

ENERGY STATISTICS - 2000

Introduction

Data presented in this third issue of the Economic and Social Indicators on Energy Statistics, refer to the years 1999 and 2000. These statistics have been compiled in close collaboration with the Ministry of Public Utilities and the Central Electricity Board.

All data refer to the Republic of Mauritius, unless stated otherwise. For meaningful analysis, the quantities of the different types of fuel have been expressed in common energy unit, namely, tonnes of oil equivalent (**toe**). The conversion factors used, are given on page 4. Energy commodity balance for the years 2000 and 1999 are given in Tables 1 and 2, imports and re-exports of energy sources, in Table 4 and 5 and final energy consumption, in Table 10.

2 The energy commodity balance

The energy commodity balance shows the supply and final uses of electricity and the different type of fuel. Total primary energy requirement is obtained as the sum of the indigenous production (hydro, fuelwood and bagasse) and imports less re-exports and bunkering, after stock adjustments. The transformation process is the conversion of primary energy into secondary energy, for example, transformation of coal and fuel oil into electricity. Own use and losses during transformation are also recorded. Final energy consumption is the total amount of energy required by end users as a final product. End-users are categorised into five sectors, namely manufacturing, transport, commercial and distributive trade, residential and agriculture.

2.1 Total primary energy requirement

The total primary energy requirement of the country in the year 2000 amounted to some 1,164 ktOE of which 891 ktOE (76%) were met from imported fuels and the remaining, 274 ktOE (24%), from indigenous sources. Imports consisted of 734 ktOE of petroleum products and 157 ktOE of coal while the indigenous production was mainly derived from bagasse (91%), hydro electricity (8%) and fuelwood (1%).

2.1.1 Local production

Total energy production from local sources increased by 24% and reached 274 ktOE in 2000 compared to 221 ktOE in 1999. Production of electricity from hydro was 20.9 ktOE in 2000 compared to only 6.5 ktOE in 1999 had been and that from bagasse reached 248.5 ktOE in 2000 against 210.3 ktOE in 1999. It is recalled that, in 1999, because of the severe drought, energy production from local sources was very low.

2.1.2 Imports of energy sources

Table 4 shows data on imports of energy sources. Some 1,065 ktoe of petroleum products and coal were imported in 2000 compared to 1,003 ktoe in 1999, representing an increase of 6%. Petroleum products increased from 923.3 ktoe to 927.2 ktoe and coal from 79.9 ktoe to 137.9 ktoe. The substantial rise in the imports of coal reflects its increased use in electricity production. Because of the rise in the prices of petroleum products, the import bill was 62% higher in 2000: Rs 6,135.8 million against Rs 3,795.7 million in 1999.

2.1.3 Re-exports and bunkering

Of the 1,065.1 ktoe of imported energy sources, 307.9 ktoe were re-exported to bunkers and foreign aircraft. Re-exports consisted of 161.6 ktoe of diesel oil, 55.3 ktoe of fuel oil and 91.0 ktoe of aviation fuel. (Table 5)

2.2 Electricity generation

In 2000, 1,584.5 GWh (348.6 ktoe) of electricity were produced which, compared to 1,440.7 GWh (316.9 ktoe) in 1999, represented an increase of 10%. The Central Electricity Board (CEB) generated 62% and Independent Power Producers, 38%. Thermal energy represented 94% and hydro, the remaining 6%. The installed capacity of the power plants in the Island of Mauritius increased from 509.4 MW in 1999 to 615.0 MW in 2000 and the effective capacity from 425.7 MW to 497.9 MW. The peak demand in 2000 reached 283.9 MW (Tables 6 and 7).

2.2.1 Fuel input for electricity generation

Table 8 shows the different types of fuel used for electricity generation. Fuel input increased from 375.5 ktoe in 1999 to 434.7 ktoe in 2000, representing an increase of 16%. The share of coal, which was 18.5% in 1999, increased to 32.6% in 2000 with the coming into operation of the Central Thermique of Belle Vue.

