

The page features three large, overlapping blue circles of varying sizes, each with a gradient from light to dark blue. Two thin blue lines intersect at the top left, forming a large 'V' shape that frames the circles. A red watermark is oriented diagonally across the page.

# National Trend Analysis - Energy

Working Paper NRE 04/11

## **1.0 Introduction**

Energy production, import and use are an integral part of economic development. There is a strong causality between energy and sustainable development. The objective of this paper is to map past and projected energy trends for Mauritius and also present a brief review of current and medium-term policy directions.

National trend analysis also known as trend extrapolation is a method used to graph historical data with the objective of analyzing past trends and contemplating future developments based on past data. This can provide a feedstock for strategic research thinking surrounding energy issues.

This paper is structured as follows: section 2.0 describes the current energy status in Mauritius, section 3.0 graphs the various energy indicators till 2010 and analyses the trends, section 4.0 summarises the energy outlook in the local context based on energy projections from published documents, the last section 5.0 briefly lists the drivers and inhibitors for the energy sector

## **2.0 Current status**

Mauritius has no oil, natural gas or coal reserves and therefore exclusively depends on imported petroleum products to meet most of its energy requirement. In 2010, imported fossil fuels accounted for about 83% of total primary energy requirement, contrasting with 66% in 1993. Over the same period energy from local sources (coming mainly from bagasse) as a percentage of primary energy requirement decreased from 34% to 17% (Figure 1.0).

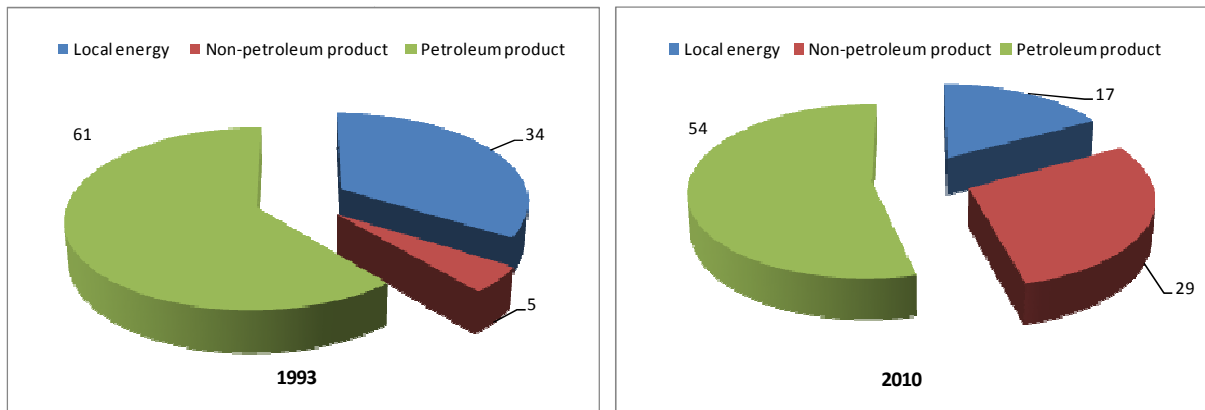


Figure 1.0: Energy from primary energy requirement in 1993 as compared to 2010

In 2010, imported fossil fuels accounted for about 83.4% of total primary energy requirement, coming from gasoline (9.0% of primary energy requirement), diesel oil (15.1%), kerosene (9.3%), fuel oil (16.4%), LPG (4.5%) and coal (29.2%). The remaining 16.6% came from local energy sources, namely bagasse and hydro with 15.9% and 0.63% of primary energy requirement respectively (CSO, 2010).

