USE
C1	Wholesale & Retail Trade	13.96
C2	Transportation & Storage	-
C3	Accommodation & Food Service	185.90
C4	Information & Communication	-
C5	Selected Services	3.40
C6	Professional, Scientific & Technical	5.79
C7	Travel Agencies & Tour	-
C8	Public Administration	167.01
C9	Education	152.71
C10	Human Health & Social Activities	35.41
C11	Arts, Entertainment & Recreation	10.73
C12	Other Service Activities	68.10
	TOTAL	643.00



Accommodation & Food Service	28.91%
Travel Agencies & Tour	0.00%
Selected Services	0.53%
Information & Communication	0.00%
Professional, Scientific & Technical	0.90%
Public Administration	25.97%
Education	23.75%
Human Health & Social Activities	5.51%
Arts, Entertainment & Recreation	1.67%
Other Service Activities	10.59%
Wholesale & Retail Trade	2.17%
Transportation & Storage	0.00%

TABLE 45: FINAL ELECTRICITY CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2015

UNIT: GWh	CATEGORY	SPACE COOLING	WATER HEATING	LIGHTING	OTHER USE	TOTAL
C1	Wholesale & Retail Trade	1,969.19	42.17	1,038.99	1,166.33	**4,216.67**
C2	Transportation & Storage	892.59	5.41	406.12	699.24	**2,003.57**
C3	Accommodation & Food Service	586.08	118.31	308.19	509.95	**1,522.69**
C4	Information & Communication	1,536.01	140.23	709.28	1,477.67	**3,863.20**
C5	Selected Services	2,112.16	-	1,166.72	1,749.57	**5,028.95**
C6	Professional, Scientific & Technical	180.80	-	110.37	253.89	**545.06**
C7	Travel Agencies & Tour	8.05	0.01	2.72	8.64	**19.41**
C8	Public Administration	2,740.85	244.39	1,319.43	2,109.68	**6,414.36**
C9	Education	1,246.19	-	626.91	1,060.49	**2,933.58**
C10	Human Health & Social Activities	1,972.42	186.58	1,026.19	1,410.84	**4,595.56**
C11	Arts, Entertainment & Recreation	319.24	37.69	208.18	264.96	**830.07**
C12	Other Service Activities	1,730.65	187.69	999.26	1,488.32	**4,405.92**
	TOTAL	**15,294.21**	**962.48**	**7,922.37**	**12,199.58**	**36,379.03**

