MINISTRY OF ENERGY AND PUBLIC UTILITIES

ENERGY OBSERVATORY REPORT 2019

MAY 2021

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Note:

- All data in this report 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 error may be present on certain totals.

Disclaimer:

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1 ENERGY SUPPLY

1.1 Introduction

The energy supply of Mauritius is divided into:

- imports of primary energy (*Fossil fuels: Fuel Oil, Liquefied Petroleum Gas, Gasolene, Diesel, Kerosene, Aviation fuel and Coal*);
- production of primary energy (*Local resources: Bagasse, hydro, wind, landfill gas, fuelwood, charcoal and photovoltaic*);
- primary energy re-exports and bunkering; and
- variation of stocks.

1.2 Imports

The imports of energy sources in 2019 totalled 2,580 ktoe, as shown in Table 1.1.

Table 1.1 - Imports of energy sources

Fossil Energy Imports 2019	ktonne	ktoe
Coal	1,173.1	727.3
Gasolene	183.5	198.2
Diesel oil	333.9	337.2
Aviation fuel	287.2	298.6
Kerosene	13.5	14.0
Fuel oil	849.5	815.5
Liquefied Petroleum Gas (LPG)	175.1	189.1
TOTAL	**3,015.8**	**2,579.9**

Data Source: Statistics Mauritius

The distribution of fossil energy imports in 2019 is shown in Figure 1.1.

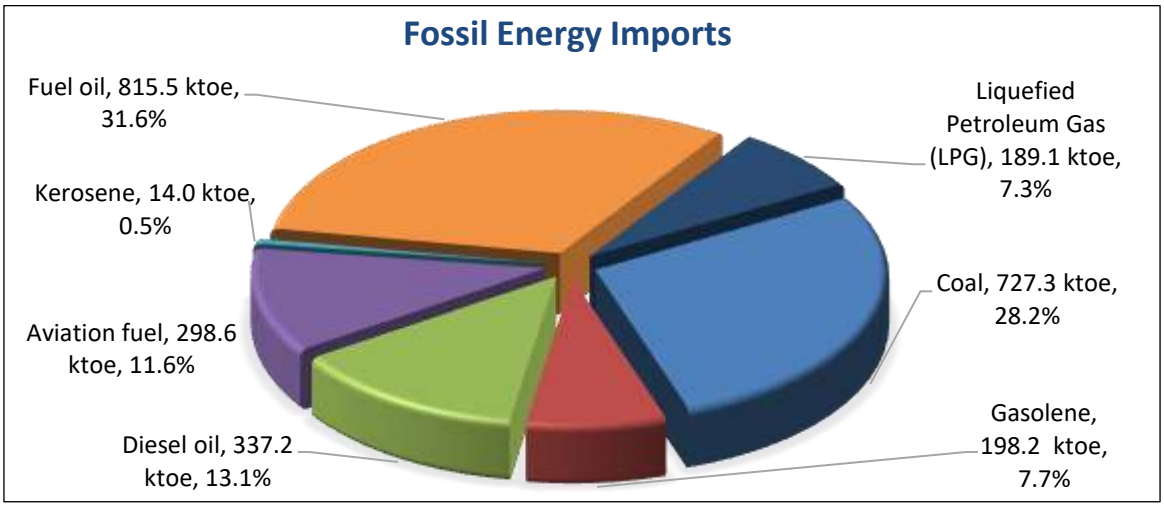
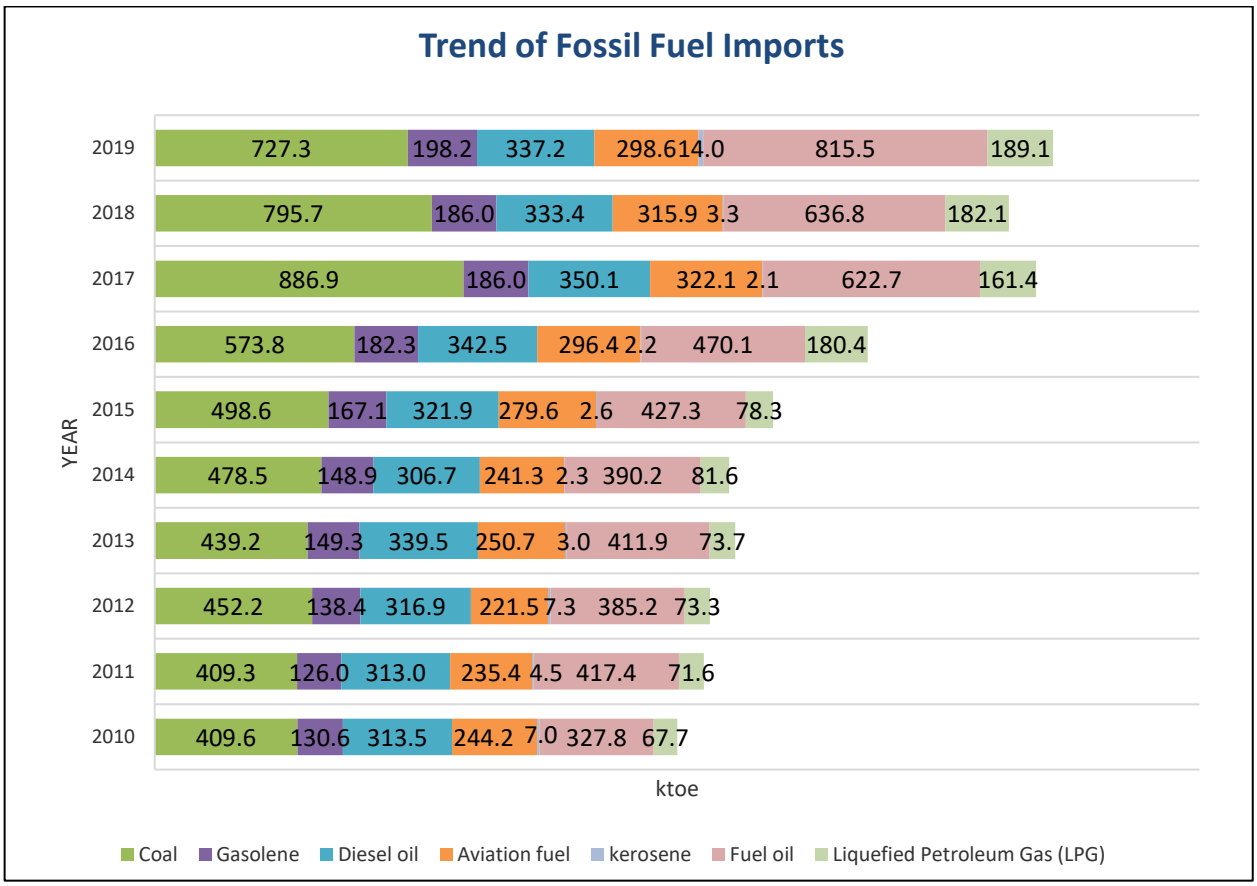


Figure 1.1 - Fossil energy imports

Petroleum products are intended mostly for the sectors of transport, electricity generation, manufacturing as well as in the household, commercial and agricultural 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. Figure 1.2 shows the trend of fossil fuel import for the period 2010 - 2019.



Data Source: Statistics Mauritius

Figure 1.2 - Trend of fossil fuel imports

In 2019, the amount of fossil fuels imported increased by 5.2% compared to 2018. The total import bill of energy sources for 2019 amounted to Rs 35,848 M compared to Rs 37,553 M in 2018, representing a decrease of 4.5%, due to decreases in the average imports price of petroleum products as follows: gasolene (-11.5%), diesel oil (-9.3%), dual purpose kerosene (-4.2%), fuel oil (-18.5%) and LPG (-15.6%). On the other hand, the average imports price of coal remained the same at Rs 2000 per tonne.

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.

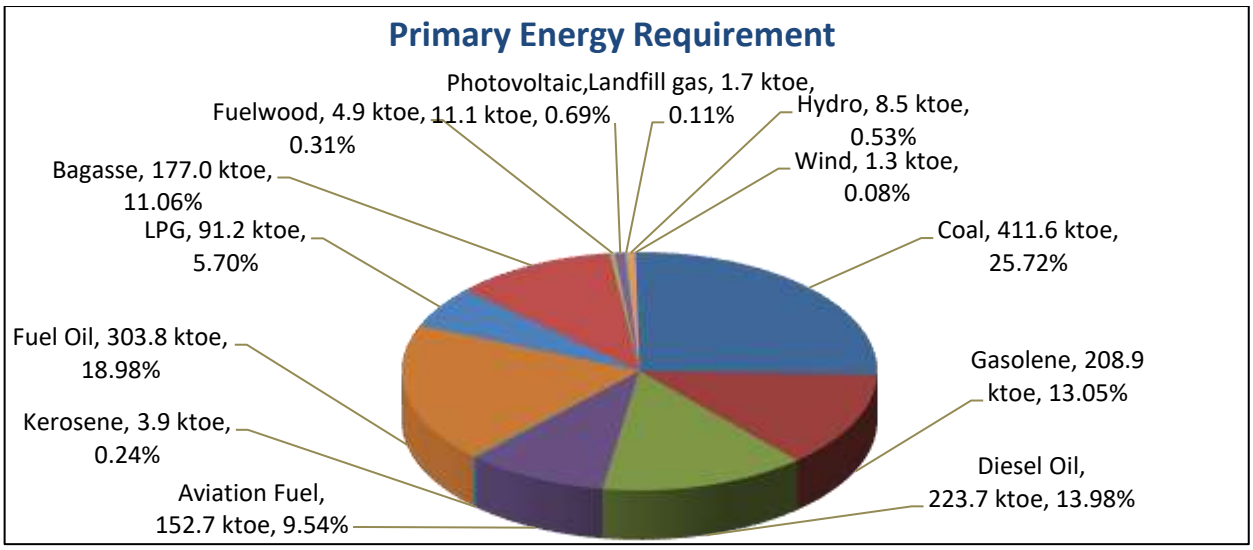
Table 1.2 - Primary energy requirement 2018 – 2019

	Energy source	Primary energy requirement (ktoe)		% change
		2018	2019	
Imported fuels	Coal	447.7	411.6	-8.1 %
	Gasolene	191.5	208.9	9.1 %
	Diesel Oil	216.6	223.7	3.3 %
	Aviation Fuel	162.5	152.7	-6.0 %
	Kerosene	0.7	3.9	457.1 %
	Fuel Oil	278.7	303.8	9.0 %
	LPG	84.2	91.2	8.3 %
	Sub Total	***1,381.9***	**1,395.8**	1.0 %
Local resources	Bagasse	180.1	177.0	-1.7 %
	Fuelwood	6.1	4.9	-19.7 %
	Photovoltaic	4.2	11.1	164.3 %
	Landfill gas	1.9	1.7	-10.5 %
	Hydro	10.7	8.5	-20.6 %
	Wind	1.3	1.3	0.0 %
	Sub Total	***204.4***	**204.5**	0.0 %
TOTAL		**1,586.3**	**1,600.3**	**0.9 %**

Data Source: Statistics Mauritius

In 2019, the primary energy requirement amounted to 1,600 ktoe representing an increase of 0.9% compared to 2018.

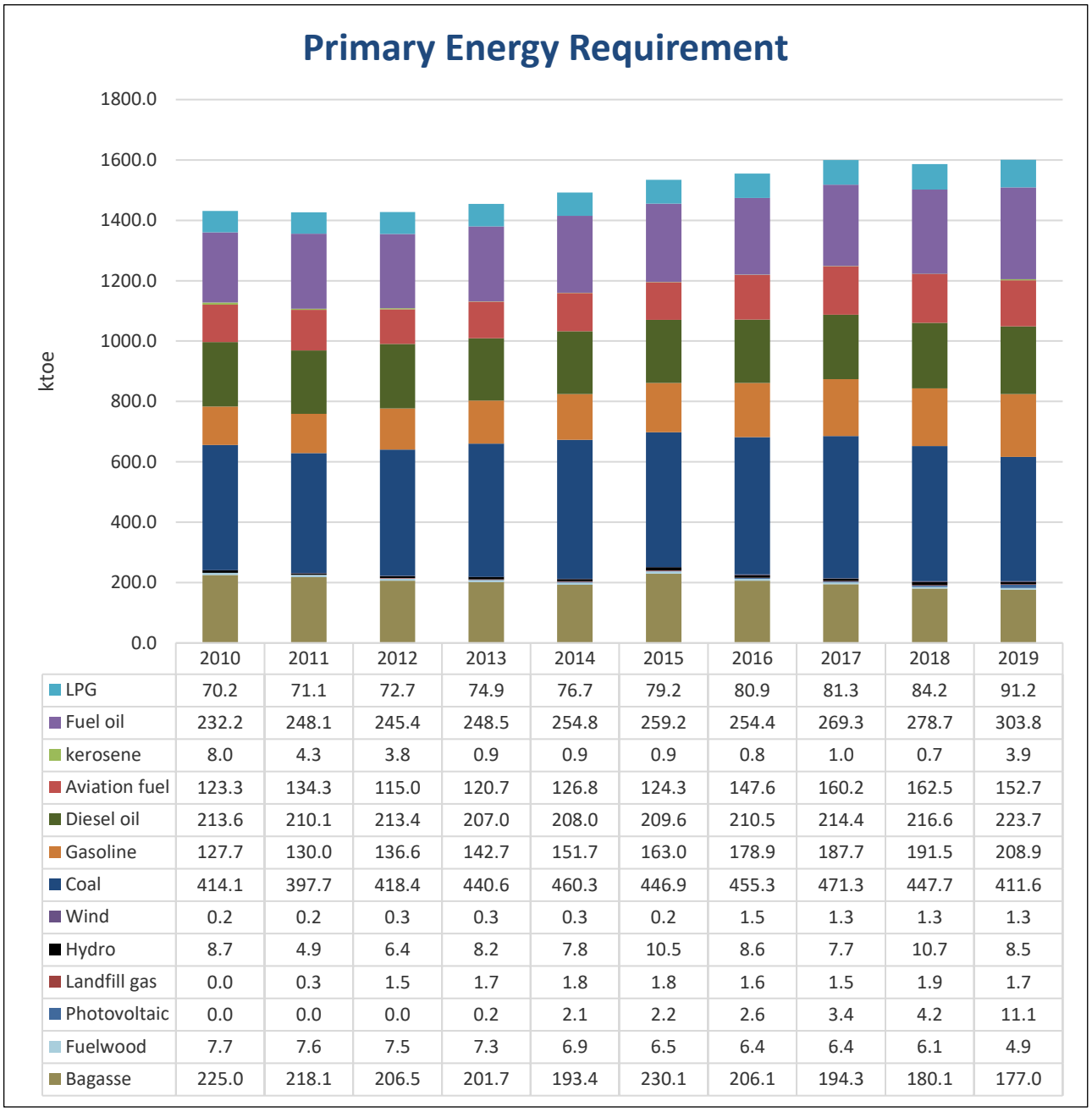
Figure 1.3 shows the share of fuel source in the primary energy requirement for year 2019.



Data Source: Statistics Mauritius

Figure 1.3 - Primary Energy Requirement 2019

The evolution of primary energy requirement over the period 2010 to 2019 is shown in Figure 1.4.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
LPG	70.2	71.1	72.7	74.9	76.7	79.2	80.9	81.3	84.2	91.2
Fuel oil	232.2	248.1	245.4	248.5	254.8	259.2	254.4	269.3	278.7	303.8
kerosene	8.0	4.3	3.8	0.9	0.9	0.9	0.8	1.0	0.7	3.9
Aviation fuel	123.3	134.3	115.0	120.7	126.8	124.3	147.6	160.2	162.5	152.7
Diesel oil	213.6	210.1	213.4	207.0	208.0	209.6	210.5	214.4	216.6	223.7
Gasoline	127.7	130.0	136.6	142.7	151.7	163.0	178.9	187.7	191.5	208.9
Coal	414.1	397.7	418.4	440.6	460.3	446.9	455.3	471.3	447.7	411.6
Wind	0.2	0.2	0.3	0.3	0.3	0.2	1.5	1.3	1.3	1.3
Hydro	8.7	4.9	6.4	8.2	7.8	10.5	8.6	7.7	10.7	8.5
Landfill gas	0.0	0.3	1.5	1.7	1.8	1.8	1.6	1.5	1.9	1.7
Photovoltaic	0.0	0.0	0.0	0.2	2.1	2.2	2.6	3.4	4.2	11.1
Fuelwood	7.7	7.6	7.5	7.3	6.9	6.5	6.4	6.4	6.1	4.9
Bagasse	225.0	218.1	206.5	201.7	193.4	230.1	206.1	194.3	180.1	177.0

Data Source: Statistics Mauritius

Figure 1.4 - Primary Energy Requirement, 2010 – 2019

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 sugar cane bagasse[1], hydro, photovoltaic (PV), wind, landfill gas and fuel wood. A total of 204.5 ktoe of local resources was tapped in 2019, as shown in Table 1.3.

[1] In this document, unless specified otherwise, bagasse includes cane trash.

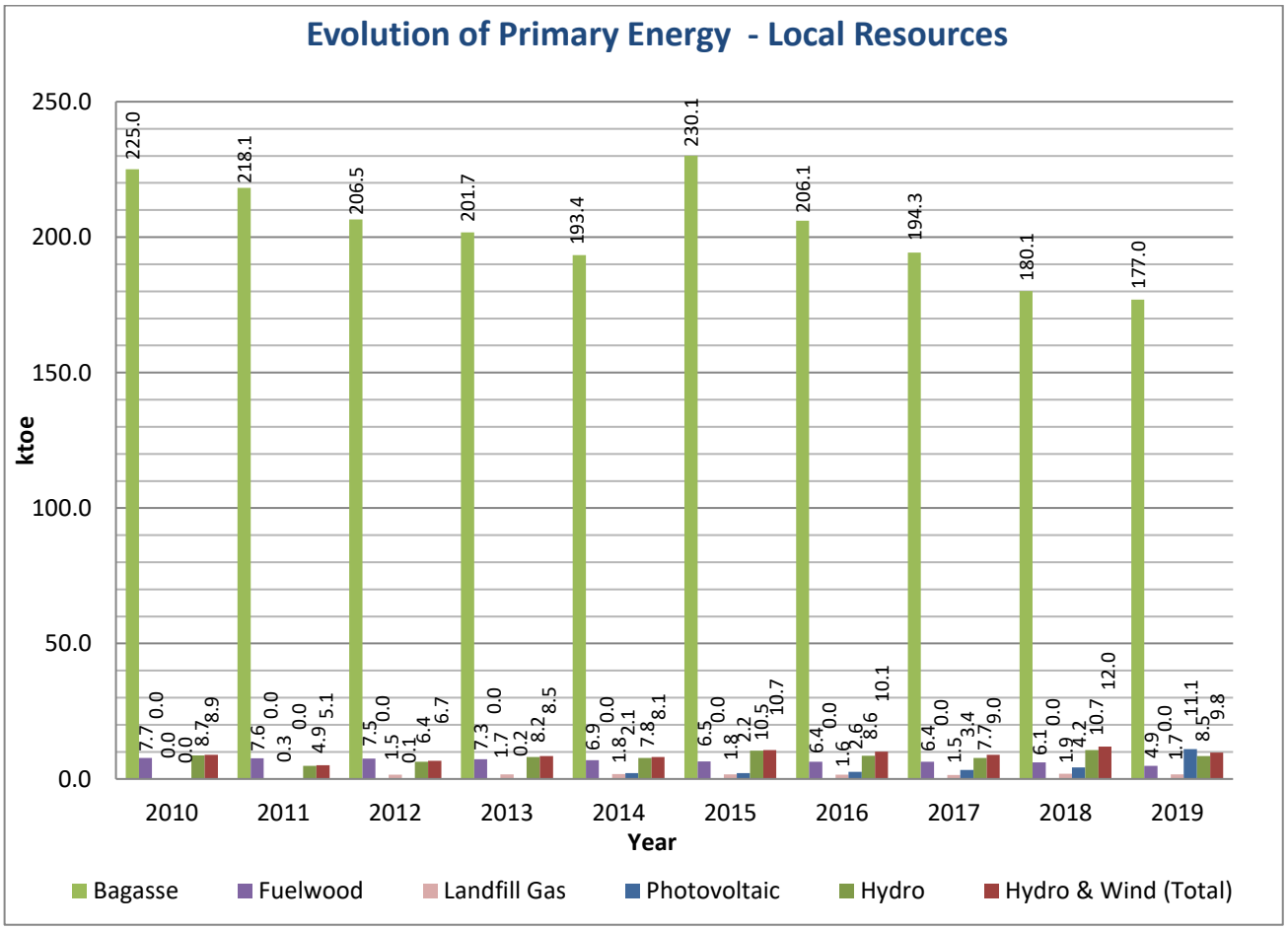
Table 1.3 - Primary energy supply in 2019 – Local resources

Local Resources	ktonne	GWh	ktoe
Bagasse	1,106.1		177.0
Fuelwood	12.9		4.9
Photovoltaic		128.5	11.1
Landfill gas		19.8	1.7
Hydro		98.6	8.5
Wind		15.2	1.3
Total	**1,119.0**	**262.1**	**204.5**

Data Source: Statistics Mauritius

In 2019, primary energy from local resources remained almost the same as 2018 .

