MINISTRY OF ENERGY AND PUBLIC UTILITIES

ENERGY OBSERVATORY REPORT 2016

MAY 2018

TABLE OF CONTENT

LIST OF TABLES

TABLE OF FIGURES

Disclaimer

This report has been compiled using data from the Central Electricity Board, National Transport Authority and Statistics Mauritius. Neither the Energy Efficiency Management Office, nor any of its employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information in this report.

Note:

- *All data in this document refer to the Republic of Mauritius, unless otherwise specified and may be subject to revision in subsequent issues. The figures for Republic of Mauritius include those for the Island of Mauritius and the Island of Rodrigues.*
- *Rounding of error may be present on certain totals.*

1 ENERGY SUPPLY

1.1 Introduction

The energy supply of Mauritius is divided into:

- imports of primary energy (*fossil fuels: heavy fuel oil, liquefied petroleum gas, gasoline, diesel, kerosene, aviation fuel, coal*);
- production of primary energy (*local resources: bagasse, hydro, wind, landfill gas, fuelwood, photovoltaic*);
- primary energy re-exports; and
- variation of stocks.

1.2 Imports

The imports of energy sources in 2016 totalled 2047.8 ktoe, as shown in Table 1.1

Table 1.1 - Imports of energy sources

Fossil Energy Imports 2016	ktonne	ktoe
Coal	925.5	573.8
Gasoline	168.8	182.3
Diesel oil	339.1	342.5
Aviation fuel	285.0	296.4
kerosene	2.1	2.2
Fuel oil	489.7	470.1
Liquefied Petroleum Gas (LPG)	167.0	180.4
TOTAL	2377.2	2047.8

Data Source: Statistics Mauritius

The distribution of the imports of energy sources are shown in Figure 1.1

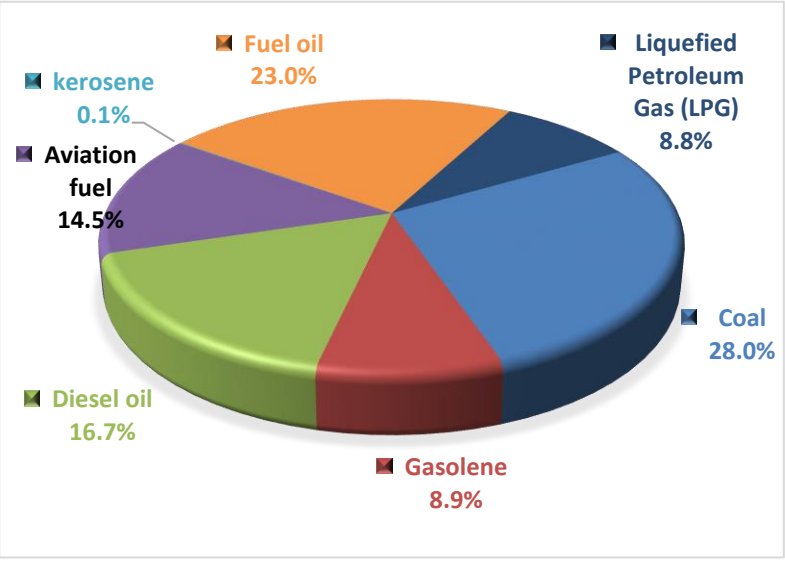
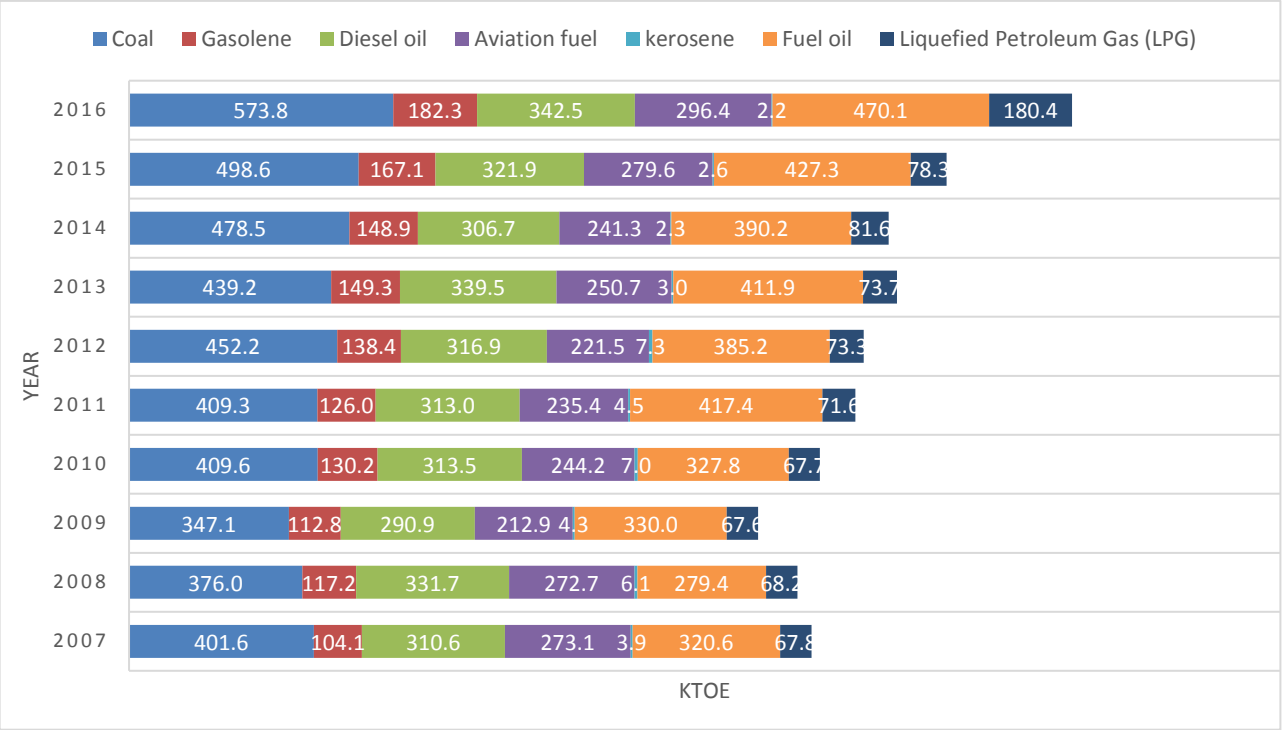


Figure 1.1 - Fossil energy imports 2016

Petroleum products are intended mostly for the sectors of transport, electricity generation, manufacturing as well as in the household, commercial and agriculture sectors. Coal is used primarily for power generation from thermal coal/bagasse power plants with a small fraction being used in the manufacturing sector. Liquefied Petroleum Gas (LPG) is used mainly as cooking and water heating fuel, to a lesser extent as fuel for vehicles. Fig 1.2 shows the trend of fossil fuel import for the period 2007-2016.



Data Source: Statistics Mauritius

Figure 1.2 - Trend of fossil fuel imports

In 2016, the amount of fossil fuels imported increased by 15% compared to 2015. However, due to a decrease in the price of fossil fuels, the total import bill of energy sources for 2016 amounted to Rs 21,610 M compared to Rs 23,152 M in 2015, representing a decrease of 6.7%. Petroleum products (Gasoline, Diesel Oil, Dual purpose kerosene, Fuel Oil and LPG) imports amounted to Rs 19,715M, while import value for coal was Rs 1, 895 M.

1.3 Primary energy requirement

The primary energy requirements are met from imported sources and from local renewable sources as shown in Table 1.2.

Table 1.2 - Primary energy requirement 2015 – 2016

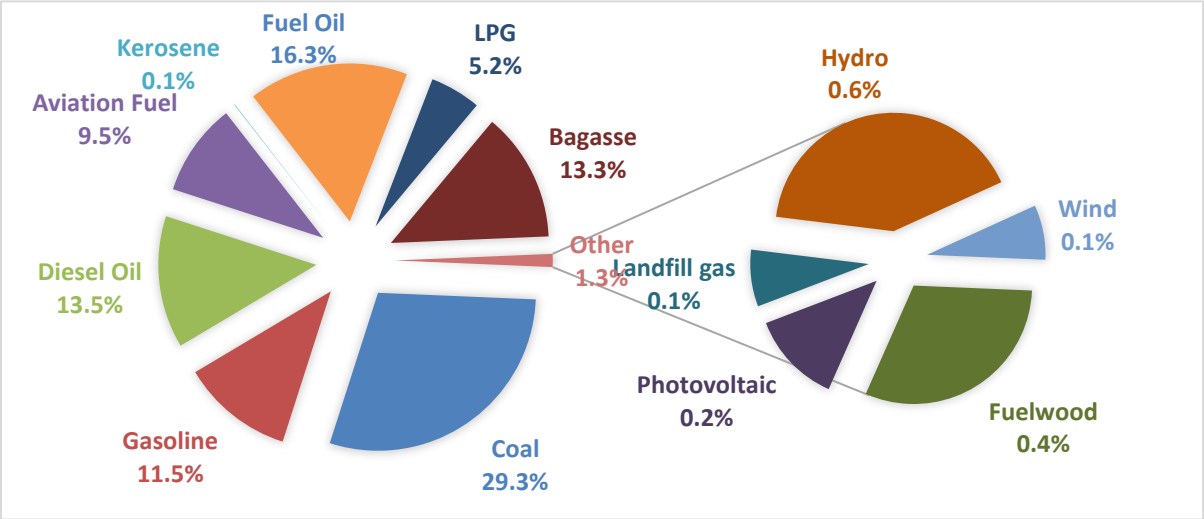
Primary Energy Requirement (ktoe)		2015	2016	% change
Imported fuels	Coal	446.9	455.3	1.9%
	Gasoline	163.0	178.9	9.8%
	Diesel Oil	209.6	210.5	0.4%
	Aviation Fuel	124.3	147.6	18.7%
	Kerosene	0.9	0.8	-11.1%

	Fuel Oil	259.2	254.4	-1.9%
	LPG	79.2	80.9	2.1%
	Sub Total	**1283.2**	**1328.5**	3.5%
Local resources	Bagasse	230.1	206.1	-10.4%
	Fuelwood	6.5	6.4	-1.5%
	Photovoltaic	2.2	2.6	18.2%
	Landfill gas	1.8	1.6	-11.1%
	Hydro	10.5	8.6	-18.1%
	Wind	0.2	1.5	650.0%
	Sub Total	**251.3**	**226.8**	-9.7%
	TOTAL	**1534.4**	**1555.3**	**1.4%**

Data Source: Statistics Mauritius

In 2016, primary energy requirement from fossil fuels amounted to 1555.3 ktoe representing an increase of 1.4 % compared to 2015.

Figure 1.3 shows the share of fuel source in the primary energy requirement for year 2016 in ktoe.



Data Source: Statistics Mauritius

Figure 1.3 - Primary energy requirement (ktoe)

1.4 Production of Primary energy – Local Renewable Sources

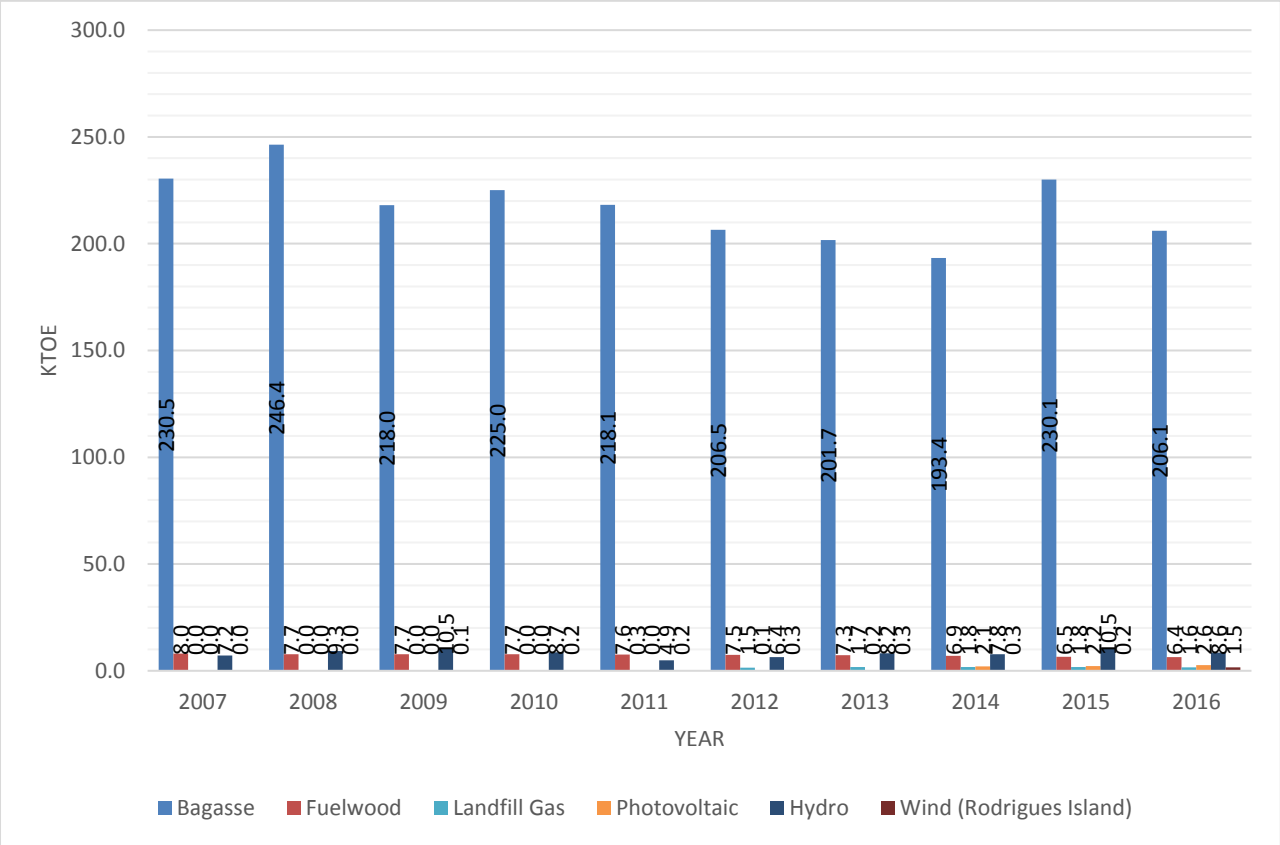
Examples of renewable energy sources are wind, solar, geothermal, wave, tidal, hydro energy including energy derived from biomass, landfill gas, sewage gas, and biogas. In Mauritius, the main sources of renewable energy exploited are biomass, in the form of bagasse, hydro, PV, wind and fuel wood. A total of 226.8 ktoe of local resources was tapped in 2016, as shown in Table 1.3.

Table 1.3 - Primary energy supply in 2016 – Local resources

Local Resources	ktonne	GWh	Ktoe
Bagasse	1288.0	-	206.1
Fuelwood	16.9	-	6.4
Photovoltaic	-	30.3	2.6
Landfill gas	-	18.7	1.6
Hydro	-	99.5	8.6
Wind	-	18.0	1.5
Total	1304.9	166.5	226.8

Data Source: Statistics Mauritius

In 2016, primary energy from local resources decreased by 9.7 %, compared to 2015. Bagasse is the main source of primary energy from local resources. Photovoltaic (PV), mostly due to the Small Scale Distributed Generation (SSDG) scheme implemented by the CEB which allows Small Independent Power Producers (SIPP) to feed electricity generated through PV plants installed on their premises to the CEB grid, provided 2.6 ktoe of electricity in 2016. Figure 1.4 shows the trend of primary energy obtained from local resources from 2007 to 2016:

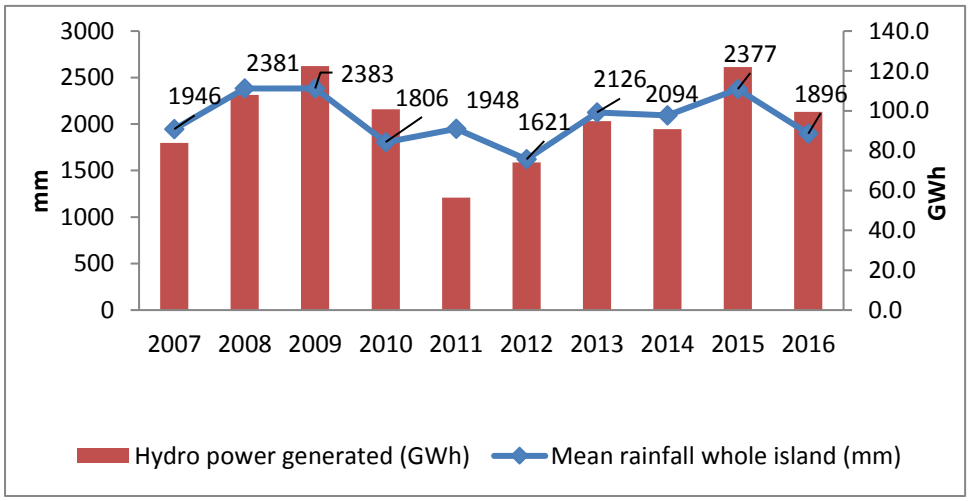


Data Source: Statistics Mauritius

Figure 1.4 - Trend of Primary energy from Local Resources, 2007 – 2016

1.4.1 Hydro electricity

Hydroelectricity is a form of energy generated by the conversion of free-falling water to electricity.



