

# How Green is Mauritius?

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## ABSTRACT

Global warming has been a major issue over the years and even after the implementation of the Kyoto Protocol on the 11th of December 1997 and other treaties which followed, the situation is still alarming. This paper is a summary of the measures taken by the Mauritian government and the private sector to contribute towards a greener environment for the island, and also to increase the awareness of the overall population, so as each and everyone can contribute as well on his/her behalf to make the “Maurice Ile Durable” concept a success in the coming years. A lot of work is currently being done by the Mauritian Government to inculcate good environmental-friendly behavior in Mauritius citizens. Many large private organizations have also joined hands to make Mauritius a pollution free island. However, despite all these measures, it is clear that a lot of work still has to be done to make Mauritius become an island who derives all its energy from renewable sources.

## Keywords

Global warming, green environment, e-wastes, energy efficiency, carbon footprint.

## 1. INTRODUCTION

“Going green” refers to individual action that a person can consciously take to mitigate harmful effects on the environment through his/her lifestyle, behavior and habits. In the same way, carbon footprint is the measure of the impact our activities have on the environment, and involves measuring all the greenhouse gases we individually produce, which has units of tons (or kg) of carbon dioxide equivalent[1]. Carbon footprint is closely related to the number of trees present, as the more trees present, the lesser is the CO<sub>2</sub> emission value. Greenness of countries is usually calculated based on the amount of their CO<sub>2</sub> emissions.

Green sustainability is gaining a very important place in many countries which are thriving at making their population aware of the environment threats which are being caused by improper disposal of wastes and wastage of resources in terms of high energy usage around the world. According to a report [2], it was found that 2005 was the warmest year on record, and also that natural disasters were becoming more severe and more frequent. All these issues are being related to the greenhouse effect, which is related to the release of too much carbon dioxide and other carbon greenhouse gases in the atmosphere.

For example, in 2010, a survey [3] showed that Apple was solely responsible for the emission of about 14.8 million metric tons of greenhouse gas in the atmosphere. Like Apple, many other companies are also contributing to the emission of carbon gases, but many of them are also now taking the steps to cut down these emissions, Apple included, and are adhering to the 3 R’s rule, which are Recycle, Reuse and Refurbish, wherever possible.

Mauritius, which is a member of the Kyoto Protocol since 9th May 2001, but a practicing member only as from 2005, has also started to take initiatives to go for a greener environment. According to a report based on the year 2008 from the World Bank [4], Mauritius had a CO<sub>2</sub> emission of about 3.1 metric tons per capita, which is an increase as compared to the 2006 report, where the emission was 3.0 metric tons per capita, and its ranking globally was 131st in the year 2007.

The concept “Maurice Ile Durable - MID” [5] was thus launched on 19th June 2008 as a long term plan to make Mauritians start taking the steps for a greener and sustainable environment, as well as to try reduce the country’s dependency on imported fossil fuels, and instead use our own available resources, which include solar, biomass, hydro, and wind power. In fact, the main concept of MID is to make Mauritius a world model of sustainable development, particularly in the context of Small Island Developing States, and of course to minimize our dependency on fossil fuels and increase awareness for environment protection. Both the public and private sectors have started contributing since then to a more ecological environment. Along with the Ministry of Environment, the University of Mauritius has launched its Eco-Campus initiative to increase awareness for a greener environment.

NGOs (Non-Governmental Organizations) such as the Environment Protection and Conservation organization, the Mauritius Marine Conservation Society, the Society for Biology Teachers, the Biodiversity Action Group, the Pesticide Action Network and some others, are also involved in research and applying action plans to contribute to a greener and sustainable environment [6].

The paper proceeds as follows. In the next section, green energy and green buildings in Mauritius are described. In section 3, additional measures to make Mauritius are discussed. Section 4 informs of some of the current environmental threats such as smoke pollution, improper waste management and deforestation. Finally, we conclude with paper knowing many issues are still unresolved and needs more attention from decision and policy makers in Mauritius.