2.2.2 Number of electricity consumers and average unit price by category

The total number of electricity consumers in the Island of Mauritius increased from 304,029 in 1999 to 313,963 in 2000. The domestic category had the highest number of consumers (279,886) followed by commercial (26,915) and industrial (6,879). The average sales price of electricity increased from Rs 2.11 per KWh in 1999 to Rs 2.29 per KWh in 2000. (Table 9)

2.3 Final energy consumption

Some 1,049.0 ktoe of energy was consumed as final energy in 2000 compared to 926.0 ktoe in 1999. The Transport sector and the Manufacturing sectors were the two largest energy-consuming sectors accounting for 37% and 34% respectively. Consumption by households represented 16% followed by the Commercial and Distributive Trade (8%) and Agriculture (1%). The details on the different types and amount of fuel consumed by each sector are given in Table 10.

2.3.1 Manufacturing

Energy used for manufacturing process in 2000 amounted to 354.2 ktoe, with bagasse contributing 141.0 ktoe, electricity, 100.6 ktoe, fuel oil and diesel oil, 92.8 ktoe. This represents an increase of 9% over 1999 (325.1 ktoe).

2.3.2 Transport

As shown in Table 10, in 2000, 388.9 ktoe of energy were used for transportation. Gasolene consumption increased from 96.7 ktoe to 114.5 ktoe, and that of diesel oil from 127.8ktoe to 161.4 ktoe. Aviation fuel used by our national airline rose from 101.0 ktoe to 112.4 ktoe. It is worth noting the use of LPG in the transport sector, 684 toe in 2000 compared to 524 in 1999.

2.3.3 Commercial and Distributive Trade

Total energy consumption by Commercial and Distributive sector stood at 86.2 ktoe in 2000. Electricity is the main source of energy and its consumption increased from 73.6 ktoe in 1999 to 81.5 ktoe in 2000.

2.3.4 Residential

Energy consumed by households increased by 12% in 2000 and amounted to 164.9 ktoe. The two main sources of energy for households were electricity and LPG. Electricity consumption increased by 9% from 96.9 ktoe to 106.1 ktoe whilst that of LPG, by 18 %, from 37.5 ktoe in 1999 to 44.0 ktoe in 2000.

2.3.5 Agriculture

Electricity and diesel oil are the two sources of energy used in Agriculture. In 2000 nearly 6.0 ktoe of electricity were used for irrigation and 2.4 ktoe of diesel oil were used for derocking of land and preparation of soil prior to plantation.

3. Energy Ratios

As shown in Table 11, the total primary energy requirement index, expressed with 1990 as reference year (1990 = 100), increased by 13.3 points from 136.2 in 1999 to 149.5 in 2000. Per capita primary energy requirement increased by 8 % from 0.85 toe to 0.92 toe.

Energy intensity defined as total primary energy requirement (toe) per Rs 100,000 of GDP (in 1990 rupees) provides a measure of the efficiency with which energy is being used in production. A lower ratio indicates a less efficient use of energy. As shown in Table 11, energy intensity, which stood at 2.22 in 1990 dropped to 1.92 in 1999 and rose marginally to 1.94 in 2000.

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Concepts and Terminology

The energy data have been compiled according to the recommendations of the United Nations Manual, Series F No. 29 on Energy Statistics.

- **Energy**
Energy means the capacity for doing work or for producing heat. Producing heat is a common manifestation of "doing work" as are producing light and motive force.
- **Primary energy**
Primary energy designates energy from sources that involve only extraction or capture, with or without separation from contiguous material, cleaning or grading, before the energy embodied in that source can be converted into heat or mechanical work. Primary energy is not derived from any other form of energy. By convention, sources of energy that occur naturally such as coal, natural gas, fuel wood are termed primary energy.
- **Secondary energy**
Secondary energy designates energy from all sources of energy that results from transformation of primary sources.
- **Fuels**
The term fuel is used to describe those energy sources, whether primary or secondary, that must be subjected to combustion or fission in order to release for use the energy stored up inside them.
- **Re-export of bunkers and aviation fuel**
Bunkers relate to fuels sold to ships irrespective of their flags of ownership or registration. Re-exports include aviation fuel delivered to foreign aircraft. Aviation fuel delivered to aircraft owned by the national airline is included as final consumption in the transport sector.
- **Primary energy requirement**
It is the sum of imported fuels and locally available fuels less re-exports of bunkers and aviation fuel to foreign aircraft after adjusting for stock changes.
- **Primary energy input to hydro electricity.**
The primary energy input to hydro electricity is defined as the energy value of the electricity generated from hydro.