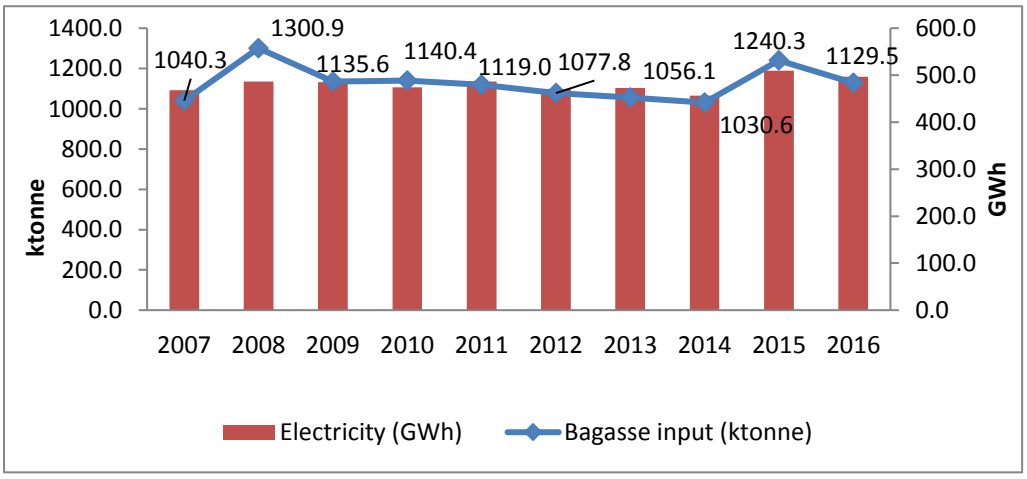
Data Source: Statistics Mauritius

Figure 1.5 - Trend of hydro-electric generation, 2007 to 2016

Hydroelectric power generation accounted for 3.3% of electricity produced in 2016. Fluctuations in hydroelectric power generation tend to follow annual rainfall levels as shown in Figure 1.5. In 2011, the discrepancy between hydroelectric power generation and rainfall level can be attributed to the water shortage that affected the island of Mauritius where water, that otherwise, would have been used for hydroelectric power generation had to be diverted for use in other sectors.

1.4.2 Bagasse

Bagasse is the fibrous residue of sugar cane used by sugar factories for heat production to meet their own requirements. Surplus of bagasse is converted into electricity by thermal power plants found mostly on sugar estates. Figure 1.6 gives the bagasse input for electricity generation and the amount so generated over the period 2007 to 2016. In 2016, 1288.0 ktonnes of bagasse was produced out of which 1129.5 ktonnes was used for electricity generation.



Data Source: Statistics Mauritius

Figure 1.6 - Trend of electricity generation from bagasse, 2007 to 2016

Table 1.4 shows the ratio of electricity produced per tonne of bagasse over the period 2007 to 2016. The ratio varies in the range of 0.374 MWh/tonne to 0.450 MWh/tonne. In 2016, the ratio of electricity produced per tonne of bagasse was 0.440. Also 16.3 % of electricity production was from bagasse representing a decrease of 2.5 % compared to 2015.

Table 1.4 - Ratio of electricity produced per tonne of bagasse, 2007 - 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ratio electricity produced to bagasse input (MWh/tonne)	0.450	0.374	0.427	0.416	0.435	0.437	0.448	0.443	0.411	0.440

1.4.3 Photovoltaics (PV)

Photovoltaics is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors.

PV installations are generally used as source of electricity in remote areas where access to the CEB network is not accessible or the cost of extension of the existing network is too high. The main applications are in private hunting ground or domains. Another use of PV is for solar powered street lighting.

The electricity generation from photovoltaic panels was 30.0 GWh in 2016 compared to 25.9 GWh in 2015. A notable increase arising mainly from the coming into operation of small and medium scale PV plants installed by CEB customers.

Table 1.5 provides information about Solar PV under the Small Scale Distributed Generation (SSDG) and Medium Scale Distributed Generation (MSDG) up to the year 2016 for the Island of Mauritius.

Table 1.5 – SSDG and MSDG summary, Island of Mauritius

Scheme	No. of approved applications (cumulated)	Total Capacity of approved applications (kW) (cumulated)	Total Capacity of PV systems connected to the CEB grid (kW) (cumulated)	Total kWh Produced during the year	Total kWh Exported to the CEB grid during the year
SSDG FIT Scheme	317	2815.3	2199.0	2955015.0	1851855.0
SSDG PECR Scheme	137	1688.9	975.0	1129608.1	723751.1
SSDG Net metering Scheme	1058	3371.3	602.8	210184.0	133376.0
MSDG Net metering Scheme	83	10238.5	1518.1	2365516.0	139860.0
Total	**1595.0**	**18114.0**	**5295.0**	**6660323.1**	**2848842.1**

Data source: CEB

Table 1.6 provides information about Solar PV under the Small Scale Distributed Generation (SSDG) and Medium Scale Distributed Generation (MSDG) for year 2016 for the Island of Rodrigues.

Table 1.6 - SSDG and MSDG summary, Island of Rodrigues

Scheme	No. of approved applications (cumulated)	Total Capacity of approved applications (kW) (cumulated)	Total Capacity of PV systems connected to the CEB grid (kW) (cumulated)	Total kWh Produced during the year	Total kWh Exported to the CEB grid during the year
SSDG FIT scheme	39	230	172	241597	188593
SSDG PECR scheme	6	32.88	32.88	28642.5	7241
Total	**31**	**189.88**	**204.88**	**270239.5**	**195834**

Data source: CEB

1.4.4 Electricity from Wind energy

Wind energy comes from the movement of air across the atmosphere of the Earth. Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to generate electricity, windmills for mechanical power, wind pumps for water pumping or sails to propel ships.

It may be noted 18.0 GWh of electricity was produced from wind energy in Rodrigues Island in 2016.

In Mauritius, a wind farm of a total installed capacity of 9.35 MW, set up by Eole Plaines des Roches Ltd, was launched in Mauritius in December 2016.

A Power Purchase Agreement for a 29.4 MW wind farm to be set up by Consortium Suzlon-Padgreen Co Ltd at Curepipe Point (Plaine Sophie) was signed in August 2012. The wind farm project is currently being implemented.

1.4.5 Electricity from Landfill gas

Landfill gas is a gas, constituted mostly of methane, produced by the fermentation of organic waste in landfills in the absence of oxygen. 18.7 GWh of electricity was produced from landfill gas in Mauritius in 2016.

1.4.6 Electricity from biogas

Data on biogas from sludge digester used to partially meet the electricity requirements of the St Martin wastewater treatment plant is provided in Table 1.7.

Table 1.7 - Electricity produced from biogas at St Martin Treatment plant

	2009	2010	2011	2012	2013	2014	2015	2016
Electricity generated (kWh)	1,093,335	1,140,138	1,185,523	1,145,557	965,616	950,773	644,031	783,883

Data source: Wastewater Management Authority

1.4.7 Solar Thermal – Solar Water Heaters (SWH) in Mauritius

According to the Performance Audit Report 2017 of the National Audit Office, grants have been provided for the subsidy of 73,480 solar water heaters up to 2016, under the four phases of the Solar Water Heater Grant Scheme (SWHGS).

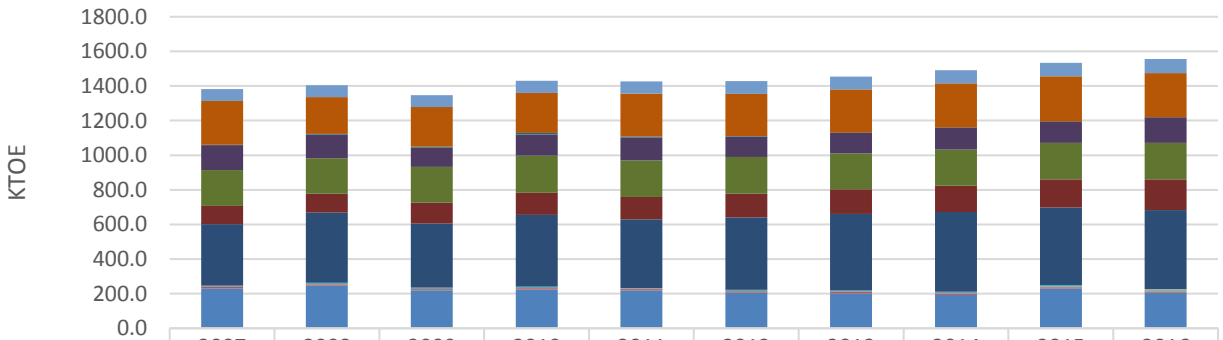
In the case that these solar water heaters have displaced only electric water heaters, in the ratio of 1 : 5, the avoided electric energy is estimated at 6.34 GWh and the avoided LPG mass is estimated at 2, 987 tonnes.

The avoided CO_2 emissions, using the grid emission factor for year 2016, and assuming 1.51 kg of CO_2 per litre of LPG, would be 14 613 tCO_2.

It is to be noted that large scale solar water heater are used in other sectors of the economy such as the tourism sector and manufacturing sector to preheat water for swimming pools and boilers. Figures for these sectors are, however, currently not available.

1.5 Primary Energy Requirement

The evolution of primary energy requirement over the period 2007 to 2016 is shown in Figure 1.7.



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LPG	68.9	67.9	68.9	70.2	71.1	72.6	74.9	76.7	79.2	80.9
Fuel oil	251.9	213.3	227.9	232.2	248.1	245.5	248.5	254.8	259.2	254.4
kerosene	2.4	4.0	6.7	8.0	4.3	3.8	0.9	0.9	0.9	0.8
Aviation fuel	143.6	136.9	110.5	123.3	134.3	115.0	120.7	126.8	124.3	147.6
Diesel oil	207.4	205.4	206.7	213.6	210.1	213.4	207.0	208.0	209.6	210.5
Gasoline	106.9	109.5	120.6	127.7	130.0	136.6	142.7	151.7	163.0	178.9
Coal	355.0	403.9	369.3	414.1	397.7	418.4	440.6	460.3	446.9	455.3
Wind	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.3	0.2	1.5
Hydro	7.2	9.3	10.5	8.7	4.9	6.4	8.2	7.8	10.5	8.6
Landfill gas	0.0	0.0	0.0	0.0	0.3	1.5	1.7	1.8	1.8	1.6
Photovoltaic	0.0	0.0	0.0	0.0	0.0	0.1	0.2	2.1	2.2	2.6
Fuelwood	8.0	7.7	7.7	7.7	7.6	7.5	7.3	6.9	6.5	6.4
Bagasse	230.5	246.4	218.0	225.0	218.1	206.5	201.7	193.4	230.1	206.1

Data Source: Statistics Mauritius

Figure 1.7 - Primary Energy Requirement, 2007 - 2016

1.6 Petroleum products

The State Trading Corporation (STC) is responsible for the importation of all the country's requirements of petroleum products. These include the demands for the running of public transport, industrial and commercial activities, private motor vehicles, the needs of the Central Electricity Board in fuel oils for its power plants, the needs for aircraft refuelling at the SSR International Airport and the needs of bunker fuels for international shipping.

Table 1.8 shows the imports of petroleum products over the period 2007 to 2016. It may be noted that annual demand in Petroleum Products to meet domestic and international demand increased by 15% from 1,262,322 tonnes in 2015 to 1,451,834 tonnes in 2016.

Kerosene is used essentially in the household sector. With a price increase in 2006, consumption of kerosene has seen a sharp decrease over the years. In 2005, 18.1 ktonnes of kerosene was imported while in 2016, this stood at 2.1 ktonnes.

Table 1.8 - Import of petroleum products, 2007 - 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gasoline	96.4	108.5	104.4	120.9	116.7	128.2	138.2	137.9	154.7	168.8
Diesel oil	307.5	328.5	288.0	310.4	309.9	313.8	336.1	303.6	318.7	339.1
Aviation fuel	262.6	262.2	204.7	234.9	226.4	213.0	241.1	232.0	268.8	285.0
kerosene	3.7	5.9	4.1	6.7	4.3	7.0	2.8	2.2	2.5	2.1
Fuel oil	333.9	291.0	343.7	341.5	434.8	401.2	429.1	406.4	445.1	489.7
Liquefied Petroleum Gas (LPG)	62.8	63.1	62.6	62.7	66.3	67.9	68.2	75.6	72.5	167.0
TOTAL (thousand tonnes)	**1066.9**	**1059.2**	**1007.6**	**1076.7**	**1158.4**	**1131.1**	**1215.5**	**1159.9**	**1262.3**	**1451.8**

Data Source: Statistics Mauritius

Upon arrival at the Port Louis Harbour, the petroleum products are pumped out of the tankers and delivered through pipelines into fuel tanks, owned by local oil companies, in the port Area. The capacity of the fuel tanks are as follows:

(i) Gasolin (MOGAS) – 12,900 tonnes;
(ii) Diesel – 18,900 tonnes; and
(iii) LPG – 5,400 tonnes.

Joint Utility Hydrant Installation (JUHI), a consortium of four local oil companies, owns and operates a Jet Fuel tank of capacity 22,500 tonnes near SSR Airport.

The oil companies market, distribute and retail the products through their respective networks of fuel pump stations across the country. Some also operate barges to carry out their bunker supply operations at sea.

1.7 Primary energy re-export

Primary energy re-export in 2016 is shown in Table 1.9.

Table 1.9 - Primary energy re-export

Energy Source	ktonne	ktoe
Diesel oil	119.9	121.1
Aviation fuel (foreign aircraft)	141.6	147.3
Fuel oil	217.0	208.3
LPG	82.7	89.3

Data Source: Statistics Mauritius

1.8 Stock variation

The variations in stock in 2016 are provided in the Table 1.10.

Table 1.10 - Variation in stock year

	2016							
	Import		Export		Primary energy requirement		Stock Variations (Import - Export - Primary Energy Requirement)	
	ktonne	ktoe	ktonne	ktoe	ktonne	ktoe	ktonne	ktoe
Coal	925.5	573.8			734.4	455.3	191.1	118.5
Gasoline	168.8	182.3			165.7	178.9	3.1	3.4
Diesel oil	339.1	342.5	119.9	121.1	208.4	210.5	10.8	10.9
Aviation Fuel	287.2	296.4	141.6	147.3	141.9	147.6	3.7	3.8
Kerosene	2.1	2.2			0.8	0.8	1.3	1.4
Fuel oil	489.7	470.1	217.0	208.3	265.0	254.4	7.7	7.4
LPG	167.0	180.4	82.7	89.3	74.9	80.9	9.4	10.2

Data Source: Statistics Mauritius

1.9 Dependency on Imported Energy Carriers

In 2016, the dependency rate on imported energy carriers was **85.4%**. The trend of the dependency rate from 2007 to 2016 is shown in Table 1.11.

Table 1.11 - Energy Dependency Rate, 2007 – 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
82.2%	81.2%	82.5%	83.1%	83.8%	84.4%	84.9%	85.8%	83.6%	85.4%

2 ELECTRICITY PRODUCTION CAPACITY

The capacity of power plants connected to the grid in 2016 is shown in Table 2.1.

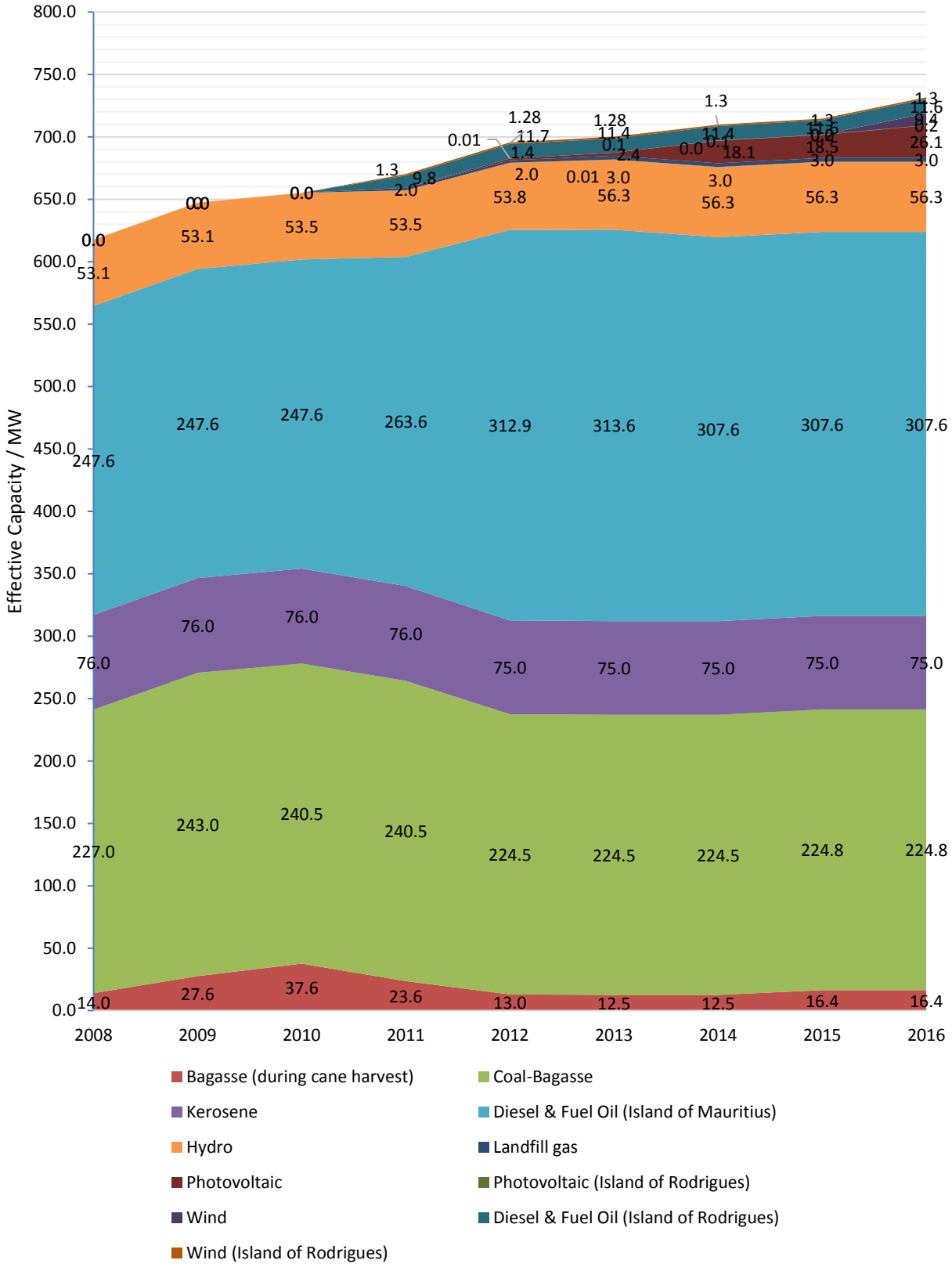
Table 2.1 - Capacity of power plants in 2016