## 2. GREEN ENERGY AND BUILDINGS IN MAURITIUS

### 2.1 Use of solar energy for households

Mauritius being a tropical island enjoys the benefits of having long periods of sunshine, around 2900 hours yearly. As a result, the government found that with the use of solar water heaters, the country could save on its energy consumptions. Thus, since 1992, steps were taken to facilitate and encourage the population to buy solar water heaters for their households, and the government currently provides a grant of Rs. 10000 per individual who is qualified under specific conditions,

while the Development Bank of Mauritius provides a soft loan of Rs. 15000 for the purchase of solar water heaters [5].

If we compare this initiative to China [7], it can be seen that China is the leading country for hot water from solar energy. They established their plan in 2007. Around 10% of Chinese households rely on solar heated water. Mauritius is still struggling to reach this mark, as people are still reluctant to adopt solar water heaters, mostly due to the fact that Mauritius usually faces cyclones, and the heaters are fragile devices which can easily be damaged in such conditions. However, the Mauritian government has taken measures to reduce the costs of repairs and spare parts of the solar heaters been made more accessible to the population [8].

## **2.2 Green buildings**

Currently, two well-known companies in Mauritius have already started using solar energy to power their buildings and machines: namely RT Knits and MCB (The Mauritius Commercial Bank). RT Knits is a textile company, and as from the year 2008 [9], it started contributing towards a green environment by making use of solar energy to heat water to process its raw materials. They also invested in a more ecofriendly building architecture, so as to use sunlight to light up its knitting and storage areas.

MCB, one the leading banks in Mauritius, also started its involvement towards a green environment as from March 2009, but its more recent achievement is the green building at Ebene, which was officially set in operation on 31st October 2011. The building makes use of solar energy to power most of its electrical appliances, such as air conditioners and office lightings. The building is also architecture in such a way that it gets both morning and afternoon sunlight directly to its offices, and on its solar panels located on the roof, so as to maximise the trapping of the solar energy. It is estimated that the MCB building generates about 430 KW of energy during sunny hours. Both buildings have been designed in such a way so as to collect rainwater and use it for their internal purposes. RT Knits use it for its dyeing process while MCB use it for watering its garden plants and in toilets. RT Knits also uses wind power for cooling and operating extractors in the plant. Another green building in Mauritius is the Nautica Commercial Center located at Black River, which has almost same characteristics as the two previously mentioned buildings, but it is not fully operational.

However, if we compare our three greenest buildings to the Bank of America Tower or other existing buildings like BMW Welt in Munich [10], then we see that more efforts and investments are still required to reach the standards of these buildings. The BWM Welt building has solar panels which produce a minimum of 824 KWPH of energy, thus saving 30% on its energy costs [11], and it also makes use of natural ventilation system.

## **2.3 Biomass as an energy alternative**

Biomass energy in Mauritius is a derivative from the bagasse which is obtained after processing sugarcane. FUEL sugarcane plant [12] generates most of its energy to run its cane processing machines from bagasse, and surplus energy are then made available on the CEB grid to be used for household uses. Other sugarcane processing plants also contribute in the production of electricity, but on a lower scale. Currently, about 20% of the island's energy is derived from biomass [13], but the other 78% is still derived from

fossil fuels. About 2% is shared between wind and hydro power sources.

Developing countries are among the ones which are currently using biomass energy, examples being Nepal, with 95%, and Malawi, 94%, though their biomass energy is not necessarily derived from processed sugarcane. Denmark is also another country where biomass energy plays an important role, as it accounts for 70% of their renewable energy consumption.

## **2.4 Wind power**

Wind power is yet to make a landmark in Mauritius, despite the country being subjected to windy conditions prevailing consistently all over the island, with many studies carried out to make it a primary source of energy. The first barrier is the cost for installation of the turbines needed to generate wind power. Second is the lack of expertise to work with these turbines. However, a wind farm has been made operational in Rodriguez as from 2010, with 4 turbines installed and having a combined capacity of 1.1 MW [14]. Aero watt has started a wind farm in Mauritius near Plaines des Roches in the North of the island, where it has install 18 megawatts turbines. The project is expected to be completed in late 2012. It will then move to the South of the island for another wind farm phase [15]. Leading countries which are using wind power include Germany, USA, China, India, France, UK and Spain [16].