Bagasse is the main source of primary energy from local resources. The Small Scale Distributed Generation (SSDG) scheme implemented by the Central Electricity Board (CEB), which allows Small Independent Power Producers (SIPP) to feed electricity generated through photovoltaic systems installed on their premises to the CEB grid. 11.1 ktoe of electricity was generated in 2019 from photovoltaic systems. Figure 1.5 shows the trend of primary energy obtained from local resources from 2010 to 2019:



Data Source: Statistics Mauritius

Figure 1.5 - Trend of primary energy from local resources, 2010 – 2019

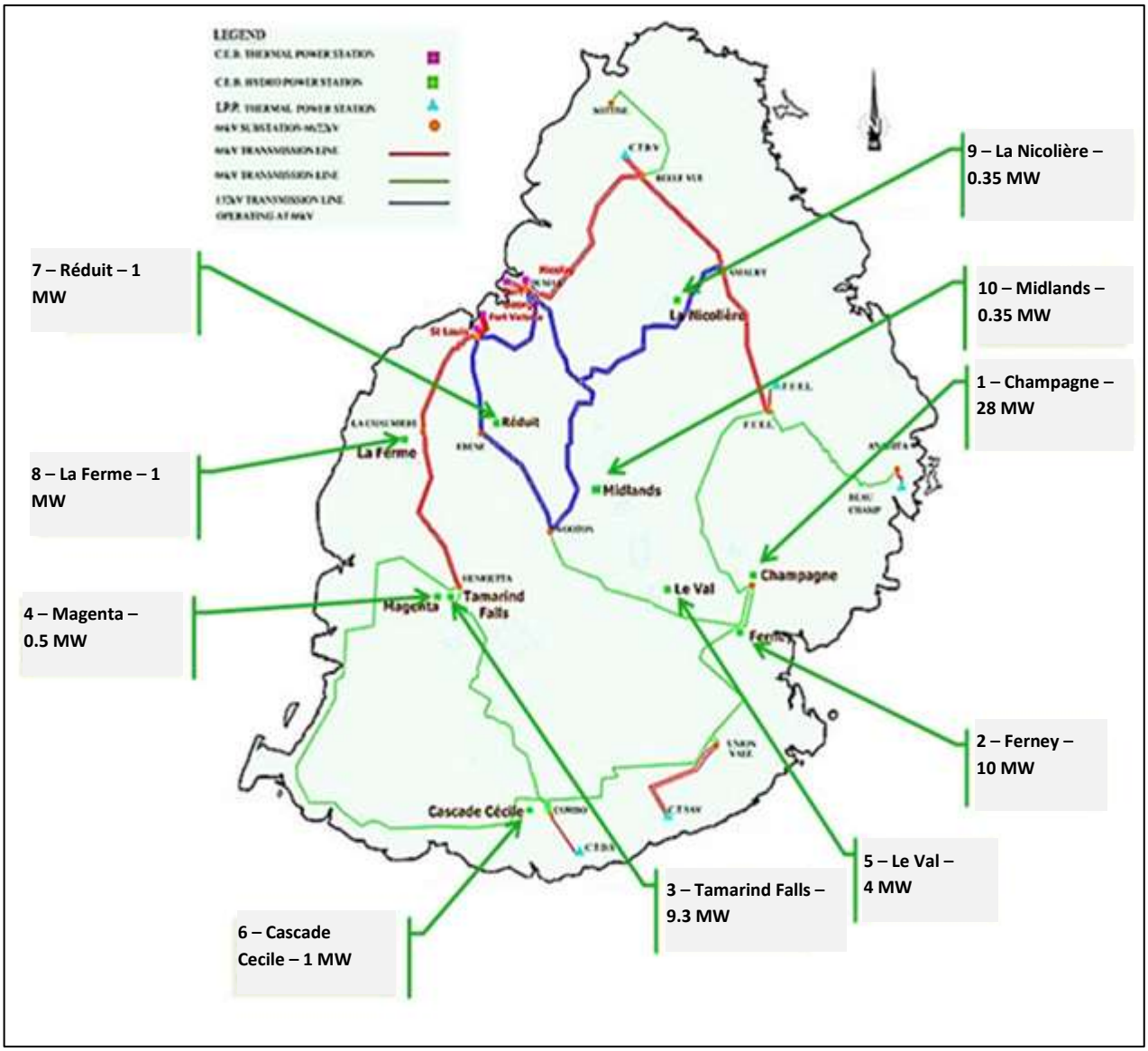
1.4.1 Hydroelectricity

The use of hydropower for electricity generation dates as far back as 1899 when electricity was first produced in Mauritius. It was the major renewable energy source for power generation contributing as much as 50-60% of the electricity mix in 1968.

The amount of hydropower generated is dependent on several factors such as rainfall, water storage levels and water demand from mainly agricultural and potable use. However, climate change with prolonged dry periods and reduction in rainfall poses a significant challenge to the availability of water resources and hence, for hydropower generation.

Hydropower is harnessed through the gravitational force of falling or flowing water. There are two types of hydropower plants, namely conventional and non-conventional ones. The conventional power stations can be further sub-categorised into impounded and diversion, of which the impounded facility is the most common. These hydropower plants vary in size, ranging from small systems to large utility scale projects, of capacities of ≤30 MW and >30 MW respectively. The small hydro systems can be further sub-divided into mini (100 - 1000 kW), micro (<100 kW) and pico (<5 kW) systems.

Currently, there are 10 hydroelectric power stations, ranging in size from 0.35 MW to 28 MW, in operation in Mauritius, as per Figure 1.6.

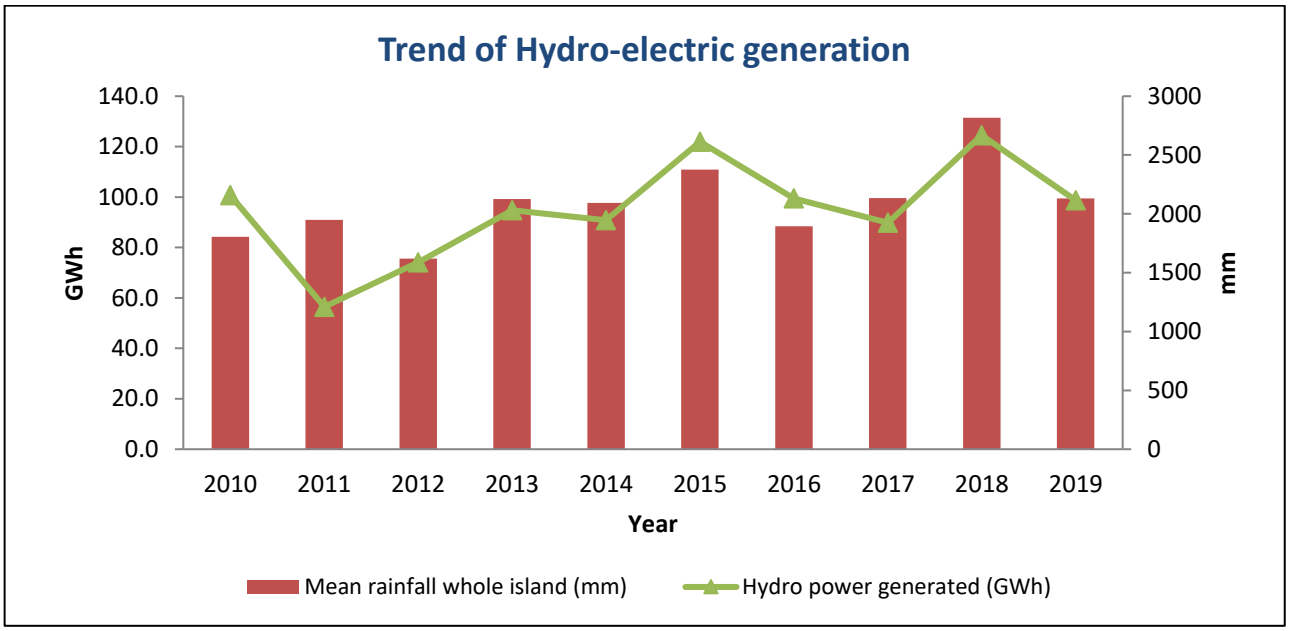


Data Source: CEB

Figure 1.6 - Hydropower stations in Mauritius

Hydroelectric power generation accounted for 3.0% of total electricity produced in 2019. Fluctuations in hydroelectric power generation tend to follow annual rainfall levels as shown in Figure 1.7 . The electricity generated from all the hydropower plants was 98.6 GWh in 2019. In a rainy season, the annual production can be as high as 125 GWh, while in a dry season, it can drop to 57 GWh. On an average therefore, some 90 GWh annually is considered in a normal rainfall year.

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.



Data Source: Statistics Mauritius

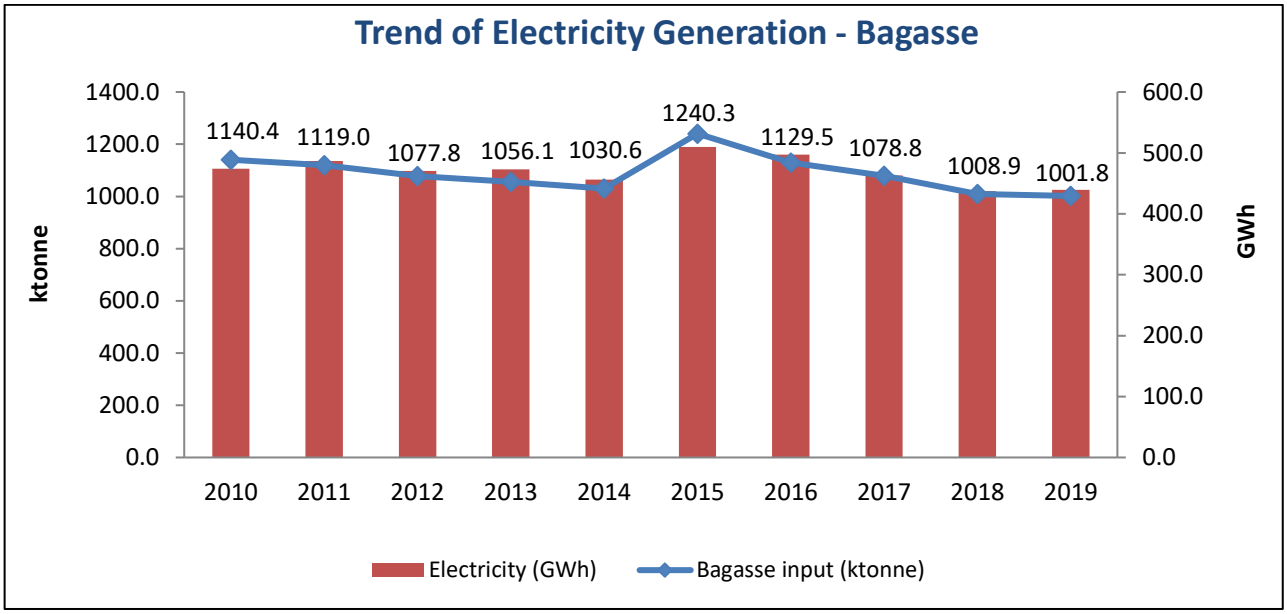
Figure 1.7 - Trend of hydro-electric generation, 2010 to 2019

1.4.2 Bagasse

Bagasse, a by-product of sugarcane, is the prime source of biomass in Mauritius. In year 2019, sugarcane plantation covering about 48,819 hectares of land generated around 1.10 million tons of bagasse upon harvest and crushing. Bagasse is almost entirely used by the cane industry to meet all their energy requirements in terms of heat and electricity generation. The surplus power is fed into the national grid.

There are currently three main bagasse/coal power plants at the sugar factories of Alteo Energy Ltd, Terragen Ltd and Omnicane Thermal Energy Operations (La Baraque and Saint Aubin) Ltd. During the off-crop season, the three main power plants use coal to generate electricity, which account for about 70% of the electricity production of each plant. Overall, in the year 2019, the cane industry Independent Power Producers (IPPs) exported about 323.0 GWh from bagasse.

Figure 1.8 gives the bagasse input for electricity generation and the amount generated over the period 2010 to 2019. In 2019, 1,001.8 ktonnes of bagasse was used for electricity generation as compared to 1,008.9 ktonnes in 2018. This was due to a decrease of 1.7 % in the production of bagasse from 1,125.4 ktonnes in 2018 to 1,106.1 ktonnes in 2019.



Data Source: Statistics Mauritius

Figure 1.8 - Trend of electricity generation from bagasse, 2010 to 2019

Table 1.4 shows the ratio of electricity produced per tonne of bagasse over the period 2010 to 2019. The ratio varies in the range of 0.411 MWh/tonne to 0.448 MWh/tonne. In 2019, the ratio of electricity produced per tonne of bagasse was 0.439. Also 13.6 % of total electricity production in Mauritius was from bagasse, representing an increase of 0.6 % compared to 2018.

Table 1.4 - Ratio of electricity produced per tonne of bagasse, 2010 - 2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Ratio electricity produced to bagasse input (MWh/tonne)	0.416	0.435	0.437	0.448	0.443	0.411	0.440	0.429	0.433	0.439

1.4.3 Photovoltaics (PV)

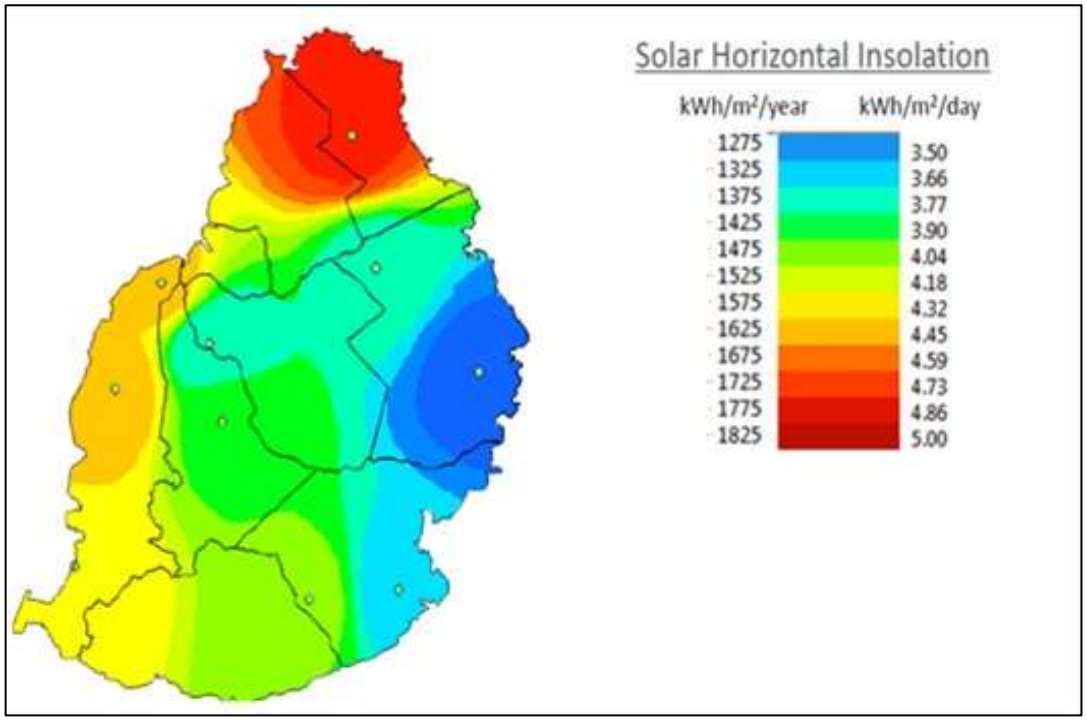
Mauritius, being a tropical island, enjoys a sunny climate all year round. The Mauritius Meteorological Services has key stations located at Medine, Pamplemousses (Ferret), FUEL, Plaisance and Vacoas to collect data.

Table 1.5 gives the average daily duration of sunshine in each month for these five regions for the year 2019 and Figure 1.9 gives the solar potential by region.

Table 1.5 - Average daily duration of sunshine in each month per region for year 2019

MONTH	Medine (West)		Vacoas (Central)		Plaisance (South)		FUEL (East)		Pamplemouses (North)	
	Hrs per day	Mean Hrs Monthly	Hrs per day	Mean Hrs Monthly	Hrs per day	Mean Hrs Monthly	Hrs per day	Mean Hrs Monthly	Hrs per day	Mean Hrs Monthly
January	7.0	217.8	7.1	221.1	8.1	252.2	6.7	206.6	8.4	259.4
February	7.9	220.3	7.6	213.0	8.6	241.7	7.7	215.1	8.0	224.8
March	9.7	300.2	8.8	272.0	8.3	256.4	8.0	246.9	8.4	259.8
April	7.3	217.8	7.1	213.6	6.3	189.1	4.9	146.3	6.6	197.4
May	6.6	203.9	6.8	211.7	5.3	163.7	5.3	164.0	6.8	209.3
June	7.3	218.9	6.9	207.8	5.1	154.4	5.6	167.5	7.0	210.1
July	7.5	232.6	7.2	222.5	4.9	152.5	5.1	158.8	6.6	204.5
August	7.1	220.8	7.5	232.9	5.8	179.9	6.3	194.9	7.6	234.9
September	6.9	206.6	7.6	228.9	6.7	199.5	6.0	181.2	6.8	203.9
October	8.0	247.2	8.2	253.6	7.4	228.4	6.8	209.3	8.2	252.8
November	7.4	223.3	6.6	196.5	7.2	214.9	5.8	172.8	7.3	217.9
December	8.2	253.1	7.1	221.5	7.4	227.9	6.8	209.9	8.0	248.0
Annual Average	**7.0**	**217.8**	**7.1**	**221.1**	**8.1**	**252.2**	**6.7**	**206.6**	**8.4**	**259.4**

Data Source: Mauritius Meteorological Services



Data Source: Ministry of Energy and Public Utilities

Figure 1.9 - Solar potential by region

Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors. Commercial PV modules are currently available as wafer-based crystalline silicon (c-Si), which currently represents about 85 to 90% of the global annual market, and thin films. The c-Si is further classified into mono-crystalline modules having efficiency up to 15 to 20% and poly-crystalline modules which is the most commonly available on the market, though its efficiency ranges between 13 – 15%. On the other hand, thin film solar cells, which can be cheaper at manufacturing, are less efficient than the conventional crystalline silicon cells and have thus a very low commercial penetration.

The electricity generation from PV installations in Republic of Mauritius was 128.5 GWh in 2019 compared to 49.4 GWh in 2018.

Table 1.6 provides information about PV installations under the Small Scale Distributed Generation (SSDG) and Medium Scale Distributed Generation (MSDG) scheme up to the year 2019 for the Island of Mauritius.

Table 1.6 - 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 2019	Total kWh Exported to the CEB grid during the year 2019
SSDG FIT Scheme	311	2,671	2,064	2,600,235	1,613,562
SSDG PECR Scheme	152	1,780	1,294	1,279,041	663,379
SSDG Net metering Scheme-Phase 1	1,541	4,780	2,999	4,122,556	2,546,230
SSDG Net metering Scheme-Phase 2	612	2,293	1,319	1,664,445	1,195,292
SSDG Net metering Scheme-Phase 3	696	2,600	495	197,907	143,568
MSDG Net metering Scheme	83	10,239	5,357	5,504,441	180,688
SME Rebate (Cooperative MRU)	10	39	29	37,181	23,105
No Tariff Category	6	144	144	61,069	13,081
Home Solar Project	1,000	1,000	871	835,161	835,161
Green Energy Scheme for SME	1,000	2,000	1,446	941,075	941,075
Total	**5,411**	**27,546**	**16,018**	**17,243,111**	**8,155,141**

Data source: CEB

Table 1.7 provides information about PV installations under the Small Scale Distributed Generation (SSDG) scheme up to the year 2019 for the Island of Rodrigues.

Table 1.7 - SSDG 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 2019	Total kWh Exported to the CEB grid during the year 2019
SSDG FIT scheme	39	230	172	216,608	163,341
SSDG Net metering Scheme	30	97	28	42,687	25,394
SSDG PECR scheme	10	63	55	56,259	14,001
SME Rebate (Cooperative RD)	1	5	3	5,588	4,496
Home Solar Project (HSP)	91	91	91	95,691	95,691
Green Energy Scheme for SMEs	46	92	92	25,290	25,290
Total	**217**	**578**	**441**	**442,123**	**328,213**

Data source: CEB

Expected Share of PV

As per the Renewable Energy Road Map 2030, the expected share of PV in the electricity mix in 2020 is 8% as detailed in Table 1.8.