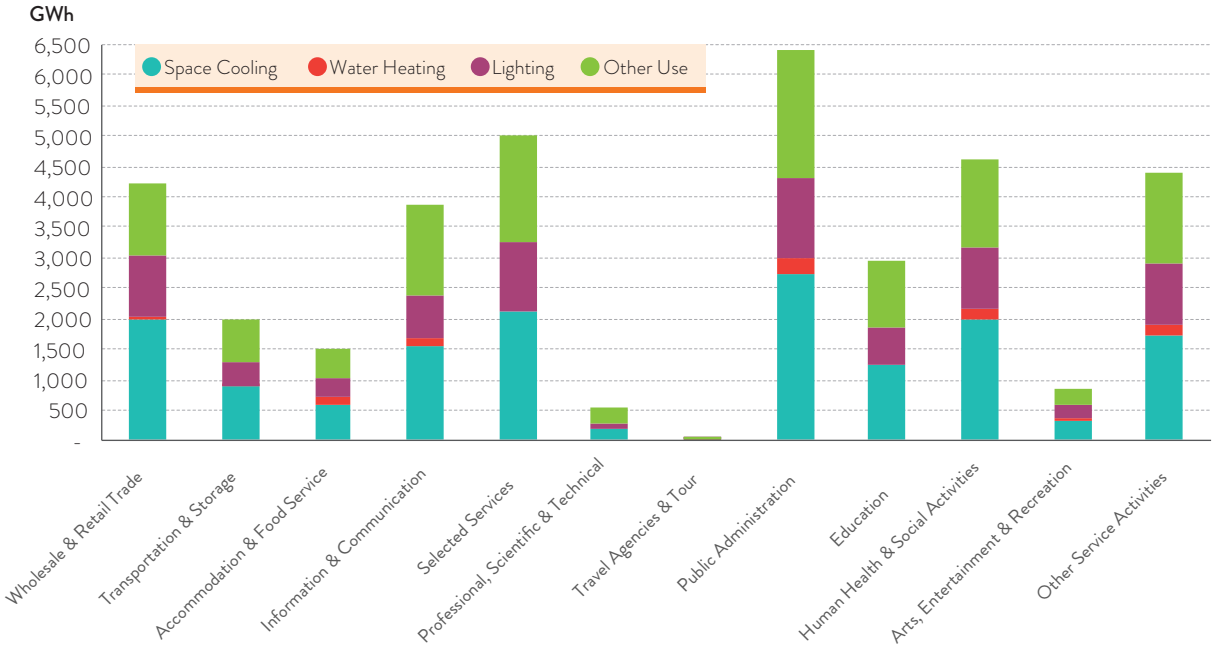
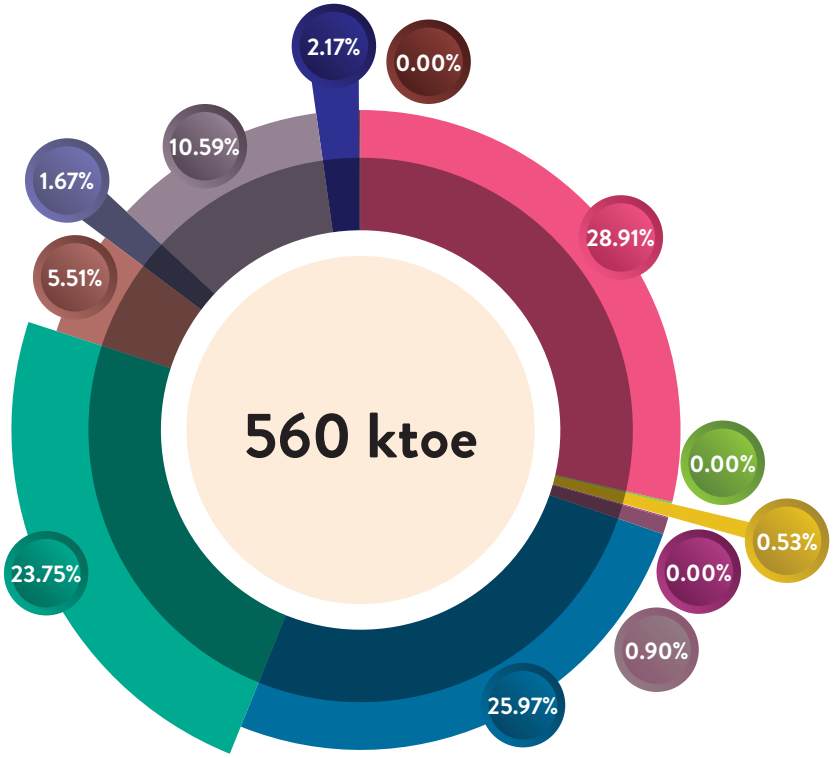


TABLE 46: FINAL LPG CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2015

UNIT: ktoe	CATEGORY	OTHER USE
C1	Wholesale & Retail Trade	12.16
C2	Transportation & Storage	-
C3	Accommodation & Food Service	161.91
C4	Information & Communication	-
C5	Selected Services	2.97
C6	Professional, Scientific & Technical	5.04
C7	Travel Agencies & Tour	-
C8	Public Administration	145.45
C9	Education	132.99
C10	Human Health & Social Activities	30.84
C11	Arts, Entertainment & Recreation	9.34
C12	Other Service Activities	59.31
	TOTAL	560.00