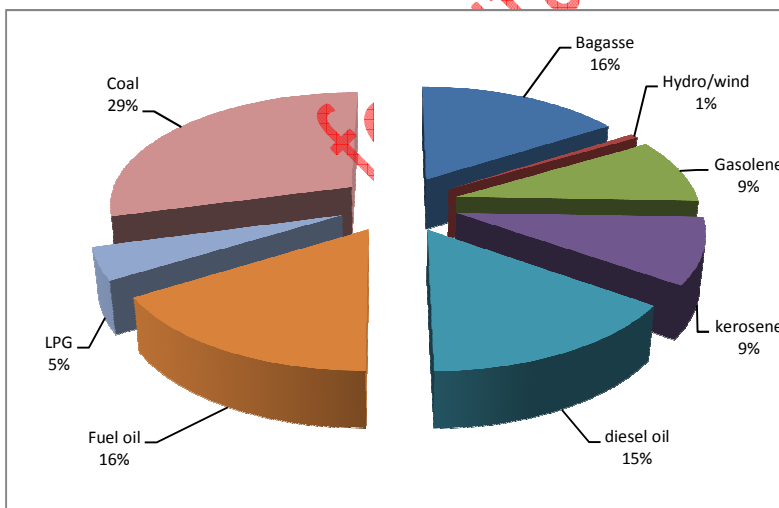


Figure 2.0: Energy mix in 2010

The energy end-users in Mauritius are mainly categorized into five sectors, namely: transport, commercial, distributive trade, manufacturing and households. As shown in figure 3.0, the transport sector is currently the largest consumer of energy accounting for about 49% of the total energy demand in 2010. Manufacturing industries and household accounted for about 27.7% and 13.8% of the total energy consumption respectively.

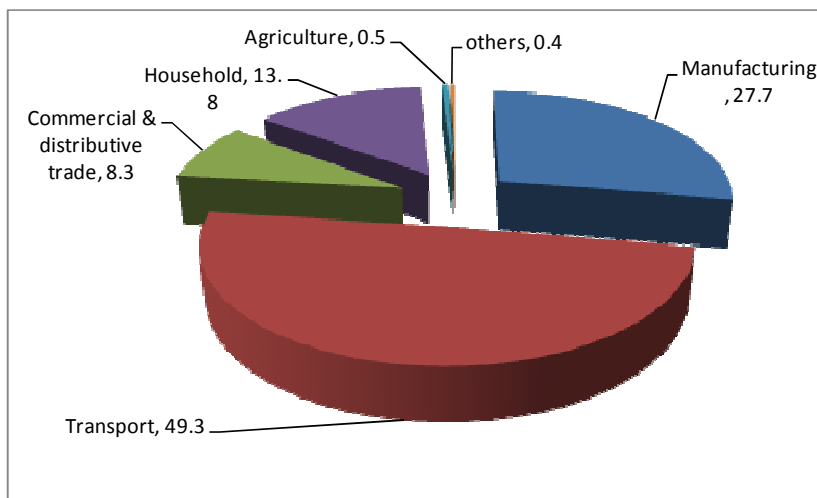


Figure 3.0: Energy consumption by different sectors in 2010

Over the period 1993 to 2010, the energy consumption by the transport sector has increased in terms of proportion, from 39.8% in 1993 (figure 4.0) to 49.3% in 2010. Interestingly the % of energy used by the manufacturing sector has decreased and accounted for 27.7% of total consumption in 2010.

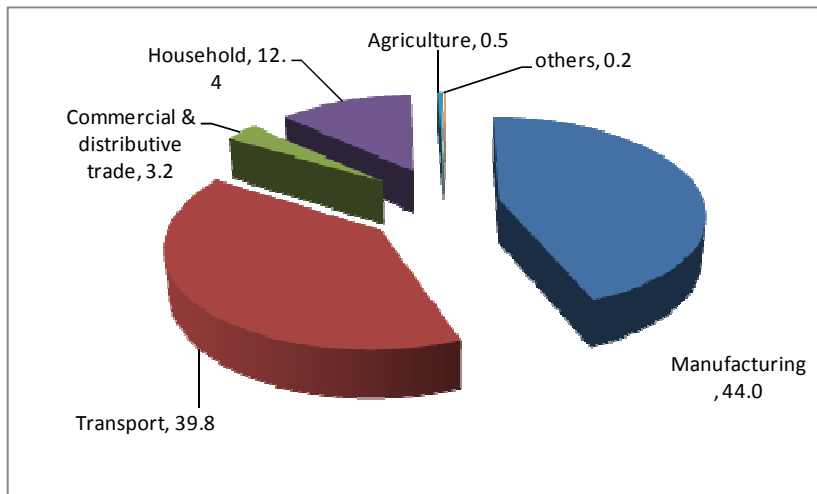


Figure 4.0: Energy consumption by different sectors in 1993

### 3.0 Energy trends up to 2010

As shown in figure 5.0, coal consumption is growing at a faster rate with an increase of 135% in the last 10 years. Nevertheless, in 1997 coal consumption went down to 25 Ktoe while in 2006, coal became the largest fuel in demand with 300.4 Ktoe representing a share of 22% of the total energy use in the country. This trend is expected to continue in the future given that coal is the cheapest energy source for electricity production with 3467 MRU/Tonne as compared to diesel oil and fuel oil at 23974 and 14973 MRU/Tonne respectively (CSO, 2010). By contrast, fuel oil and diesel oil which is the main petroleum product have grown more slowly during the past 17 years with an increase of 53.6% and 80.7% of total primary energy requirement respectively. The other petroleum products are kerosene, gasoline and LPG. Kerosene is mostly used in aviation and during peak hours for production of electricity and account about 9.27% of total energy demand.