Table 1.8 - Expected Share of PV in 2020

Project	Installed Capacity (MW)	Annual Output (GWh)
SSDG FIT Scheme Phases 1 & 2	2	3
SSDG PECR Scheme	1	1.5
SSDG Net Metering scheme – Phase 1	5	7.5
SSDG Net Metering scheme – Phase 2	2	3
SSDG Net Metering scheme - Phase 3 - NEW	2	6
NEW SSDG Scheme	5	7.5
Solar Home Project, 2,000 households initially (to be extended to 10,000 households) over a five year period	6	9
Schemes for Cooperatives	0.1	0.15
SSDG Solar Photovoltaic Rebate Scheme for SME	0.2	0.3
SSDG for Small Business Scheme	4	6
MSDG– Phase 1	10	15
MSDG– Phase 2	10	15
MSDG Greenfield (Cooperatives)	2	3
Utility scale		
1-9 MW farms		
• Solar Farm at Beau Champ	10.3	17
• Solar Farm at Petite Retraite (I)	2	3.1
• Solar Farm at La Tour Koenig	5	8.25
• Solar Farm at Mon Choisy	2	4.3
• Solar Farm at Petite Retraite (II)	11.5	18
• Solar Farm at L'Esperance	2	3.1
10-15 MW farms		
• Solar Farm at Bambous	15	22
• Solar Farm at Henrietta (CEB)	12	15
• Solar Farm at Solitude	15.1	24
• Solar Farm at Queen Victoria	16.3	26
• Solar Farm at Henrietta (Medine)	17.6	28
ESTIMATED TOTAL	**158.1**	**245.8**
Share in energy mix		**8%**

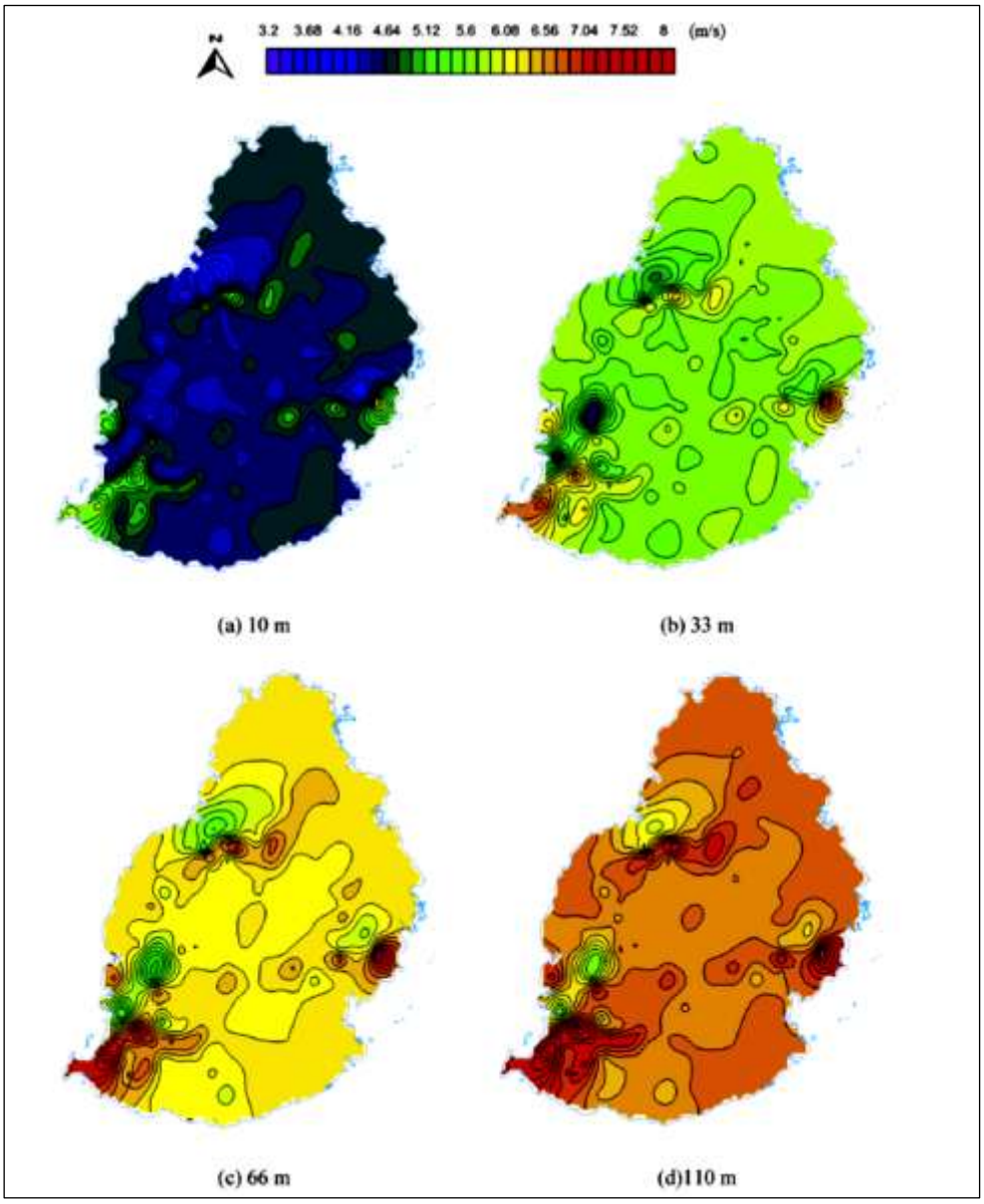
Data Source: Ministry of Energy and Public Utilities

1.4.4 Electricity from Wind energy

Trade winds dominate the weather of Mauritius. The trade winds are continuous throughout the year and blow from the subtropical high-pressure zone from the South-East towards Mauritius. This means that the wind has a much greater impact on the south eastern coastal areas compared to the western coastal areas, which are somewhat protected by the central plateau and some mountains. Furthermore, cloud formation is favoured on the South-East side of the mountains, thus leading to more rain and less sunshine hours per day.

The Wind Energy Resource Assessment Study carried out by the UNDP in the 1980s showed that wind speed in Mauritius varies between 7m/s to 4m/s at a height of 10m. In a more recent research carried out by

Dhunny and Lollchund (2017) of the University of Mauritius, they computed a yearly mean wind speed map at multiple heights above ground. Based on this wind speed map, it can be observed that wind power potential of Mauritius is best in the South-East, lower in central plateau and South-West region in a typical year. Regions in the South-East may be best suited for this source of power.[2]



Data Source: Ministry of Energy and Public Utilities

Figure 1.10 - Computed yearly mean wind speed map at multiple heights above ground

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.

[2] *Data Source: Ministry of Energy and Public Utilities*

In Mauritius, a wind farm with a total installed capacity of 9.35 MW, has been set up by Eole Plaines des Roches Ltd and has generated 12.87 GWh of electricity in 2019. The power is injected into the national grid at CEB's Amaury sub-station.

A Power Purchase Agreement for a 29.4 MW wind farm has been set up by Consortium Suzlon-Padgreen Co. Ltd at Curepipe Point (Plaine Sophie) was signed in August 2012. The generated electricity would have been procured by the CEB for a period of 20 years. However due to legal constaints, this project has not been able to come about.

As for Rodrigues Island, 2.4 GWh of electricity was produced from wind energy in 2019.

1.4.5 Electricity from Landfill gas

The amount of waste generated in Mauritius is currently around 460,000 tonnes per annum and this amount is expected to increase in the coming years. The wastes are disposed in the sole landfill of the island at Mare Chicose. Since 2011, electricity is generated from landfill gas which is constituted mostly of methane, produced by the fermentation of organic waste in landfills in the absence of oxygen. The effective capacity is 3 MW and in 2019, an amount of 19.8 GWh of electricity was generated.

1.4.6 Electricity from biogas

Data on biogas production through mesophilic anaerobic digestion and electricity production used to partially meet the electricity requirements of the St Martin Wastewater Treatment Plant over the period 2010 to 2019 are provided in Table 1.9 and 1.10. No electricity was generated in year 2018 and 2019 given that the Gas Generator Set was not operational since February 2017.

Table 1.9 - Volume of biogas produced over the last 10 years

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Volume (Nm3)	926,943	922,288	1,075,604	1,141,327	1,704,956	1,289,681	797,536	826,867	919,914	903,520

Data source: Wastewater Management Authority

Table 1.10 - Electricity produced from biogas over the last 10 years

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Electricity generated (kWh)	1,140,138	1,185,523	1,145,557	965,616	950,773	644,031	783,883	27,461	0	0

Data source: Wastewater Management Authority

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

Grants have been provided to subsidize the purchase of 73,480 solar water heaters up to 2016, under the four phases of the Solar Water Heater Grant Scheme (SWHGS). No updated figures are available currently for the year 2019.[3]

Assuming that these solar water heaters have displaced electric water heaters and gas 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 of 917.8 gCO_2/kWh for year 2019, and assuming 1.51 kg of CO_2 per litre of LPG, would be approximately 14,435 tCO_2. It is to be noted that large scale solar water heaters are used in other sectors of the economy such as the tourism sector and manufacturing sector to preheat water for swimming pools and boilers respectively.

1.5 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.

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) Gasolene – 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.

Table 1.11 shows the imports of petroleum products over the period 2010 to 2019. It may be noted that annual demand in petroleum products to meet domestic demand and bunkering increased by 12.3 % from 1,641.3 ktonnes in 2018 to 1,842.6 ktonnes in 2019.

[3] *Date Source: Performance Audit Report 2017 of the National Audit Office*

Table 1.11 - Import of petroleum products, 2010 – 2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gasolene	120.9	116.7	128.2	138.2	137.9	154.7	168.8	172.2	172.2	183.5
Diesel oil	310.4	309.9	313.8	336.1	303.6	318.7	339.1	346.7	330.1	333.9
Aviation fuel	234.9	226.4	213.0	241.1	232.0	268.8	285.0	309.7	303.8	287.1
Kerosene	6.7	4.3	7.0	2.8	2.2	2.5	2.1	2.0	3.1	13.5
Fuel oil	341.5	434.8	401.2	429.1	406.4	445.1	489.7	648.7	663.4	849.5
Liquefied Petroleum Gas (LPG)	62.7	66.3	67.9	68.2	75.6	72.5	167.0	149.4	168.6	175.1
TOTAL (ktonnes)	**1,077.1**	**1,158.4**	**1,131.1**	**1,215.5**	**1,157.7**	**1,262.3**	**1,451.7**	**1,628.7**	**1,641.2**	**1,842.6**

Data Source: Statistics Mauritius

Kerosene is used at the Nicolay power station for electricity generation. It was also used in the household sector for cooking purposes. Consequently, the Gas Turbines at Nicolay Power Station were solicited more than planned in November and December 2019 due to extended maintenance period at Fort George Power station. The prolonged running of the Turbines at Nicolay Power Station have resulted into an increase in the consumption of kerosene. In 2010, 6.7 ktonnes of kerosene was imported while in 2019, this stood at 13.5 ktonnes .

1.6 Primary energy re-export and bunkering

Primary energy re-export and bunkering in 2019 is shown in Table 1.12.

Table 1.12 - Primary energy re-export and bunkering

Energy Source	ktonne	ktoe
Diesel oil	141.3	142.7
Aviation fuel (foreign aircraft)	146.6	152.4
Fuel oil	520.2	499.4
LPG	61.8	66.7

Data Source: Statistics Mauritius

1.7 Stock variation

The variations in stock in 2019 are provided in the Table 1.13.

Table 1.13 - Variation in stock year

	2019							
	Import		Export		Primary energy requirement		Stock variations (import - export - primary energy requirement)	
	ktonne	ktoe	ktonne	ktoe	ktonne	ktoe	ktonne	ktoe
Coal	1,173.1	727.3	-	-	663.9	411.6	509.2	315.7
Gasolene	183.5	198.2	-	-	193.5	208.9	-10.0	-10.7
Diesel oil	333.9	337.2	141.3	142.7	221.5	223.7	-28.9	-29.2
Aviation Fuel	287.1	298.7	146.6	152.4	146.9	152.7	-6.4	-6.4
Kerosene	13.5	14.0	-	-	3.7	3.9	9.8	10.1
Fuel oil	849.5	815.5	520.2	499.4	316.5	303.8	12.8	12.3
LPG	175.1	189.1	61.8	66.7	84.4	91.2	28.9	31.2

Data Source: Statistics Mauritius

1.8 Dependency on Imported Energy Carriers

In 2019, the dependency rate on imported energy carriers was 87.2%. The trend of the dependency rate from 2010 to 2019 is shown in Table 1.14.

Table 1.14 - Import energy dependency rate, 2010 – 2019

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
83.1%	83.8%	84.4%	84.9%	85.8%	83.6%	85.4%	86.6%	87.1%	87.2%

Data Source: Statistics Mauritius

2 ELECTRICITY PRODUCTION CAPACITY

The capacity of power plants connected to the grid in 2019 is shown in Table 2.1.

Table 2.1 - Capacity of power plants in 2019

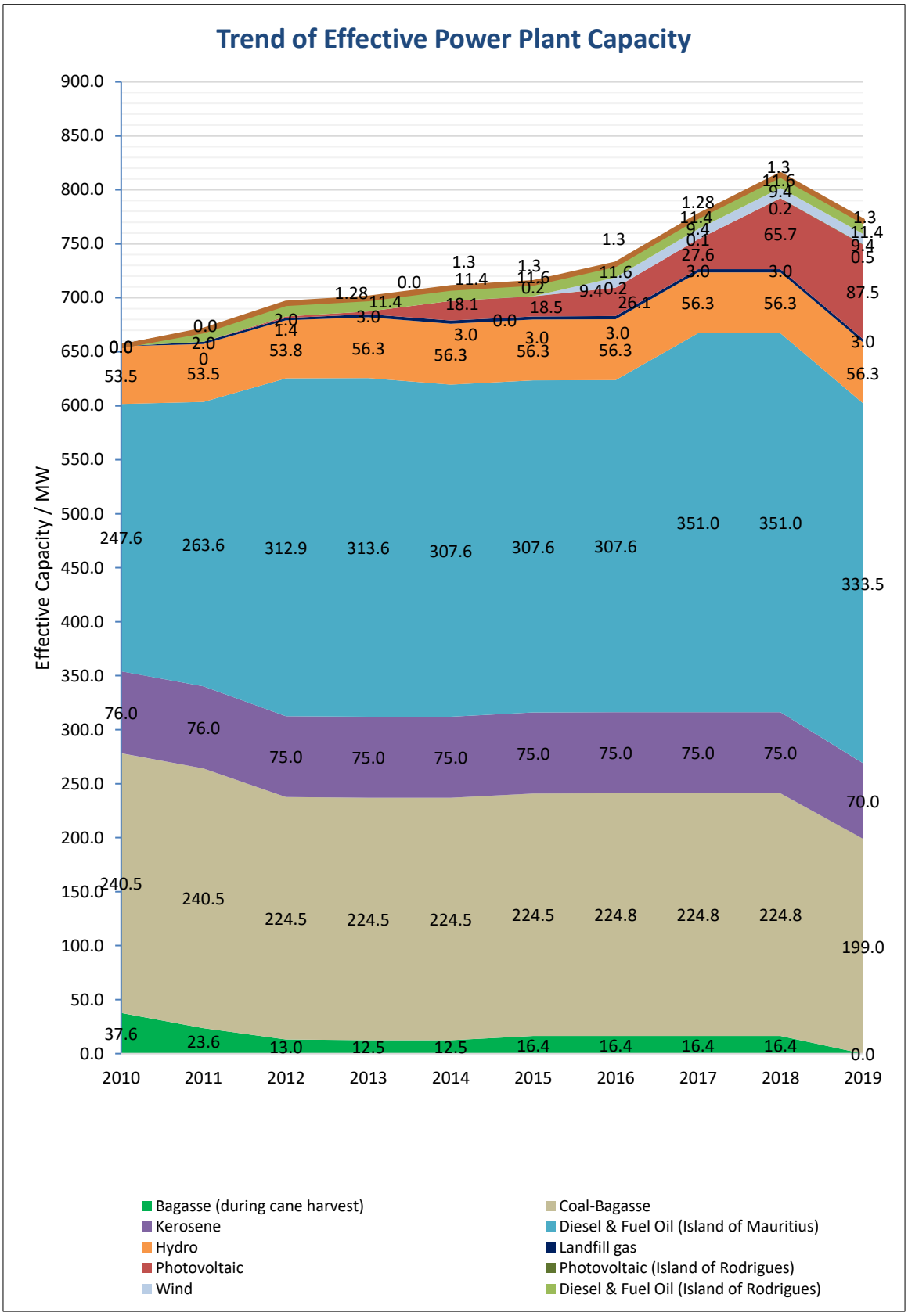
Type of power plant		Installed plant capacity (MW)	Total Installed plant capacity (MW)	Effective plant capacity (MW)	Total effective plant capacity (MW)
COAL- BAGASSE	Alteo Energy Ltd (formerly Consolidated Energy Ltd)	36.70	230.40	33.00	199
	Terragen Ltd (formerly Compagnie Thermique de Belle Vue)	71.20		62.00	
	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	60.44	28.00	56.30
	Ferney	10.00		10.00	
	Tamarind Falls	11.40		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 (Mare Chicose)	3.45	3.45	3.00	3.00
KEROSENE	Nicolay	78.40	78.40	70.00	70.00
DIESEL & FUEL OIL	St Louis	110.00	359.60	103.50	333.50
	Fort Victoria	109.60		103.00	
	Fort George	140.00		127.00	
PHOTOVOLTAIC	Island of Mauritius[4]	88.51	88.54	87.53	87.56
	Fort George	0.005		0.005	
	Fort Victoria	0.020		0.020	
	Island of Rodrigues[5]	0.53	0.53	0.53	0.53
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	12.30	12.30	11.40	11.40
Total capacity (Island of Mauritius) (MW)		830.2	830.2	758.7	758.7
Total capacity (Island of Rodrigues) (MW)		14.1	14.1	13.2	13.2
	Total (MW)	**844.3**	**844.3**	**771.9**	**771.9**

Data Source: Statistics Mauritius

[4]Includes SSDG, MSDG and Sarako

[5] Includes SSDG and MSDG

The trend of effective power plant capacity from 2010 to 2019 (Island of Mauritius) is shown in Figure 2.1.



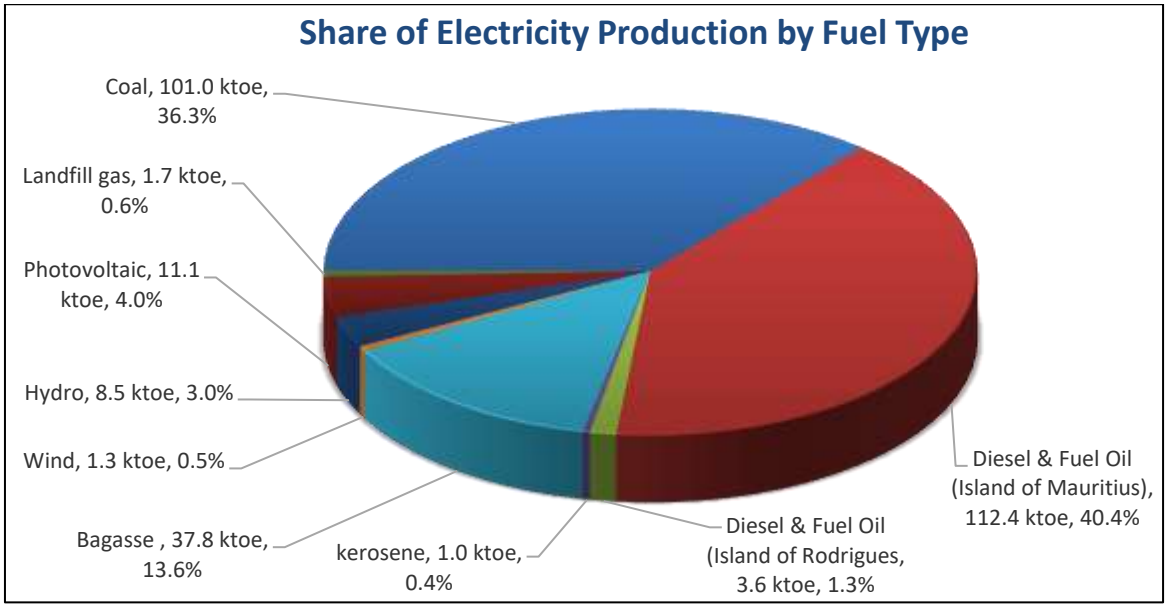
Data Source: Statistics Mauritius

Figure 2.1 - Trend of effective power plant capacity, 2010 – 2019

The decreasing trend in the effective power plant capacity is mainly due to the decommissioning of Medine for Bagasse (cane harvest season) and Alteo Beau Champ (Consolidated Energy Limited) for Coal – Bagasse. There has also been a decrease in the effective power plant capacity and St Louis, Fort Victoria and Fort Georges from 110 MW, 107 MW and 134 MW respectively in 2018 to 103 MW and 127 MW respectively in 2019.