Type of power plant		Installed plant capacity (MW)	Total Installed plant capacity (MW)	Effective plant capacity (MW)	Total effective plant capacity (MW)
BAGASSE (during cane harvest)	Medine	22.50	22.50	16.40	16.40
COAL- BAGASSE	Alteo Energy Ltd (formerly Consolidated Energy Ltd)	36.70	258.80	33.00	224.80
	Terragen Ltd (formerly Compagnie Thermique de Belle Vue)	71.20		62.00	
	Consolidated energy limited	28.40		25.80	
	Omnicane Thermal Energy Operations (St Aubin) Ltd (formerly Compagnie Thermique du Sud)	32.50		30.00	
	Omnicane Thermal Energy Operations (La Baraque) Ltd (formerly Compagnie Thermique de Savannah)	90.00		74.00	
HYDRO	Champagne	30.00	60.74	28.00	56.30
	Ferney	10.00		10.00	
	Tamarind Falls	11.70		9.50	
	Le Val	4.00		4.00	
	Reduit	1.20		1.00	
	Cascade Cecile	1.00		1.00	
	Magenta	0.94		0.90	
	Midlands Dam	0.35		0.35	
	La Nicoliere	0.35		0.35	
	La Ferme	1.20		1.20	
LANDFILL GAS	Sotravic Ltd	3.45	3.45	3.00	3.0
KEROSENE	Nicolay	78.40	78.40	75.00	75.00
DIESEL & FUEL OIL	St Louis	89.00	336.60	66.60	307.60
	Fort Victoria	109.60		107.00	
	Fort George	138.00		134.00	
PHOTOVOLTAIC	Island of Mauritius[1]	27.09	27.10	26.11	26.12
	Fort George	0.005		0.005	
	Fort Victoria	0.005		0.005	
PHOTOVOLTAIC	Island of Rodrigues[2]	0.20	0.20	0.20	0.20
WIND	Island of Mauritius (IPP)	9.35	9.35	9.35	9.35
WIND	Island of Rodrigues	1.28	1.28	1.28	1.28
DIESEL & FUEL OIL	Island of Rodrigues	12.40	12.40	11.60	11.60
Total power available on grid (Island of Mauritius) (MW)		796.94	796.94	718.57	718.57
Total power available on grid (Island of Rodrigues) (MW)		13.88	13.88	13.08	13.08
Total (MW)		**810.82**	**810.82**	**731.65**	**731.65**

[1] Includes SSDG, MSDG and Sarako
[2] Includes SSDG and MSDG

Data Source: Statistics Mauritius

The trend of power plant capacity from 2008 to 2016 (Island of Mauritius) is shown in Figure 2.1.



Data Source: Statistics Mauritius

Figure 2.1 - Trend of effective power plant capacity, 2008 – 2016

3 ELECTRICITY PRODUCTION

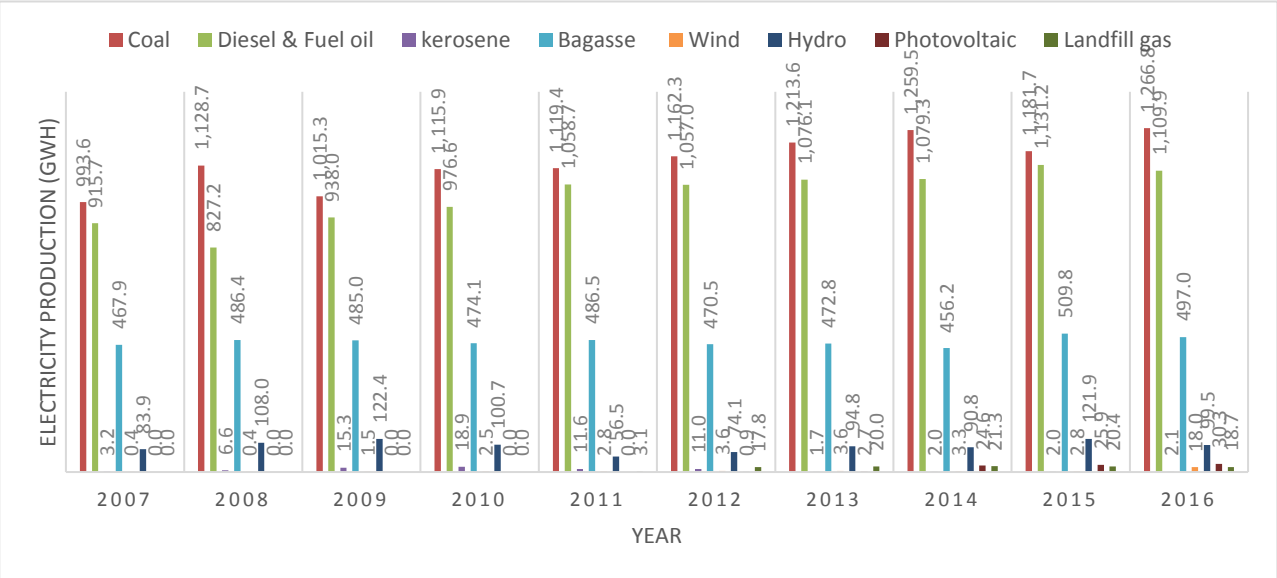
Overall conversion efficiencies of power plants in 2016 are given in Table 3.1

Table 3.1 - Conversion efficiency of power plants

2016	Fuel input	Electricity production		Overall conversion efficiency
	ktoe	GWh	ktoe	%
Coal	434.8	1266.8	108.9	25.0
Diesel & Fuel Oil (Island of Mauritius)	207.2	1072.9	92.3	44.5
Diesel & Fuel Oil (Island of Rodrigues	8.2	37.0	3.2	39.0
kerosene	0.8	2.1	0.2	25.0
Bagasse	180.7	497.0	42.7	23.6
TOTAL (Thermal)	**832.5**	**2875.8**	**247.3**	**29.7**

Data Source: Statistics Mauritius

Figure 3.1 shows the trend of electricity production per source of energy over the period 2007 to 2016.

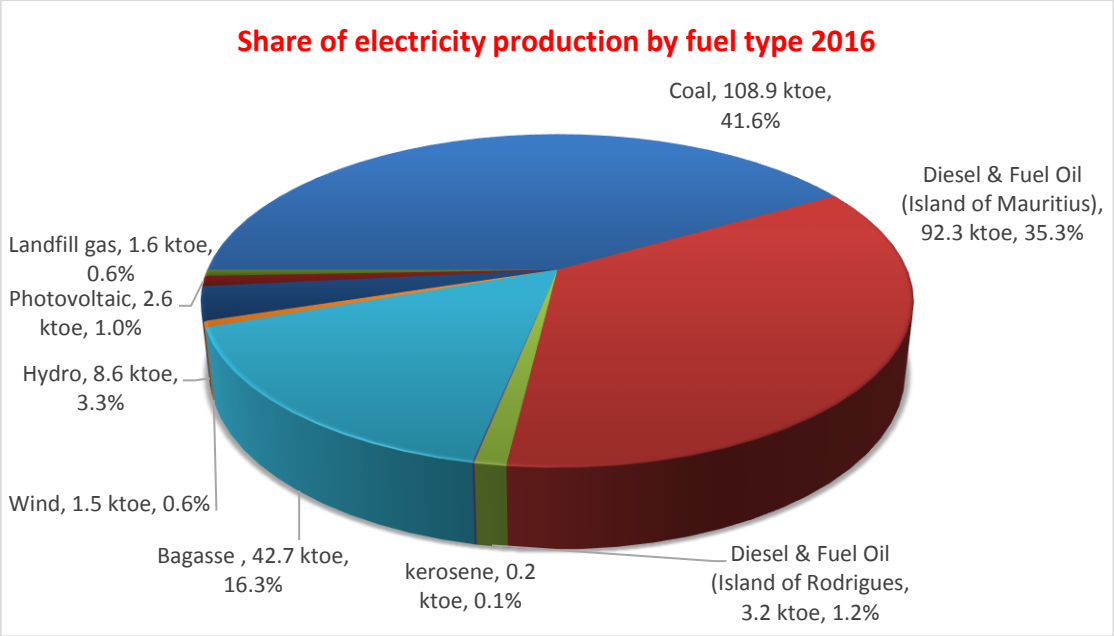


Data Source: Statistics Mauritius

Figure 3.1 - Trend of electricity production, 2007 - 2016

Total electricity production over the previous year increased by 1.6 % in 2016 compared to 2.0 % in 2015. In 2016, 78.2% of electricity production was derived from fossil fuel sources while 21.8% of electricity production was from renewable energy sources.

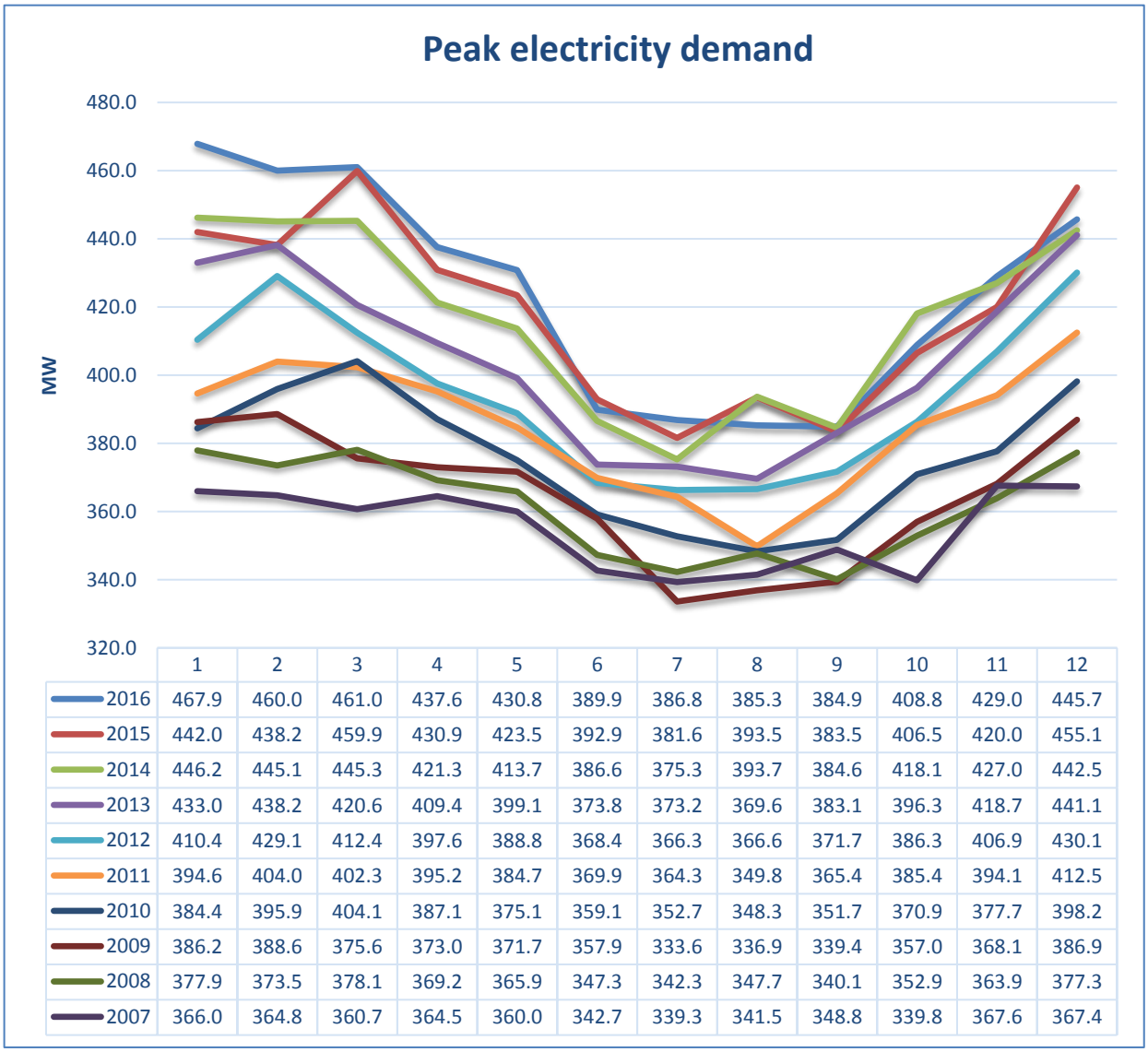
The share of electricity generated from renewable energy sources in 2016 was 21.8% which is less than the share of 22.7% in 2015. This is due to the decrease in electricity production from bagasse by 2.5% and 18.4 % from hydro power stations as compared to 2015.



Data Source: Statistics Mauritius

Figure 3.2 - Share of electricity production by fuel type

Figure 3.3 shows the monthly peak electricity demand for the years 2007 - 2016 (Island of Mauritius).



	1	2	3	4	5	6	7	8	9	10	11	12
2016	467.9	460.0	461.0	437.6	430.8	389.9	386.8	385.3	384.9	408.8	429.0	445.7
2015	442.0	438.2	459.9	430.9	423.5	392.9	381.6	393.5	383.5	406.5	420.0	455.1
2014	446.2	445.1	445.3	421.3	413.7	386.6	375.3	393.7	384.6	418.1	427.0	442.5
2013	433.0	438.2	420.6	409.4	399.1	373.8	373.2	369.6	383.1	396.3	418.7	441.1
2012	410.4	429.1	412.4	397.6	388.8	368.4	366.3	366.6	371.7	386.3	406.9	430.1
2011	394.6	404.0	402.3	395.2	384.7	369.9	364.3	349.8	365.4	385.4	394.1	412.5
2010	384.4	395.9	404.1	387.1	375.1	359.1	352.7	348.3	351.7	370.9	377.7	398.2
2009	386.2	388.6	375.6	373.0	371.7	357.9	333.6	336.9	339.4	357.0	368.1	386.9
2008	377.9	373.5	378.1	369.2	365.9	347.3	342.3	347.7	340.1	352.9	363.9	377.3
2007	366.0	364.8	360.7	364.5	360.0	342.7	339.3	341.5	348.8	339.8	367.6	367.4

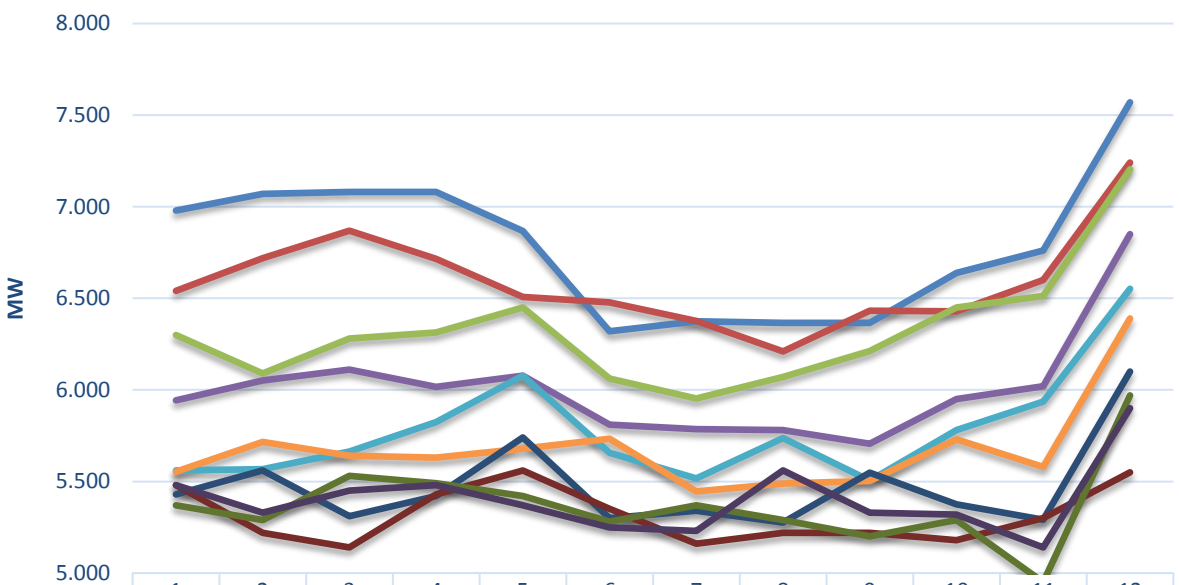
Data Source: Statistics Mauritius

Figure 3.3 - Peak electricity demand (Island of Mauritius), 2007 – 2016

In 2016, peak power demand varied between 384.9 MW and 467.9 MW. Peak demand of 467.9 MW occurred in January.

The peak power demand is observed to follow prevailing meteorological conditions, mainly temperature with peaks noted in the summer season, which implies additional power demand for air conditioning across the island. Electricity use for refrigeration also increases during the summer period.

Figure 3.4 shows the monthly peak electricity demand for the years 2007 to 2016 (Island of Rodrigues).

