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Bioenergy and Food Security Projects

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MAURITIUS

BEFS COUNTRY BRIEF

FAO FIAT PANIS

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1.BEFS

1.1 Bioenergy and food security

Increasing costs of fossil fuels, the threat of climate change and the need to increase energy security and access have put alternative renewable energy sources, including bioenergy, high on the development agenda. Compared with other sources of energy, bioenergy potentially offers some developmental advantages. Bioenergy can target and stimulate the agriculture sector, a critical sector for development and poverty reduction, while improving energy access, creating a new market for producers, offering new employment opportunities, and potentially contributing to environmental objectives. Nevertheless, there are concerns regarding the actual viability of the sector and its environmental and socio-economic sustainability, also in terms of potential competition with food security.

1.2 The Bioenergy and Food Security Approach

To date, the rush to develop bioenergy as an alternative to fossil fuels has tended to occur in the absence of an understanding of the associated risks and benefits. In order to assist governments in gaining a proper understanding of the issues at stake, FAO has developed the Bioenergy and Food Security (BEFS) Approach.

FAO's **Bioenergy and Food Security (BEFS) Approach** aims to assist policy-makers in assessing the interplay between natural resource availability, bioenergy production potential, rural development and food security, and in strengthening their capacity to manage the trade-offs associated with bioenergy development.

1.3 The BEFS country brief

Part of the first stage of the implementation of the BEFS Approach in a country, is to undertake a review of the agriculture, energy and food security situation at domestic level. This review provides the basis for the identification of potential bioenergy sources, and for a preliminary assessment of potential risks associated with the development of the sector.

The BEFS Approach consists of a **multidisciplinary** and integrated set of **tools** and **guidance** that can support countries throughout the following key steps of the bioenergy policy development and implementation process:

- **Identification of** the key **issues** surrounding **bioenergy and food security**, based on the conceptual foundation provided by the BEFS Analytical Framework, and through an **institutionalized dialogue** among relevant national stakeholders;
- **Assessment of the sustainable bioenergy potential,** based on an assessment of **land suitability** and **production costs**, and through an **analysis** of the **environmental** and **socio-economic** dimensions and implications of different bioenergy development pathways, with particular emphasis on food security;
- **Risk prevention and management**, through good environmental and socio-economic practices and related policy instruments;
- **Investment screening and appraisal** through an assessment of the viability and sustainability of proposed bioenergy investments/projects;
- **Impact monitoring, evaluation and response** at both national and project levels; and
- **Capacity building** both at **technical** and **policy** level through training on the above technical tools and guidance.

The BEFS Approach helps countries design and implement sustainable bioenergy policies and strategies, by ensuring that bioenergy development fosters both food and energy security, and that it contributes to both agricultural and rural development in a climate-smart way.

2. Country Overview

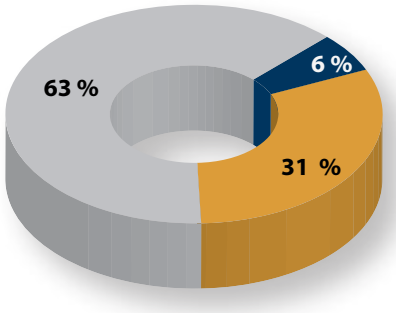
2.1 Quick Facts

Mauritius is an island nation off the East coast of Africa and has a total area of 2,030 square kilometers[1]. It is a volcanic archipelago with a sub-tropical climate and an average annual rainfall of 2,000 mm[2]. The population in 2010 was 1,281,214 and increasing by an average of 0.5 percent per annum[3]. Of this, nearly 57 percent is classified as rural.

2.2 Economy

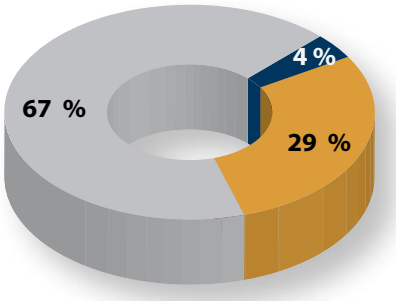
In 2009, Mauritius's GDP grew by 2.1 percent. Between 1999 and 2009, GDP per capita increased from $3,576 to $4,997 dollars (in constant US dollars)[3]. In 2010, trade equaled 116 percent of GDP, and foreign direct investments equaled 1.3 percent of the latter[3]. In the same year, consumer price inflation amounted to 2.9 percent[3]. In 2009, services were the most important sector, with a share of GDP amounting to 67 percent, up from 63 percent in 1999. During the same period, the share of the industrial sector decreased from 31 percent to 29 percent and the share of agriculture from 6 percent to 4 percent **(Figures 1,2).**