3 ELECTRICITY PRODUCTION

Figure 3.1 shows the share of electricity production by fuel type in 2019.



Data Source: Statistics Mauritius

Figure 3.1 - Share of electricity production by fuel type, 2019

3.1 Share of Renewable Energy in Electricity Mix

The actual renewable energy in the electricity mix in 2019 is given in Table 3.1.

Table 3.1 - Share of renewable energy in electricity mix for Island of Mauritius

Renewable energy source	2019		
	Installed Capacity (MW)	Total RE (GWh)	% Share in Electricity Mix
(i) On-shore wind	9.35	12.9	0.44
(ii) Solar Energy - Residential	10.6	11.5	0.39
(iii) Solar Energy - Commercial	5.4	5.4	0.18
(iv) Solar Energy - Utility	82	110.7	3.75
(v) Biomass - Bagasse	131.5	314.0	10.6
(vi) Biomass –Cane trash		9.0	0.3
(vii) Landfill Gas	3.3	19.9	0.67
(viii) Hydro	61.1	98.6	3.3
Total	**303.25**	**582.0**	**19.63**

Data Source: CEB

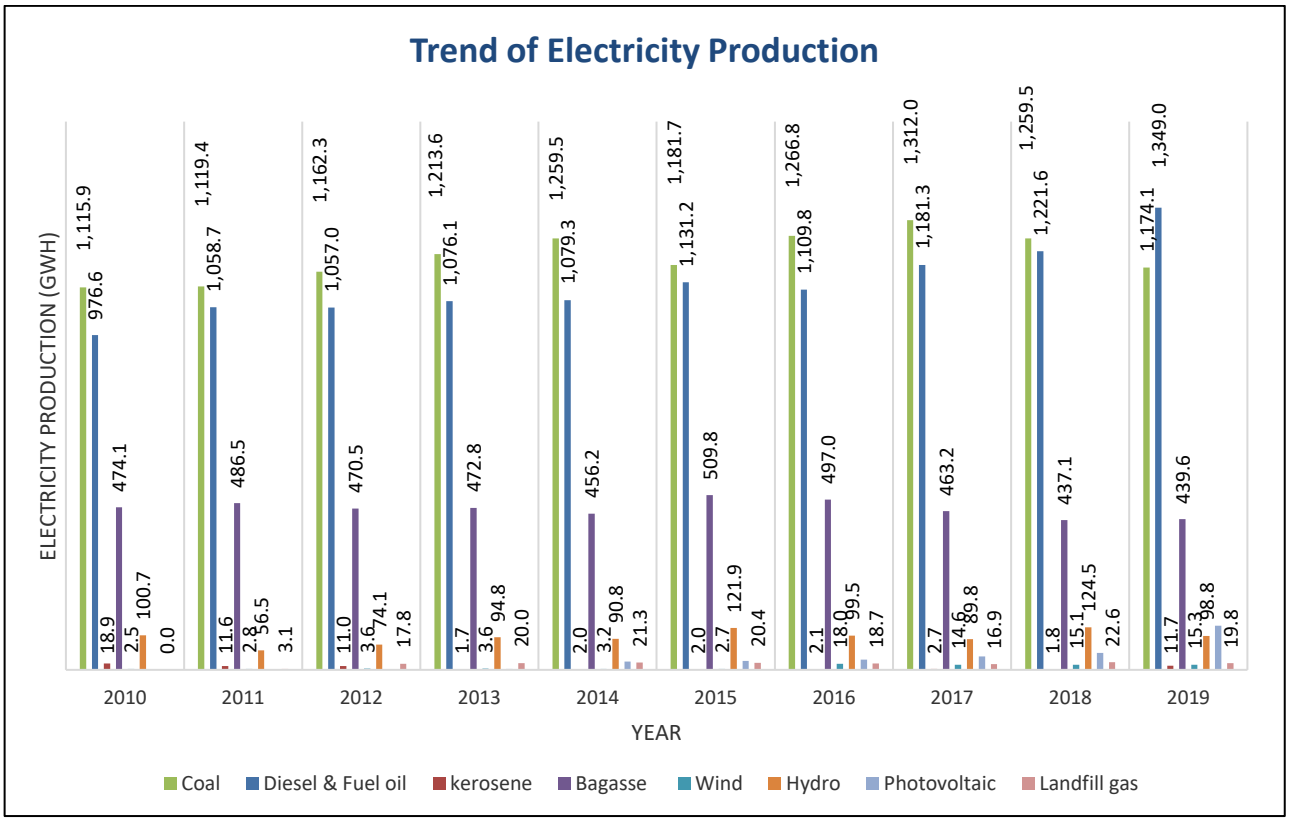
The overall conversion efficiencies of the power plants in 2019 are given in Table 3.2.

Table 3.2 - Conversion efficiency of power plants

2019	Fuel input	Electricity production		Overall conversion efficiency
	ktoe	GWh	ktoe	%
Coal	393.2	1,174.1	101.0	25.7
Diesel & Fuel Oil (Island of Mauritius)	253.8	1,307.4	112.4	44.3
Diesel & Fuel Oil (Island of Rodrigues	9.0	41.6	3.6	40.0
Kerosene	3.9	11.7	1.0	25.6
Bagasse	160.3	439.6	37.8	23.6
TOTAL	**820.2**	**2,974.4**	**255.8**	**31.2**

Data Source: Statistics Mauritius

Figure 3.2 shows the trend of electricity production per source of energy over the period 2010 to 2019.

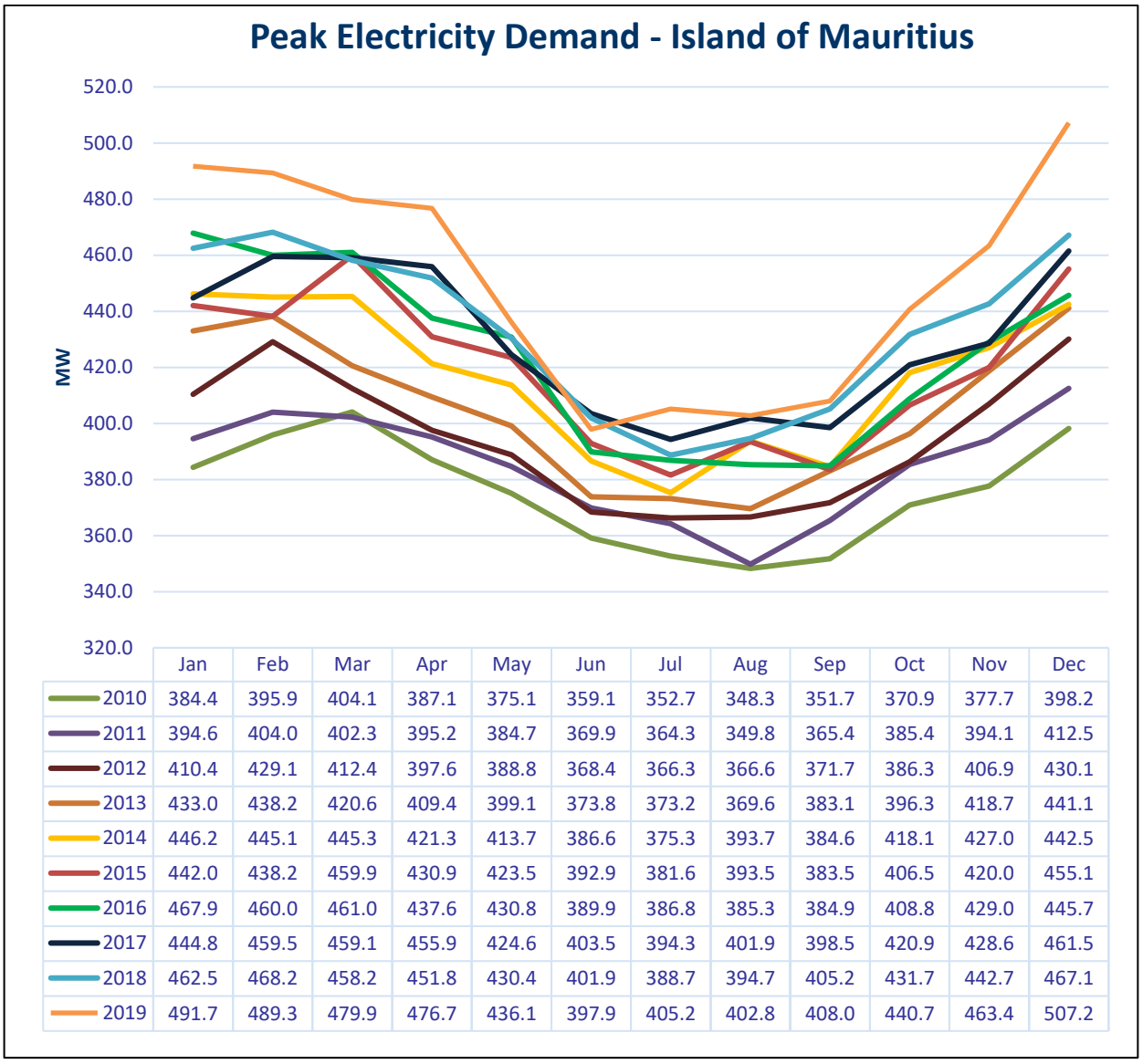


Data Source: Statistics Mauritius

Figure 3.2 - Trend of electricity production, 2010 – 2019

Total electricity production increased by 3.4 % in 2019 as compared to 2018. In 2019, 78.3% of electricity production was derived from fossil fuel sources while 21.7% of electricity production was from renewable energy sources. This is due to an increase in electricity production from photovoltaic from 49.4 GWh in 2018 to 128.5 GWh in 2019 and electricity generated from wind energy has also increased from 15.1 GWh in 2018 to 15.3 GWh in 2019.

Figure 3.3 shows the monthly peak electricity demand for the years 2010 – 2019 (Island of Mauritius).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
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
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
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
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
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
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
2017	444.8	459.5	459.1	455.9	424.6	403.5	394.3	401.9	398.5	420.9	428.6	461.5
2018	462.5	468.2	458.2	451.8	430.4	401.9	388.7	394.7	405.2	431.7	442.7	467.1
2019	491.7	489.3	479.9	476.7	436.1	397.9	405.2	402.8	408.0	440.7	463.4	507.2

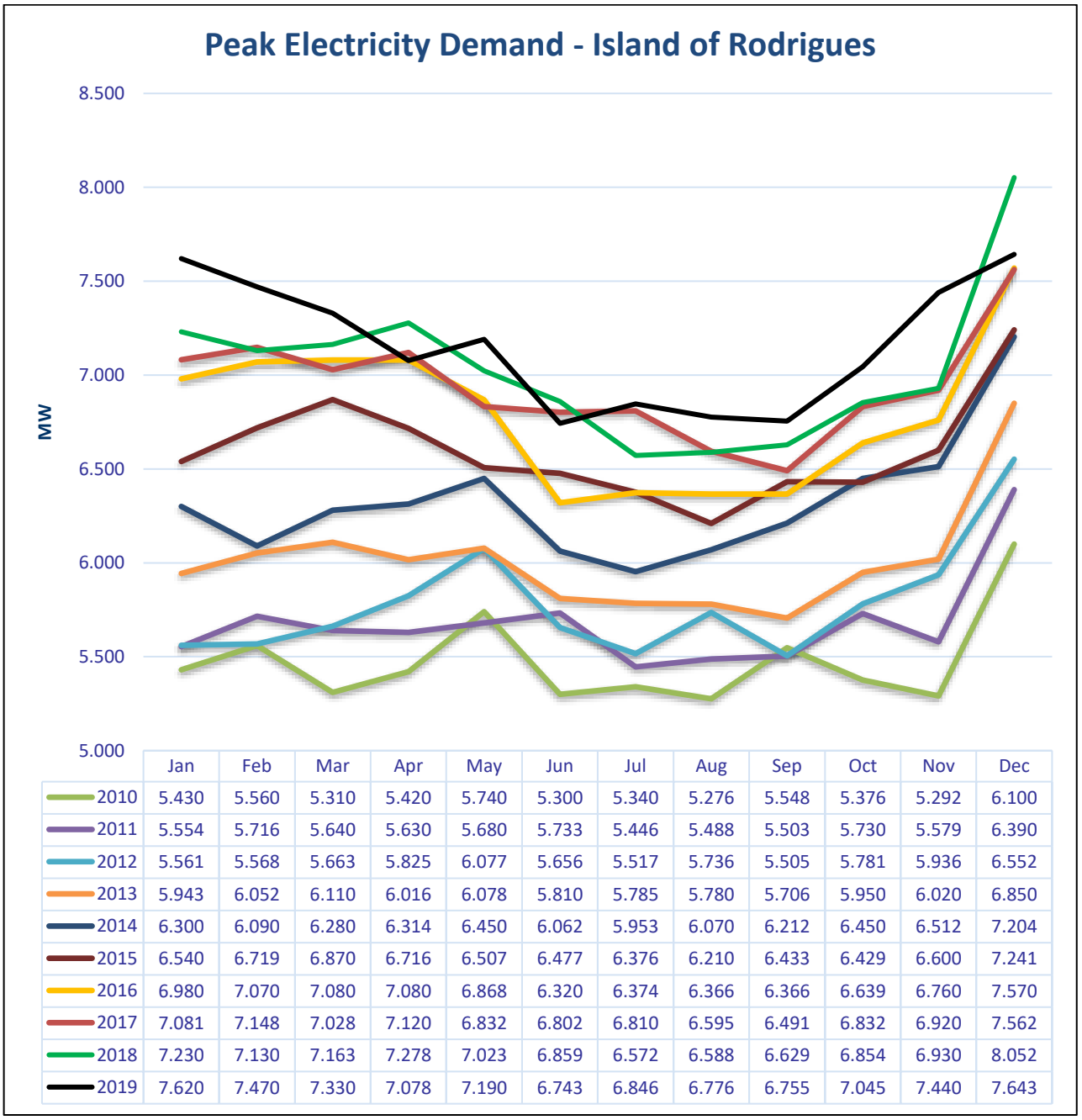
Data Source: Statistics Mauritius

Figure 3.3 - Peak electricity demand (Island of Mauritius), 2010 – 2019

In 2019, peak power demand varied between 397.9 MW and 507.2 MW for the Island of Mauritius. The peak for the year 2019, i.e 507.2 MW, occurred in December 2019.

Peak demand has consistently increased as shown by the demand trend over the period 2010 – 2019 (Island of Mauritius) in Figure 3.5. It is also observed that the peak demand of 507.2 MW recorded in 2019 is more than the peak demand of 468.2 MW recorded in 2018.

Figure 3.4 shows the monthly peak electricity demand for the years 2010 to 2019 (Island of Rodrigues).

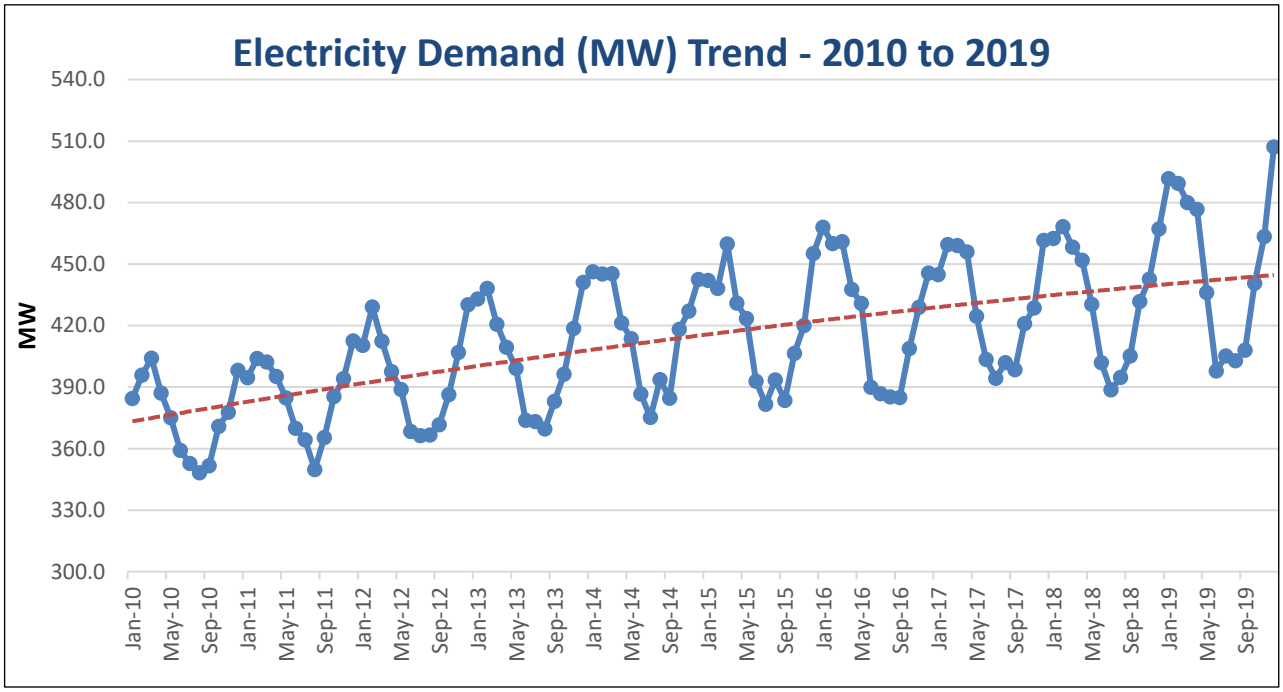


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	5.430	5.560	5.310	5.420	5.740	5.300	5.340	5.276	5.548	5.376	5.292	6.100
2011	5.554	5.716	5.640	5.630	5.680	5.733	5.446	5.488	5.503	5.730	5.579	6.390
2012	5.561	5.568	5.663	5.825	6.077	5.656	5.517	5.736	5.505	5.781	5.936	6.552
2013	5.943	6.052	6.110	6.016	6.078	5.810	5.785	5.780	5.706	5.950	6.020	6.850
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
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
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
2017	7.081	7.148	7.028	7.120	6.832	6.802	6.810	6.595	6.491	6.832	6.920	7.562
2018	7.230	7.130	7.163	7.278	7.023	6.859	6.572	6.588	6.629	6.854	6.930	8.052
2019	7.620	7.470	7.330	7.078	7.190	6.743	6.846	6.776	6.755	7.045	7.440	7.643

Data Source: Statistics Mauritius

Figure 3.4 - Peak electricity demand (Island of Rodrigues), 2010 – 2019

In 2019, peak power demand in Island of Rodrigues varied between 6.743 MW and 7.643 MW. Peak demand of 7.643 MW occurred in December.