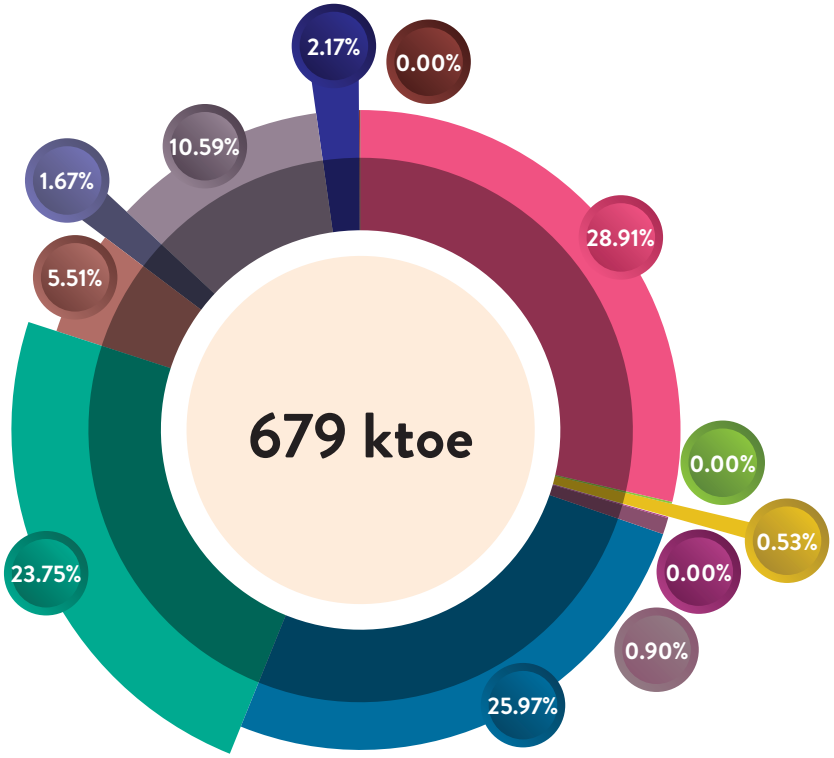
Accommodation & Food Service	28.91%
Travel Agencies & Tour	0.00%
Selected Services	0.53%
Information & Communication	0.00%
Professional, Scientific & Technical	0.90%
Public Administration	25.97%
Education	23.75%
Human Health & Social Activities	5.51%
Arts, Entertainment & Recreation	1.67%
Other Service Activities	10.59%
Wholesale & Retail Trade	2.17%
Transportation & Storage	0.00%

TABLE 47: FINAL ELECTRICITY CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2016

UNIT: GWh	CATEGORY	SPACE COOLING	WATER HEATING	LIGHTING	OTHER USE	TOTAL
C1	Wholesale & Retail Trade	2,116.80	45.33	1,116.87	1,253.76	**4,532.76**
C2	Transportation & Storage	959.50	5.82	436.57	751.66	**2,153.75**
C3	Accommodation & Food Service	630.02	127.18	331.29	548.17	**1,636.83**
C4	Information & Communication	1,651.15	150.75	762.45	1,588.44	**4,152.78**
C5	Selected Services	2,270.49	-	1,254.17	1,880.72	**5,405.92**
C6	Professional, Scientific & Technical	194.35	-	118.65	272.92	**585.92**
C7	Travel Agencies & Tour	8.65	0.01	2.92	9.28	**20.86**
C8	Public Administration	2,946.31	262.71	1,418.34	2,267.82	**6,895.18**
C9	Education	1,339.60	-	673.90	1,139.99	**3,153.49**
C10	Human Health & Social Activities	2,120.27	200.57	1,103.11	1,516.59	**4,940.04**
C11	Arts, Entertainment & Recreation	343.17	40.51	223.79	284.82	**892.29**
C12	Other Service Activities	1,860.37	201.76	1,074.17	1,599.88	**4,736.19**
	TOTAL	**16,440.66**	**1,034.62**	**8,516.23**	**13,114.06**	**39,106.00**

TABLE 48: FINAL LPG CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2016

UNIT: ktoe	CATEGORY	OTHER USE
C1	Wholesale & Retail Trade	14.74
C2	Transportation & Storage	-
C3	Accommodation & Food Service	196.31
C4	Information & Communication	-
C5	Selected Services	3.60
C6	Professional, Scientific & Technical	6.11
C7	Travel Agencies & Tour	-
C8	Public Administration	176.36
C9	Education	161.26
C10	Human Health & Social Activities	37.39
C11	Arts, Entertainment & Recreation	11.33
C12	Other Service Activities	71.91
	TOTAL	679.00