## **2.5 Hydro Power**

Mauritius has 9 hydro power plants installed, with a combined capacity of 59 MW [17]. The 9th one is actually more recent, at Midlands Dam, where it was built to counter the rising prices of fuel like coal, and to alleviate the overloading of existing power plants, and to make full use of natural resources. However, with the recent decrease in rainfall and being on the edge of facing a major drought across the country, the hydro power plant could no longer be used to its full capacity, as the dam itself is facing scarcity of water.

On the international scene, China is the leading country so far in terms of generation of energy using hydropower plants, with an estimated 200GW of energy produced, while countries like Canada and the USA average about 85GW; South American countries like Venezuela and Paraguay, are almost 100% dependent on hydro power, with Venezuela having a production of 15GW [18].

## **3. OTHER MEASURES FOR A GREENER MAURITIUS**

The government has also invested in other measures apart from renewable energy, along with the private sector, so as to increase the population's awareness towards the looming crisis which may result from global warming. These are discussed below.

### **3.1 Fines for littering**

Under the Local Government Act of 2003 [19], any person found guilty of illegal littering, which consists of objects being thrown on the streets, like paper wrappings, cigarette butts and other related objects, could be fined around Rs. 500 to Rs 2000 for a first time offence. If the same person is caught again, he/she would pay a fine of Rs. 10000, with a jail sentence included, but not going beyond 1 year. A special branch was also created in the Police Force, "Environmental Police", whose task is to enforce the environmental laws around the island. Boards have also been placed along motorways and other roads to discourage people from

littering. However, it will take some time to make the Mauritian population get rid of this bad habit. Most countries in Europe, the USA and also Singapore have very strict rules concerning littering and environment preservation [20].

### **3.2 Creating awareness at the educational level**

One of the biggest challenges which Mauritius may be facing is to create the necessary awareness towards a green sustainability in the education sector. It is not a secret that with the generation of core i3-i5-i7 processors being made available, we still have many schools, colleges, and even the University of Mauritius, still using Pentium 4 machines, which are already outdated, and contributing to the carbon emissions of Mauritius. These machines are usually operational 5 days per week, and are left switched on most of the times during that period, even when there are no courses being dispensed. However, the budget required for changing from older PCs to new ones will cost a lot, as the country has a rather limited budget which needs to be allocated to other sectors as well. There is also the absence of appropriate subjects as from the primary education level, which would have helped create awareness to our students as from their young age on how to preserve the environment and save energy wherever possible.

However, one college which has so far shown some awareness towards a greener environment is the Hindu Girls College, which is found in Curepipe. The college has been equipped with a 3 KW solar system, which in turn produces 14 KWh of electricity daily, and makes up of one fifth of the college's energy needs [21]. If other schools and colleges were to follow this example very soon, Mauritius would benefit a lot in terms of reduced carbon emissions.

The MCB is creating short documentaries which are telecasted for five minutes every week, so as to make people aware of the simple things that can be done to reduce energy consumption so as to protect the environment [22].

### **3.3 Replacing plastic bags with paper ones in supermarkets and fast foods outlets**

As from September 2010, the supermarket chain, Winners, became the first ones to adopt a more sustainable approach for creating environment awareness to its customers [23]. Usually, plastic bags were given freely by the supermarkets and hypermarkets for customers to carry their goods back home, however, with the Maurice Ile Durable concept, drastic changes were brought about. Paper bags entered the scene, as they are more bio-degradable as compared to plastic bags, and furthermore, a fee was introduced for those who really needed plastic bags. A plastic bag which was given freely in the past now costs about Rs 2.30.

A tax of Rs. 2.30 is also applicable on PET bottles (made of Polyethylene Terephthalate material), which are used by companies like Phoenix Beverages and others as soft drinks companies. These companies also recycle the PET bottles to reduce their environmental footprint. Moreover, fast food outlets like KFC are also contributing in plastic usage reduction, by replacing their plastic bags with recycled paper-based ones, which cost around Rs. 1.00.