The local energy resources are mainly bagasse and hydro. In 2010, Bagasse accounted for 225 Ktoe of total primary energy requirement of which 20.5% was meant for electricity production (CSO, 2010).

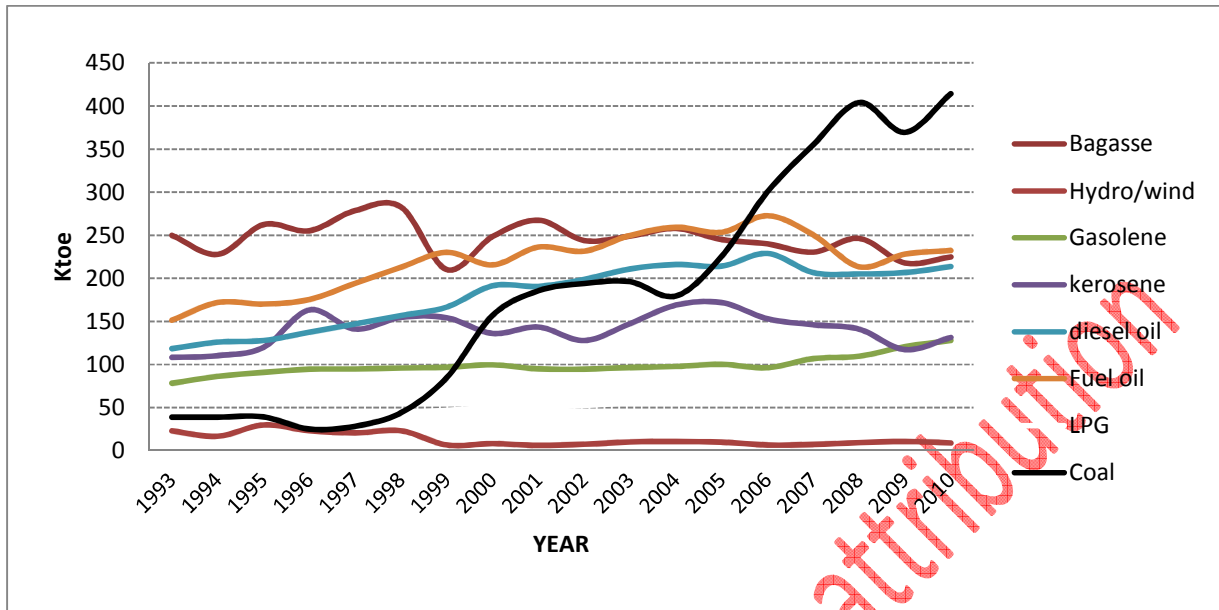


Figure 5.0: Trend of energy sources for the years 1993-2010

The energy used by households increased by 48% from 190.0 Ktoe in 1997 to 283.2 Ktoe in 2007 (Figure 6.0). The main driver was the electricity demand to power increasing number of household appliances. The manufacturing sector on the other hand registered a negative growth rate of 6.6% in the last 10 years which affected the export and import activities in the country.