Energy conversion factors

The following energy conversion factors have been used to express the energy content for the different fuels in terms of a common accounting unit, tonnes of oil equivalent (toe)

	<u>Tonne</u>	<u>toe</u>
Gasolene	1	1.08
Diesel Oil	1	1.01
Dual Purpose Kerosene (DPK)	1	1.04
Fuel oil	1	0.96
Liquefied Petroleum Gas (LPG)	1	1.08
Coal	1	0.62
Bagasse	1	0.16
Fuel Wood	1	0.38
Charcoal	1	0.74
	<u>GWh</u>	<u>toe</u>
Electricity	1	220

1 toe = 41.84 gigajoule (net calorific value)

SYMBOLS

The following technical abbreviations have been used throughout the report.

toe	Tonne of oil equivalent
ktoe	Thousand tonnes of oil equivalent
LPG	Liquefied Petroleum Gas
MW	Megawatt (1,000 kW)
kWh	Kilowatt hour
GWh	Gigawatt hour

ACRONYMS

CEB	Central Electricity Board
GDP	Gross Domestic Product

Table 1 - Energy commodity balance, 2000

													Tonne of oil equivalent (toe)
Source Flow	Coal	Gasolene	Diesel	Aviation Fuel	Kerosene	Fuel Oil	LPG	Fuel Wood	Charcoal	Hydro	Bagasse	Electricity	Total
Indigenous Production	-	-	-	-	-	-	-	4,104	-	20,900	248,538	-	273,542
Imports	137,902	97,010	343,068	197,619	28,445	210,012	51,099	-	-	-	-	-	1,065,155
Re-Exports and Bunkering	-	-	(161,566)	(91,018)	-	(55,316)	-	-	-	-	-	-	(307,900)
Stock change / Statistical error	18,948	17,470	27,703	5,804	(2,966)	64,580	2,255	-	-	-	-	-	133,794
Total Primary Energy Requirement	156,850	114,480	209,205	112,405	25,479	219,276	53,354	4,104	-	20,900	248,538	-	1,164,591
Electricity Generation	(141,682)	-	(3,397)	-	(13,604)	(168,495)	-	-	-	(20,900)	(107,504)	348,590	(106,992)
Other transformation	-	-	-	-	-	-	-	(684)	333	-	-	-	(351)
Own use	-	-	-	-	-	-	-	-	-	-	-	(8,274)	(8,274)
Total Final Energy Consumption	15,168	114,480	205,808	112,405	11,875	50,781	53,354	3,420	333	-	141,034	340,316	1,048,974
Manufacturing Sector	15,168	-	42,016	-	-	50,781	3,984	570	-	-	141,034	100,597	354,150
Transport Sector	-	114,480	161,367	112,405	-	-	684	-	-	-	-	-	388,936
Commercial and Distributive Trade Sector	-	-	-	-	-	-	4,482	-	222	-	-	81,545	86,249
Residential Sector	-	-	-	-	11,875	-	44,053	2,850	111	-	-	106,064	164,953
Agriculture	-	-	2,424	-	-	-	-	-	-	-	-	5,988	8,412
Other(n.e.s) and losses	-	-	1	-	-	-	151	-	-	-	-	46,122	46,274