Figure 1: Mauritius GDP by Sector (1999)



Source: WDI (2010)

Figure 2: Mauritius GDP by Sector (2009)



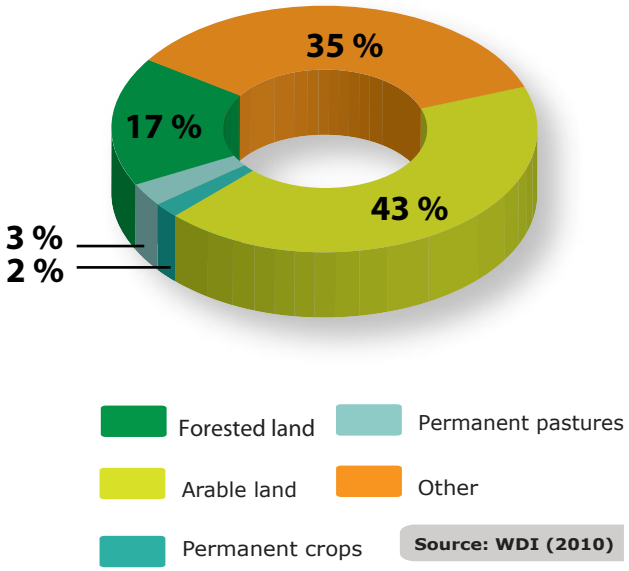
Source: WDI (2010)

3. Agriculture and Biomass

3.1 Land and water

Mauritius has a total of 980 square kilometers of agricultural land, or 48.3 percent of total land available **(Figure 3).** Of that, 43 percent is classified as arable land. The country has over 2.75 billion cubic meters of renewable water resources available, of which 18 percent is withdrawnused annually[4]. Of the total water withdrawn, around 68 percent is used in the agricultural sector[4].

Figure 3: Mauritius Land Use (2010)



3.2 Agriculture and livestock

Agriculture employs approximately 9 percent of the labour force and contributes 15.6 percent of total exports[5]. Both subsistence farming and commercial farming can be found in Mauritius, with the latter producing mainly sugar cane for the export market. Although the country receives high average annual rainfall, irrigated agricultural production is relatively common.

Sugar cane is the main crop produced in Mauritius in terms of volume, followed by potatoes and pumpkins. Sugar and wheat are the main export crops in terms of value. Between 1999 and 2009, sugar cane production increased by 20 percent, potato production by 29 percent and pumpkin production by 177 percent **(Figure 4).**

Figure 4: Mauritius Crop Production - tonnes (2009)