Accommodation & Food Service	28.91%
Travel Agencies & Tour	0.00%
Selected Services	0.53%
Information & Communication	0.00%
Professional, Scientific & Technical	0.90%
Public Administration	25.97%
Education	23.75%
Human Health & Social Activities	5.51%
Arts, Entertainment & Recreation	1.67%
Other Service Activities	10.59%
Wholesale & Retail Trade	2.17%
Transportation & Storage	0.00%

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 of 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:

PRIMARY SUPPLY	Refers to supply of energy that has not undergone the transformations / conversion process within the country.
PRIMARY PRODUCTION (1)	Refers to the quantity of fuels extracted. Data for natural gas excludes the amount of reinjected and flared gas. Gross production of hydro is shown in conventional fuel equivalent input.
GAS FLARING, REINJECTION & USE (2)	Refers to the quantity of gas flared, reinjected into the gas fields and use for production purpose.
IMPORTS (3) AND EXPORTS (4)	Refers to the amount of primary and secondary energy obtained from, or supplied to other countries. In the energy balance format, imports always carry a positive and export a negative sign.
BUNKERS (5)	Refers to the amount of fuels delivered to ocean-going ships of all flags engaged in international traffic.
STOCK CHANGE (6)	Refers to the difference between the amounts of fuel in stocks at the beginning and end of year and should ideally cover producers, importers and industrial consumers. At this stage, however, only oil companies' stock are taken into account. A negative sign indicates net increase while a positive sign indicates net decrease in stocks.
TOTAL	Under primary supply, 'total' is the addition of columns to obtain total availability. Under transformation, 'total' is the addition of columns to obtain transformation and conversion losses.
GAS PLANTS (9)	Shows the input of natural gas into the LNG, MDS and GPP-LPG plants and their respective outputs.
REFINERIES (10), POWER STATIONS AND CO-GENERATION & PRIVATE LICENSEES (11)	Shows the input of any energy product (negative sign) for the purpose of converting it to one or more secondary products (positive sign).
LOSSES AND OWN USE (12)	Refers to losses of electrical energy and natural gas which occur outside the utilities and plants (i.e. distribution losses) and the consumption of energy by utilities and plants for operating their installation (i.e. electricity for operating auxiliary equipment and petroleum products used in the crude distillation process respectively). It does not, however, include conversion loss that is accounted for in the 'total' column.
SECONDARY SUPPLY (14)	Refers to the supply of energy from the transformation process and after deducting the energy sector's own use and losses, including power station use.
RESIDENTIAL AND COMMERCIAL (15 & 16)	Not only refers to energy used within households and commercial establishments but includes government buildings and institutions.
INDUSTRY (17)	Is a very broad-based sector ranging from manufacturing to mining and construction. Diesel sales through distributors are assumed to be to industrial consumers.
TRANSPORT (18)	Basically refers to all sales of motor gasoline and diesel from service stations and sales of aviation fuel. It also includes diesel and motor gasoline sold directly to government and military.
AGRICULTURE (19)	Covers agriculture and forestry.
FISHERY (20)	May involve the capture of wild fish or raising fish through fish farming or aquaculture.
NON-ENERGY USE (21)	Use of products resulting from the transformation process for non-energy purpose (i.e. bitumen/lubricants, asphalt/greases) and use of energy products (such as natural gas) as industrial feedstocks.
FINAL USE (22)	Refers 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

RESERVE MARGIN	Total capacity margin is defined as the amount of installed generation available over and above system peak load $\text{RESERVE MARGIN} = \frac{\text{Installed Capacity} - \text{Peak Demand}}{\text{Peak Demand}}$
PEAK DEMAND	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.
INSTALLED CAPACITY	Installed capacity is defined as the maximum possible capacity (nameplate rating) that can be provided by the plant.
DEPENDABLE CAPACITY	The maximum capacity, modified for ambient limitations for a specified period of time, such as a month or a season.
AVAILABLE CAPACITY	Available capacity refers to the Latest Tested Net Capacity. It is the dependable capacity, modified for equipment limitation at any time.
UNIT GENERATED (GROSS GENERATION)	The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatt-hours (kWh) or megawatt-hours (MWh).
UNIT SENT OUT FROM STATION(S) (NET GENERATION)	The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries.