Note: figures in brackets represent negative quantities

Table 2 - Energy commodity balance, 1999

		Tonne of oil equivalent (toe)											
Source Flow	Coal	Gasolene	Diesel	Aviation Fuel	Kerosene	Fuel Oil	LPG	Fuel Wood	Charcoal	Hydro	Bagasse	Electricity	Total
Indigenous Production	-	-	-	-	-	-	-	4,484	-	6,505	210,299	-	221,288
Imports	79,900	100,156	298,507	195,205	45,947	236,428	47,055	-	-	-	-	-	1,003,198
Re-Exports and Bunkering	-	-	(123,344)	(81,394)	-	(45,061)	-	-	-	-	-	-	(249,799)
Stock change / Statistical error	4,800	(3,491)	(8,558)	(12,800)	7,143	38,624	(199)	-	-	-	-	-	25,519
Total Primary Energy Requirement	84,700	96,665	166,605	101,011	53,090	229,990	46,856	4,484	-	6,505	210,299	-	1,000,206
Electricity Generation	(69,516)	-	(3,539)	-	(43,626)	(186,646)	-	-	-	(6,505)	(72,163)	316,955	(65,041)
Other transformation	-	-	-	-	-	-	-	(760)	370	-	-	-	(390)
Own use	-	-	-	-	-	-	-	-	-	-	-	(8,729)	(8,729)
Total Final Energy Consumption	15,184	96,665	163,066	101,011	9,464	43,344	46,856	3,724	370	-	138,136	308,227	926,046
Manufacturing Sector	15,184	-	32,977	-	-	43,344	3,888	684	-	-	138,136	90,874	325,086
Transport Sector	-	96,660	127,765	101,011	-	-	524	-	-	-	-	-	325,960
Commercial and Distributive Trade Sector	-	-	-	-	-	-	4,860	-	222	-	-	73,367	78,449
Residential Sector	-	-	-	-	9,464	-	37,476	3,040	148	-	-	96,869	146,997
Agriculture	-	-	2,323	-	-	-	-	-	-	-	-	4,944	7,267
Other(n.e.s) and losses	-	5	1	-	-	-	108	-	-	-	-	42,173	42,287

Note: figures in brackets represent negative quantities

Table 3 - Primary energy requirement , 1999 - 2000

Energy source	Physical unit		Energy unit			
	(Tonne\GWh)		(ktoe)		%	
	1999	2000	1999	2000	1999	2000
Imported						
Gasolene	89,505	106,000	96.67	114.48	9.66	9.83
Diesel Oil	164,955	207,134	166.60	209.20	16.66	17.96
Dual Purpose Kerosene	148,174	132,581	154.10	137.88	15.41	11.84
<i>Kerosene</i>	51,048	24,499	53.09	25.48	5.31	2.19
<i>Aviation Fuel</i>	97,126	108,082	101.01	112.40	10.10	9.65
Fuel Oil	239,573	228,412	229.99	219.28	22.99	18.83
LPG	43,385	49,402	46.86	53.35	4.69	4.58
Sub total (petroleum products)			694.22	734.19	69.41	63.04
Coal	136,613	252,984	84.70	156.85	8.47	13.47
Sub total (Imported)			778.92	891.04	77.88	76.51
Local						
Electricity (hydro) GWh	30	95	6.51	20.90	0.65	1.79
Bagasse	1,314,370	1,553,361	210.30	248.54	21.03	21.34
Fuel Wood *	11,800	10,800	4.48	4.10	0.45	0.35
Sub total (Local)			221.29	273.54	22.12	23.49
Total			1,000.21	1,164.58	100.00	100.00