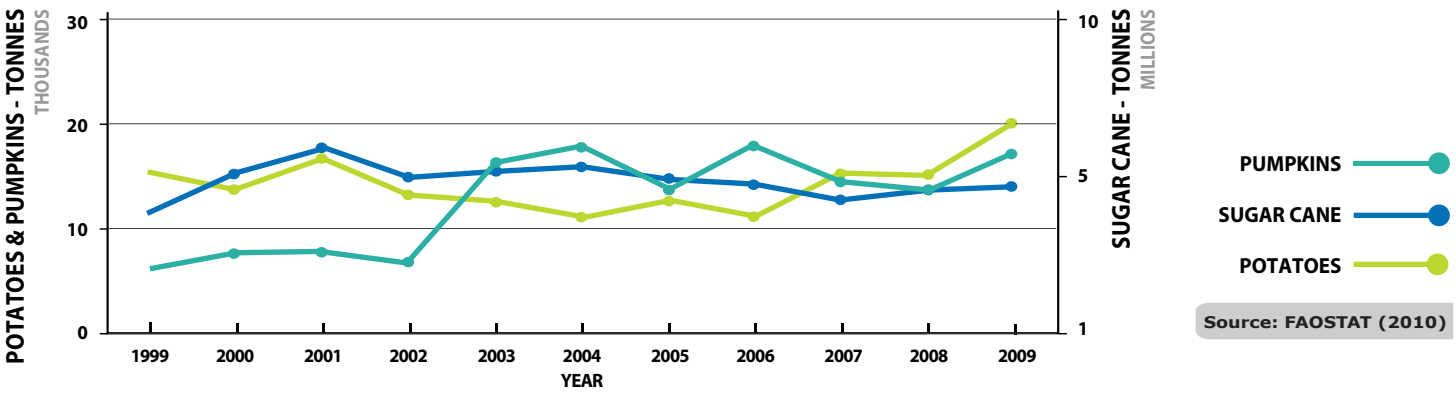
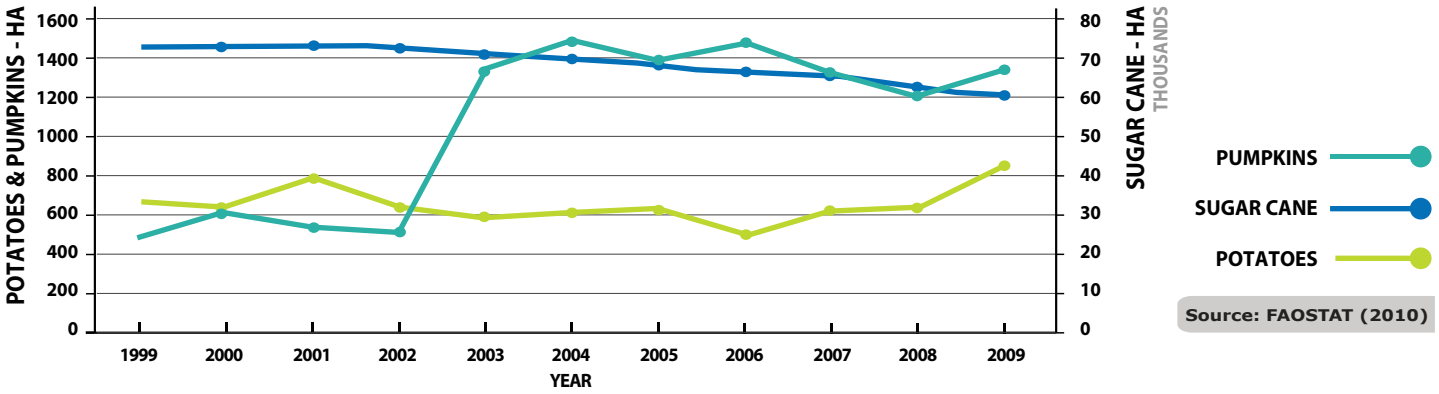
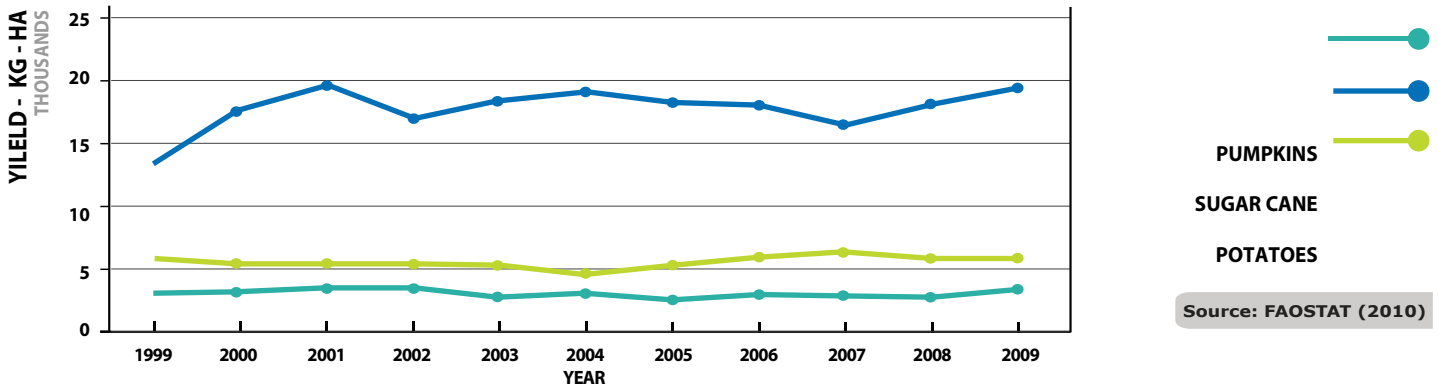


Figure 5: Mauritius Area Harvested - hectares (2009)



The increase in the production of sugar cane between 1999 and 2009 was due to a 44 percent increase in yields, with a 17 percent reduction in the area harvested. With regard to pumpkin, production increased because of an increase in both area harvested and yields, by 165 percent and 4 percent respectively. Potato production increased with the 34 percent increase in the area harvested, even with yields decreasing 4 percent **(Figures 5,6).**

Figure 6: Mauritius Crop Yield - kilogram/hectare (2009)



A small share of agricultural output is wasted due to post-harvest losses **(Table 1).** For instance, approximately 10 percent of the vegetables produced in 2009 were lost to waste.