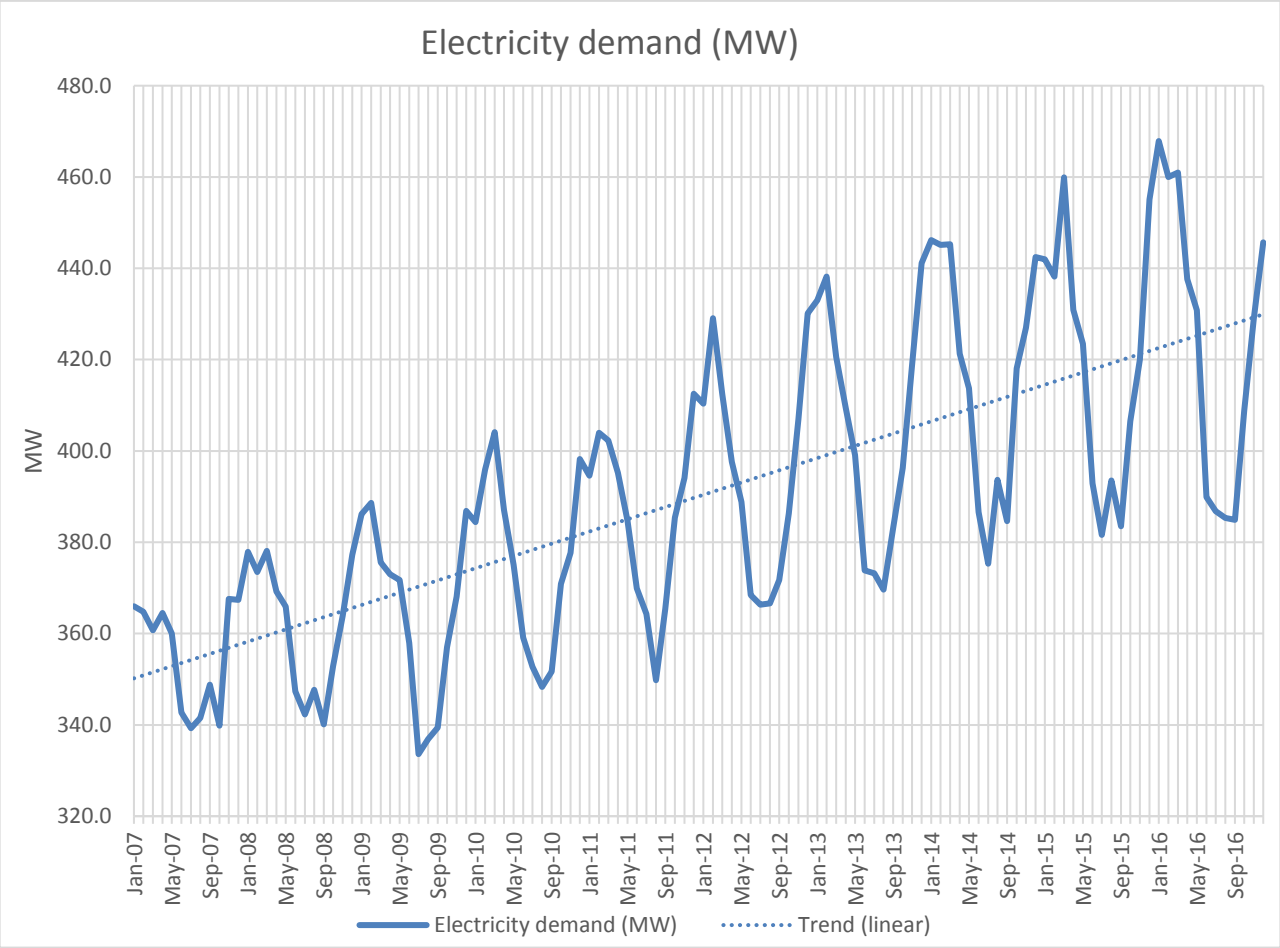


	1	2	3	4	5	6	7	8	9	10	11	12
2016	6.980	7.070	7.080	7.080	6.868	6.320	6.374	6.366	6.366	6.639	6.760	7.570
2015	6.540	6.719	6.870	6.716	6.507	6.477	6.376	6.210	6.433	6.429	6.600	7.241
2014	6.300	6.090	6.280	6.314	6.450	6.062	5.953	6.070	6.212	6.450	6.512	7.204
2013	5.943	6.052	6.110	6.016	6.078	5.810	5.785	5.780	5.706	5.950	6.020	6.850
2012	5.561	5.568	5.663	5.825	6.077	5.656	5.517	5.736	5.505	5.781	5.936	6.552
2011	5.554	5.716	5.640	5.630	5.680	5.733	5.446	5.488	5.503	5.730	5.579	6.390
2010	5.430	5.560	5.310	5.420	5.740	5.300	5.340	5.276	5.548	5.376	5.292	6.100
2009	5.480	5.220	5.140	5.430	5.560	5.350	5.160	5.220	5.220	5.180	5.300	5.550
2008	5.370	5.290	5.530	5.490	5.420	5.280	5.370	5.290	5.200	5.290	4.950	5.970
2007	5.480	5.330	5.450	5.480	5.370	5.250	5.230	5.560	5.330	5.320	5.140	5.900

Data Source: Statistics Mauritius

Figure 3.4 - Peak electricity demand (Island of Rodrigues), 2007 - 2016

Peak demand has consistently increased as shown by the demand trend over the period 2007 - 2016 (Island of Mauritius) in Figure 3.5.

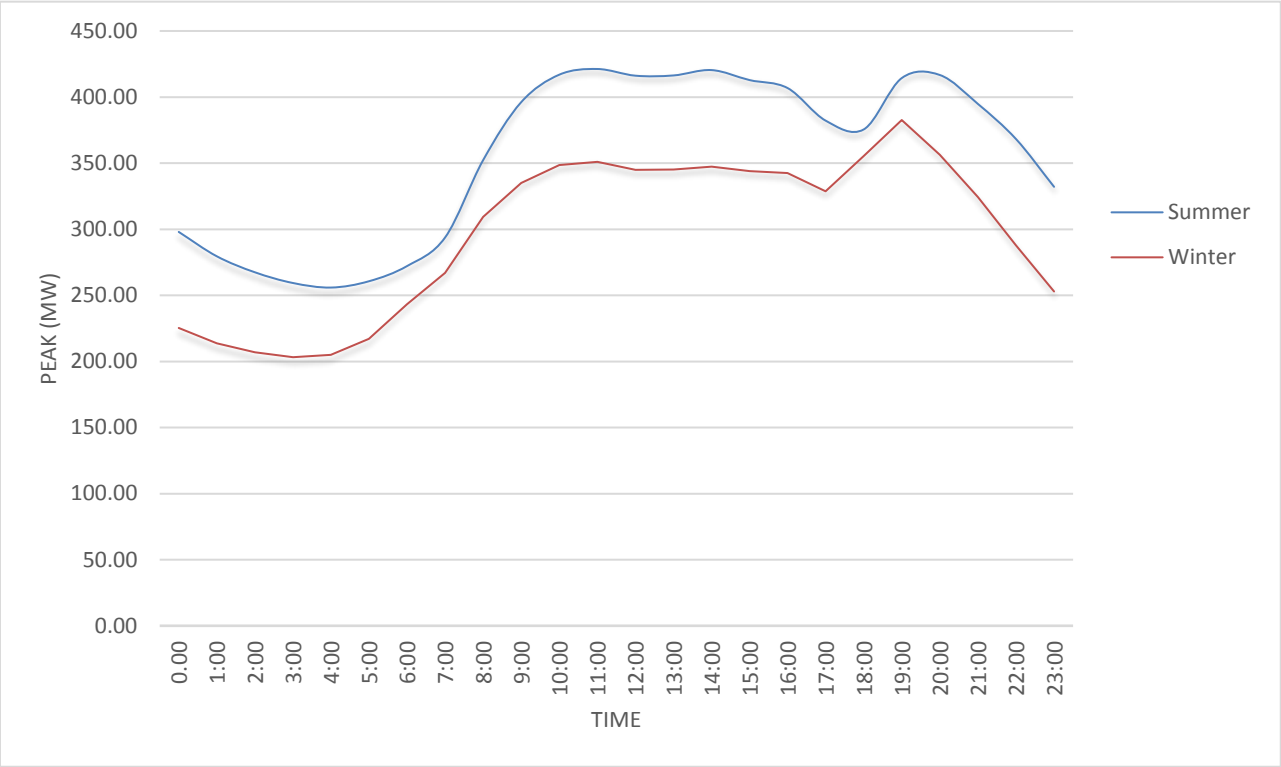


Data Source: Statistics Mauritius

Figure 3.5 - Electricity demand (MW) trend, January 2007 to Dec 2016

Based on the seasonality in Mauritius, two typical demand profiles namely winter demand profile and summer demand profile are identified. In summer, demand is higher than in winter. This is mainly due to the use of air conditioning loads. However, during the day, the increase in demand is due to the Commercial and Industrial Sectors while the residential sector contributes mainly in the evening.

Figure 3.6 shows the hourly seasonal peak demand profile for the year 2016.



Data Source: CEB

Figure 3.6 – Seasonal peak demand profile, 2016

Table 3.2 provides a summary of the electricity production over the period 2007 to 2016 (Island of Mauritius).

Table 3.2 - Summary of electricity production, 2007 – 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fossil (GWh)	1,912.5	1,962.4	1,968.5	2,111.4	2,189.6	2,230.3	2,291.3	2,340.7	2,314.9	2,378.8
Renewables (GWh)	552.2	594.8	608.9	577.3	548.9	566.8	594.0	596.2	680.6	663.5
Increase (GWh)	114.6	92.5	20.2	111.3	49.9	58.6	88.1	51.6	58.7	214.8
Percentage increase overall	4.9 %	3.8 %	0.8 %	4.3 %	1.9 %	2.1 %	3.2 %	1.8 %	2.0 %	1.6 %
Percentage of renewables	22.4%	23.3%	23.6%	21.5%	20.0%	20.3%	20.6%	20.3%	22.7%	21.8%
Peak demand (MW) (Island of Mauritius)	367.6	378.1	388.6	404.1	412.5	430.1	441.1	446.2	459.9	467.9
Peak demand evolution	0.1 %	2.9 %	2.8 %	4.0 %	2.1 %	4.3 %	2.5 %	1.2 %	3.1 %	1.7 %

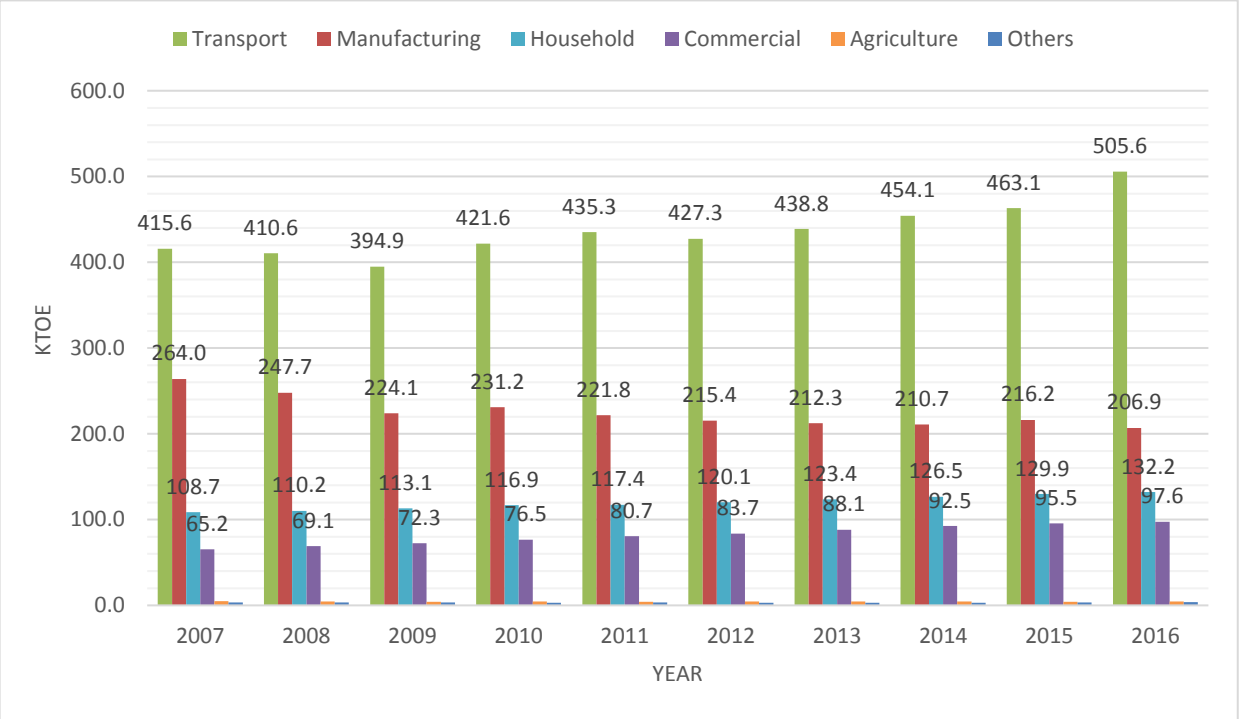
Data Source: Statistics Mauritius

4 FINAL ENERGY CONSUMPTION

4.1 General

Final energy consumption describes consumption of end users, excluding energy used for electricity generation and losses in the energy transfer matrix. Figure 4.1 shows the final energy consumption on a sector basis, for the period 2007 to 2016. It can be noted that the total final energy consumption in 2016

amounted to 951.1 ktoe, representing an increase of 4.2 % compared to 2015. As can be seen in Figure 4.1, an increase in final energy consumption has been observed in all other sectors, with the highest increase (+ 42.5 ktoe) being for the transport sector.



Data Source: Statistics Mauritius

Figure 4.1 : Final energy consumption by sector, 2007– 2016

4.2 Final Energy consumption - Transport sector

Table 4.1 gives the fuel consumption in the sub-sectors of the transport sector, while Figure 4.2 shows the share of fuel use in each sub-sector and Figure 4.3 depicts the trend in consumption over the period 2007 – 2016.

Table 4.1 - Fuel consumption in the Transport sector in 2016

Transport sector	Gasoline	Diesel	Aviation fuel (local aircraft)	LPG	Fuel Oil	Total (ktoe)
Land	174.7	170.2		3.8		348.7
Aviation			147.6			147.6
Sea[3]	4.2	1.2			3.9	9.3
Total (ktoe)	178.9	171.5	147.6	3.8	3.9	505.6

Data Source: Statistics Mauritius

[3] Sea Transport comprises interisland traffic for both cargo and passengers, pleasure crafts in the tourism sector and Mauritian fishing vessels.