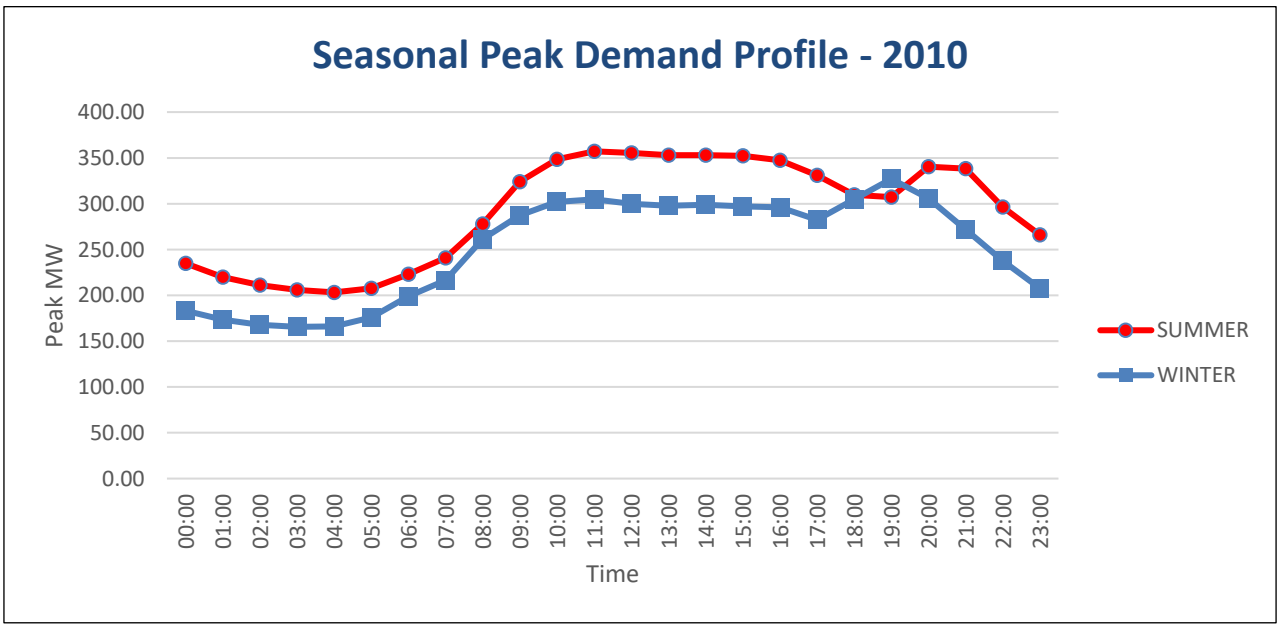


Data Source: Statistics Mauritius

Figure 3.5 - Electricity demand (MW) trend, 2010 to 2019 (Island of Mauritius)

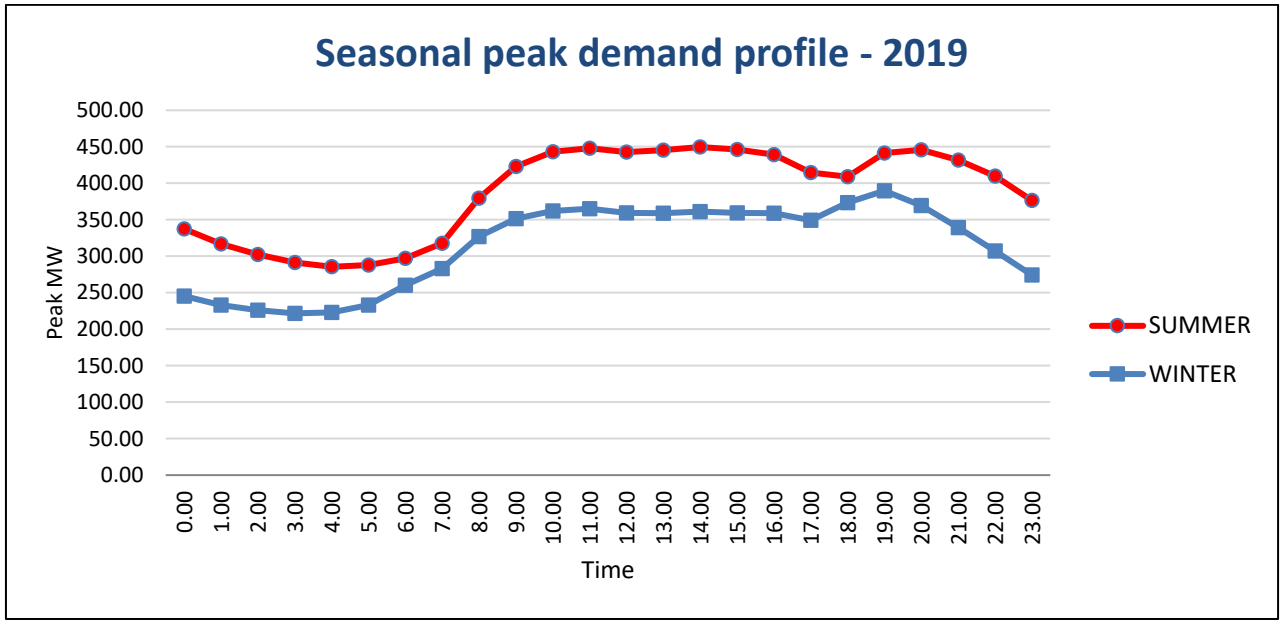
Based on the seasonality in Mauritius, two typical demand profiles namely winter demand profile and summer demand profile are identified. In summer, demand is higher than in winter. This is mainly due to air conditioning loads. However, during the day, the increase in demand is due to the Commercial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

Figure 3.6 and Figure 3.7 show the hourly seasonal peak demand profile (Island of Mauritius) for the years 2010 and 2019 respectively.



Data Source: CEB

Figure 3.6 - Seasonal peak demand profile, 2010



Data Source: CEB

Figure 3.7 - Seasonal peak demand profile, 2019

Table 3.3 provides a summary of the electricity production over the period 2010 to 2019 (Island of Mauritius).

Table 3.3 - Summary of electricity production, 2010 – 2019

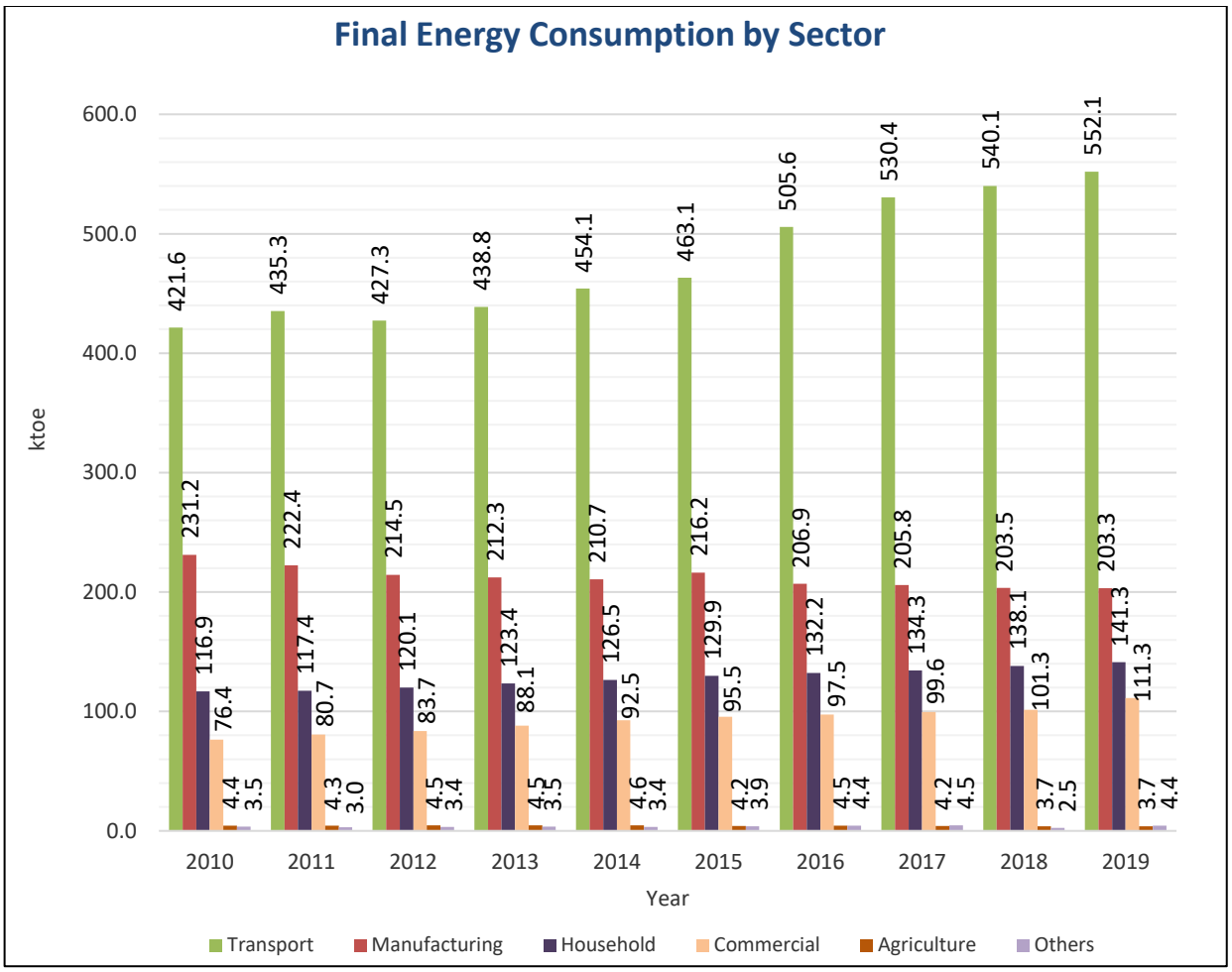
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fossil (GWh)	2,111.4	2,189.6	2,230.3	2,291.3	2,340.8	2,314.9	2,378.7	2,496.0	2,482.9	2,534.8
Renewables (GWh)	577.3	549.0	566.8	594.0	596.2	680.6	663.5	623.7	648.7	701.8
Increase in Electricity Production (GWh)	111.3	49.9	58.5	88.2	51.6	58.7	46.6	77.5	11.9	105.0
Percentage increase overall	4.3 %	1.8 %	2.1 %	3.1 %	1.8 %	2.0 %	1.5 %	2.5 %	0.4 %	3.2 %
Percentage of renewables	21.5%	20.0%	20.3%	20.6%	20.3%	22.7%	21.8%	20.0 %	20.7%	21.7%
Peak demand (MW) (Island of Mauritius)	404.1	412.5	430.1	441.1	446.2	459.9	467.9	461.5	468.2	507.2
Peak demand evolution	4.0 %	2.1 %	4.3 %	2.6 %	1.2 %	3.1 %	1.7 %	-1.4%	1.5 %	8.3 %

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 2010 to 2019. The total final energy consumption in 2019 amounted to 1,016.0 ktoe, representing an increase of 2.7 % compared to 2018. As can be seen in Figure 4.1, an increase in final energy consumption has been observed in the transport, household and commercial sectors, with the highest increase (+12 ktoe) being for the transport sector. However, a decrease in final energy consumption is observed for the manufacturing sector.



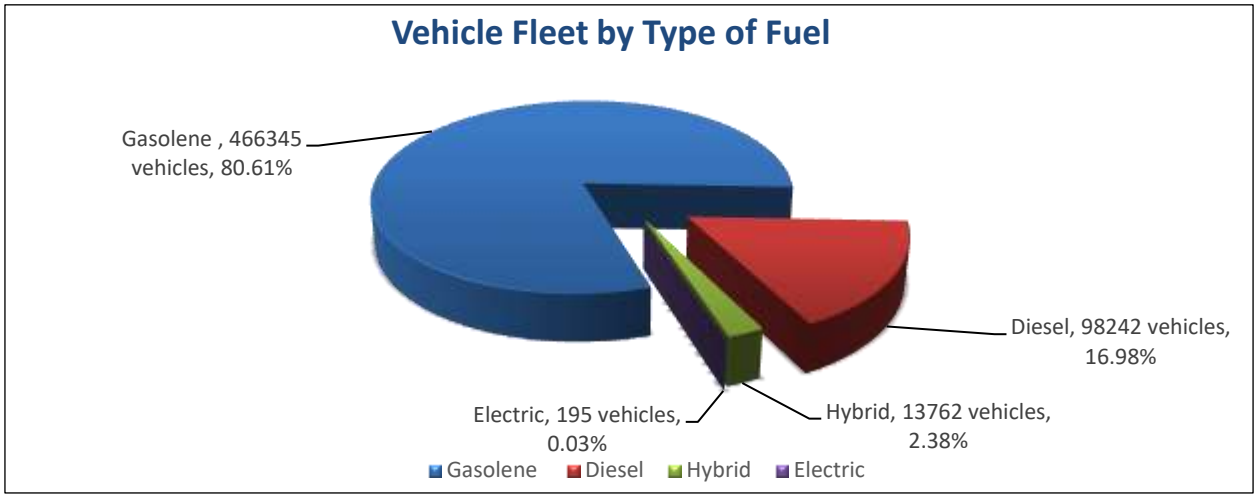
Data Source: Statistics Mauritius

Figure 4.1 - Final energy consumption by sector, 2010 – 2019

4.2 Final Energy consumption - Transport sector

4.2.1 Vehicle fleet

The fleet of powered vehicles for Mauritius comprised 580,629 vehicles in 2019, with the share of fuel type as given in Figure 4.2.



Data Source: National Transport Authority

Figure 4.2 - Vehicle fleet by type of fuel in 2019

In 2019 the number of hybrid (petrol/electric) powered vehicles increased by 37.7% as compared to 2018 i.e. from 9,992,to 13,762 and the number of electric vehicles increase by more than two-fold as compared to 2018, i.e. from 85 to 195.

It may be noted from Table 4.1 that there has been an increase in new and second hand imported vehicles registrations in 2019 of +2.7 % compared to 2018, whereas the increase from 2017 to 2018 was +1.8%.

Table 4.1 - New and second hand imported car, 2010 – 2019

Engine capacity	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	% Growth in 2019 over 2018
Up to 1,000 c.c	804	948	856	1,634	1,982	1,519	3,205	8,988	9,769	9,805	0.4
1,001 - 1,250 c.c	1,211	1,060	1,158	1,582	2,056	3,166	4,128	3,199	2,600	2,617	0.7
1,251 - 1,400 c.c	1,691	2,205	2,015	2,691	3,321	3,212	1,986	3,888	3,472	2,955	-14.9
1,401 - 1,500 c.c	1,835	2,384	1,771	1,824	2,528	2,425	2,543	3,138	4,147	5,012	20.9
1,501 - 2,000 c.c	2,927	2,105	2,867	3,557	3,240	3,039	2,743	3,556	4,270	4,270	0.0
2,001 - 2,250 c.c	32	9	20	30	51	56	61	160	177	249	40.7
2,251 - 2,500 c.c	155	196	166	58	432	512	335	1,224	1,579	1,530	-3.1
2,501 - 3,000 c.c	139	154	185	142	102	94	122	676	733	798	8.9
Above 3,000 c.c	72	87	71	77	48	44	34	937	946	963	1.8
Total	**8,866**	**9,148**	**9,109**	**11,595**	**13,760**	**14,067**	**15,157**	**25,766**	**27,693**	**28,199**	**1.8**

Data Source: National Transport Authority

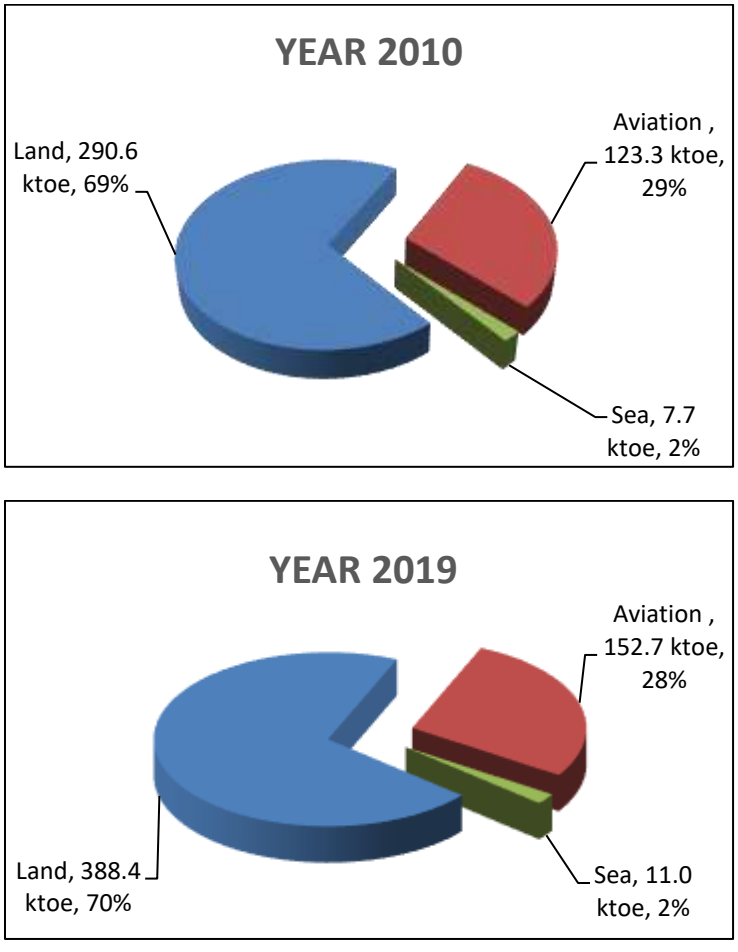
4.2.2 Fuel Consumption

Table 4.2 gives the fuel consumption in the sub-sectors of the transport sector in 2019, while Figure 4.3 shows the share of fuel use in each sub-sector in 2010 and 2019 and Figure 4.4 depicts the trend in consumption over the period 2010 – 2019.

Table 4.2 - Fuel consumption (ktoe) in the transport sector, 2019

Transport sector	Gasolene	Diesel	Aviation fuel (local aircraft)	LPG	Fuel Oil	Total
Land	203.9	181.2	-	3.3	-	388.4
Aviation	-	-	152.7	-	-	152.7
Sea[6]	5.0	1.7	-	-	4.3	11.0
Total	**208.9**	**182.9**	**152.7**	**3.3**	**4.3**	**552.1**

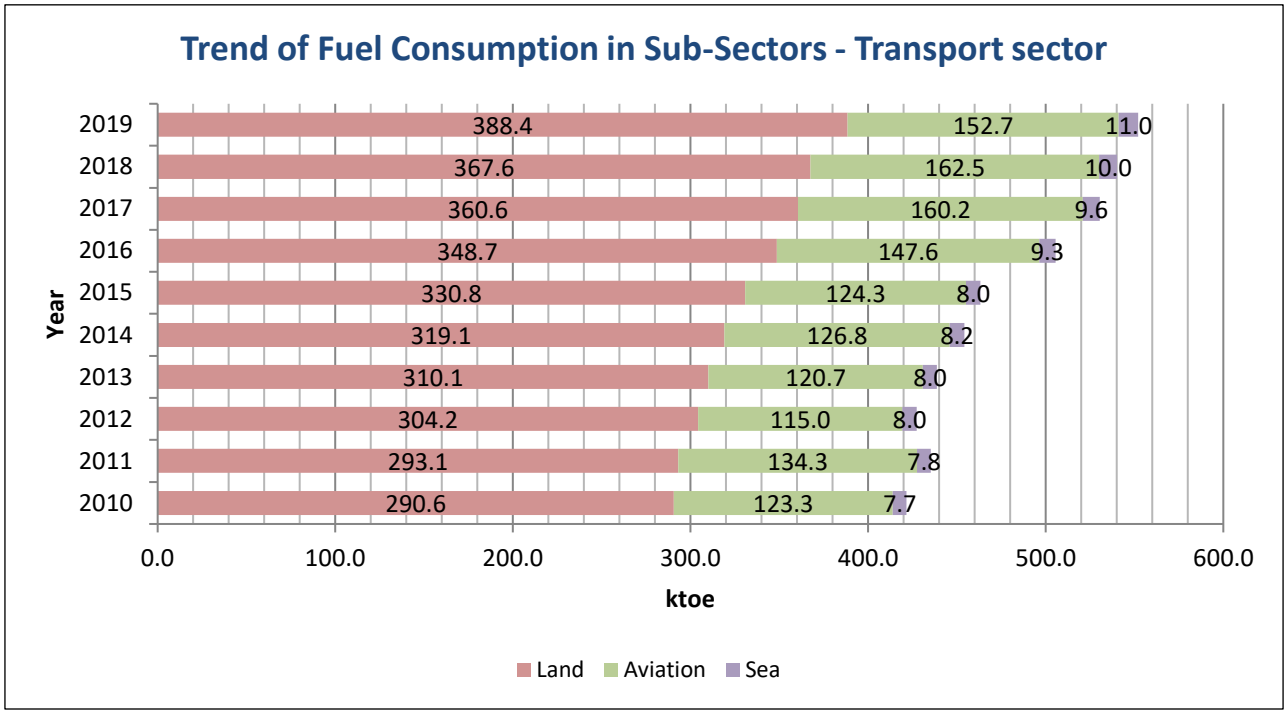
Data Source: Statistics Mauritius



Data Source: Statistics Mauritius

Figure 4.3 - Fuel consumption share in sub-sectors of the transport sector in 2010 and in 2019

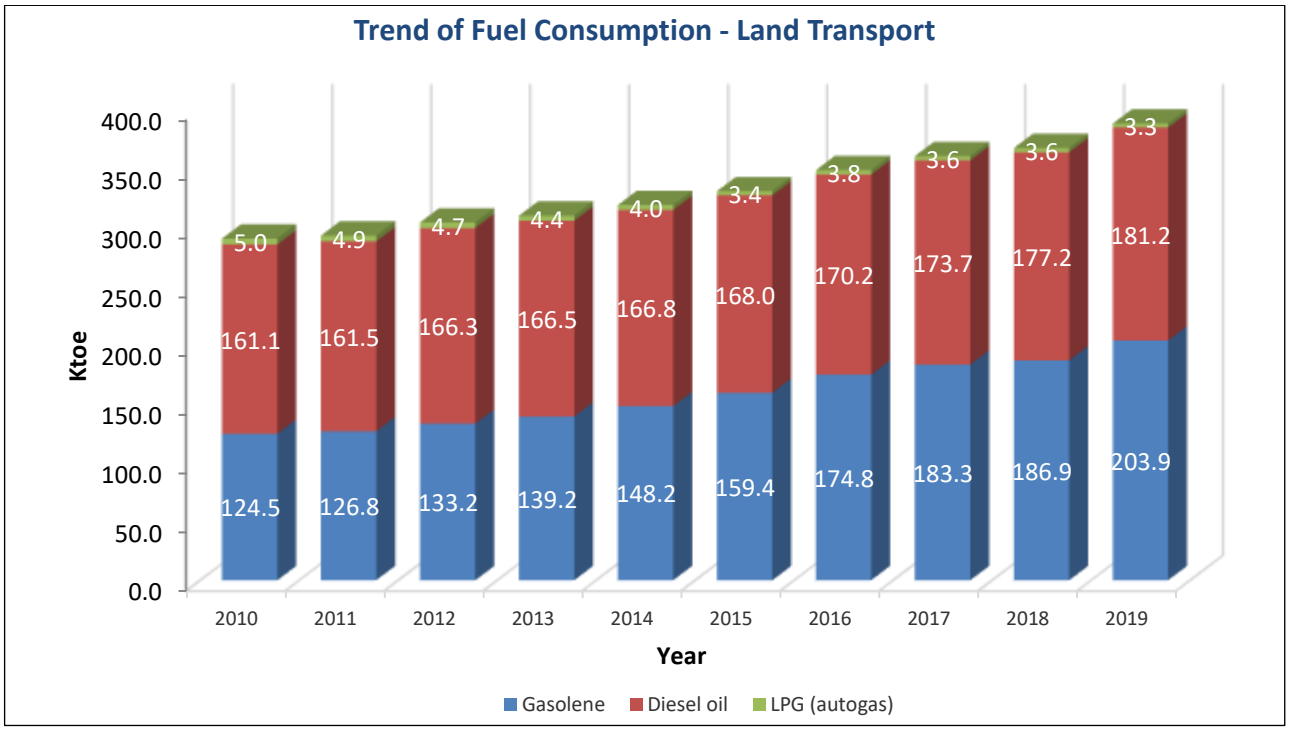
[6] Sea Transport comprises interisland traffic for both cargo and passengers, pleasure crafts in the tourism sector and Mauritian fishing vessels.