Table 1: Mauritius Crop Utilization (2009)

Commodity	Production	Domestic Consumption	Food Supply	Processing	Wastage	Feed	Seed	Other Utility
	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes
Sugar Cane	4 669 420	4 669 420	–	4 669 420	–	–	–	–
Potatoes	19 828	31 644	26 590	–	850	–	1 750	2 453
Vegetables, Other	54 291	65 012	59 526	–	5 476	–	–	10

Source: FAOSTAT (2009)

With regard to livestock, permanent pastureland accounts for 3 percent of total available land according to 2010 data[3]. Over 13.6 million chickens, 26 thousand goats, 14 thousand pigs, 12 thousand sheep, and 7 thousand cattle are raised in Mauritius[2].

3.3 Policy

The *Diversified Agri-Food Sector for Mauritius (2008-2015)* has the overall goal of enabling the Mauritian agri-food system to become: more diverse and multi-functional in terms of food supply stability and nutritional security; more modern, competitive and economically, socially, and environmentally stable; and more flexible and responsive to the changes in consumer demand[6].

4. FOOD SECURITY

4.1 NUTRITION

Wheat and rice make up respectively 27.7 and 16.9 percent of the average[6] daily calorie intake, followed by sugar cane with 12.8 percent **(Table 2).** Animal products account for 14.6 percent of the calorie intake.

TABLE 2: MAURITIUS FOOD CROP CALORIC INTAKE (2009)

Ranking	Commodity	Calorie Share (%)
1	Wheat	27.7
2	Rice	16.9
3	Sugar	12.8
4	Soyabean Oil	10
5	Sunflowerseed Oil	3
6	Pulses	1.8
Subtotal Food Crop share		72.2
Animal Products Share		14.6
Total Calories (kcal/capita/day)		2 993

Source: FAOSTAT (2009)

4.2 FOOD SECURITY AND FOOD PRICES

Currently, 1.5 percent of the population lives below the poverty line[3] and 5 percent is undernourished[7]. Mauritius is a net importer of wheat and rice, while the demand for sugar cane is met through domestic production. In 200, imports accounted for 100 percent of the domestic consumption of potatoes and rice **(Table 3).** Potential increases in the price of these two crops on the international market can thus affect the trade balance, as well as the welfare of net consuming households.

TABLE 3: MAURITIUS NET FOOD CROP TRADE (2009)

Commodity	Production	Import	Export	Stock Variation	Domestic Consumption	Import Share of Consumption
	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	%
Wheat	–	178 044	41 242	- 132	136 671	100
Rice	0	119 880	2 295	- 13 844	103 740	100
Sugar	4 669 420	–	–	–	4 669 420	0

Source: FAOSTAT (2009)

4.3 POLICY

In 2008-2009, a new strategy for a sustainable *Diversified Agri-Food Sector for Mauritius* for the period 2008 to 2015 was published. This strategy comprises five specific objectives: 1) Boosting investment in agriculture through policy to attain self-sufficiency; 2) Capitalizing on the Cross Border Initiative set up by FAO with other countries in order to increase production and regional trade; 3) Encouraging food production surpluses to increase income through export; 4) Seeking development partners and promotion of joint ventures with international businesses and foreign countries; and 5) Campaigning for healthy eating of local produce to reduce dependence on rice and flour[8].

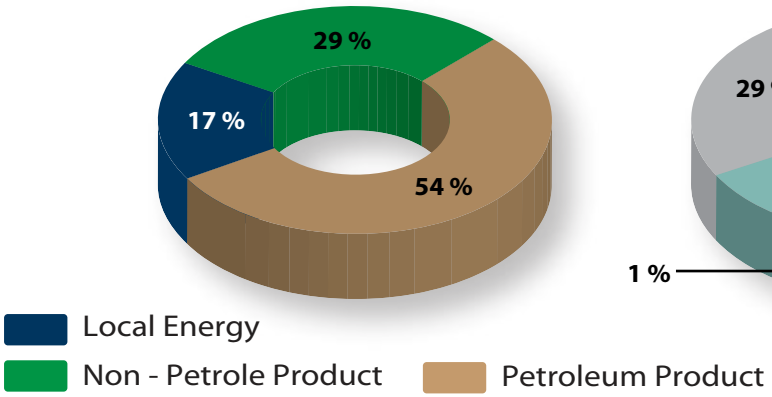
5. Energy and Bioenergy

5.1 Energy Supply and Access

The energy sector in Mauritius is highly developed, with 100 percent of the population having access to electricity[3].