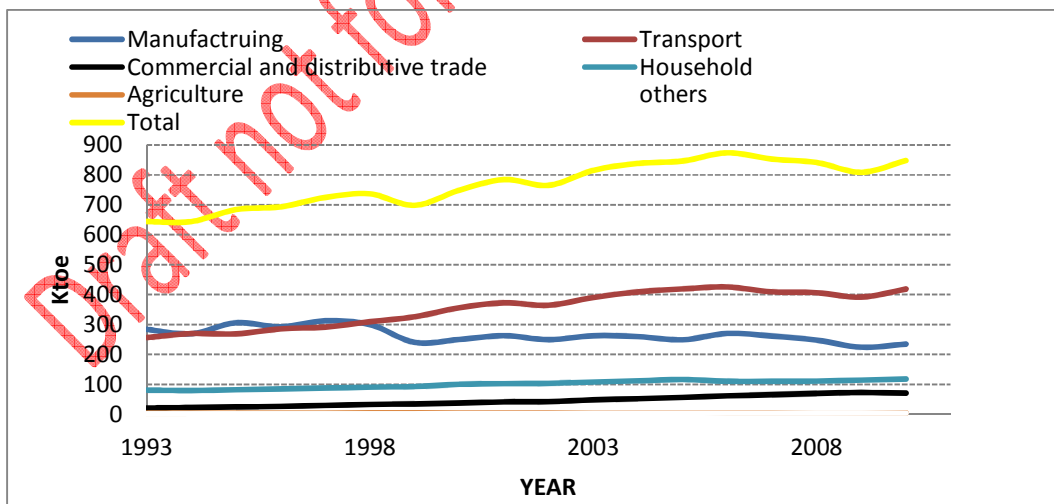


Figure 6.0: Trend of energy consumption by sectors for the years 1993-2010

As shown in figure 7.0, the price of petroleum product underwent a % decrease of 31.4% in 2009 after a record peak of 124305 MRU/tonne in 2008. However, after 2009 the price of petroleum product increased and reached around 25505 MRU/tonne in 2010. The price of coal also increased over the last decade, but at a more steady pace. While, the price of coal was historically lower and more stable than oil and gas.

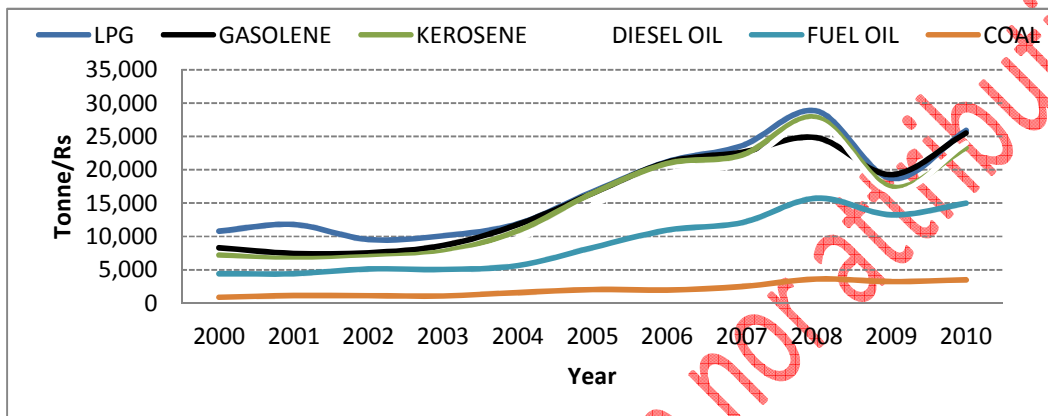


Figure 7.0: Average real prices of imported fossil fuels for the years 2000 to 2010(CSO, 2010)

The above figure also show that the imported price of coal has also gone up over the last decade and as per figure 8.0 will generally still increase. Hence production of electricity using solely coal and/or coal jointly with bagasse will become more expensive.

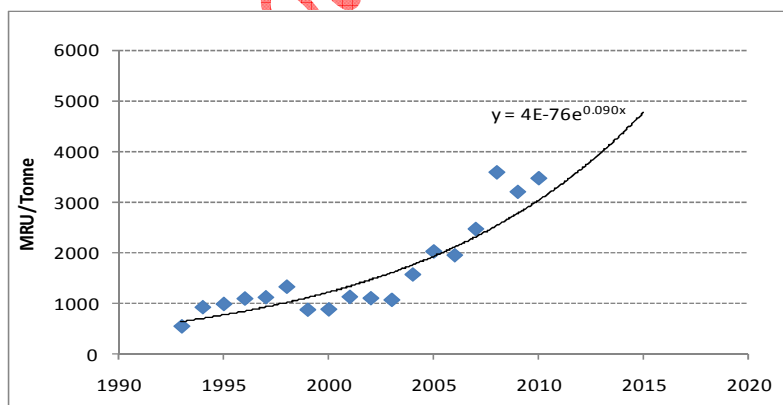


Figure 8.0: Forecasting import price of coal

## 4.0 Outlook

There is causality between energy consumption and economic growth. Mauritius aspires to sustain its economic growth over the medium to long term. Therefore the demand for energy will also increase. According to the Long-Term Energy Strategy (2009), coal will remain the major energy resources in Mauritius. This projection is given in table 1.0, with 45 percent in 2015, 44 percent in 2020 and 40 percent in 2025. (Ministry of Renewable Energy & Public Utilities, 2009). Similarly, it is forecasted that in year 2025, renewable energy will contribute about 35% of total electricity generation with bagasse 17% followed by wind with only 8%.