Data Source: Statistics Mauritius

Figure 4.4 - Trend of fuel consumption in sub-sectors of transport sector 2010 – 2019

The trend of fuel consumption in the land transport sector over the period 2010 to 2019 is shown in Figure 4.5. It may be noted that fuel consumption in land transport reached 388.4 ktoe in 2019; representing an increase of 5.7% over 2018.



Data Source: Statistics Mauritius

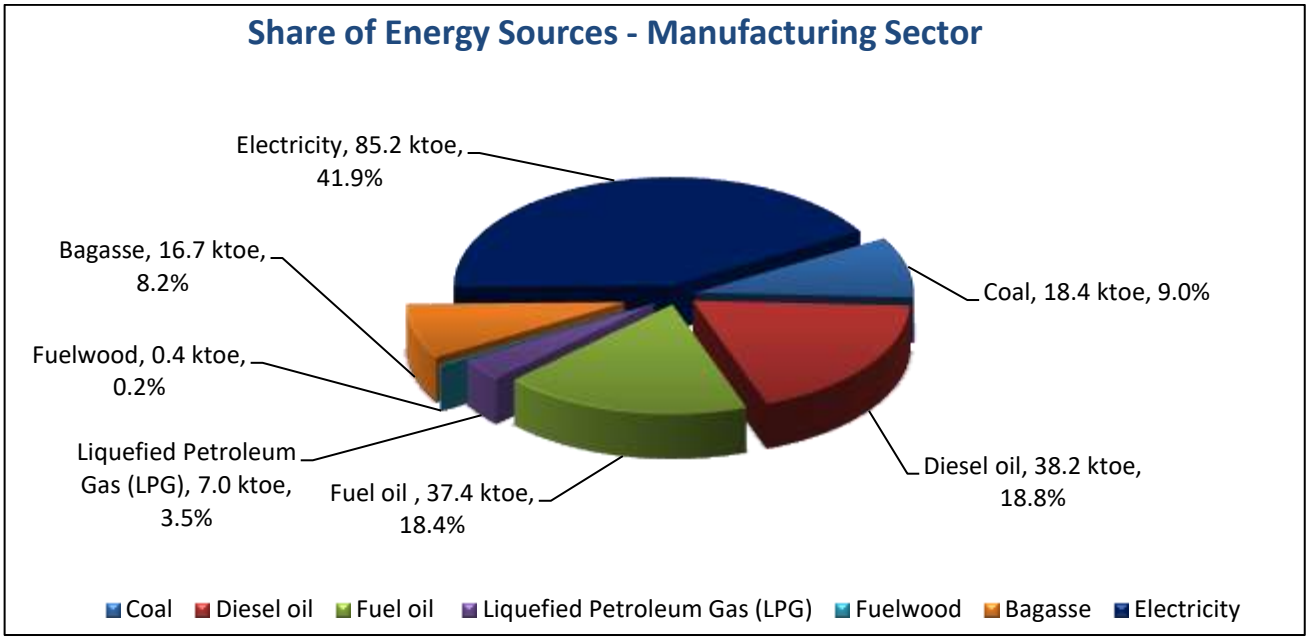
Figure 4.5 - Trend of fuel consumption in land transport, 2010 – 2019

Compared to 2018, it may be observed that for land transport in 2019:

- diesel consumption increased by 2.3%.
- gasolene consumption increased by 9.1%.
- LPG (autogas) consumption decreased by 8.3%.

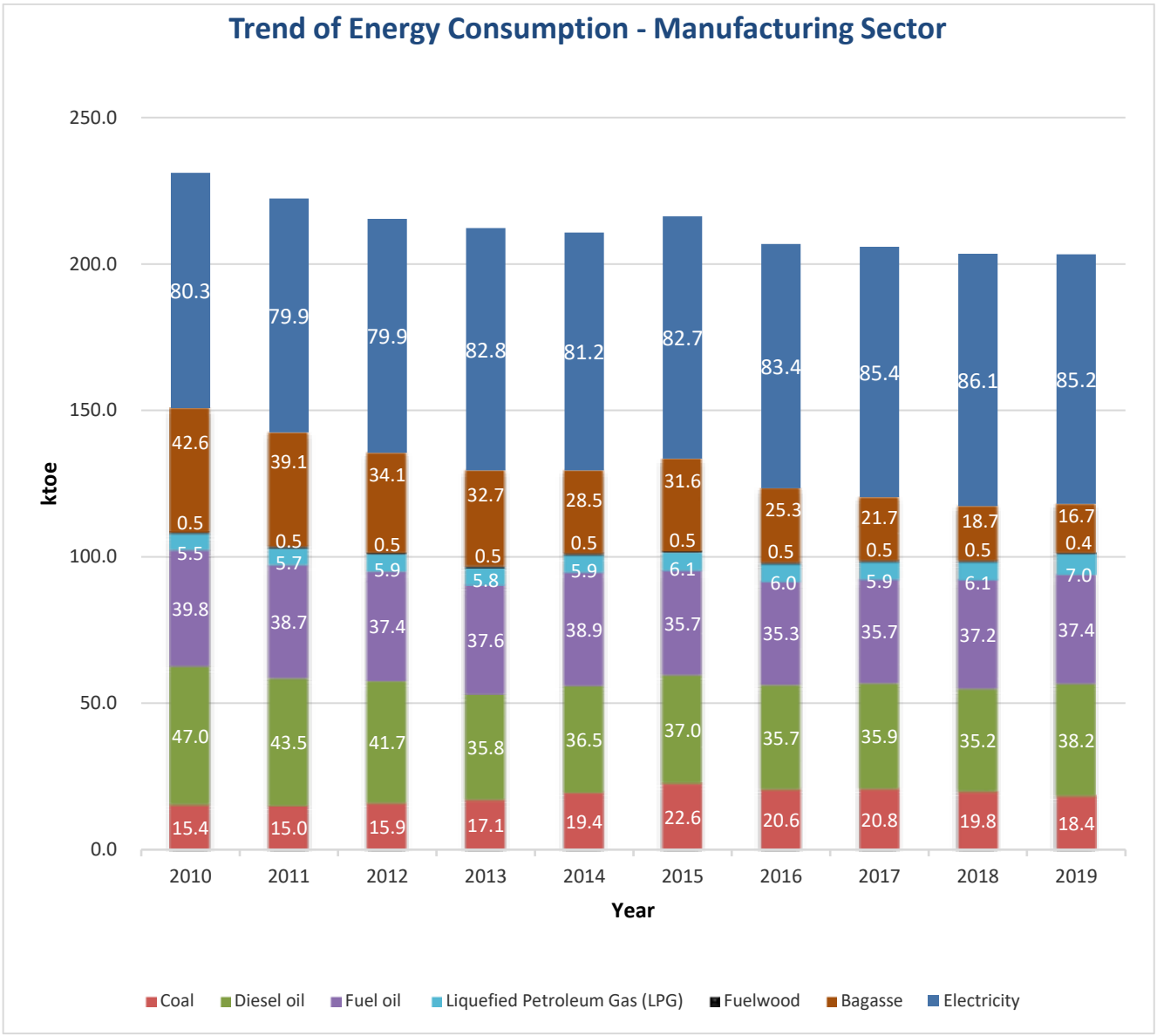
4.3 Final energy consumption - Manufacturing sector

Total energy consumption in the manufacturing sector amounted to 203.3 ktoe in 2019, which was 0.1% less than in 2018. Figure 4.6 shows the share of different energy sources used in the manufacturing sector in 2019, while Figure 4.7 provides the trend for the period 2010 to 2019.



Data Source: Statistics Mauritius

Figure 4.6 - Share of energy sources in the manufacturing sector, 2019

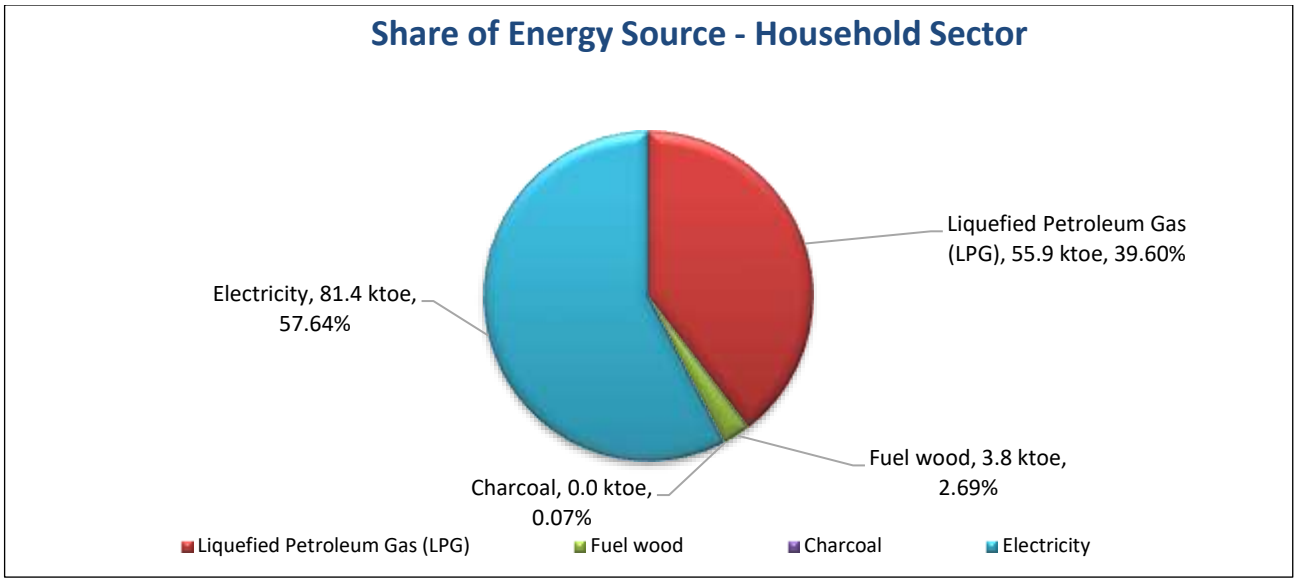


Data Source: Statistics Mauritius

Figure 4.7 - Trend of energy consumption in the manufacturing sector, 2010 – 2019

4.4 Final energy consumption - Household sector

Total energy consumption in the household sector amounted to 141.2 ktoe in 2019 representing a 2.2% growth over 2018. The share of energy sources in the household sector in 2019 is given in Figure 4.8.

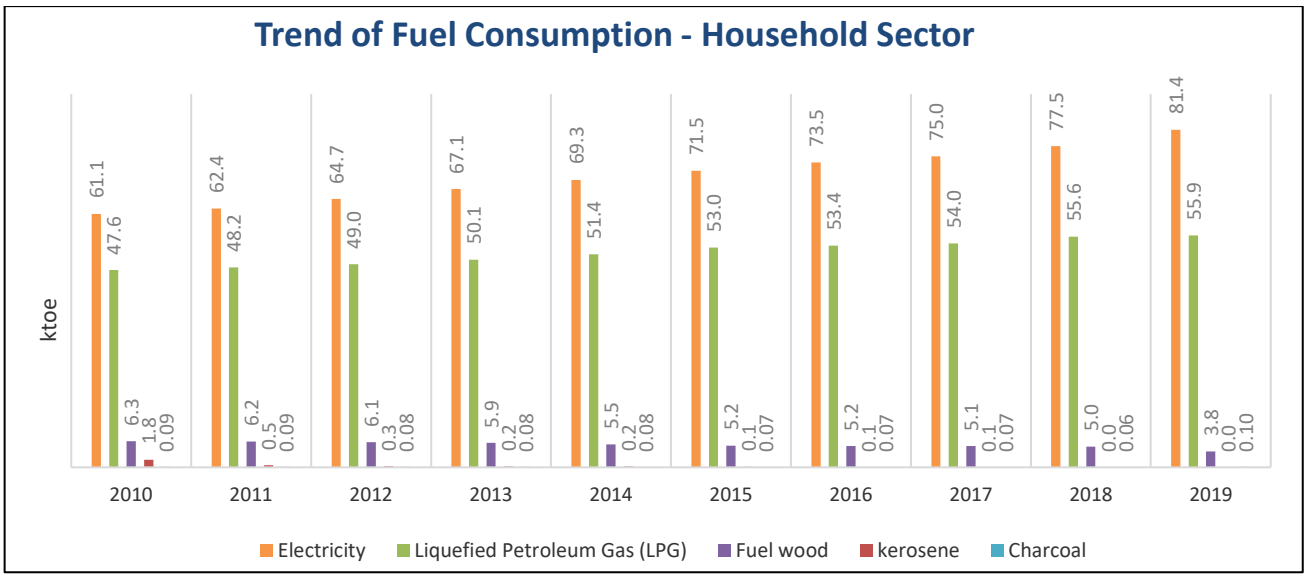


Data Source: Statistics Mauritius

Figure 4.8 - Share of energy sources,household sector, 2019

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 insignificant. In 2019 the consumption of electricity and LPG have both increased compared to 2018 by 5.0% and 0.5% respectively.

The trend of each fuel consumption over the period 2010 to 2019 is shown in Figure 4.9.

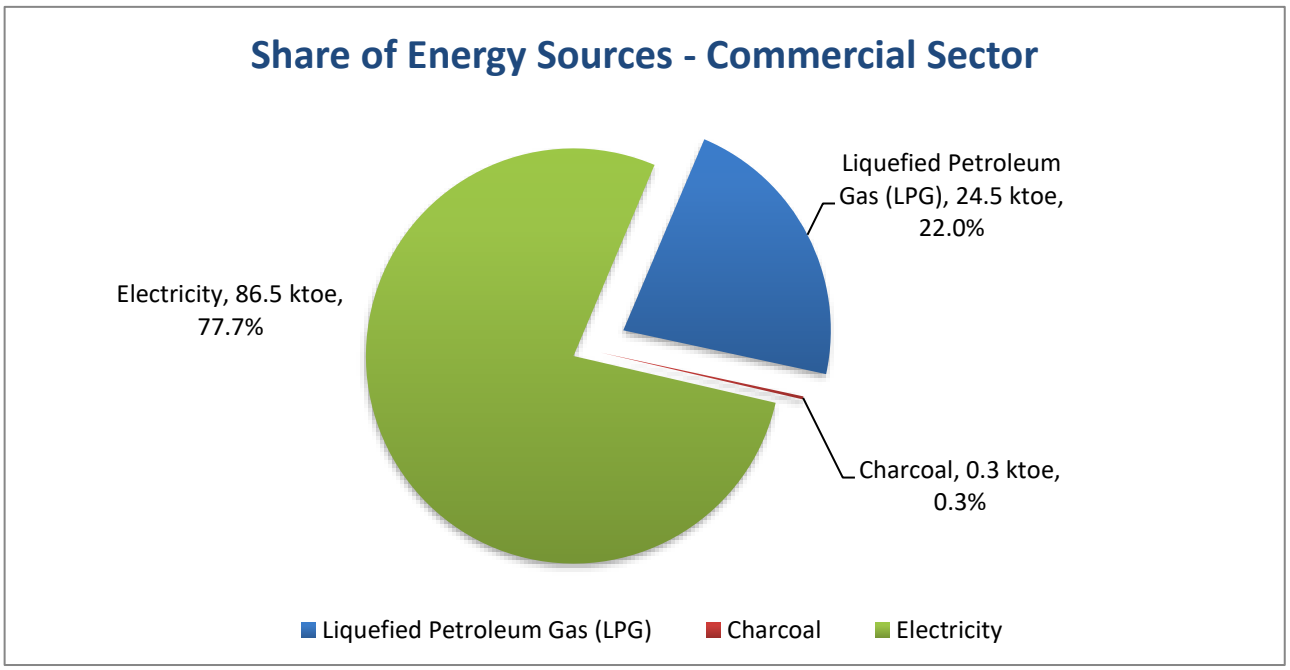


Data Source: Statistics Mauritius

Figure 4.9 - Trend of fuel consumption in the household sector, 2010 – 2019

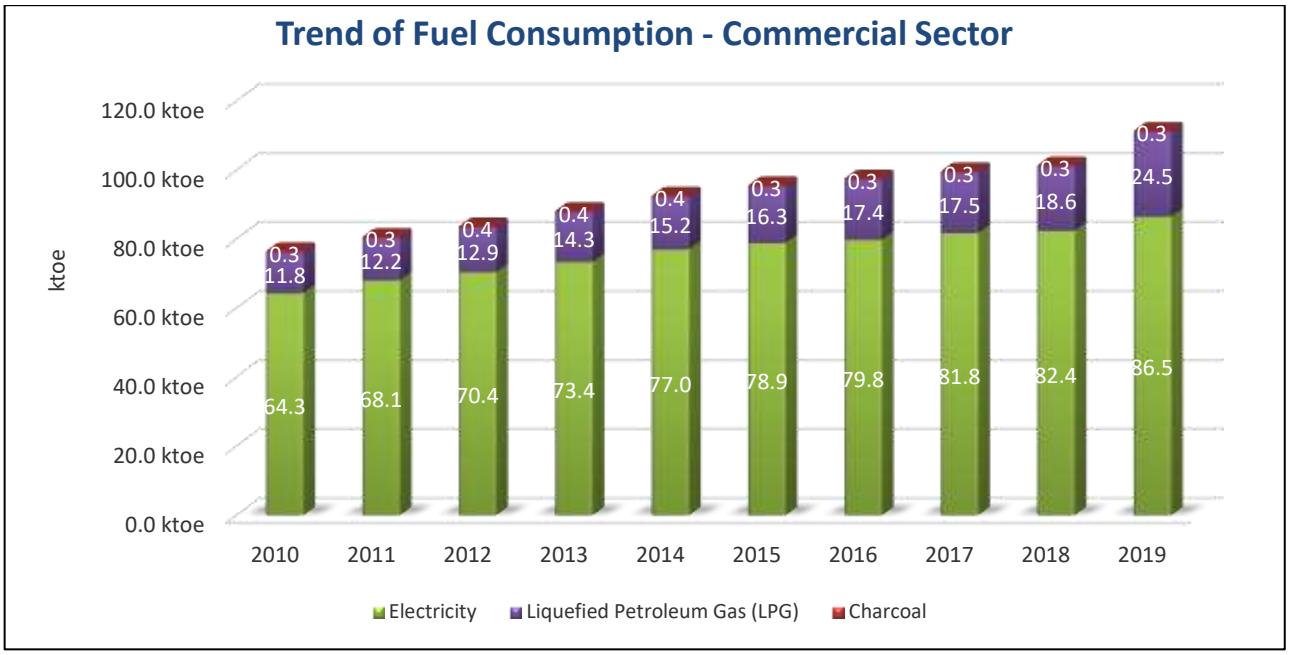
4.5 Final energy consumption - Commercial sector

Total energy consumption in the Commercial sector amounted to 111.3 ktoe in 2019 and the share of energy sources in 2019 is shown in Figure 4.10, while Figure 4.11 gives the trend of fuel consumption over the period 2010 to 2019.