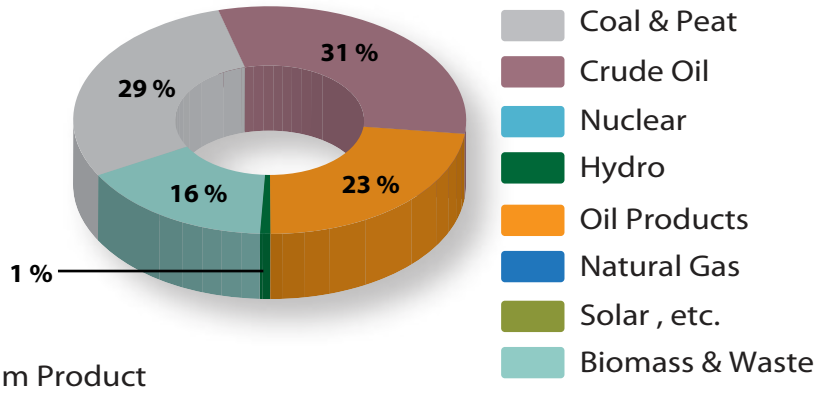
Mauritius is heavily reliant on imported fossil fuels, with crude oil and oil products providing 54 percent of final energy consumption in 2009, followed by coal and peat with 29 percent. Biomass accounts for 16 percent of final energy consumption, a much lower share compared to other countries in Southern Africa **(Figures 7, 8).** Other potential renewable energy options include modern bioenergy, solar energy, wind energy, and further development of hydropower[9].

Figure 7: Mauritius Energy Production Sources, 2010



Source: CSO (2010)

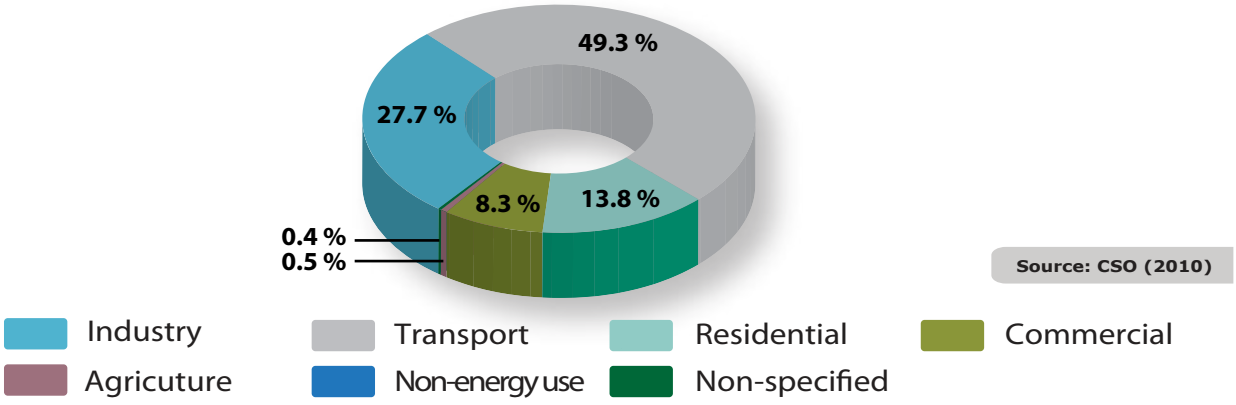
Figure 8: Mauritius Energy Consumption Sources, 2010



Source: CSO (2010)

The main consumer of energy in Mauritius is the transport sector, accounting for over 49 percent of energy use, followed by the industrial sector with around 28 percent **(Figure 9).**

Figure 9: Mauritius Energy Use by Sector (2010)



Source: CSO (2010)

5.2 Modern Bioenergy

As of May 2010, Mauritius produced over 150 million liters of ethanol from sugar cane per year[10]. Further projects for the production of ethanol from sugar cane and of electricity from bagasse are currently being established[10]. Further assessment is needed in order to adequately understand the potential role of bioenergy within the country's energy mix.