However, the picture is not all rosy, as in the case of packed foods and vegetables being sold in supermarkets, plastic wrappings are still being used, as they allow keeping these products for a longer period as compared to other types of

wrappings. It is known that products like vegetables or meat, when packed in paper-based wrappings, tend to decay quicker, thus the impossibility to completely remove plastic packages from the market.

### **3.4 Use of energy saving lamps**

The purpose of these lamps is to reduce energy consumption, thus reducing our carbon emissions, as well as to alleviate the populations' expenditure on electricity bills [5]. A survey in 2009 showed that about 500000 such lamps were sold to household customers. Similar lamps were also made available for schools and other educational infrastructures, public buildings, hospitals and so on, to ensure energy savings and efficiency [24].

### **3.5 Reducing the use of chemical fertilizers**

Due to health concerns, the Ministry of Agro Industry and Food Security has decided to reduce the use of some chemical fertilizers which were being used in the past, and instead are promoting bio fertilizers and natural ones. Planters are also being encouraged to go for hydroponic culture wherever possible, whereby, very less fertilisers are needed for the growth of crops [25].

### **3.6 Paint industry going green**

The paint industry is also contributing towards a better environment, with companies like Mauvilac [26] and SOFAP Ltd [27] introducing eco-friendly paints, and also taking proper measures to counter the improper disposal of their wastes in the environment. In fact, SOFAP Ltd became Mauritius' first company to achieve the ISO 14001:2004 certification usually awarded to those companies thriving towards a better environment management [27].

### **3.7 E-services by banks, MRA and the government**

Since last year, banks like the MCB have started charging print-outs made at their ATM machines, so as to reduce the use of paper [28]. They have started favouring e-statements and online banking facilities so as to provide easy access for details to customers, while contributing to the environment protection. In the case of MCB, it has also made computers available at each branch so as to enable those customers who do not have a computer at home to benefit of these services as well. Services like mobile top-up/refill are also being provided via ATMs and online, reducing the needs of buying prepaid cards. State Bank of Mauritius is providing an eco-loan scheme [29], where a minimum amount of Rs. 100000 is granted to anyone who wants to acquire and install a solar Photovoltaic system to be used to generate their own electricity for consumption, and/or to export to the CEB (Central Electricity Board) grid. MCB has also launched a similar loan scheme called the 'Green Loan' [30].

Moreover, the MRA (Mauritius Revenue Authority), which is involved with tax collection, has also launched its e-filing service [31], whereby it encourages more and more people to fill and submit their tax forms online, unlike in the past where the tax payers had either to download and print the forms, or the MRA itself dispatched the forms individually by post for them to fill.

### **3.8 Waste to energy project (WTE)**

Although this project has not yet been fully functional, it is being backed by the Gamma Energy group, in joint venture

with Covanta Energy [32]. The facility has been designed in a safe, sustainable and climate-friendly way to process solid wastes and eventually relieve the country from its fossil fuel dependency. However, this project is facing a lot of opposition, mostly from planters and inhabitants around La Chaumiere, as the burning of wastes will produce a lot of smoke emission, which according to them, even after filtering, will still damage their crops and health. Nevertheless, there are about 89 such plants in the USA and 431 in Europe [33].

### **3.9 Waste to fertilizer**

Since last year, Solid Waste Recycling Ltd in Mauritius has already started the conversion of organic domestic waste into fertilizers and soil conditioners. This project is expected to reduce the country's bill for imported fertilizers by Rs1 billion.

### **3.10 Recycling of old metals**

Many companies and owners of private lorries have been given license to collect old metals from all over the island. Indeed, this project has been most welcomed by the population and it has surely contributed to a more beautiful landscape as earlier the country was littered with old metals.

## **4. CURRENT ENVIRONMENTAL THREATS IN MAURITIUS**

Despite measures being taken to move towards a greener Mauritius, there are still some issues which are yet to be resolved, and are still threats to our environment. These are discussed below.