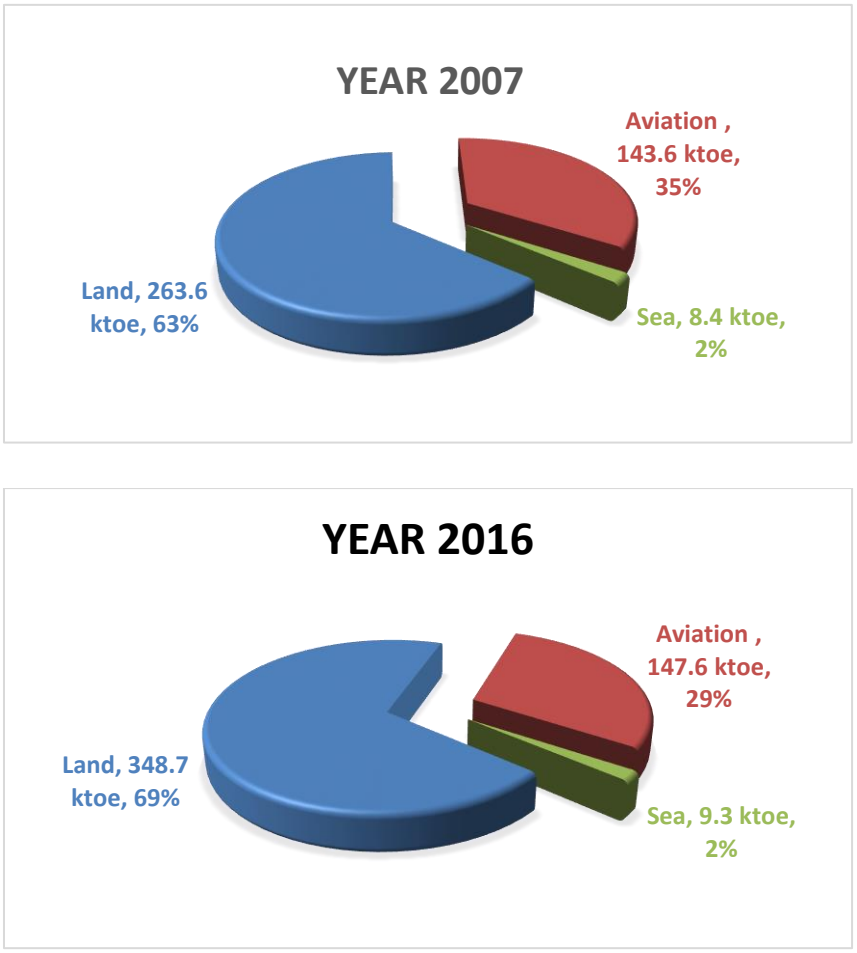
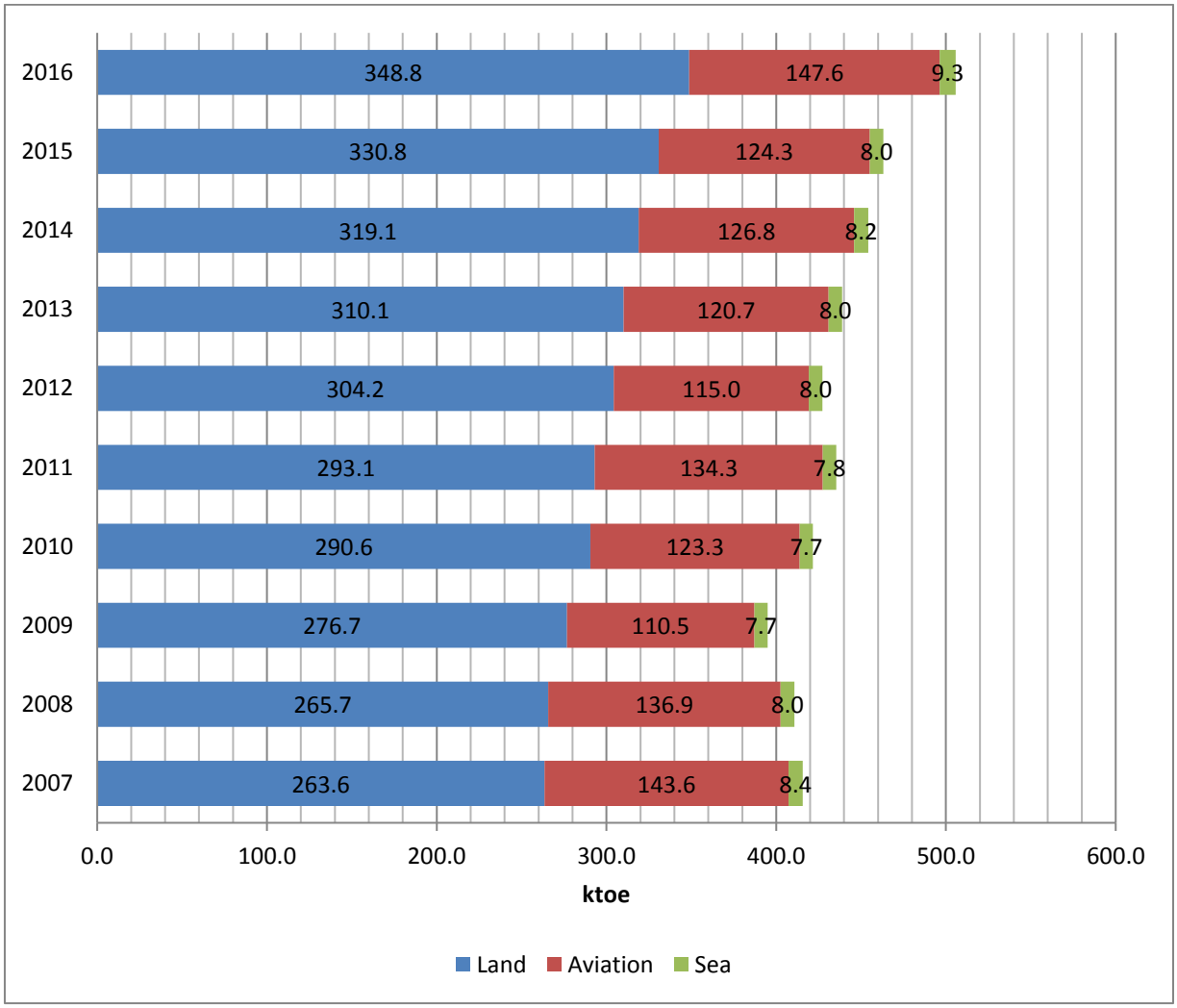


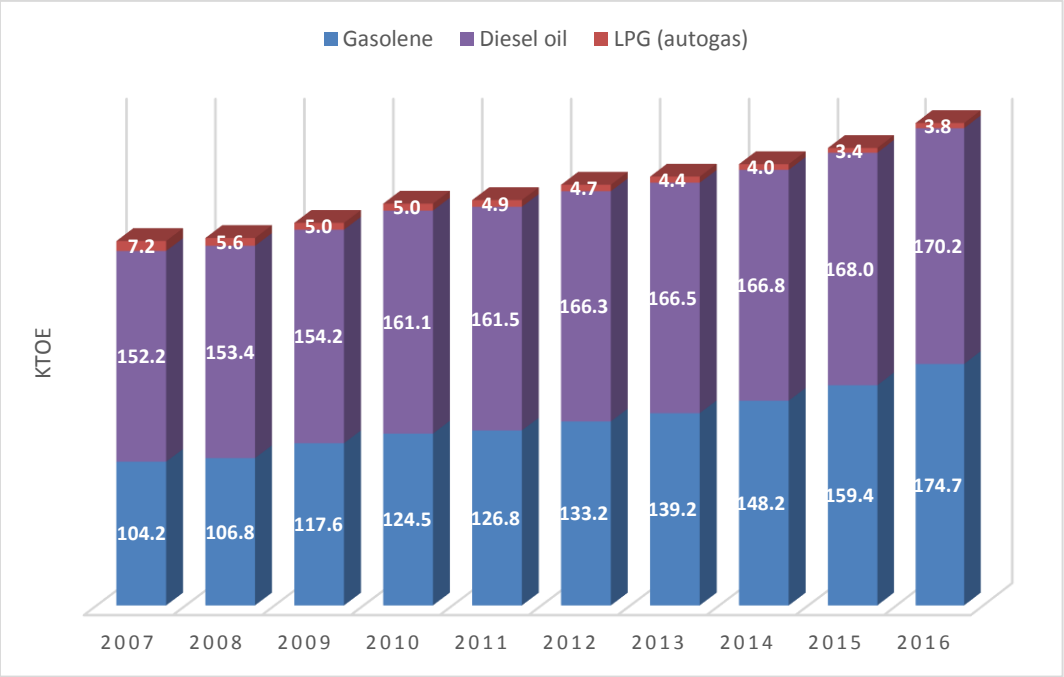
Figure 4.2 - Fuel consumption share in sub-sectors of the Transport sector in 2007 and 2016



Data Source: Statistics Mauritius

Figure 4.3 - Trend of Fuel Consumption in sub-sectors of Transport sector 2007 – 2016

The trend of fuel consumption in the land transport sector over the period 2007 to 2016 is shown in Figure 4.4. It may be noted that fuel consumption in land transport reached 348.7 ktoe in 2016; representing an increase of 5.4 % over 2015.



Data Source: Statistics Mauritius

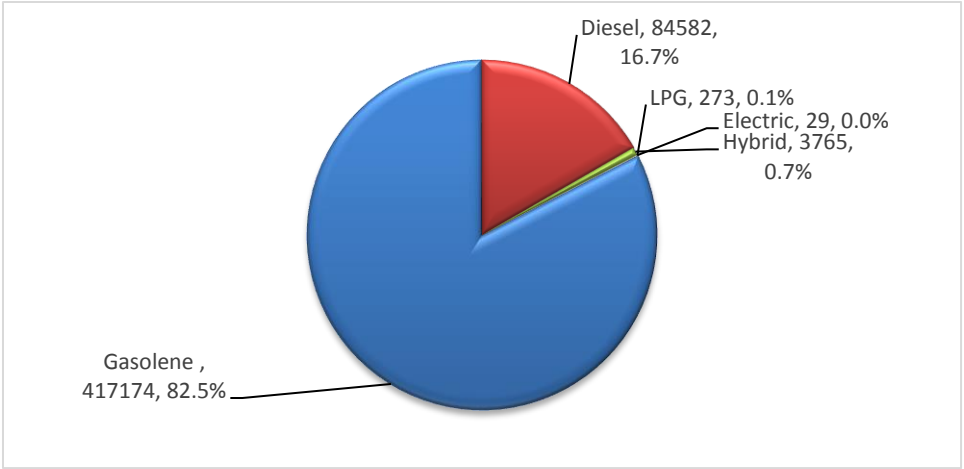
Figure 4.4 - Trend of Fuel Consumption in land Transport, 2007 - 2016

Compared to 2015, it may be observed that in 2016:-

- Diesel consumption increased by 1.3%.
- Gasoline consumption increased by 9.6 %.
- LPG (autogas) consumption has increased by 11.8 %

4.3 Vehicle fleet

The fleet of powered vehicles for Mauritius comprised 505 823 vehicles in 2016.



Data Source: National Transport Authority

Figure 4.5 - Vehicle fleet by type of fuel

In 2016 the number of hybrid powered vehicles increased to 3765 compared to 2413 in 2015.

It may be noted from Table 4.2 that there has been an increase in new and second hand imported vehicles registrations in 2016 of +70 % compared to 2015.

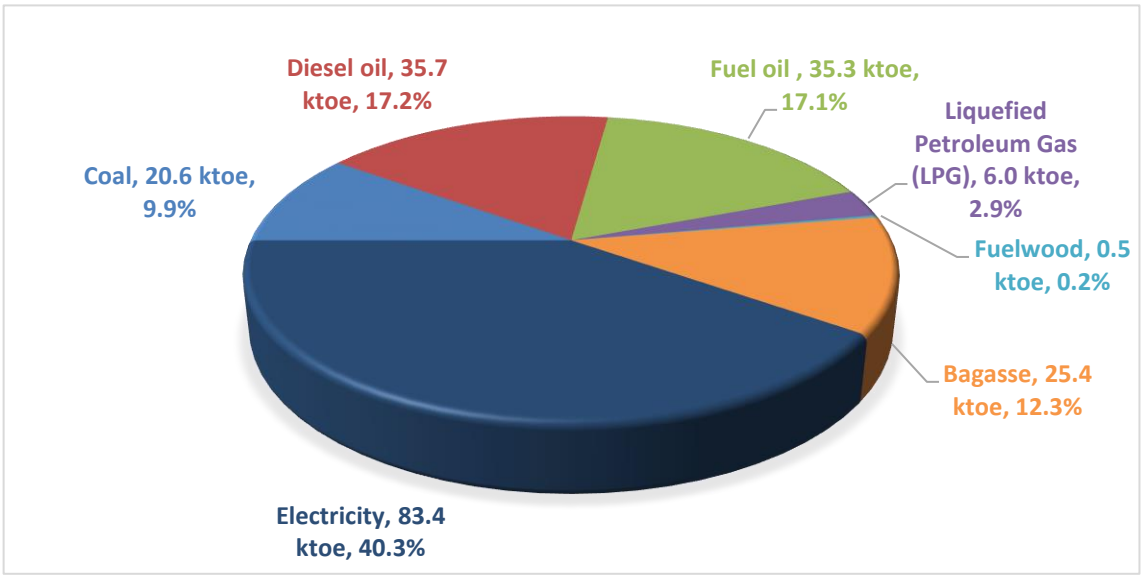
Table 4.2 - New and second hand imported car registration

Engine capacity	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% growth in 2016 over 2015
Up to 1,000 c.c	535	726	804	948	856	1634	1982	1519	3205	8988	180.4
1,001 - 1,250 c.c	1338	1580	1211	1060	1158	1582	2056	3166	4128	3199	-22.5
1,251 - 1,400 c.c	1283	1801	1691	2205	2015	2691	3321	3212	1986	3888	95.8
1,401 - 1,500 c.c	2033	2042	1835	2384	1771	1824	2528	2425	2543	3138	23.4
1,501 - 2,000 c.c	2482	2858	2927	2105	2867	3557	3240	3039	2743	3556	29.6
2,001 - 2,250 c.c	72	338	32	9	20	30	51	56	61	160	162.3
2,251 - 2,500 c.c	91	169	155	196	166	58	432	512	335	1224	265.4
2,501 - 3,000 c.c	129	162	139	154	185	142	102	94	122	676	454.1
Above 3,000 c.c	82	115	72	87	71	77	48	44	34	937	2655.9
Total	**8045**	**9791**	**8866**	**9148**	**9109**	**11595**	**13760**	**14067**	**15157**	**25766**	**70.0**

Data Source: National Transport Authority

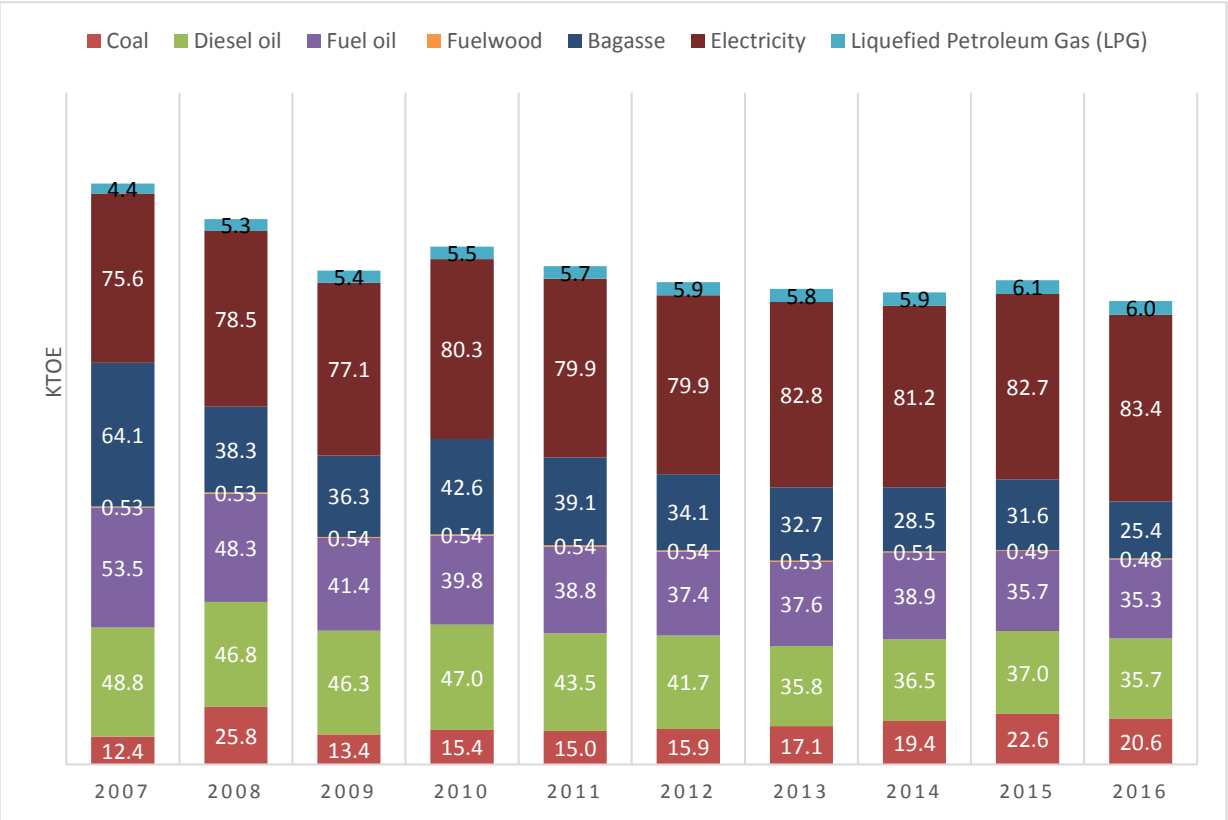
4.4 Final energy consumption - Manufacturing sector

Total energy consumption in the manufacturing sector amounted to 206.9 ktoe in 2016 which was 4.3 % less than in 2015. Figure 4.6 shows the share of different energy sources used in the manufacturing sector in 2016, while Figure 4.7 provides the trend for the period 2007 to 2016.



Data Source: Statistics Mauritius

Figure 4.6 - Share of energy sources, Manufacturing Sector, 2016

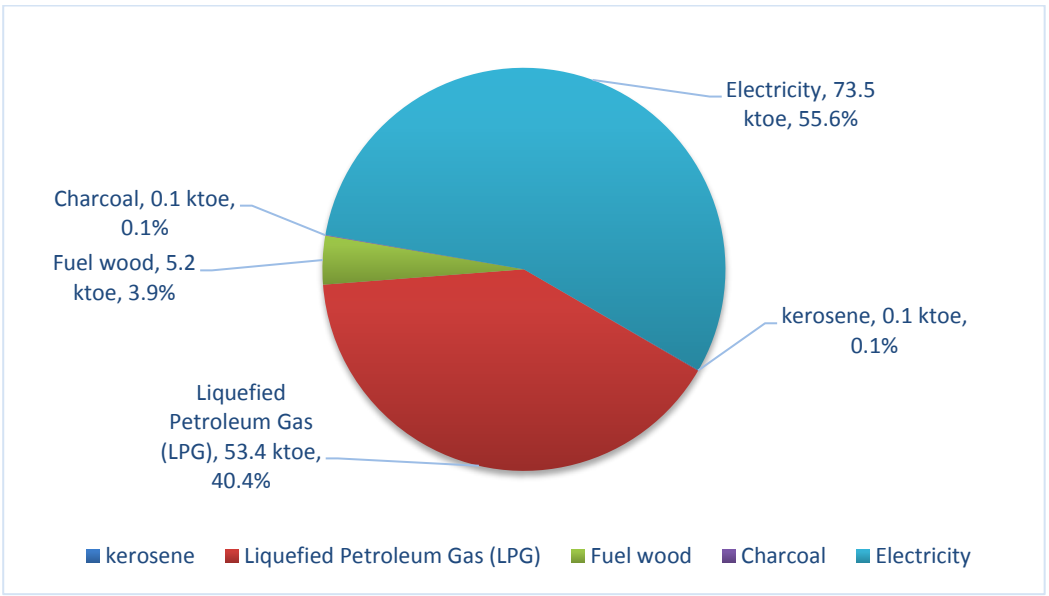


Data Source: Statistics Mauritius

Figure 4.7 - Trend of fuel consumption in the Manufacturing Sector, 2007 – 2016

4.5 Final energy consumption - Household sector

Total energy consumption in the household sector amounted to 132.2 ktoe in 2016 representing a 1.8% growth over 2015. The share of energy sources in the Household sector in 2016 is given in Figure 4.8.