NOTES ON COAL

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

NOTES OF ENERGY BALANCE

NOTES ON GDP

GDP DEFINITION	GDP can be measured by using three approaches namely Production, Expenditure and Income Approach. Conceptually, GDP by these three approaches produce the same results.
PRODUCTION APPROACH	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.
EXPENDITURE APPROACH	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.
INCOME APPROACH	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. GDP by Income Approach is calculated as follows: GDP by Income Approach = **CE + GOS + (T - S)** where; **CE** - Compensation of Employees **GOS** - Gross Operating Surplus **(T - S)** - Taxes Less Subsidies on Production and Imports

NOTES ON GNI

DEFINITION	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.
MEASURING GNI	As GNI is an add up of Net Income from abroad and the GDP, one can calculate the GNI by the following formula: **GNI = GDP + (FL – DL) + NCI** Where FL and DL are respectively the foreign and domestic income from labor, and NCI the net capital inflow. For example, if a country A's nominal GDP is $20,000, the domestic income from labor $3,000 and the foreign income from labor $5,000, and the country received a $10,000 donation from another country's charity organization, the GNI of country A would be $32,000.

CONVERSION COEFFICIENTS AND EQUIVALENCE

COAL AND COKE (TJ/1000 TONNES)[1]

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

NATURAL GAS PRODUCTS (TJ/1000 TONNES)

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

ELECTRICITY

Electricity	3.6 TJ/GWh

PETROLEUM PRODUCTS (TJ/1000 TONNES)

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

1,000 Tonnes of 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)

PRODUCT	BARRELS/TONNE
Crude Oil - Import	7.33
- Local	7.60
Petrol	8.55
Diesel	7.50
Fuel Oil	6.60
Kerosene	7.90
Liquefied Petroleum Gas (LPG)	11.76
Aviation Turbine Fuel (ATF)	7.91
Aviation Gasoline (AV GAS)	9.05
Non-Energy	6.50

SOLID FUELS

FROM METRIC TONNE / INTO	GIGAJOULES	MILLION BTUS	GIGACALORIES	MEGAWATT HOURS	BARRELS OIL	TONNE OF COAL EQUIVALENT	TONNE OF OIL EQUIVALENT
	MULTIPLY BY						
Hard Coal	29.310	27.780	7.000	8.140	4.900	1.000	0.700
Lignite	*11.280*	10.700	2.700	3.130	2.500	0.385	0.270
Peat	9.530	9.030	2.280	2.650	2.300	0.325	0.228
Gas Coke	26.380	25.000	6.300	7.330	4.400	0.900	0.630
Oven Coke	26.380	25.000	6.300	7.330	4.400	0.900	0.630
Petroleum Coke	35.170	33.330	8.400	9.770	5.900	1.200	0.840
Charcoal	28.890	27.380	6.900	8.020	4.800	0.985	0.690
Fuelwood	12.600	11.940	3.010	3.500	2.100	0.430	0.301

LIQUID FUELS

FROM METRIC TONNE / INTO	GIGAJOULES	MILLION BTUS	GIGACALORIES	MEGAWATT HOURS	BARRELS OIL	TONNE OF COAL EQUIVALENT	TONNE OF OIL EQUIVALENT	LITRES
	MULTIPLY BY							
Crude Oil	42.620	40.390	10.180	11.840	7.320	1.454	1.018	1,164
Natural Gas Liquids	45.190	42.830	10.790	12.550	10.400	1.542	1.079	1,653
Liquefied Petroleum Gas (LPG)	45.550	43.170	10.880	12.650	11.650	1.554	1.088	1,852
Propane	45.590	43.210	10.890	12.670	12.340	1.556	1.089	1,962
Butane	44.800	42.460	10.700	12.440	10.850	1.529	1.070	1,726
Petrol	43.970	41.670	10.500	12.210	8.500	1.500	1.050	1,590
Aviation Gasoline (AV GAS)	43.970	41.670	10.500	12.210	8.620	1.500	1.050	1,370
Aviation Turbine Fuel (ATF)	43.210	40.950	10.320	12.000	7.770	1.474	1.032	1,235
Kerosene	43.210	40.950	10.320	12.000	7.770	1.474	1.032	1,235
Diesel	42.500	40.280	10.150	11.810	7.230	1.450	1.015	1,149
Residual Fuel Oil	41.510	39.340	9.910	11.530	6.620	1.416	0.991	1,053
Lubricants	42.140	39.940	10.070	11.700	6.990	1.438	1.007	1,111
Bitumen / Asphalt	41.800	39.620	9.980	11.610	6.050	1.426	0.998	962
Naphtha	44.130	41.830	10.540	12.260	8.740	1.506	1.054	1,389
Other Petroleum Products	42.500	40.280	10.150	11.800	6.910	1.450	1.015	1,099