Data Source: Statistics Mauritius

Figure 4.10 - Share of energy sources in the commercial sector, 2019



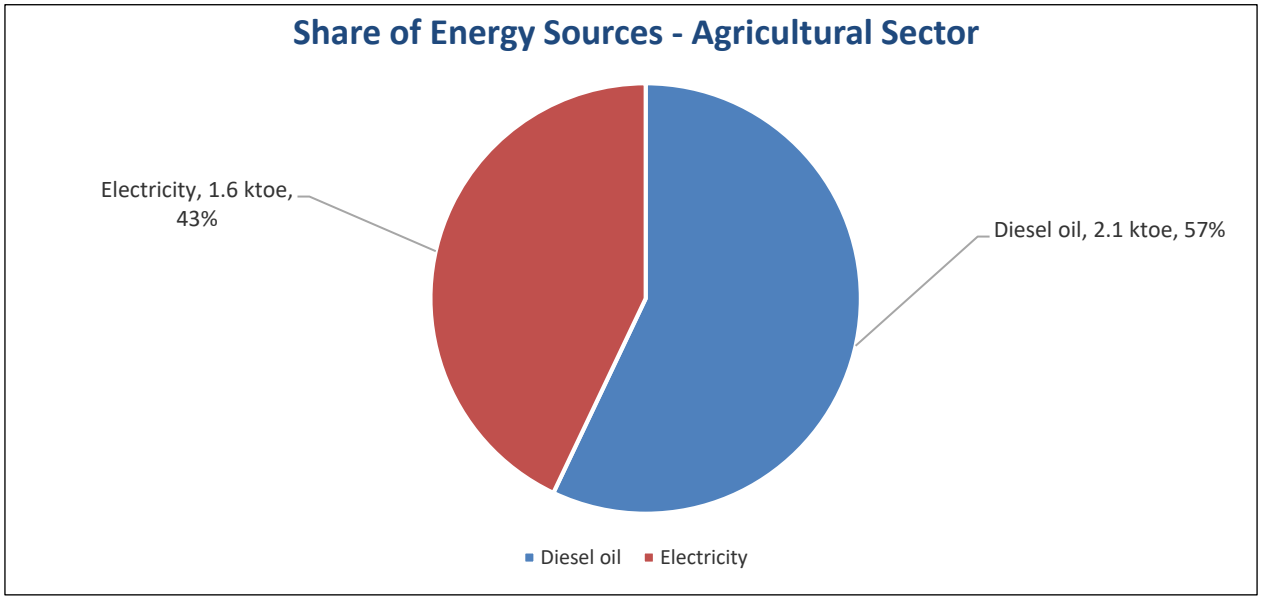
Data Source: Statistics Mauritius

Figure 4.11 - Trend of fuel consumption in the commercial sector, 2010 – 2019

In 2019, electricity consumption in the commercial sector increased by 5.0% compared to 2018, indicating continued expansion in the sector. The main areas of electricity use in this sector are refrigeration, air conditioning and decorative and security lighting.

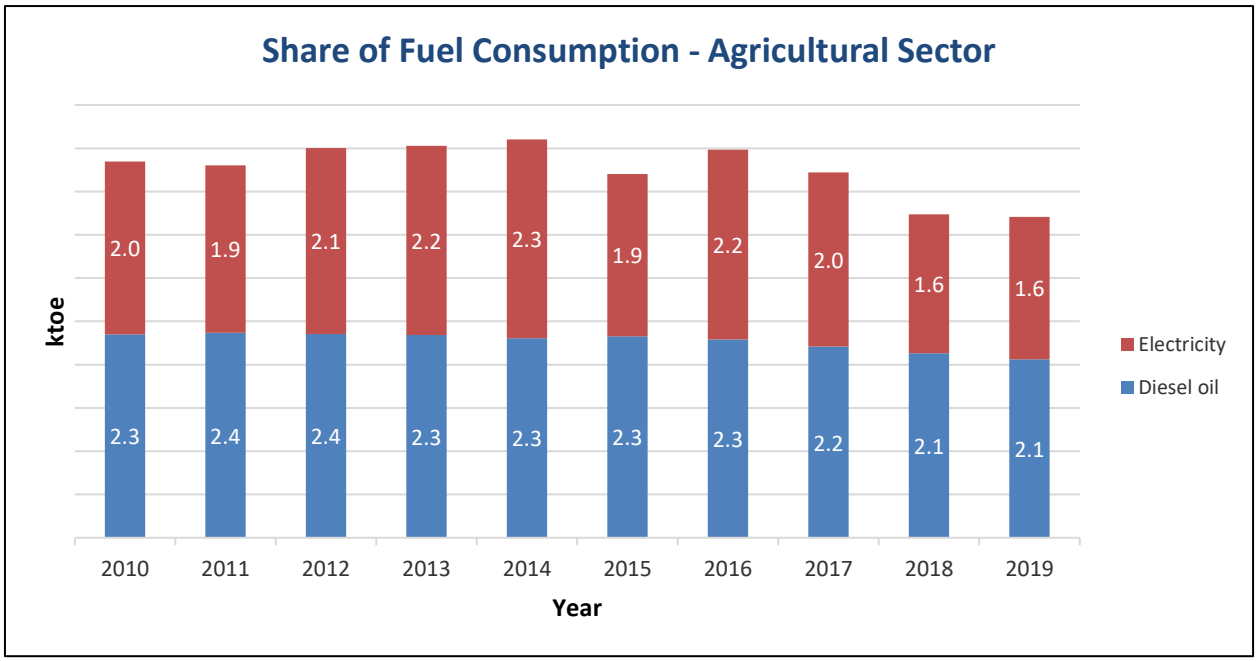
4.6 Final energy consumption - Agricultural sector

Total energy consumption in the agricultural sector amounted to 3.7 ktoe in 2019, same as in 2018. The share of energy sources in 2019 is shown in Figure 4.12, while Figure 4.13 gives the trend of fuel consumption over the period 2010 to 2019.



Data Source: Statistics Mauritius

Figure 4.12 - Share of energy sources in agricultural sector, 2019



Data Source: Statistics Mauritius

Figure 4.13 - Share of fuel consumption in the agricultural sector, 2010 – 2019

It may be noted from Figure 4.13 that in 2019, the fuel consumption in the Agricultural sector has reached a minimum value of 3.7 ktoe for the period 2010 to 2019.

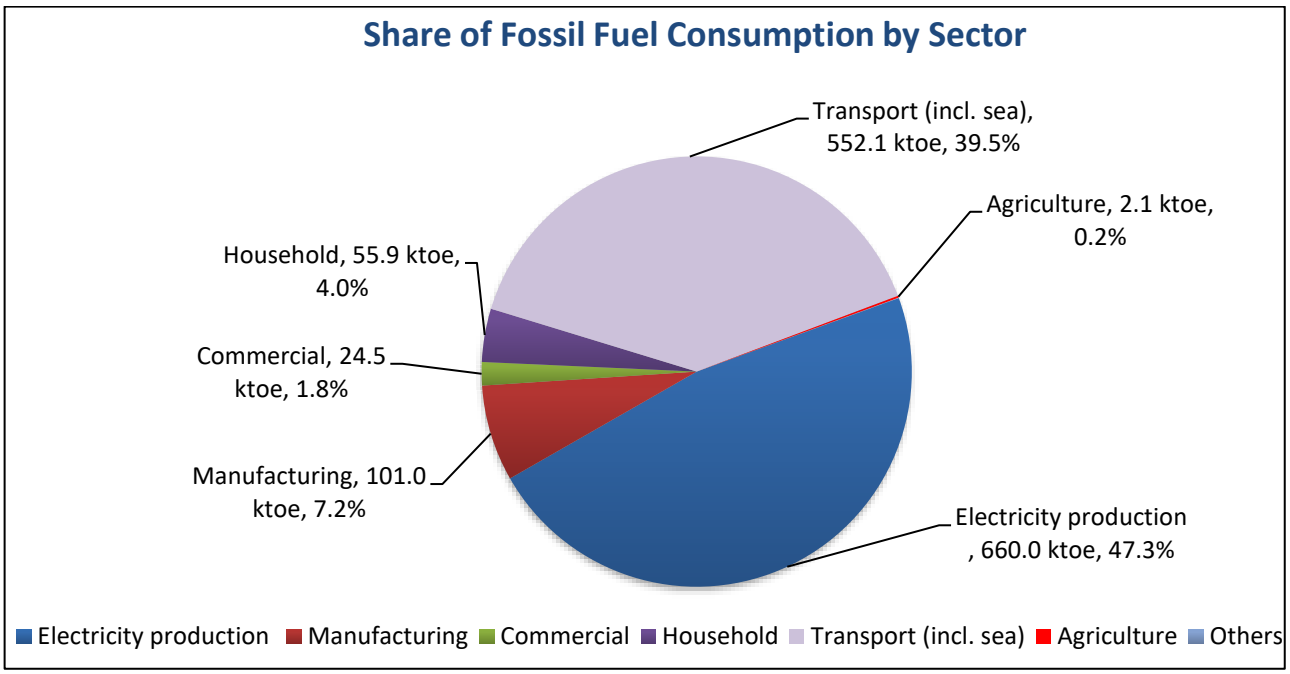
4.7 Fossil Fuel consumption

Table 4.3 provides a breakdown of fossil fuel consumption by sector in 2019 while Figure 4.14 shows the share of fossil fuel consumption by sector for the same year.

Table 4.3 - Fossil fuel consumption (ktoe) by sector, 2019

Sector	Coal	Gasolene	Diesel	Aviation fuel	Kerosene	Fuel oil	LPG	Total
Electricity production	393.2	-	0.7	-	3.9	262.2	-	660.0
Manufacturing	18.4	-	38.2	-	-	37.4	7.0	101.0
Commercial	-	-	-	-	-	-	24.5	24.5
Household	-	-	-	-	0.0	-	55.9	55.9
Transport (incl. sea)	-	208.9	182.8	152.7	-	4.3	3.3	552.1
Agriculture	-	-	2.1	-	-	-	-	2.1
Others	-	-	-	-	-	-	0.4	0.4
Total	**411.6**	**208.9**	**223.8**	**152.7**	**3.9**	**303.9**	**91.1**	**1,396.0**

Data Source: Statistics Mauritius



Data Source: Statistics Mauritius

Figure 4.14 - Share of fossil fuel consumption by sector, 2019

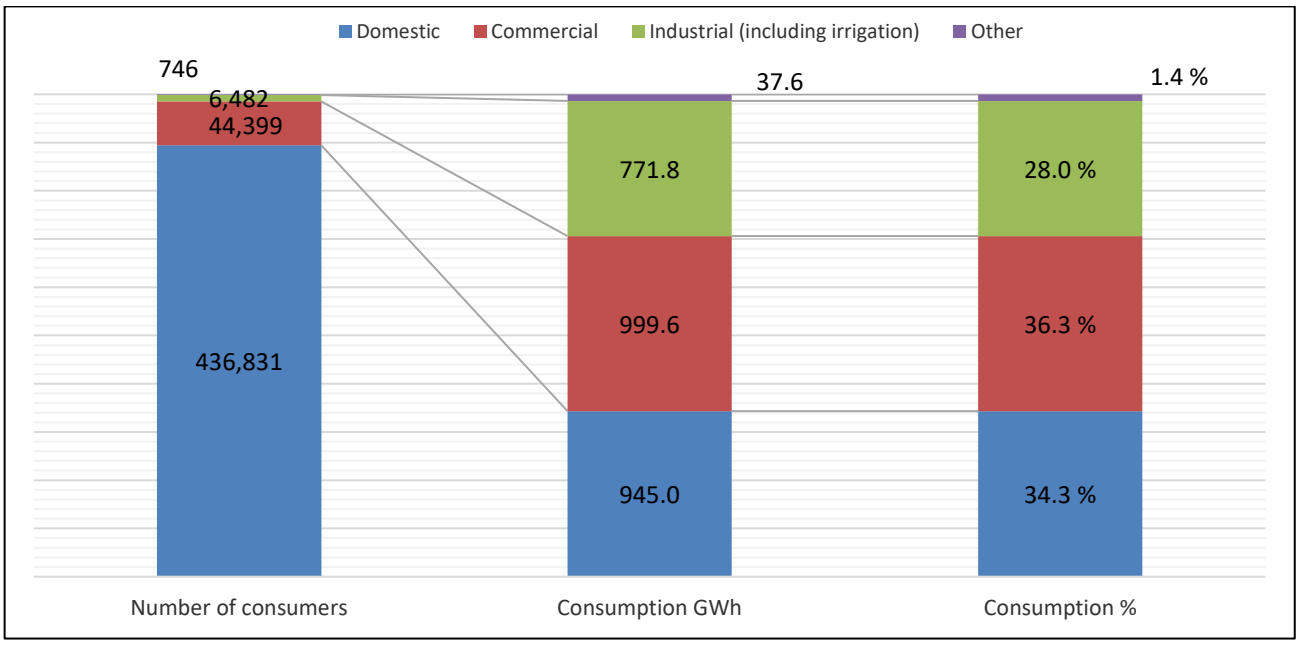
4.8 Sales of Electricity

As shown in Table 4.4, sales of electricity for 2019 amounted to 2,754.0 GWh compared to 2,650.2 GWh in 2018, that is an increase of 3.9 % compared to 2018. Figure 4.15 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 the year 2019.

Table 4.4 - Sales Electricity per category of consumers, 2018 and 2019

Type of tariff	Number of consumers		Electricity Sold - GWh		Electricity Sold - %	
	2018	2019	2018	2019	2018	2019
Domestic	428,569	436,831	899.3	945.0	33.9	34.3
Commercial	43,398	44,399	954.3	999.6	36.0	36.3
Industrial (including irrigation)	6,420	6,482	759.1	771.8	28.7	28.0
Other[7]	724	746	37.5	37.6	1.4	1.4
Total	**479,111**	**488,458**	**2,650.2**	**2,754.0**	**100.0**	**100.0**

Data Source: Statistics Mauritius



Data Source: Statistics Mauritius

Figure 4.15 - Sales of Electricity per category of consumers, 2019

An analysis of domestic electricity consumption is given in Table 4.5, which shows an increase from 1.95 MWh/consumer/year in 2010 to 2.16 MWh/consumer/year in 2019.

[7] 'Other' means sugar factories, street lighting & traffic lights, pumping for irrigation and temporary supply

Table 4.5 - Analysis of domestic electricity consumption, 2010 – 2019

Domestic consumers	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Consumption (GWh)	710.7	725.3	753.0	780.8	806.3	831.0	854.5	872.7	899.3	945.0
Number of consumers	364,474	372,315	381,096	388,910	396,335	404,463	413,068	420,876	428,569	436,831
Annual electricity consumption per consumer (MWh/consumer/year)	1.95	1.95	1.98	2.01	2.03	2.05	2.07	2.07	2.10	2.16
Annual Electricity Consumption per Consumer Growth Rate %	2.7%	-0.1%	1.4%	1.6%	1.3%	1.0%	0.7%	0.2%	1.2%	3.1%
Average daily consumption per inhabitant (kWh/inhabitant/day)	1.56	1.59	1.64	1.70	1.75	1.80	1.85	1.89	1.95	2.05

Data Source: Statistics Mauritius

5 CO_2 EMISSIONS DUE TO FOSSIL FUELS

5.1 Introduction

Some gases in the atmosphere are capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. These gases are known as "greenhouse gases" (sometimes abbreviated as GHG) are primarily water vapour, and including much smaller amounts of carbon dioxide, methane and nitrous oxide which acts as a thermal blanket for the Earth (greenhouse effect), absorbing heat and warming the surface to a life-supporting average of 15 degrees Celsius.

5.2 Greenhouse Gas Emissions

Human activities since the beginning of the Industrial Revolution (around 1750), have produced a 40% increase in the atmospheric concentration of carbon dioxide (CO_2), from 280 ppm in 1750 to 406 ppm in early 2017. This increase has occurred despite the uptake of more than half of the emissions by various natural "sinks" involved in the carbon cycle.

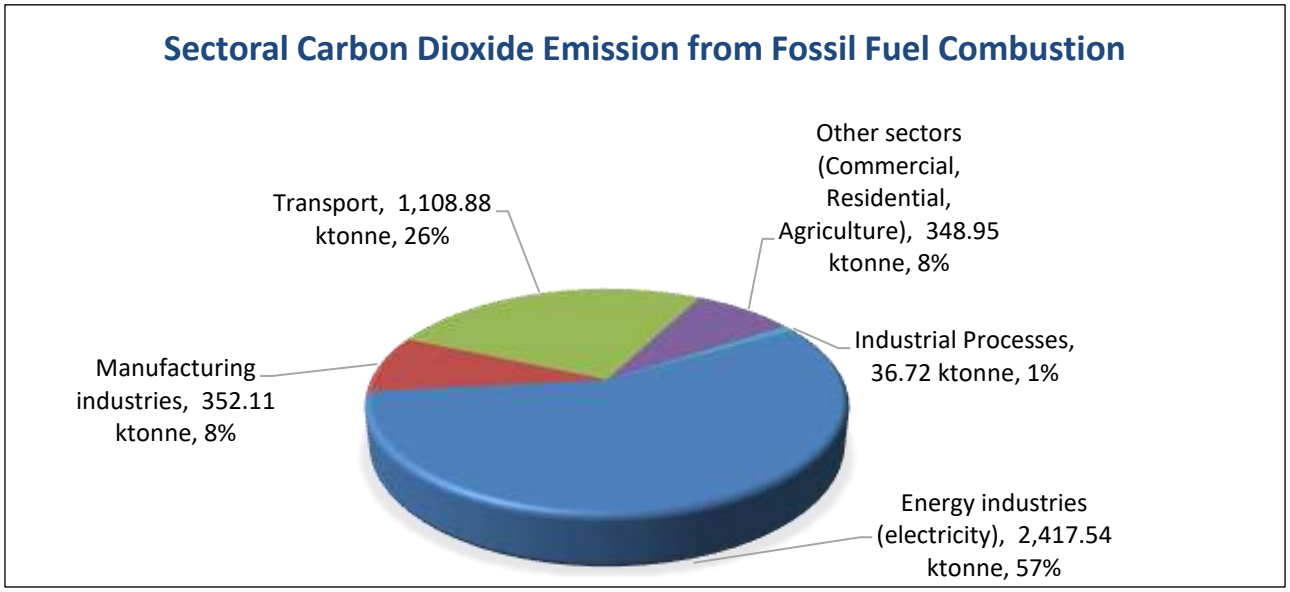
Emissions from human activities mainly concern the following six gases, covered by the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

The vast majority of anthropogenic carbon dioxide emissions (i.e., emissions produced by human activities) come from combustion of fossil fuels, principally coal, heavy fuel oil and its derivatives [gasoline, diesel, Liquefied Petroleum Gas (LPG)] and natural gas, with comparatively modest additional contributions coming from deforestation, changes in land use, soil erosion, and agriculture.

5.3 Inventory of CO_2 from energy sources for the Republic of Mauritius in 2019

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_2 emissions due to fossil energy conversion in the following 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 2019. It may be noted that, in 2019, total CO_2 emissions from fuel combustion activities amounted to 4,264.2 ktonnes and CO_2 removals amounted to 360.90 ktonnes. Net CO_2 emissions for 2019 stood at 3,903.3 ktonnes.