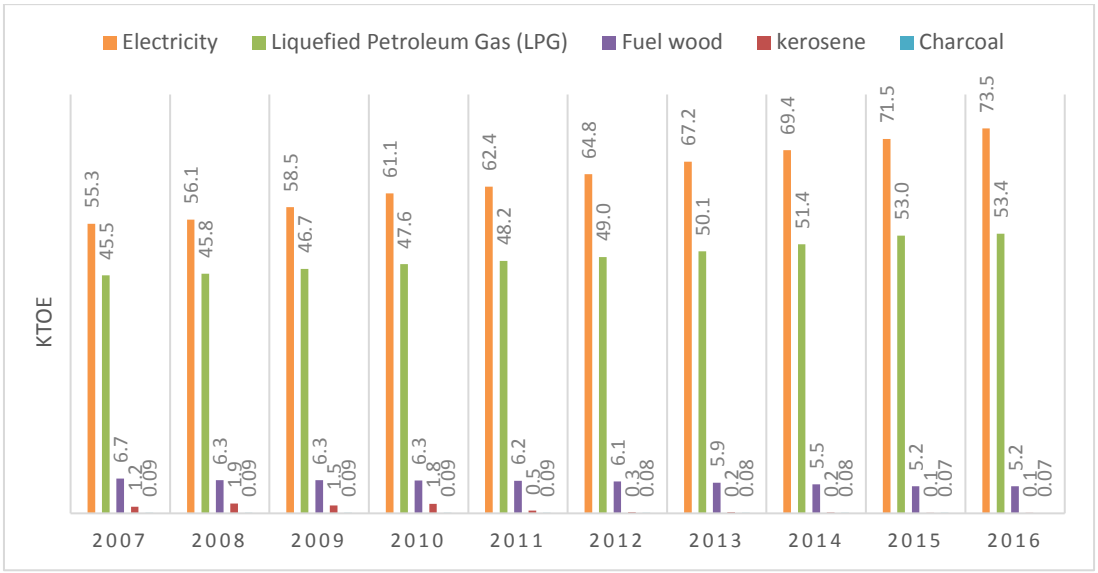


Data Source: Statistics Mauritius

Figure 4.8 - Share of energy sources, Household sector, 2016

As can be seen from Figure 4.8, the main sources of energy for the household sector are LPG and electricity. LPG is used mostly for cooking and water heating. Fuel wood is still in use as cooking fuel albeit not very significant. Use of kerosene as fuel has nearly ceased since an increase in its retail price in 2006. In 2016 the consumption of electricity and LPG have both increased compared to 2015 by 2.8 % and 0.75 % respectively.

The trend of the use of each fuel over the period 2006 to 2016 is shown in Figure 4.9.

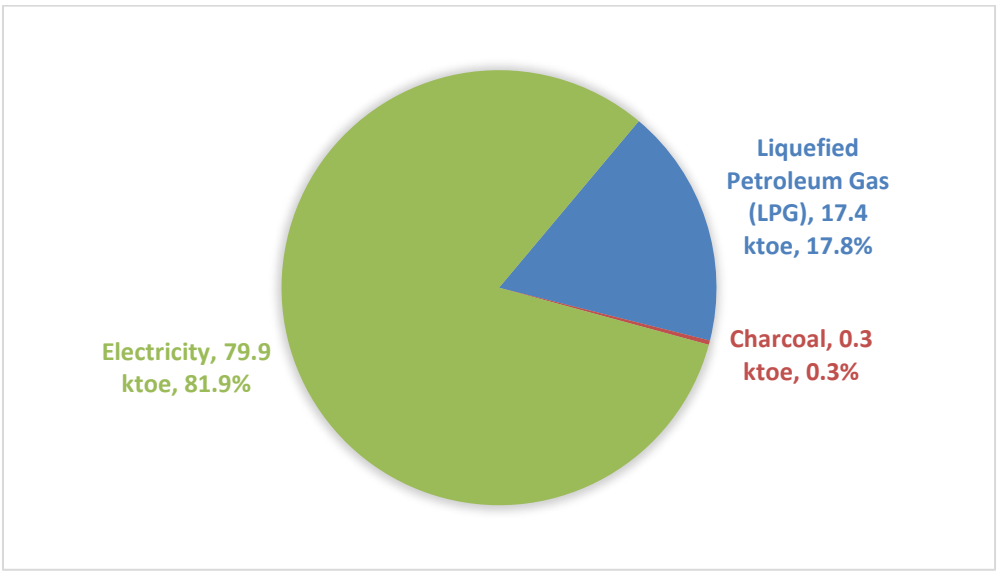


Data Source: Statistics Mauritius

Figure 4.9 - Trend of fuel consumption in the Household sector, 2007 - 2016

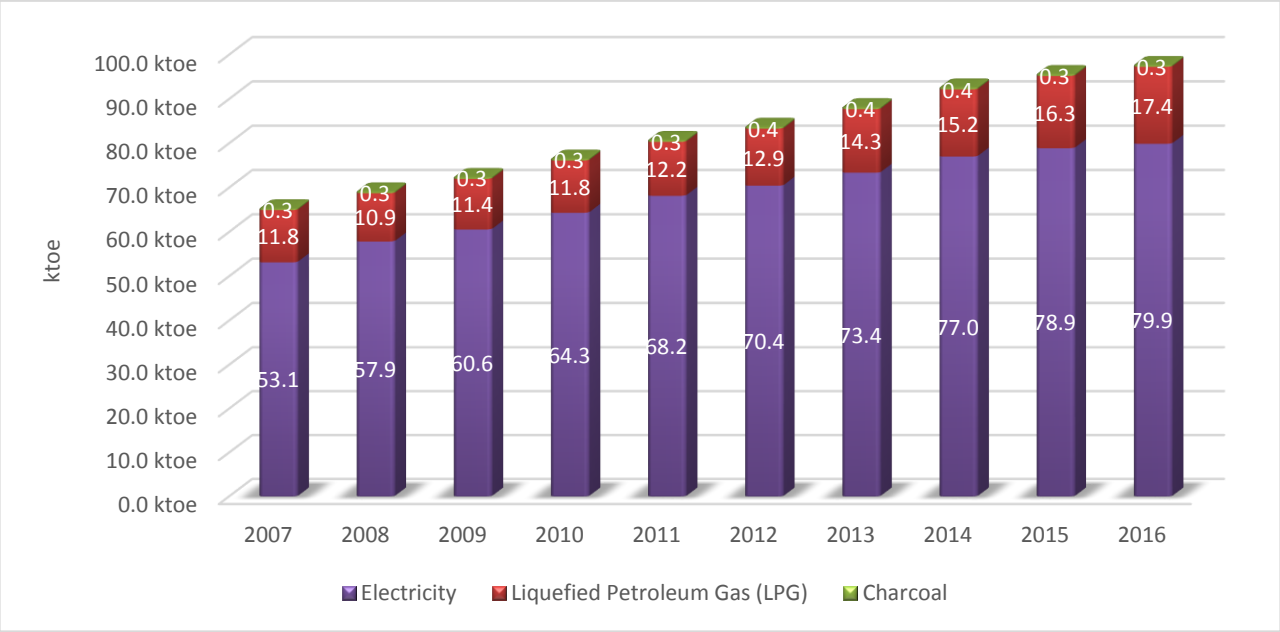
4.6 Final energy consumption - Commercial sector

Total energy consumption in the Commercial sector amounted to 97.6 ktoe in 2016 and the share of energy sources in 2016 is shown in Figure 4.10, while Figure 4.11 gives the trend of fuel consumption over the period 2007 to 2016.



Data Source: Statistics Mauritius

Figure 4.10 - Share of energy sources in the Commercial sector, 2016



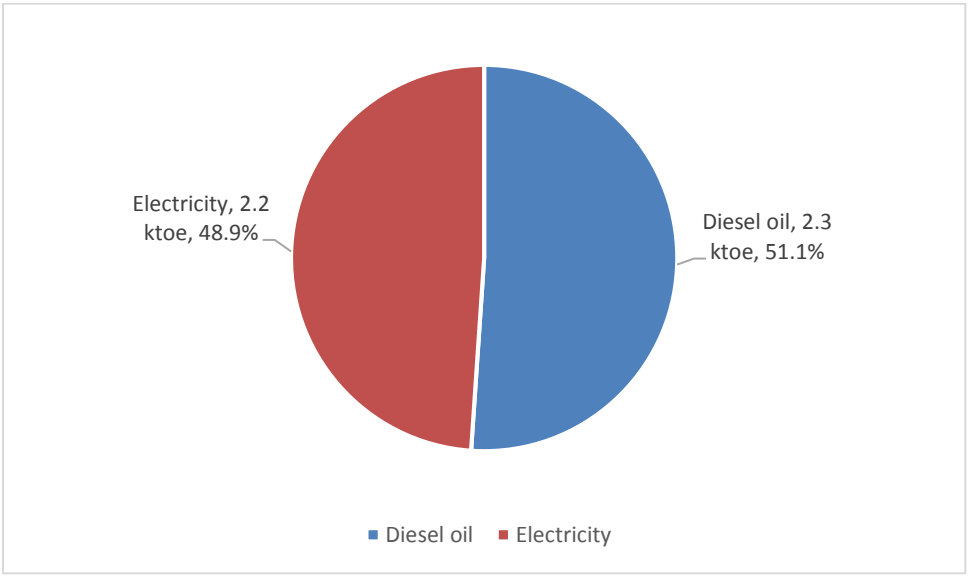
Data Source: Statistics Mauritius

Figure 4.11 - Trend of fuel consumption in the Commercial sector, 2007 - 2016

In 2016, electricity consumption in the commercial sector increased by 1.3 % compared to 2015, indicating continued expansion in the sector. The main areas of electricity use in this sector are refrigeration, air conditioning, decorative and security lighting.

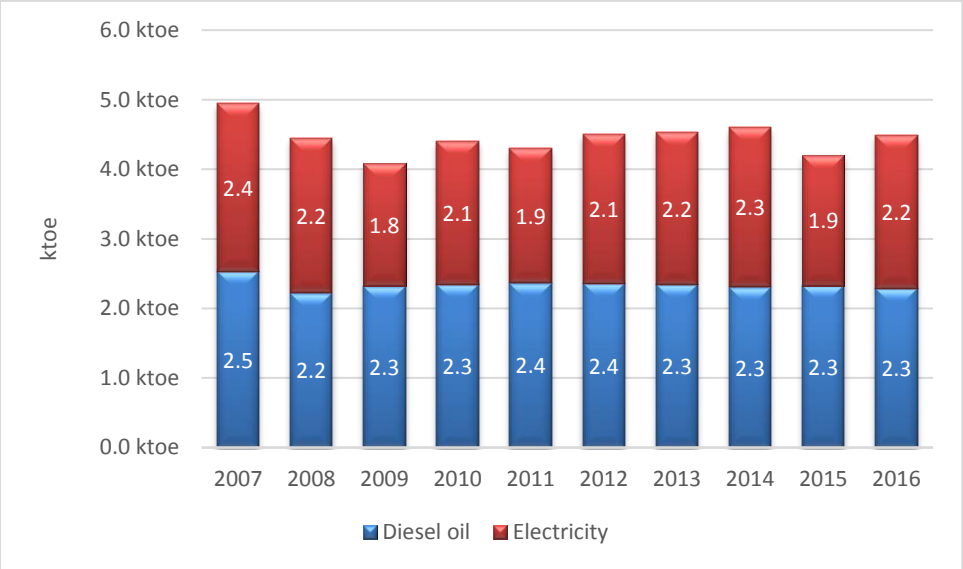
4.7 Final energy consumption - Agriculture sector

Total energy consumption in the agriculture sector amounted to 4.5 ktoe in 2016 and the share of energy sources in 2016 is shown in Figure 4.12, while Figure 4.13 gives the trend of fuel consumption over the period 2007 to 2016.



Data Source: Statistics Mauritius

Figure 4.12 - Share of energy sources in Agriculture sector, 2016



Data Source: Statistics Mauritius

Figure 4.13 - Share of fuel consumption in the Agriculture sector, 2007 – 2016

It may be noted from Figure 4.13 that the fuel consumption in the sector is rather stable, in the range of 4.9 to 4.5 ktoe over the period 2007 to 2016.

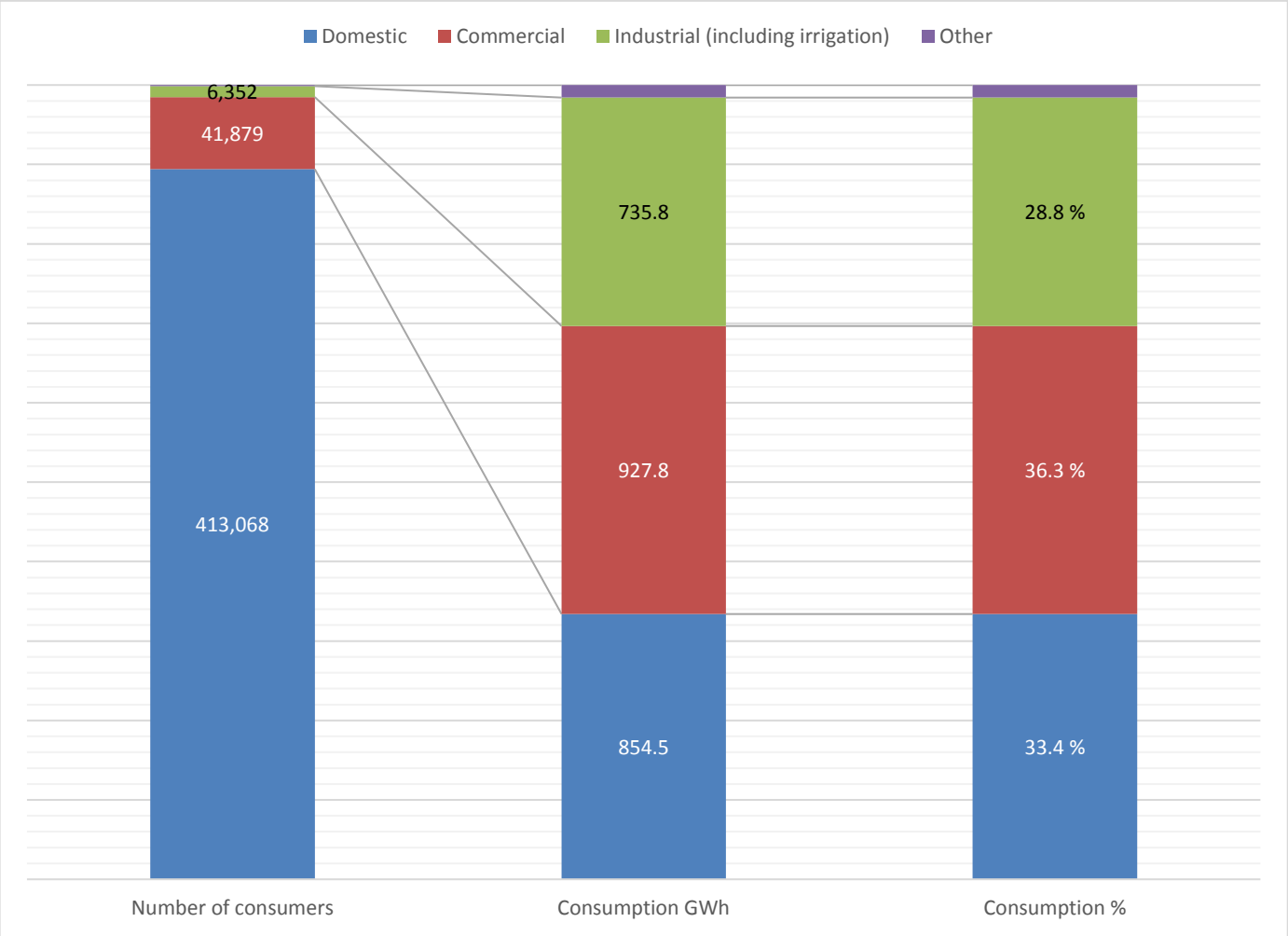
4.8 Electricity consumption

As shown in Table 4.3 electricity sales for 2016 amounted to 2,558.6GWh compared to 2,505.4GWh in 2015, that is an increase of 2.1 % compared to 2015. Figure 4.14 gives details on the number of different category consumers, the electricity consumption in each category and the share of consumption of each of these for year 2016.

Table 4.3 - Electricity consumption per category of consumers, 2016

Type of tariff	Number of consumers		Consumption GWh		Consumption %	
	2015	2016	2015	2016	2015	2016
Domestic	404,463	413,068	831.0	854.5	33.2	33.4
Commercial	41,124	41,879	915.8	927.8	36.6	36.3
Industrial (including irrigation)	6,381	6,352	720.1	735.8	28.7	28.8
Other	637	654	38.5	40.5	1.5	1.6
Total	**452,605**	**461,953**	**2,505.4**	**2,558.6**	**100**	**100**

Data Source: Statistics Mauritius



Data Source: Statistics Mauritius

Figure 4.14 - Electricity consumption per category of consumers, 2016

An analysis of domestic electricity consumption is given in Table 4.4, which shows an increase from 1.95 MWh in 2010 to 2.07 MWh in 2016.