### **4.1 Smoke pollution**

Smoke pollution is one of the issues which have been a threat to our environment for some time now. Although for privately owned vehicles this may not be the case, however, for the public transport vehicles and goods-carrying ones, this is another story. The police force has acquired opacimeters (smoke meters) to test the emission of private and public vehicles [34]. In order to reduce these smoke emissions, vehicles have been fitted with catalytic converters, and unleaded petrol and diesel containing less sulphur have been introduced. Omnicane Ethanol Holding Limited [35] has also come out with a proposal of mixing ethanol with gasoline to run motor vehicles; a product which could be named the E10 fuel. After performing successful tests, the authorities have been very slow to give the green signal for the implementation of this project at national level.

Industries as well contribute to smoke pollution, although many of them do filter out the smoke, but harmful gases are still being emitted. Smoke pollution also arises when sugar cane fields are burnt prior to harvest, and the fire sometimes becomes uncontrollable, and affects other fields.

### **4.2 Improper waste management**

Waste management is another issue which is still not conclusive. Mare Chicose landfill, which came in operation in 1997, is being used as the dumping ground for the entire household and other wastes collected across the island, but it too is exceeding its capacity over the years. Since the past years the government has taken the initiative and is investing massively in the Waste Water Management project, whereby waste water from households are collected and sent to a treatment plant to be recycled for irrigation uses. However, there are still many regions which are yet to be connected to

the system. The plan is also set to cover industries as well for their water discharging process, however, many of them are still not compliant to it, and still dump their used waters and other wastes in nearby rivers and canals. In doing so, they are releasing toxic materials which are destroying the natural habitat of wildlife species, as well as endangering the life of those species. Since our rivers and some canals end in the sea, these wastes are being carried into our lagoons and yet again killing fishes and other submarine species.

Mauritius also lacks the proper management for dealing with e-wastes, which include broken television, cell phones, computer monitors, CPUs, and other related appliances. Due to lack of information about e-waste, many Mauritians put these wastes in their dustbins, or just dump them outside in a nearby abandoned land. They are unknowingly spreading toxic content, as these devices usually contain mercury, arsenic, chromium, and other toxic chemicals [36]. Measures are now being implemented to handle these wastes properly, whereby municipalities are providing a door-to-door e-waste collection service, where a person needs to fill in a form to declare all the e-wastes available currently at his/her place. However, many people are still not aware of such services due to lack of proper information.

In fact, for Africa, e-waste management is still at the embryo stage, and since 2007, Hewlett Packard, in collaboration with the Swiss Federal Institute for Materials Testing Research, has launched "E-Waste Management in Africa" initiative. However, for the initial phase, only four countries have been selected, namely South Africa, Senegal, Morocco and Kenya [37]. Unfortunately, Mauritius is not within this initiative.

### **4.3 Deforestation**

Mauritius is currently facing the problem of deforestation. The island is in fact turning into a concrete jungle as buildings and shopping malls are cropping up almost everywhere, for example the Bagatelle and Cascavelle mall projects. Many green spaces are being converted into residential areas. In addition, new roads are also being built throughout the island. In order to build around these areas, the existing greenery and age-old trees had to be removed and these areas, which in the past have acted as rain water catchment areas. Decorative plants are being planted instead to replace the endemic ones.

This could be one of the reasons why the country is receiving less rainfall, and is being subjected to droughts for the past years. The government, to help families face the drought period, is providing a grant of Rs. 3000 per family to purchase a water tank [38], although this action does not really justify the cutting down of trees and other endemic plants for the sake of development and economic growth.

## **5. CONCLUSION**

Mauritius has embarked itself onto promoting a greener environment but more awareness campaigns, including educational ones, and international expertise will be needed in order to truly make Mauritius a famous name in the list of countries which are implementing green sustainability. Nevertheless, Mauritius, due to its small size, can certainly set the example and perhaps become the first country in the world which derives all its energy from renewable sources. Policy setters and decision makers must ensure that actions follow words.

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