* estimates

Table 4 - Imports of energy sources , 1999 - 2000

Energy source	Physical unit (Thousand tonne)		Energy unit				C.I.F value (Rs million)	
	1999	2000	(ktoe)		(%)		1999	2000
			1999	2000	1999	2000		
Gasolene	92.74	89.82	100.16	97.01	10.0	9.1	475.2	744.3
Diesel Oil	295.55	339.67	298.51	343.07	29.8	32.2	1,114.0	2,166.7
Dual Purpose Kerosene	231.88	217.37	241.15	226.06	24.0	21.2	998.5	1,555.4
<i>Kerosene</i>	<i>44.18</i>	<i>27.35</i>	<i>45.95</i>	<i>28.44</i>	<i>4.6</i>	<i>2.7</i>	<i>178.5</i>	<i>205.8</i>
<i>Aviation Fuel</i>	<i>187.70</i>	<i>190.01</i>	<i>195.20</i>	<i>197.62</i>	<i>19.5</i>	<i>18.6</i>	<i>820.0</i>	<i>1,349.5</i>
Fuel Oil	246.28	218.76	236.43	210.01	23.6	19.7	717.7	964.3
LPG	43.57	47.31	47.06	51.10	4.7	4.8	378.2	510.1
<i>Sub total (petroleum products)</i>			923.30	927.25	92.0	87.1	3,683.6	5,940.8
Coal	128.87	222.42	79.90	137.90	8.0	12.9	112.1	195.0
Total imports			1003.20	1065.15	100.0	100.0	3795.71	6135.80

Table 5 - Re-exports of energy sources to foreign aircraft and bunkers, 1999- 2000

Energy Re-exported	Physical unit (tonne)		Energy unit			
	1999	2000	(ktoe)		(%)	
			1999	2000	1999	2000
Aviation fuel to foreign aircraft	78,263	87,517	81.39	91.02	32.6	29.6
Diesel oil	122,123	159,966	123.34	161.56	49.4	52.5
Fuel oil	46,939	57,621	45.06	55.32	18.0	18.0
Total			249.79	307.90	100.0	100.0

Table 6 - Evolution of plant capacities, peak demand and electricity generation, 1999 - 2000

Year	Installed capacity ¹ (MW)	Effective capacity ¹ (MW)	Peak demand ¹ (MW)	Electricity generated (GWh)		
				Hydro	Thermal	Total
1999	509.4	425.7	265.8	29.57	1,411.14	1,440.71
2000	615.0	497.9	283.9	95.26	1,489.24	1,584.50

¹ Island of Mauritius

Table 7 - Electricity production by source of energy, 1999 - 2000

Source of energy	1999			2000		
	GWh	%		GWh	%	
Primary energy	29.57	2.1		95.26	6.0	
Hydro	29.57	2.1		95.26	6.0	
Secondary energy	1,411.14	97.9		1,489.24	94.0	
Gas turbine (kerosene)	136.64	9.5		42.77	2.7	
Diesel & Fuel oil	930.77	64.6		845.30	53.3	
Coal*	155.20	10.8		322.72	20.4	
Bagasse*	188.53	13.1		278.45	17.6	
Total	1,440.71	100.0		1,584.50	100.0	

* Electricity purchased by C.E.B.

Table 8 - Fuel input for electricity production, 1999 - 2000

Fuel	1999			2000		
	Tonne	Ktoe	%	Tonne	Ktoe	%
Fuel oil	194,423	186.65	49.7	175,515	168.49	38.8
Diesel oil	3,504	3.54	0.9	3,364	3.40	0.8
Kerosene	41,948	43.63	11.6	13,081	13.60	3.1
Coal*	112,123	69.52	18.5	228,520	141.68	32.6
Bagasse *	451,020	72.16	19.2	671,900	107.50	24.7
Total		375.49	100.0		434.67	100.0

* Electricity purchased by C.E.B.

Table 9 - Electricity consumption by class of consumer, 1999 - 2000 (Island of Mauritius)

Class of consumer	No. of consumers		Consumption (MWh)		Average sales price ¹ per KWh(Rupees)	
	1999 ²	2000 ³	1999 ²	2000 ³	1999 ²	2000 ³
Domestic	271,061	279,886	440,313	482,108	2.13	2.34
Commercial	25,730	26,915	333,487	370,658	2.43	2.75
Industrial	6,981	6,879	435,538	484,485	1.80	1.86
of which: irrigation	(562)	(348)	(22,472)	(27,222)	(2.70)	(1.38)
Other	257	283	19,912	21,210	2.80	3.08
All consumers	304,029	313,963	1,229,250	1,358,461	2.11	2.29