Table 4.4 - Analysis of domestic electricity consumption, 2009 – 2016

Domestic consumers	2010	2011	2012	2013	2014	2015	2016
Consumption (GWh)	710.7	725.3	753.0	780.8	806.3	831.0	854.5
Number of consumers	364474	372315	381096	388910	396335	404463	413068
Average consumption per consumer (MWh)	1.95	1.95	1.98	2.01	2.03	2.06	2.07
Consumption growth rate %	2.7%	-0.1%	1.4%	1.6%	1.3%	1.0%	0.7%
Average consumption per inhabitant (KWh/day)	1.56	1.59	1.64	1.70	1.75	1.80	1.85

Data Source: Statistics Mauritius

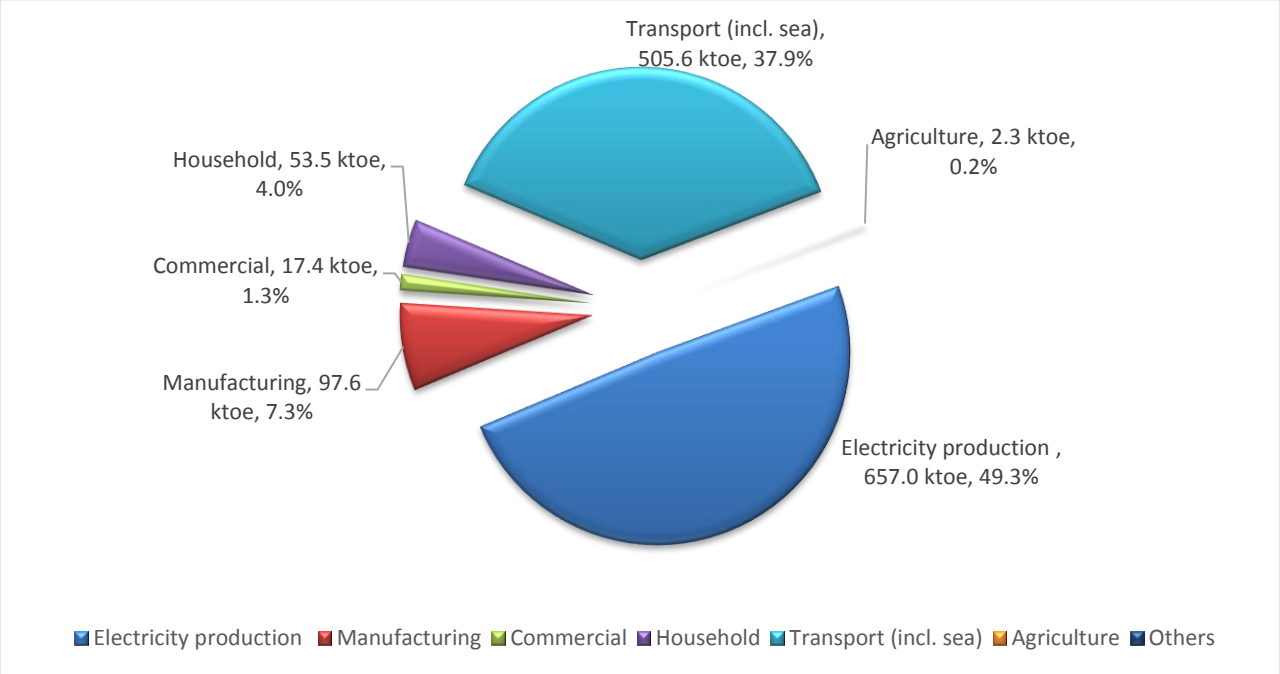
4.9 Fossil Fuel consumption

Table 4.5 provides a breakdown of fossil fuels consumption by sector.

Table 4.5 - Fossil fuel consumption by sector, 2016

Sector	Coal	Gasoline	Diesel	Aviation fuel	Kerosene	HFO	LPG	Total (ktoe)
Electricity production	434.8	-	1.1	-	0.8	215.2	-	651.9
Manufacturing	20.6	-	35.7	-	-	35.3	6.0	97.6
Commercial	-	-	-	-	-	-	17.4	17.4
Household	-	-	-	-	0.1	-	53.4	53.5
Transport (incl. sea)	-	178.9	171.5	147.6	-	3.9	3.8	505.6
Agriculture	-	-	2.3	-	-	-	-	2.3
Others	-	-	-	-	-	-	0.3	0.3
Total (ktoe)	455.3	178.9	210.6	147.6	0.8	259.6	80.9	1328.6

Data Source: Statistics Mauritius



Data Source: Statistics Mauritius

Figure 4.15 - Share of fossil fuel consumption by sector, 2016

5 CO_2 EMISSIONS DUE TO FOSSIL FUELS

5.1 Introduction

The greenhouse gas effect is a natural phenomenon that captures part of the energy emitted by the Sun to the Earth. Greenhouse Gases (sometimes abbreviated GHG) have a role comparable to that of glass of a greenhouse shed. The heat from the atmosphere depends on solar radiation (constant) and the amount of radiation trapped by greenhouse gases.

5.2 Greenhouse Gas Emissions

A greenhouse gas is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in the Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, and ozone.

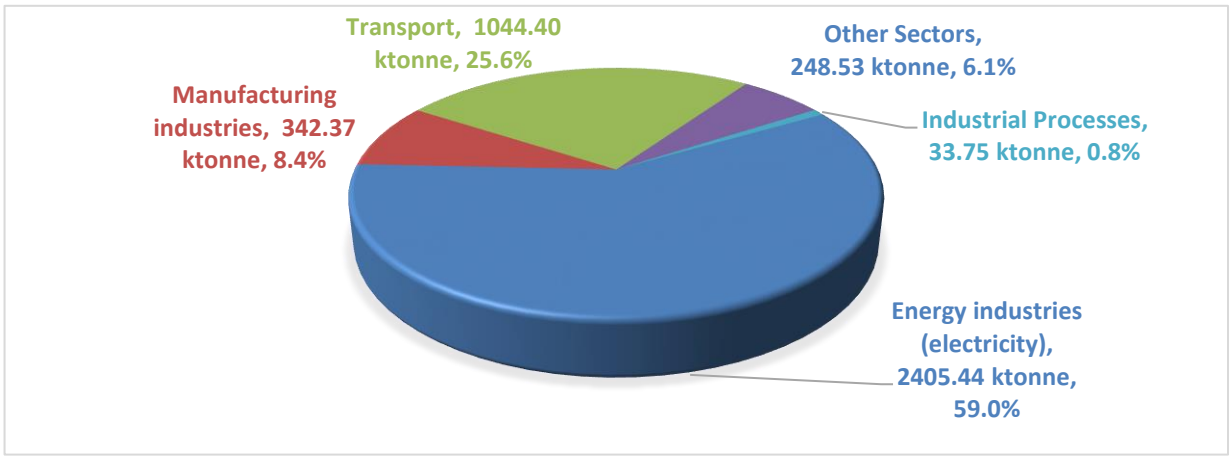
Emissions from human activities mainly concern the following six gases, covered by the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Human activity since the industrial era has led, due to the consumption of fossil energy stocks, to the increase in carbon dioxide in the atmosphere, despite the uptake of a large portion of the emissions through various natural "sinks" involved in the carbon cycle. carbon dioxide (CO_2) emissions produced by human activities come mainly from combustion of fossil fuels, principally coal, heavy fuel oil and its derivatives (gasoline, diesel, Liquefied Petroleum Gas (LPG) etc.), and natural gas.

5.3 Inventory of CO_2 from energy sources for Republic of Mauritius in 2016

This report focuses only on CO_2 emissions (excluding other greenhouse gases) during combustion of fossil fuels. The scope of emissions discussed concerns all CO_2emissions due to fossil energy conversion in all sectors (electricity generation, transport, residential and manufacturing).

Figure 5.1 gives the share of carbon dioxide emission from fossil fuel combustion in each sector in 2016. It may be noted that, in 2016, total CO_2 emissions from fuel combustion activities amounted to **4,040.74 thousand tonnes** and CO_2 removals amounted to **363.30 thousand tonnes**. Net CO_2 emissions for 2016 was **3,711.19 thousand tonnes**.



Data Source: Statistics Mauritius

Note: CO_2 removal excludes the amount of CO_2 sequestrated by trees and vegetations found along rivers and canal reserves and trees along road

Figure 5.1 - Sectoral carbon dioxide emissions from fossil fuel combustion, 2016

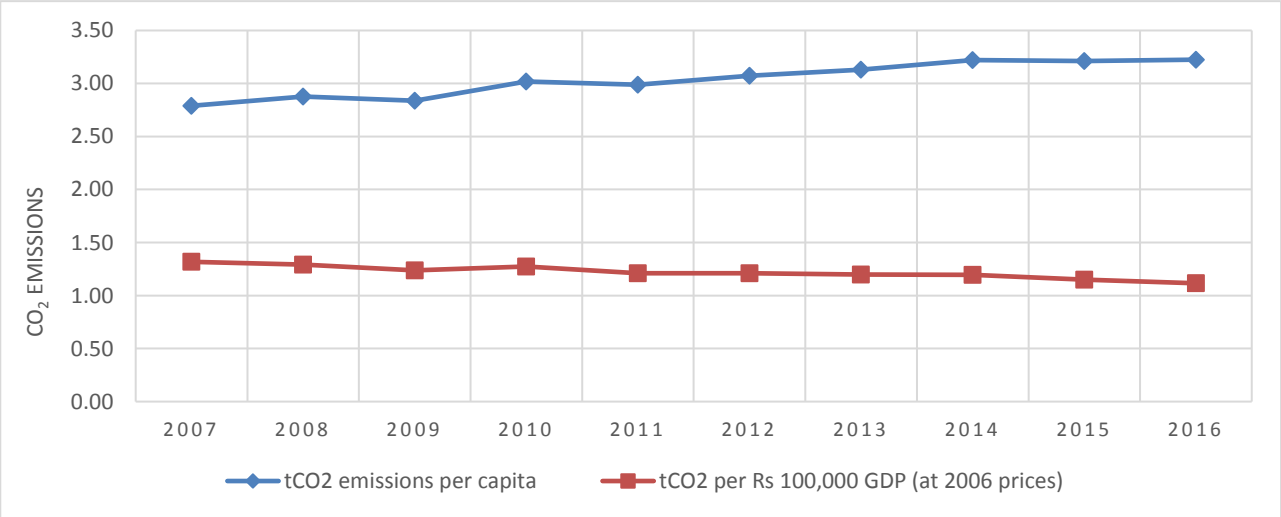
5.4 Trend of CO_2 emissions

Table 5.1 and Figure 5.2 show the trend in tonnes of CO_2 emissions per capita and per Rs 100,000 GDP (at 2000 prices). It may be observed that the amount of CO_2 emitted with respect to GDP has been decreasing since 2010. This shows an increase in the energy efficiency of the local economy.

Table 5.1 - CO2 emissions, 2007 -2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net CO2 emissions (ktonnes)	3106.1	3209.0	3177.9	3414.9	3376.7	3490.0	3573.6	3696.3	3685.4	3711.2
tCO2 emissions per capita	2.8	2.9	2.8	3.0	3.0	3.1	3.1	3.2	3.2	3.2
tCO2 per Rs 100,000 GDP (at 2006 prices)	1.32	1.29	1.24	1.28	1.21	1.21	1.20	1.20	1.15	1.12

Data Source: Statistics Mauritius



Data Source: Statistics Mauritius

Figure 5.2 - Trend of CO_2 emissions, 2007 – 2016

5.5 CO_2 emissions for electricity generation

In 2016, the total CO_2 emissions from electricity generation amounted to **2,405.44 thousand tonnes** representing an increase of 0.5 % compared to 2015.

The Grid Emission Factor for year 2016 was 945.9 gCO_2/kWh *(Data source: Central Electricity Board)*.

5.6 CO_2 emission in the transport sector (inclusive of aviation)

In 2016 emissions have reached **1,044.40 thousand tonnes** of CO_2 representing an increase of 1.6 % compared to 2015.

6 KEY FIGURES

Indicator	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total primary energy requirement	ktoe	1381.8	1404.4	1346.9	1430.7	1426.9	1427.6	1454.8	1491.7	1534.4	1555.3
Imported	*ktoe*	*1136.0*	*1140.9*	*1110.6*	*1189.0*	*1195.7*	*1205.3*	*1235.4*	*1279.4*	*1283.2*	*1328.5*
Local	*ktoe*	*245.8*	*263.5*	*236.3*	*241.6*	*231.1*	*222.3*	*219.4*	*212.3*	*251.3*	*226.8*
Annual increase (Primary Energy)	%	0.4	1.6	-4.1	6.2	-0.3	0.1	1.9	2.5	2.9	1.4
Import Dependency	%	82.2	81.2	82.5	83.1	83.8	84.4	84.9	85.8	83.6	85.4
GDP in 2006 rupees	Rs M	235634	248328	256560	267790	278709	288453	298146	309311	320301	332600
Population		1239630	1244121	1247429	1250400	1252404	1255882	1258653	1260934	1262605	1263473
Energy intensity	toe per Rs 100000 GDP at 2006 prices	0.59	0.57	0.52	0.53	0.51	0.49	0.49	0.48	0.48	0.47
Per capita primary energy requirement	toe	1.11	1.13	1.08	1.14	1.14	1.14	1.16	1.18	1.22	1.23

Data Source: Statistics Mauritius

7 SUMMARY TABLE 2015

	Fossil Fuels								Renewable Energy										
	Coal	Petroleum products							Biomass				Hydro	Solar		Wind	lectricit	Heat	TOTAL
-' Consumption in ktoe		Gasolene	Diesel	Aviation fuel	Kerosene	HFO	LPG	Used oils	Bagasse	Landfill Gas	Fuelwood	Charcoal		PV	Thermal		+ Prod	+ Prod	
+' Production and supply																	- Cons	- Cons	
Primary Energy and Supply																			
Local Production (LP)									230.1	1.8	6.5		10.5	2.2		0.2			251.3
Imported Resources	498.6	167.1	321.9	279.6	2.6	427.3	78.3												1775.4
Re-exports and bunkering			-117.1	-147.5		-160.2													-424.8
Stocks (+ destocking; - stocking)	-51.7	-4.1	4.8	-7.7	-1.7	-8.0	1.0												-67.3
TOTAL Primary Energy (PE)	**446.9**	**163.0**	**209.6**	**124.3**	**0.9**	**259.2**	**79.2**	**0.0**	**230.1**	**1.8**	**6.5**	**0.0**	**10.5**	**2.2**	**0.0**	**0.2**	**0.0**	**0.0**	**1534.4**
% Energy independence (LP/PE)																			16.4
Secondary Energy																			
Coal input for electricity production	-424.3																101.6		-322.7
HFO and diesel input for electricity production			-1.1			-220.4											97.3		-124.2
Bagasse input for electricity production									-198.4								43.8		-154.6
Kerosene input for electricity production					-0.8												0.2		-0.6
Biogas input for electricity production										-1.8							1.8		0.0
Hydro input for electricity production													-10.5				10.5		0.0
PV input for electricity production PV														-2.2			2.2		0.0
Wind input for electricity production																-0.2	0.2		0.0
Electricity production own use																	-3.8		-3.8
Solar Thermal heat production																			0.0
Fuelwood to charcoal											-0.8	0.4							-0.4
TOTAL Secondary supply (SS)	**-424.3**	**0.0**	**-1.1**	**0.0**	**-0.8**	**-220.4**	**0.0**	**0.0**	**-198.4**	**-1.8**	**-0.8**	**0.4**	**-10.5**	**-2.2**	**0.0**	**-0.2**	**253.8**	**0.0**	**-606.3**
Energy Distribution																			
Final distribution (D=PE+SS)	22.6	163.0	208.5	124.3	0.1	38.8	79.2	0.0	31.6	0.0	5.7	0.4	0.0	0.0	0.0	0.0	253.8	0.0	928.1
Losses (L=(D+F))	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-15.3	0.0	-15.3
TOTAL final distribution (D+L)	22.6	163.0	208.5	124.3	0.1	38.8	79.2	0.0	31.6	0.0	5.7	0.4	0.0	0.0	0.0	0.0	238.5	0.0	912.9
																			912.9
Final Energy Consumption																			
Manufacturing	-22.6		-37.0			-35.7	-6.1		-31.6		-0.5						-82.7		-216.2
Commercial							-16.3					-0.3					-78.9		-95.5
Household					-0.1		-53.0				-5.2	-0.1					-71.5		-129.9
Transport		-163.0	-169.2	-124.3		-3.1	-3.4										0.0		-463.1
Agriculture			-2.3														-1.9		-4.2
Others							-0.3										-3.6		-3.9
TOTAL (F)	**-22.6**	**-163.0**	**-208.5**	**-124.3**	**-0.1**	**-38.8**	**-79.2**	**0.0**	**-31.6**	**0.0**	**-5.7**	**-0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**-238.5**	**0.0**	**-912.9**