GASEOUS FUELS

FROM METRIC TONNE / INTO	GIGAJOULES	MILLION BTUS	GIGACALORIES	MEGAWATT HOURS	BARRELS OIL	TONNE OF COAL EQUIVALENT	TONNE OF OIL EQUIVALENT
	MULTIPLY BY						
Natural Gas	39.020	36.980	9.320	10.840	6.500	1.331	0.932
Refinery Gas	*46.100*	43.700	11.000	12.800	7.690	1.571	1.100
Biogas	20.000	19.000	4.800	5.600	3.360	0.686	0.480
Methane	33.500	31.700	8.000	9.300	5.590	1.143	0.800
Ethane	59.500	56.300	14.200	16.500	9.920	2.029	1.420
Propane	85.800	81.300	20.500	23.800	14.330	2.929	2.050
Butane	111.800	106.000	26.700	31.000	18.600	3.814	2.670
Pentane	134.000	127.000	32.000	37.200	22.360	4.571	3.200

Note: 1 cubic metre = 35.31467 cubic feet

DEFINITION

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

NATURAL GAS	Is a mixture of gaseous hydrocarbons (mainly methane), which occur in either gas fields or in association with crude oil in oil fields.
LNG	Is natural gas that is liquefied for ocean transportation and export
CRUDE OIL	Is natural product that is extracted from mineral deposits and consists essentially of many different non-aromatic hydrocarbons (paraffinic, cyclonic, etc.)
AVIATION GASOLINE (AV GAS)	Is a special blended grade of gasoline for use in aircraft engines of the piston type. Distillation range normally falls within 30°C and 200°C.
LIQUEFIED PETROLEUM GAS (LPG)	Commercial LPG consists essentially of a mixture of propane and butane gases which are held in the liquid state by pressure or refrigeration.
PETROL	Petroleum distillate used as fuel in spark-ignition internal combustion engines. Distillation range is within 30°C and 250°C.
AVIATION TURBINE FUEL (ATF)	Fuel for use in aviation gas turbines mainly refined from kerosene. Distillation range within 150°C and 250°C.
KEROSENE	Is a straight-run fraction from crude oil, with boiling range from 150°C to 250°C. Its main uses are for domestic lighting and cooking.
DIESEL (OR GAS OIL)	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.
FUEL OIL	Heavy distillates, residues or blends of these, used as fuel for production of heat and power. Fuel oil production at the refinery is essentially a matter of selective blending of available components rather than of special processing. Fuel oil viscosities vary widely depending on the blend of distillates and residues.
NON-ENERGY PRODUCTS	Refer mainly to naphtha bitumen and lubricants, which are obtained by the refinery process from petroleum but used for non-energy purposes. Naphtha is a refined or party refined light distillate, which is further blended into motor gasoline or used as feed-stock in the chemical industry. Bitumen is a viscous liquid or solid, non-volatile and possesses waterproofing and adhesive properties. Lubricating oil is used for lubricating purposes and has distillation range within 380°C to 500°C.
REFINERY GAS	The gas released during the distillation of crude oil and comprises methane, ethane, propane and butane. Most refinery gas is retained in the refinery and used as fuel in plant operations.
COAL AND COKE	Solid fuels consisting essentially of carbon, hydrogen, oxygen 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.
HYDROPOWER	Is the inferred primary energy available for electricity production and is shown in terms of conventional fossil fuel equivalent using the average thermal efficiency of conversion for the year, i.e. the hypothetical amount of fossil fuel, which would be needed to produce the same amount of electricity in existing thermal power plants.
ELECTRICITY PRODUCTION	Production of electricity refers to production from public utilities as well as independent power producers (IPPs) and private installations & co-generation plants which obtain licenses from the Electricity 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.

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