Data Source: Statistics Mauritius (Provisional data)

Figure 5.1 - Sectoral carbon dioxide emissions from fossil fuel combustion, 2019

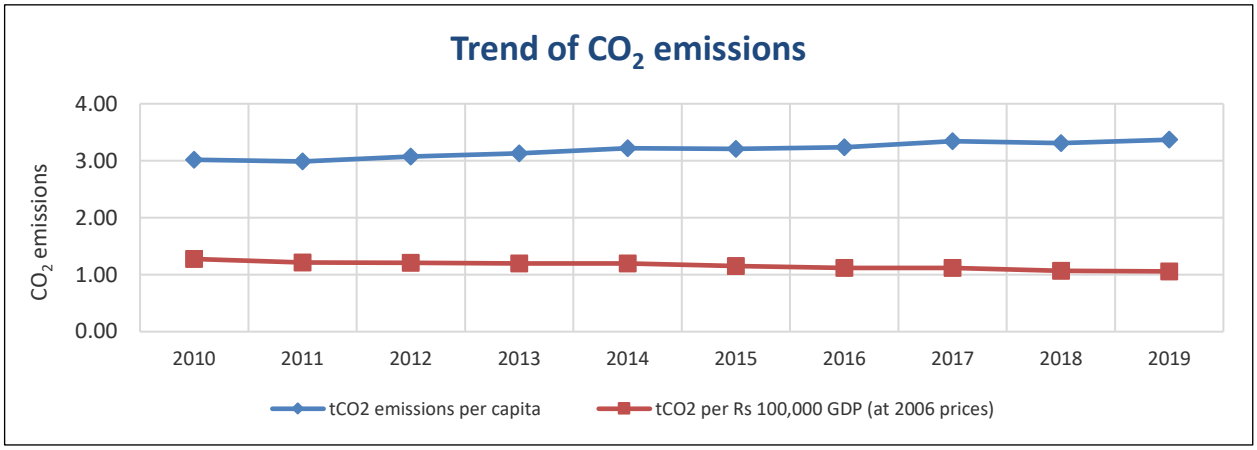
5.4 Trend of CO_2 emissions

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 2006 prices). It may be observed that the amount of CO_2 emitted with respect to GDP has generally been decreasing from 2010 to 2019.

Table 5.1 - CO_2 emissions, 2010 – 2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Net CO_2 emissions (ktonnes)	3,414.93	3,376.45	3,490.08	3,573.70	3,696.08	3,683.44	3,723.82	3,861.45	3,825.46	3,903.30
tCO_2 emissions per capita	3.02	2.99	3.07	3.13	3.22	3.21	3.23	3.34	3.31	3.37
tCO_2 per Rs 100,000 GDP (at 2006 prices)	1.28	1.21	1.21	1.20	1.20	1.15	1.12	1.12	1.07	1.06

Data Source: Statistics Mauritius (Provisional Figures)



Data Source: Statistics Mauritius (Provisional Figures)

Figure 5.2 - Trend of CO_2 emissions, 2010 – 2019

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

In 2019 emissions reached 1,108.88 ktonnes of CO_2 representing an increase of 2.0% compared to 2018.

5.6 CO_2 emissions for electricity generation

In 2019, the total CO_2 emissions from electricity generation amounted to 2,417.54 ktonnes representing a decrease of 1.9% compared to 2018.

The Grid Emission Factors for the national grid of Mauritius valid from December 09, 2019 to December 08, 2022 are as follows :

Table 5.2 - Grid Emission Factors for National Grid of Mauritius

Parameter	Unit	Description	Applicable values Project types	Applicable values		
				First crediting period	Second crediting period	Third crediting period
$EF_{grid, OM, y}$	tco_2/MWh	Operating margin CO_2 emission factor for the national grid of Island of Mauritius	All project activities	1.0273		
$EF_{grid, BM, y}$	tco_2/MWh	Build margin CO_2 emission factor for the national grid of Island of Mauritius	All project activities	0.8814		
$EF_{grid, CM, y}$	tco_2/MWh	Combined margin CO_2 emission factor for the Island of Mauritius	All project activities except wind and solar power generation	0.9543	0.9178	
$EF_{grid, CM, y}$	tco_2/MWh	Combined margin CO_2 emission factor for the national grid of Island of Mauritius	Wind and solar power generation project activities	0.9908		

Data Source: United Nations Framework Convention on Climate Change

6 KEY FIGURES

Indicator	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total primary energy requirement	*ktoe*	1,430.7	1,426.9	1,427.6	1,454.8	1,491.7	1,534.4	1,555.3	1,599.8	1,586.3	1,600.3
Imported	*ktoe*	1,189.0	1,195.7	1,205.3	1,235.4	1,279.4	1,283.2	1,328.5	1,385.3	1,381.9	1,395.8
Local	*ktoe*	241.6	231.1	222.3	219.4	212.3	251.3	226.8	214.5	204.4	204.5
Annual increase (Primary Energy)	*%*	6.2	-0.3	0.1	1.9	2.5	2.9	1.4	2.9	-0.8	0.9
Import Dependency	*%*	83.1	83.8	84.4	84.9	85.8	83.6	85.4	86.6	87.1	87.2
GDP in 2006 rupees	*Rs M*	267,790	278,709	288,453	298,146	309,311	320,301	332,594	345,279	358,262	369,061
Population		1,250,400	1,252,404	1,255,882	1,258,653	1,260,934	1,262,605	1,263,473	1,264,613	1,265,303	1,265,711
Energy intensity	*toe per Rs 100000 GDP at 2006 prices*	0.53	0.51	0.49	0.49	0.48	0.48	0.47	0.46	0.44	0.43
Per capita primary energy requirement	*toe*	1.14	1.14	1.14	1.16	1.18	1.22	1.23	1.27	1.25	1.26

Data Source: Statistics Mauritius

7 SUMMARY TABLE 2018

	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)									180.1	1.9	6.1		10.7	4.2		1.3			204.4
Imported Resources	795.7	186.0	333.4	315.9	3.3	636.8	182.1												2453.3
Re-exports and bunkering			-147.5	-162.3		-418.6													-728.4
Stocks (+ destocking; - stocking)	-348.0	5.4	30.7	8.9	-2.5	60.4	-97.9												-343.1
TOTAL Primary Energy (PE)	447.7	191.5	216.6	162.5	0.7	278.7	84.2	0.0	180.1	1.9	6.1	0.0	10.7	4.2	0.0	1.3	0.0	0.0	1586.3
% Energy independence (LP/PE)																			12.9
Secondary Energy																			
Coal input for electricity production	-427.9																108.3		-319.6
HFO and diesel input for electricity production			-0.9			-237.4											105.1		-133.2
Bagasse input for electricity production									-161.4								37.6		-123.8
Kerosene input for electricity production					-0.7												0.2		-0.5
Biogas input for electricity production										-1.9							1.9		0.0
Hydro input for electricity production													-10.7				10.7		0.0
PV input for electricity production														-4.2			4.2		0.0
Wind input for electricity production																-1.3	1.3		0.0
Electricity production own use																	-3.8		-3.8
Solar Thermal heat production																			0.0
Fuelwood to charcoal											-0.7	0.3							-0.4
TOTAL Secondary supply (SS)	-427.9	0.0	-0.9	0.0	-0.7	-237.4	0.0	0.0	-161.4	-1.9	-0.7	0.3	-10.7	-4.2	0.0	-1.3	265.5	0.0	-581.2
Energy Distribution																			
Final distribution (D=PE+SS)	19.8	191.5	215.7	162.5	0.0	41.3	84.2	0.0	18.7	0.0	5.4	0.3	0.0	0.0	0.0	0.0	265.5	0.0	1005.1
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	-15.7	0.0	-15.8
TOTAL final distribution (D+L)	19.8	191.5	215.7	162.5	0.0	41.3	84.2	0.0	18.7	0.0	5.4	0.3	0.0	0.0	0.0	0.0	249.8	0.0	989.3
																			989.3
Final Energy Consumption																			
Manufacturing	-19.8		-35.2			-37.2	-6.1		-18.7		-0.5						-86.1		-203.5
Commercial							-18.6					-0.3					-82.4		-101.3
Household					0.0		-55.6				-5.0	-0.1					-77.5		-138.1
Transport		-191.5	-178.5	-162.5		-4.1	-3.6										0.0		-540.1
Agriculture			-2.1														-1.6		-3.7
Others							-0.3										-2.2		-2.5
TOTAL (F)	-19.8	-191.5	-215.7	-162.5	0.0	-41.3	-84.2	0.0	-18.7	0.0	-5.4	-0.3	0.0	0.0	0.0	0.0	-249.8	0.0	-989.3

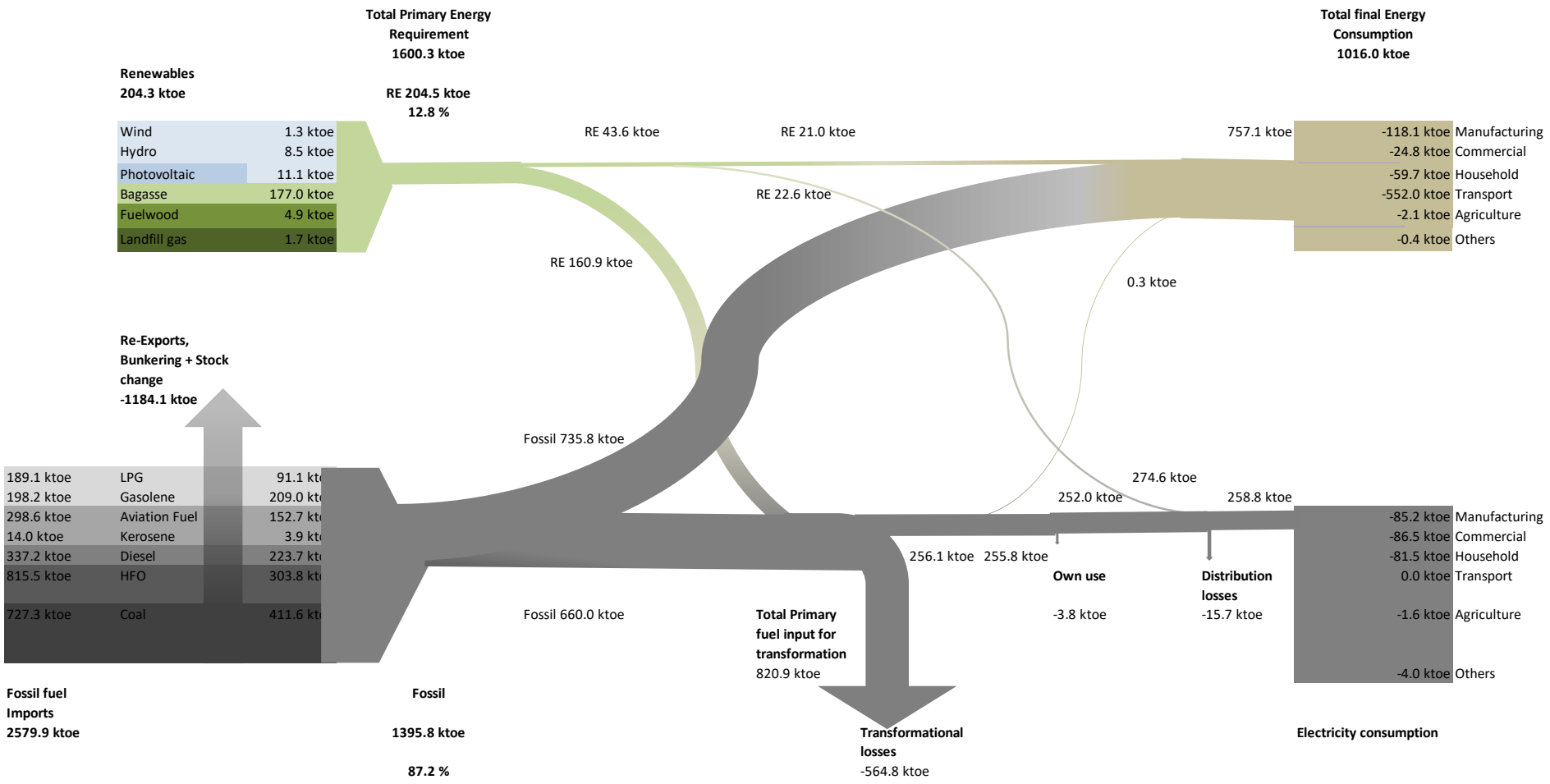
8 SUMMARY TABLE 2019

	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)									177.0	1.7	4.9		8.5	11.1		1.3			204.5
Imported Resources	727.3	198.2	337.2	298.6	14.0	815.5	189.1												2579.9
Re-exports and bunkering			-142.7	-152.4		-499.4	-66.7												-861.2
Stocks (+ destocking; - stocking)	-315.7	10.8	29.2	6.5	-10.1	-12.3	-31.3												-322.9
TOTAL Primary Energy (PE)	**411.6**	**209.0**	**223.7**	**152.7**	**3.9**	**303.8**	**91.1**	**0.0**	**177.0**	**1.7**	**4.9**	**0.0**	**8.5**	**11.1**	**0.0**	**1.3**	**0.0**	**0.0**	**1600.3**
% Energy independence (LP/PE)																			12.8
Secondary Energy																			
Coal input for electricity production	-393.2																101.0		-292.2
HFO and diesel input for electricity production			-0.7			-262.2											116.0		-146.9
Bagasse input for electricity production									-160.3								37.8		-122.5
Kerosene input for electricity production					-3.9												1.0		-2.9
Biogas input for electricity production										-1.7							1.7		0.0
Hydro input for electricity production													-8.5				8.5		0.0
PV input for electricity production														-11.1			11.1		0.0
Wind input for electricity production																-1.3	1.3		0.1
Electricity production own use																	-3.8		-3.8
Solar Thermal heat production																			0.0
Fuelwood to charcoal											-0.6	0.3							-0.3
TOTAL Secondary supply (SS)	**-393.2**	**0.0**	**-0.7**	**0.0**	**-3.9**	**-262.2**	**0.0**	**0.0**	**-160.3**	**-1.7**	**-0.6**	**0.3**	**-8.5**	**-11.1**	**0.0**	**-1.3**	**274.6**	**0.0**	-568.6
Energy Distribution																			
Final distribution (D=PE+SS)	18.4	209.0	223.0	152.7	0.0	41.6	91.1	0.0	16.7	0.0	4.3	0.3	0.0	0.0	0.0	0.0	274.6	0.0	1031.7
Losses (L=(D+F))	0.0	-0.1	0.1	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	-15.7	0.0	-15.7
TOTAL final distribution (D+L)	18.4	208.9	223.1	152.7	0.0	41.6	91.1	0.0	16.7	0.0	4.3	0.3	0.0	0.0	0.0	0.0	258.8	0.0	1015.9
																			1015.9
Final Energy Consumption																			
Manufacturing	-18.4		-38.2			-37.4	-7.0		-16.7		-0.4						-85.2		-203.3
Commercial							-24.5					-0.3					-86.5		-111.3
Household					0.0		-55.9				-3.8	0.0					-81.5		-141.2
Transport		-208.9	-182.8	-152.7		-4.3	-3.3										0.0		-552.1
Agriculture			-2.1														-1.6		-3.7
Others							-0.4										-4.0		-4.4
TOTAL (F)	**-18.4**	**-208.9**	**-223.1**	**-152.7**	**0.0**	**-41.7**	**-91.1**	**0.0**	**-16.7**	**0.0**	**-4.2**	**-0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**-258.8**	**0.0**	**-1016.0**

9 GROWTH PERCENTAGE (%) IN 2019 COMPARED TO 2018

	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)									-1.7 %	-12.6 %	-20.2 %		-20.6 %	161.7 %		0.3 %			0.0 %
Imported Resources	-8.6 %	6.6 %	1.1 %	-5.5 %	337.5 %	28.0 %	3.8 %												5.2 %
TOTAL Primary Energy (PE)	-8.1 %	9.1 %	3.3 %	-6.1 %	451.4 %	9.0 %	8.1 %		-1.7 %	-12.6 %	-20.2 %		-20.6 %	161.7 %		0.3 %			0.9 %
Secondary Energy																			
Coal input for electricity production	-8.1 %																		-8.6 %
HFO and diesel input for electricity production			-22.2 %			10.4 %													10.2 %
Bagasse input for electricity production									-0.7 %										-1.1 %
Kerosene input for electricity production					457.1 %														430.8 %
Biogas input for electricity production										-10.5 %									
Hydro input for electricity production													-20.6 %						
PV input for electricity production PV														164.3 %					
Wind input for electricity production																0.0 %			
Electricity production own use																			0.0 %
Solar Thermal heat production																			
Fuelwood to charcoal											-15.5 %	-13.3 %							-17.5 %
TOTAL Secondary supply (SS)	-8.1 %		-22.2 %		457.1 %	10.4 %			-0.7 %	-10.5 %	-15.5 %	-13.3 %	-20.6 %	164.3 %		0.0 %	3.4 %		-2.2 %
Final Energy Consumption																			
Manufacturing	-7.1 %		8.5 %			0.5 %	14.8 %		-10.7 %		-15.3 %						-1.1 %		-0.2 %
Commercial							31.7 %					0.0 %					4.9 %		9.8 %
Household					-100.0 %		0.5 %				-24.0 %	-100.0 %					5.2 %		2.3 %
Transport		9.1 %	2.4 %	-6.0 %		4.9 %	-7.8 %												2.2 %
Agriculture			0.0 %														0.0 %		0.0 %
Others							16.6 %										83.7 %		74.7 %
TOTAL (F)	-7.1 %	9.1 %	3.4 %	-6.0 %	-100.0 %	1.0 %	8.2 %		-10.7 %		-23.2 %	-18.6 %					3.6 %		2.7 %

10 ENERGY PATTERN 2019



11 TABLE OF INDICATORS

Item	Indicators	Unit	2015	2016	2017	2018	2019
Primary Energy Requirement	Primary Energy Requirement	ktoe	1,534.4	1,555.3	1,599.8	1,586.3	1,600.3
	Share of local resources: local primary requirement/total primary requirement	%	16.4	14.6	13.4	12.9	12.8
Energy intensity	Energy intensity per inhabitant: Primary energy Requirement/population	toe/inhab	1.22	1.23	1.27	1.25	1.26
	Energy intensity per 100,000 (2006 Rs): Primary Energy Requirement/GDP	toe/Rs	0.48	0.47	0.46	0.44	0.43
Electricity Production	Total fossil fuel input for electricity production	ktoe	646.6	651.8	682.6	666.9	659.9
	Total renewable input for electricity production	ktoe	198.4	180.7	172.6	161.4	160.3
	Total electricity production	GWh	2,995.6	3,042.2	3,119.7	3,131.6	3,236.6
	Penetration of renewable resources	%	22.7	21.8	20.0	20.7	21.7
Final electricity consumption per sector	Total electricity sold	GWh	2,505.4	2,558.6	2,618.1	2,650.2	2,754.0
	Domestic sector	%	33.2	33.4	33.3	33.9	34.3
	Commercial sector	%	36.6	36.3	36.4	36.0	36.3
	Industrial sector	%	28.7	28.8	28.8	28.7	28.0
	Others	%	1.5	1.6	1.5	1.4	1.4
	Annual electricity consumption per consumer (Domestic)[8]	MWh/ Consumer /year	2.05	2.07	2.07	2.10	2.16
	Annual electricity consumption per consumer (Commercial)	MWh/ Consumer /year	22.27	22.15	22.26	21.99	22.51
	Annual electricity consumption per consumer (Industrial)	MWh/ consumer /year	112.85	115.84	118.89	118.24	119.07
Final energy consumption in transport sector	Total energy consumption (transport)	ktoe	463.1	505.6	530.4	540.1	552.1
CO_2 Emissions	Total CO_2 emissions	$ktCO_2$	4,054.1	4,087.1	4,226.2	4,190.5	4,264.2
	Net CO_2 emissions	$ktCO_2$	3,685.4	3,723.7	3,861.5	3,825.5	3,903.3
	Energy sector	%	59.13	59.25	59.92	58.83	56.69
	Manufacturing sector	%	8.83	8.38	8.16	8.22	8.26
	Transport sector	%	25.23	25.55	25.22	25.95	26.00
	Others	%	6.01	6.00	5.86	6.12	8.18
	CO_2 emissions per kWh of electricity generated (Grid emission factor)[9]	gCO_2/ kWh	909.7	945.9	954.8	917.8	917.8[10]

Data Source: Statistics Mauritius

[8]Domestic sector in this document includes CEB residential consumers, charitable and religious institutions.

[9]Data Source: CEB

[10]Data Source: ABS ASB0046-2019 Standardized Baseline Mauritius Grid Emission Factor, United Nations Framework Convention on Climate Change

12 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.

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 fuel:
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.

Fuel:
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.

Gasolene:
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 motor vehicle:
A motor vehicle which for the purpose of its mechanical propulsion, has at least two different energy convertors and two different on-vehicle energy storage systems.

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.

Normal cubic metre (Nm^3):
Common unit used to refer to gas emissions or exchange. It is the value that a gas of a constant mass occupies under normal or standard condition.

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, Gasolene, 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 (t):
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 1 Joule per second.

13 ENERGY CONVERSION FACTORS

	tonne	toe
Gasolene	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/Landfill gas/Photovoltaic	1	0.086
Electricity	1	0.086

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

14 LIST OF REFERENCES

1. Digest of Energy and Water Statistics 2019, Statistics Mauritius.
2. Renewable Energy Roadmap 2030 for the Electricity Sector, Ministry of Energy and Public Utilities.
3. ASB0046-2019 Standardized Baseline Mauritius Grid Emission Factor, United Nations Framework Convention on Climate Change.