5.3 Policy

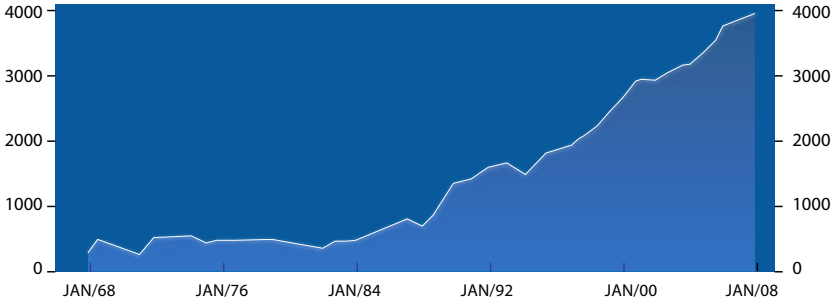
The *Long Term Energy Strategy 2009-2025* aims to limit the country's vulnerability to imported fossil fuels and volatile price changes; to promote economic growth and job creation; to democratize the energy supply; to secure affordable energy for all consumers; and to ensure the financial stability of the sector[11].

6. Environmental Concerns

6.1 Climate change

Climate change has already started to impact Mauritius. Starting in 1960, an increase in mean annual temperature and a decrease in average annual rainfall have been recorded[12]. CO2 emissions have increased significantly since the mid 1980s (**Figure 10).**

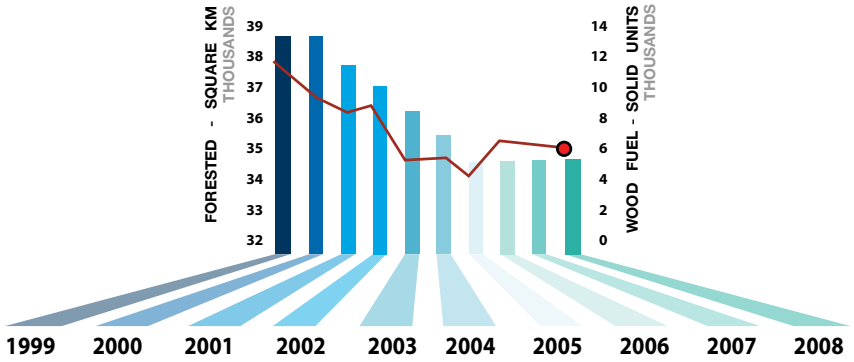
Figure 10: Mauritius CO_2 Emissions - KT (2008)



Source: WDI (2010)

Forested areas were on the decline from 1999 until 2005[13]. However, in the last few years, the forest area has stabilized, thanks also to afforestation projects and increased environmental conservation efforts[14] **(Figure 11).**

Figure 11: Mauritius Forest Area vs. Wood Fuel Production (1999-2008)



Source: FAOSTAT (2010)

6.2 Policy

The *Environment Protection Act of* 2002 provides the main legal framework and the mechanisms necessary to protect the natural environment and to ensure that government policies and provisions are properly implemented and enforced[6]. Under the framework provided by this act, the *National Environment Policy* of 2007 includes provisions for the protection of natural resources and biodiversity. Among other things, this policy requires that any party considering implementing a project shall conduct an environmental impact assessment[6].

Summary

- Mauritius' agricultural sector employs 9 percent of its total labor force and accounts for 4 percent of the country's GDP.
- Out of Mauritius' total land area, 48.3 percent is used for agricultural purposes, with 43 percent of this area classified as arable land. Around 18 percent of tThe country's has significant renewable water resources available, of which 18 percent is withdrawnused annually.
- Wheat makes up 27.7 percent of the average daily calorie intake, followed by rice with 16.9 percent and sugar with 12.8 percent. Animal products account for 14.6 percent of the average daily calorie intake.
- Mauritius is a net importer of food. The country imported 100 percent of the wheat and rice consumed domestically in 2009. Potential increases in the price of these two crops on the international market can thus affect the trade balance, as well as the welfare of net consuming households.
- 100 percent of households have access to electricity. Mauritius is heavily reliant on imported fossil fuels, with crude oil and oil products providing 54 percent of final energy consumption in 2009, followed by coal and peat with 29 percent. Biomass accounts for 16 percent of final energy consumption.
- At present, Mauritius produces over 150 million liters of ethanol from sugar cane per year, and additional modern bioenergy projects are currently being established. Further assessment is needed in order to adequately understand the potential role of bioenergy within the country's energy mix.
- Over the last ten years, Mauritius has implemented a range of policies affecting the agricultural, energy, and environmental sectors. The development of better data on the topics covered in this brief will strengthen the government's ability to assess the effectiveness of these policy interventions and improve future decisions regarding food security and energy sector development in Mauritius.

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