¹ Excluding VAT & meter rent

² Revised

³ Provisional

Source: Central Electricity Board (CEB)

Table 10 - Final energy consumption by sector and type of fuel, 1999 - 2000

Sector	1999		2000		1999		2000	
	Physical unit		Energy unit					
	(tonne)		(ktoe)		(%)			
1. Manufacturing			325.09	354.15	35.1	33.8		
1.1 Excluding bagasse			186.95	213.12	20.2	20.3		
Fuel oil	45,150	52,897	43.34	50.78	4.7	4.8		
Diesel oil	32,650	41,600	32.98	42.02	3.6	4.0		
LPG	3,600	3,689	3.89	3.98	0.4	0.4		
Coal	24,490	24,464	15.18	15.17	1.6	1.4		
Fuel wood ¹	1,800	1,500	0.68	0.57	0.1	0.1		
Electricity ² (GWh)	413.07	457.26	90.87	100.60	9.8	9.6		
1.2 Bagasse	863,350	881,461	138.14	141.03	14.9	13.4		
2. Transport			325.96	388.93	35.2	37.1		
Gasolene	89,500	106,000	96.66	114.48	10.4	10.9		
LPG	485	633	0.52	0.68	0.1	0.1		
Diesel oil	126,500	159,769	127.77	161.37	13.8	15.4		
Aviation Fuel	97,126	108,082	101.01	112.40	10.9	10.7		
3. Residential			147.00	164.94	15.9	15.7		
Kerosene	9,100	11,418	9.46	11.87	1.0	1.1		
LPG	34,700	40,790	37.48	44.05	4.0	4.2		
Fuel wood ¹	8,000	7,500	3.04	2.87	0.3	0.3		
Charcoal ¹	200	150	0.15	0.11	0.0	0.0		
Electricity ² (GWh)	440.31	482.11	96.87	106.06	10.5	10.1		
4. Commercial and Distributive Trade			78.64	86.24	8.5	8.2		
LPG	4,500	4,150	4.86	4.48	0.5	0.4		
Charcoal ¹	300	300	0.22	0.22	0.0	0.0		
Electricity ² (GWh)	333.49	370.66	73.37	81.54	7.9	7.8		
5. Agriculture			7.28	8.41	0.8	0.8		
Diesel oil ¹	2,300	2,400	2.32	2.42	0.3	0.2		
Electricity ² (GWh)	22.47	27.22	4.94	5.99	0.5	0.6		
6. Other (n.e.s) and losses			42.08	46.30	4.5	4.4		
TOTAL			926.05	1,048.97	100.0	100.0		

¹ Estimates² Island of Mauritius only

Table 11 - Energy Ratios, 1996 - 2000

Energy Ratio	unit	1990	1996	1997	1998	1999	2000
1. Total primary energy requirement	ktoe	734.33	918.56	950.96	1,017.37	1,000.01	1,098.08
<i>Imported</i>	<i>ktoe</i>	<i>433.85</i>	<i>634.70</i>	<i>647.31</i>	<i>707.18</i>	<i>778.72</i>	<i>824.54</i>
<i>Local</i>	<i>ktoe</i>	<i>300.48</i>	<i>283.86</i>	<i>303.65</i>	<i>310.20</i>	<i>221.29</i>	<i>273.54</i>
2. Total primary energy requirement index (1990 = 100)		100.00	125.09	129.50	138.54	136.18	149.54
3. Import dependency	%	59.08	69.10	68.07	69.51	77.87	75.09
4. GDP (at 1990 factor cost)	Rs. Mn	33,030	45,537	48,087	50,876	51,944	56,567
5. GDP Index (1990 = 100)		100.00	137.87	145.59	154.03	157.26	171.26
6. Energy Intensity	toe per Rs.100,000 GDP	2.22	2.02	1.98	2.00	1.92	1.94
7. Mid-year population	thousand	1,059	1,134	1,148	1,160	1,174	1,186
8. Per capita primary energy requirement	toe	0.69	0.81	0.83	0.88	0.85	0.92