Table 1.0: Forecasted energy mix for the next 15 years. (Ministry of Renewable Energy & Public Utilities, 2009)

Fuel Source		Percentage of Total Electricity Generation			
		2010	2015	2020	2025
Renewable	Bagasse	16%	13%	14%	17%
	Hydro	4%	3%	3%	2%
	Waste to energy	0	5%	4%	4%
	Wind	0	2%	6%	8%
	Solar PV	0	1%	1%	2%
	Geothermal	0	0	0	2%
	<b>Sub-total</b>	<b>20%</b>	<b>24%</b>	<b>28%</b>	<b>35%</b>
Non-Renewable	Fuel Oil	37%	31%	28%	25%
	<b>Coal</b>	<b>43%</b>	<b>45%</b>	<b>44%</b>	<b>40%</b>
	<b>Sub-total</b>	<b>80%</b>	<b>76%</b>	<b>72%</b>	<b>65%</b>
	<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>



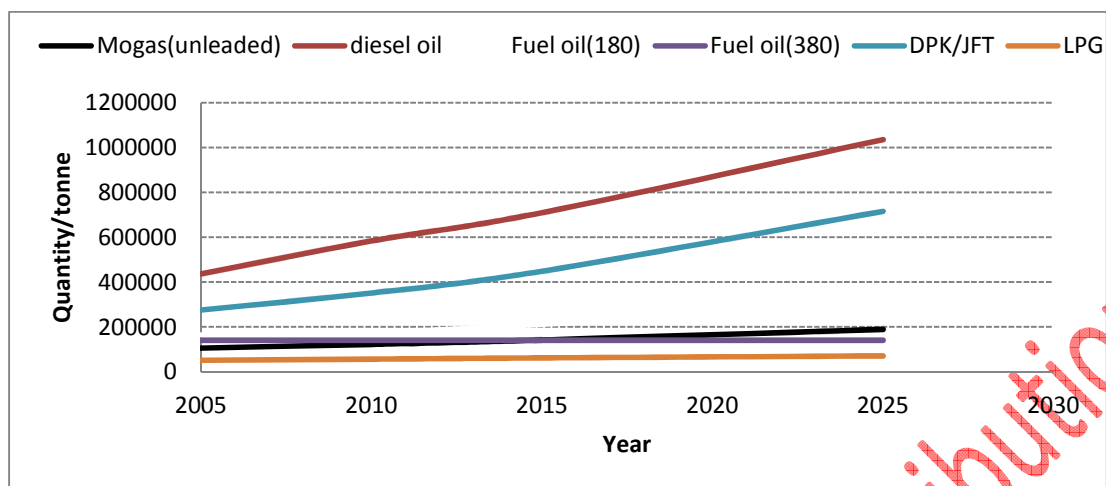


Figure 9.0: Projection on energy use in transport sector for years 2005-2025 (NESC, 1998)

Mauritius in its quest for better standard of living, has led to a rapid increase in transport services over the recent years. Likewise, the use of fossil fuels namely mogas (unleaded), diesel oil, fuel oil (180), DPK/JFT and LPG is forecasted to increase in the next 15 years (figure 8.0). It is projected that gasoline (mogas) will stabilize to confirm the trend noted over the past decade, and the use of diesel oil, fuel oil and kerosene may be much lower than predicted if renewable energy are favored and demand-side management (DSM) is fully considered (NESC, 2009) and implemented. Similarly, demand for kerosene is expected to follow the same trend as fuel oil due to the bunkering requirements unless there is major economic slowdown (NESC, 2009).

## 5.0 Implication<sup>1</sup>

The negative impact effect of climate change resulting from increasing use of fossil fuel, coupled to high prices of fossil fuels, has made Government reconsider its long-term strategy. This new direction is embedded in the Long-term energy strategy and the "Maurice ile durable". One of the linchpins underlining these two strategies is increasing

<sup>1</sup> The Maurice Ile Durable working group on Energy has provided some recommendations on the way forward given existing constraints. More information can be obtained from the Information Paper NRFE 03/11.

the percentage of renewable energy in the energy mix, focusing mainly on wind energy and energy from bagasse.

## 6.0 Drivers and Inhibitors

### ➤ Drivers

1. The implementation of the MID programme, driven by Government
2. Primary energy requirement will be driven mostly by economic and population growth.
3. Services sector is now the main driver of the economy

### ➤ Inhibitors

1. Increasing price of imported petroleum products given that they are exhaustible and limited.
2. Increasing the % of renewable in the energy mix is challenging, given the high initial cost of investment
3. Greater impact to environment and main factor for causing climate change; yield in lower consumption of fossil fuels.
4. Swifter interaction between the public and the private sector to implement and drive renewable energy projects.

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