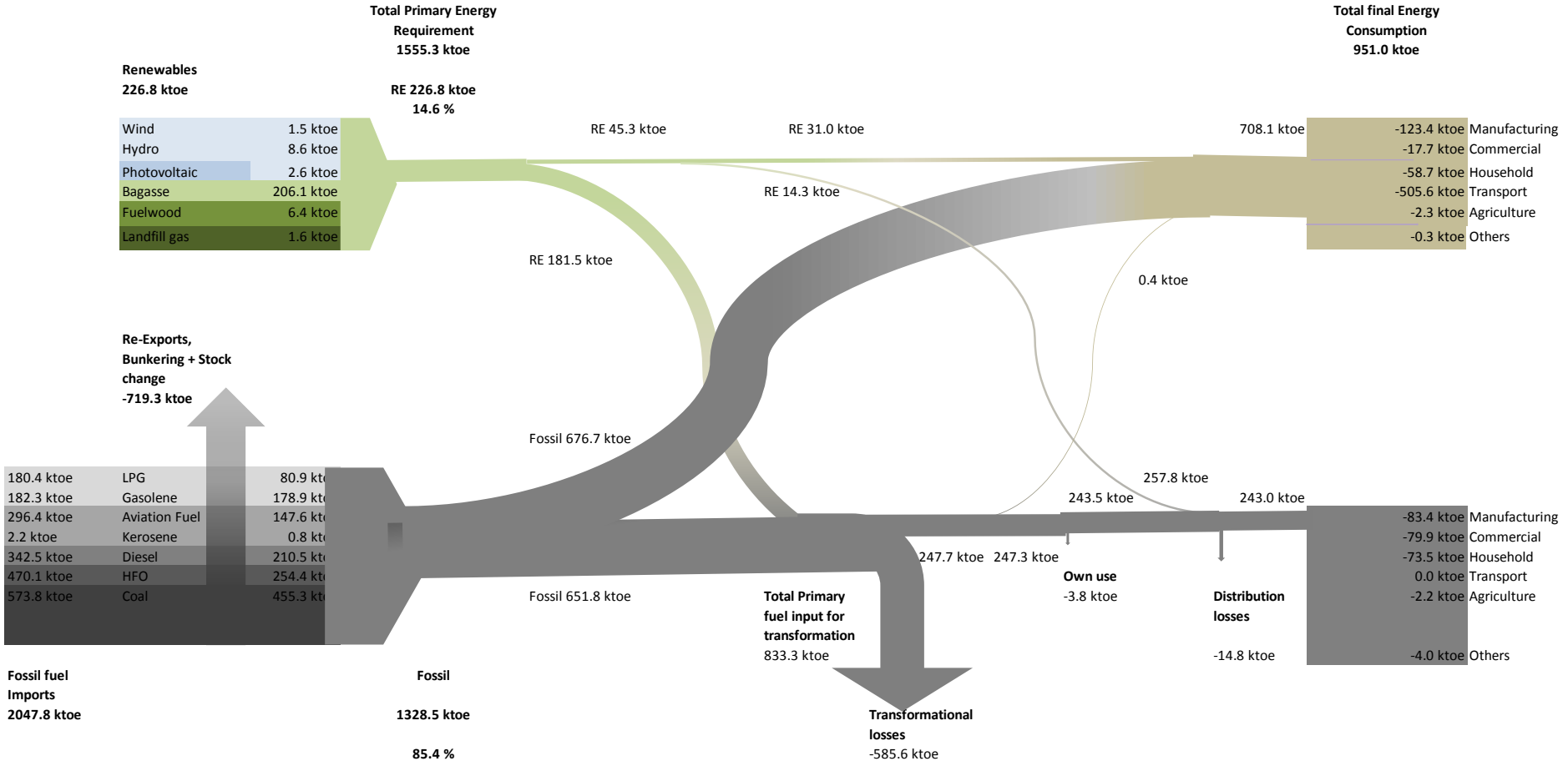
8 SUMMARY TABLE 2016

-' Consumption in ktoe +' Production and supply	Coal	Petroleum products							Biomass				Hydro	Solar		Wind	Electricity + Prod - Cons	Heat + Prod - Cons	TOTAL
		Gasolene	Diesel	Aviation fuel	Kerosene	HFO	LPG	Used oils	Bagasse	Landfill Gas	Fuelwood	Charcoal		PV	Thermal				
Primary Energy and Supply																			
Local Production (LP)									206.076	1.608	6.416		8.557	2.606		1.544			226.8
Imported Resources	573.8	182.3	342.5	296.4	2.2	470.1	180.4												2047.8
Re-exports and bunkering			-121.1	-147.3		-208.3	-89.3												-566.0
Stocks (+ destocking; - stocking)	-118.5	-3.4	-10.9	-1.6	-1.4	-7.4	-10.1												-153.3
TOTAL Primary Energy (PE)	**455.339**	**178.931**	**210.460**	**147.592**	**0.832**	**254.448**	**80.903**	**0.000**	**206.076**	**1.608**	**6.416**	**0.000**	**8.557**	**2.606**	**0.000**	**1.544**	**0.000**	**0.000**	**1555.3**
% Energy independence (LP/PE)																			14.6
Secondary Energy																			
Coal input for electricity production	-434.8																108.9		-325.8
HFO and diesel input for electricity production			-1.0			-215.2											95.4		-120.8
Bagasse input for electricity production									-180.7								42.7		-138.0
Kerosene input for electricity production					-0.8												0.2		-0.6
Biogas input for electricity production										-1.6							1.6		0.0
Hydro input for electricity production													-8.6				8.6		0.0
PV input for electricity production PV														-2.6			2.6		0.0
Wind input for electricity production																-1.5	1.5		0.0
Electricity production own use																	-3.8		-3.8
Solar Thermal heat production																			0.0
Fuelwood to charcoal											-0.8	0.4							-0.4
TOTAL Secondary supply (SS)	**-434.8**	**0.0**	**-1.0**	**0.0**	**-0.8**	**-215.2**	**0.0**	**0.0**	**-180.7**	**-1.6**	**-0.8**	**0.4**	**-8.6**	**-2.6**	**0.0**	**-1.5**	**257.8**	**0.0**	**-589.4**
Energy Distribution																			
Final distribution (D=PE+SS)	20.6	178.9	209.4	147.6	0.1	39.2	80.9	0.0	25.3	0.0	5.6	0.4	0.0	0.0	0.0	0.0	257.8	0.0	965.9
Losses (L=(D+F))	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-14.8	0.0	-14.8
TOTAL final distribution (D+L)	20.6	178.9	209.4	147.6	0.1	39.2	80.9	0.0	25.3	0.0	5.6	0.4	0.0	0.0	0.0	0.0	243.0	0.0	951.1
																			951.1
Final Energy Consumption																			
Manufacturing	-20.6		-35.7			-35.3	-6.0		-25.3		-0.5						-83.4		-206.8
Commercial							-17.4					-0.3					-79.9		-97.6
Household					-0.1		-53.4				-5.2	-0.1					-73.5		-132.2
Transport		-178.9	-171.5	-147.6		-3.9	-3.8										0.0		-505.6
Agriculture			-2.3														-2.2		-4.5
Others							-0.3										-4.0		-4.3
TOTAL (F)	**-20.6**	**-178.9**	**-209.4**	**-147.6**	**-0.1**	**-39.2**	**-80.9**	**0.0**	**-25.3**	**0.0**	**-5.6**	**-0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**-243.0**	**0.0**	**-951.1**

9 GROWTH PERCENTAGE (%) IN 2016 COMPARED TO 2015

	Fossil Fuels								Renewable Energy										
	Coal	Petroleum products							Biomass				Hydro	Solar		Wind	Electricity	Heat	TOTAL
-' Consumption in ktoe		Gasolene	Diesel	Aviation fuel	Kerosene	HFO	LPG	Used oils	Bagasse	Landfill Gas	Fuelwood	Charcoal		PV	Thermal		+ Prod	+ Prod	
+' Production and supply																	- Cons	- Cons	
Primary Energy and Supply																			
Local Production (LP)									-10.4 %	-8.2 %	-1.4 %		-18.4 %	17.1 %		568.4 %			-9.7 %
Imported Resources	15.1 %	9.1 %	6.4 %	6.0 %	-14.8 %	10.0 %	130.5 %												15.3 %
TOTAL Primary Energy (PE)	1.9 %	9.7 %	0.4 %	18.7 %	-8.3 %	-1.8 %	2.1 %		-10.4 %	-8.2 %	-1.4 %		-18.4 %	17.1 %		568.4 %			1.4 %
Secondary Energy																			
Coal input for electricity production	2.5 %																		1.0 %
HFO and diesel input for electricity production			-5.5 %			-2.3 %													-2.7 %
Bagasse input for electricity production									-8.9 %										-10.8 %
Kerosene input for electricity production					-1.7 %														-3.6 %
Biogas input for electricity production										-8.2 %									
Hydro input for electricity production													-18.4 %						
PV input for electricity production PV														17.1 %					
Wind input for electricity production																568.4 %			
Electricity production own use																			0.0 %
Solar Thermal heat production																			
Fuelwood to charcoal											-6.0 %	-6.2 %							-5.9 %
TOTAL Secondary supply (SS)	2.5 %		-5.5 %		-1.7 %	-2.3 %			-8.9 %	-8.2 %	-6.0 %	-6.2 %	-18.4 %	17.1 %		568.4 %	1.6 %		-2.8 %
Final Energy Consumption																			
Manufacturing	-8.9 %		-3.5 %			-1.1 %	-1.3 %		-19.8 %		-3.0 %						0.8 %		-4.3 %
Commercial							6.5 %					-6.6 %					1.3 %		2.2 %
Household					-45.6 %		0.7 %				-0.5 %	-4.1 %					2.8 %		1.8 %
Transport		9.7 %	1.4 %	18.7 %		24.4 %	9.1 %												9.2 %
Agriculture			-1.7 %														17.1 %		6.7 %
Others							2.3 %										11.5 %		10.8 %
TOTAL (F)	-8.9 %	9.7 %	0.5 %	18.7 %	-45.6 %	0.9 %	2.1 %		-19.8 %		-0.7 %	-6.2 %					1.9 %		4.2 %

10 ENERGY PATTERN 2016



11 TABLE OF INDICATORS

Item	Indicators	Unit	2015	2016	% change
Primary Energy Consumption	Primary Energy Consumption	ktoe	1534.4	1555.3	1.4
	Share of local resources: local primary consumption/total primary consumption	%	16.4	14.6	-10.9
Energy intensity	Energy intensity per inhabitant: Primary energy Consumption/population	toe/inhab	1.22	1.23	8.2
	Energy intensity per 100,000 (2006 Rs): Primary Energy Consumption/GDP	toe/Rs	0.48	0.47	-2.1
Electricity Production	Total fossil fuel input for electricity production	ktoe	646.7	651.8	0.8
	Total renewable input for electricity production	ktoe	198.4	180.7	-8.9
	Total electricity production	GWh	2995.6	3042.2	1.6
	Penetration of renewable resources	%	22.7	21.8	-4.0
Final electricity consumption per sector	Total electricity sold	GWh	2505.4	2558.6	2.1
	Domestic sector	%	33.2	33.4	0.6
	Commercial sector	%	36.6	36.3	-0.8
	Industrial sector	%	28.7	28.8	0.3
	Electricity consumption per consumer (Domestic)[1]	GWh/consumer	2.05	2.07	0.7
	Electricity consumption per consumer (Commercial)	GWh/consumer	22.27	22.15	-0.5
	Electricity consumption per consumer (Industrial)	GWh/consumer	112.85	115.84	2.6
Final energy consumption in transport sector	Total energy consumption (transport)	ktoe	463.1	505.6	9.2
CO2 Emissions	Total CO_2 emissions	$ktCO_2$	4054.1	4074.5	0.5
	Net CO_2 emissions	$ktCO_2$	3685.4	3711.2	0.7
	Energy sector	%	59.13	59.04	-0.2
	Manufacturing sector	%	8.83	8.40	-4.9
	Transport sector	%	25.23	25.63	1.6
	Others	%	6.01	6.10	1.5
	CO2 emissions per kWh of electricity generated (Grid emission factor)[2]	gCO_2/kWh	909.7	945.9	4.0

Data Source: Statistics Mauritius

1 Domestic sector in this document includes CEB residential consumers, charitable and religious institutions.

[2] Source: Central Electricity Board

GLOSSARY

Aviation fuel:
A kerosene type meeting the required properties for use in jet engines and aircraft-turbine engines.

Bagasse:
Cellulosic residue left after sugar is extracted from sugar cane.

Capacity:
The maximum power available from a power station at a point in time:
- *Installed capacity*: The nameplate capacity of the generator set.
- *Plant capacity*: The net capacity measured at the terminals of the stations, i.e., after deduction of the power absorbed by the auxiliary installations and the losses in the station transformers.
- *Effective capacity*: It is the plant capacity less any amount of derated capacity from the installed capacity.

Charcoal:
Comprises the solid residue obtained by the destructive distillation of wood in the absence of air.

CPP (Continuous Power Producers)
Entities which, in addition to their main activities, themselves produce (individually or in combination) electric energy intended, in whole or in part, to meet their own needs from bagasse only and the surplus for sale to the CEB only during the cane harvest period.

Coal:
Fossil fuel that has a high degree of coalification, with a gross calorific value over24MJ/kg (5700 Kcal/kg) on an ash-free but moist basis.

Diesel Oil:
Consists primarily of medium oil distilling between 180^0C and 380^0C.

Electric energy dependence:
The ratio of electricity generation from fossil fuels and electricity generation total.

Electric dependency ratio:
Ratio between electricity production from fossil fuels and the total electricity production.

Energy:
Capacity for doing work or for producing heat. Producing heat is a common manifestation of ‘doing work’ as are producing light and motive force.

Energy intensity
A measure of the energy efficiency of the economy of the country. Provides a measure of the efficiency with which energy is being used in production. A lower ratio usually reflects a more efficient use of energy.

Energy unit:
The International System of Units (SI unit) of energy is the Joule.

Final energy:
Energy that is supplied to consumers (electricity, petrol, diesel, natural gas, fuel oil, heating oil).

Final Energy Consumption:
Energy consumption by final user- i.e. energy which is not being used for transformation into other forms of energy. The consumption by sector is presented as follows:
Agriculture: Energy used for irrigation and by other agricultural equipments;
Commercial & distributive trade: Energy consumed by the business and commercial sector;
Residential: Consumption of energy by residential sector;
Manufacturing: Consumption in industry and construction; and
Transport: Includes consumption by land vehicles, ships and local aircrafts.

Fossils fuels:
Formed from the fossilized remains of dead plants and animals by exposure to heat and pressure in the Earth's crust over hundreds of millions of years.

Fuels:
Term used to describe energy sources that must be subjected to combustion in order to release the energy stored up inside them.

Fuel wood:
All forms of woody material.

Fuel Oils:
Heavy oils from the refining process of crude oil and used as fuel in power stations. It is also commonly used by ships and industrial large-scale heating boilers installations as a fuel in furnaces or boilers in the manufacturing sector.

Gasoline:
A mixture of relatively volatile hydrocarbons, which have been blended to form a fuel suitable for use in spark-ignition internal combustion engines.

Gross Domestic Product (GDP):
The aggregate money value of all goods and services produced within a country out of economic activity during a specified period, usually a year, before provision for the consumption of fixed capital.

Gigawatt hour (GWh):
Unit of electrical energy, equal to 3.6 terajoules (TJ).

Hybrid vehicle:
A vehicle that uses different types of energy for power. This vehicle has usually two types of engines: internal combustion engine and electric motor.

IPP (Independent Power Producers):
Entities which, in addition to their main activities, themselves produce(individually or in combination) electric energy intended, in whole or in part, to meet their own needs and for sale to the CEB throughout the year from bagasse during the cane harvest period and coal outside this period.

Kerosene (excl. Aviation fuel type):
A medium oil distilling between 150^0C and 300^0C and which is used in sectors other than aircraft transport.

Kilowatt (kW):
Unit of electrical power equal to 1 000 watts

Kilowatt hour (kWh):

Unit of electrical energy equal to one kilowatt (1 kW) of power expended for one hour (3 600 s) or 3 600 000 joules.

Liquefied petroleum Gas (LPG):

Consists mainly of propane or butane, derived from either petroleum refining process or extracted from petroleum streams. It is normally liquefied under pressure for transportation and storage. In Mauritius it is often used to power cooking stoves or gas water heaters and to fuel some types of vehicle.

Losses (transmission / distribution losses):

Comprise losses in transmission and distribution of electric energy and losses in transformers, which are *not* considered as integral parts of the power stations.

Own use (Station use and loss):

Included are consumption by station auxiliaries and losses in transformers, which are considered as integral parts of the power stations.

Peak demand:

Term used in energy demand management describing a period in which electrical power is expected to be provided for a sustained period at a significantly higher than the average supply level. Peak demand fluctuations may occur on daily, monthly seasonal and yearly cycles.

Petroleum products:

The primary source of petroleum products is crude oil. Petroleum or crude oil is a naturally occurring, flammable liquid found in rock formations in the Earth. Diesel oil, fuel oils, Gasoline, Kerosene and Liquefied petroleum gas (LPG) are among the major products derived from crude oil distillation.

Primary energy:

Primary energy designates energy from sources that involve only extraction or capture. Primary energy is not derived from any other forms of energy. By convention, sources of energy that occur naturally such as coal, heavy fuel oil, fuel wood are termed primary energy.

Primary energy consumption:

The final energy consumption in which is included the losses and consumption of producers and transformers of energy.

Production:

Comprises gross production, i.e., the amount of electric energy produced, including that consumed by station auxiliaries and any losses in transformers that are considered integral parts of the power station.

Renewable energy or Renewables;

Natural resources that, after exploitation, can return to their previous stock levels by natural processes of growth or replenishment.

Secondary energy:

Designates energy from all sources of energy that results from transformation of primary sources. e.g. electricity from coal.

Solar Thermal

Solar energy harnessed in the form of thermal energy

Thermal plants:

Comprises of conventional thermal plants of all types that require combustion of fuels to generate electricity. They include steam-operated generating plants and plants using internal combustion engines or gas turbines.

Thermal sources of electricity:

These include coal, oil and its derivatives and bagasse.

Tonne

The tonne (SI symbol: t) is a metric system unit of mass equal to 1,000 kilograms.

Tonne of oil equivalent (toe):

Amount of heat obtained by the perfect combustion one tonne of oil, defined as 41.868 gigajoules.

Watt (W):

The conventional unit to measure a rate of conversion of energy. One watt equals to 1Joule per second.

Energy conversion factors

	tonne	toe
Gasoline	1	1.08
Diesel Oil	1	1.01
Dual Purpose Kerosene (DPK)	1	1.04
Fuel Oil	1	0.96
Liquified Petroleum Gas (LPG)	1	1.08
Coal	1	0.62
Bagasse	1	0.16
Fuelwood	1	0.38
Charcoal	1	0.74

	GWh	ktoe
Hydro/Wind/Bagasse	1	0.086
Electricity	1	0.086

1 toe = 0.041868 terajoule (TJ) (net calorific value)