

# Local Market Readiness Analysis for Selected Sustainable Products in Mauritius

(Air Conditioning, Fresh Produce and Alternatives to Single-Use Plastic Items)



## TRANSFORMING TOURISM

Transforming tourism value chains in developing countries and  
Small Island Developing States (SIDS) to accelerate more resource efficient,  
low carbon development

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## ACRONYMS AND ABBREVIATIONS USED IN THIS REPORT

AHRIM	Association des Hôteliers et Restaurateurs de l'Île Maurice	
APEIM	Association de Parents D'enfants Inadaptés de L'Île Maurice	
BPA	Bisphenol A	
COP	Coefficient of Performance	
CSCP	Centre for Sustainable Consumption and Production	
CSPF	Cooling Seasonal Performance	
DOWA	Deep Ocean Water Application	
EEMO	Energy Efficiency Management Office	
EER	Energy Efficiency Ratio	
EIA	Environmental Impact Assessment	
FAREI	Food and Agricultural Research and Extension Institute	
FORENA	Fondation Ressources et Nature	
FSC	Forest Stewardship Council	
GAP	Good Agricultural Practices	
GHG	Greenhouse Gas	
GMO	Genetically Modified Organism	
GSTC	Global Sustainable Tourism Council	
GWP	Global Warming Potential	
HACCP	Hazard Analysis and Critical Control Point	
HCFC	Hydrochlorofluorocarbons	
HVAC	Heating, Ventilation and Air Conditioning	
IEER	Integrated Energy Efficiently Ratio	
ISO	International Standards Organisation	
MACB	Mauritius Agricultural Certification Body	
MAIFS	Ministry of Agro Industry and Food Security	
MBEAT	Mauritius Building Energy Audit Tool	
MCAF	Mauritius Cooperative Agricultural Federation Ltd	
MCCI	Mauritius Chamber of Commerce and Industry	
MCFI	Mauritius Chemical & Fertilizer Industry limited	
MEPS	Minimum Energy Performance Standard	
MICE	Meetings, Incentives, Conferences and Events	
MRA	Market Readiness Analysis	
MSB	Mauritius Standards Bureau	
ODP	Ozone Depletion Potential	
PGS	Participatory Guarantee Systems	
PLA	Polyactic Acid	
RAC	Room Air Conditioner	
SEER	Seasonal Energy Efficiency Ratio	
SEFA	Sustainable Energy Fund for Africa	
SIDS	Small Island Developing States	
SMEs	Small and Medium Sized Enterprises	
STAGs	Stakeholder Advisory Groups	
SWAC	Sea Water Air Conditioning	
TTVC	Transforming Tourism Value ChainsUN	United NationsUNEP
	United Nations Environment Programme	
VRF	Variable Refrigerant Flow	

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## CHAPTER ONE: INTRODUCTION

### 1.1 Background

The project '*Transforming tourism value chains*' in Mauritius aims to reduce greenhouse gas (GHG) emissions and improving resource efficiency within the accommodation sector and its value chain. Transforming the sector to low carbon, resource efficient operations, requires an increase in sustainable consumption and production practices by businesses and tourists which can be achieved through coherent in-country actions.

For many countries, tourism provides a significant source of foreign exchange and foreign direct investment. In Mauritius, in 2018 tourist arrivals increased by 4.6% from 1,341,860 in 2017 to 1,399,408 and tourism earnings stood at Rs64.0 billion<sup>1</sup>. Direct contribution of tourism to GDP is 7.4% (MUR 34.2 billion (US\$ 982.9 million)– 89% of which is estimated to be from accommodation and food services activities) and total contribution of MUR 110.0 billion (US\$ 3,167.0 million) (23.8%). Tourism is one of the largest employment sectors, providing 41,500 direct jobs (7.2% of total employment); 131,000 jobs indirectly supported (22.6% of total employment)<sup>2</sup>.

If managed sustainably, tourism can make an important contribution towards conserving natural and cultural heritage resources, generating and distributing wealth equitably, empowering the disadvantaged, generating jobs and supporting infrastructure development.

The hospitality sector needs to respond to guests' requirements. Guests expect hotels to provide a high-quality experience, including services and products. At the same time, tourists around the world are becoming more environmentally conscious and concern about climate change. 68% of tourist confirm they are more likely to consider choosing eco-friendly accommodation<sup>3</sup>. This pressure can affect purchasing decisions that if made adequately may bring with them major environmental, economic and social positive impacts.

Achieving greater sustainability in the hospitality sector relies on businesses being aware of their role in the global and local value chains. Leveraging their purchasing power by buying more sustainable goods and services can help drive markets towards sustainability, reduce the negative impacts of an organisation and produce positive benefits for the environment and society. By incorporating sustainability requirements into their procurement processes, the private sector conveys a strong market signal and helps scale the market for sustainable products and services.

### 1.2 Objectives of the Study and Expected Outcomes

In order to gain a better understanding of the maturity of the local market in terms of the demand and supply dynamics for the procurement of sustainable products/services, a market readiness analysis on selected products was be conducted. The main objectives of this market readiness analysis (MRA) are:

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<sup>1</sup> Statistics Mauritius (2018). *International Travel and Tourism 2018*. Available at: [http://statsmauritius.govmu.org/English/Publications/Pages/Tourism\\_Yr18.aspx](http://statsmauritius.govmu.org/English/Publications/Pages/Tourism_Yr18.aspx)

<sup>2</sup> <https://www.wttc.org/economic-impact/country-analysis/country-reports/>

<sup>3</sup> <https://globalnews.booking.com/bookingcom-reveals-2017-sustainable-travel-intentions-goals-and-considerations/>

- i. Engagement of the market to assess its potential responsiveness to an increased demand of sustainable products/services – targeting the prioritized products/services.
- ii. Identification of potential threats/opportunities that a shift of the demand to sustainable alternatives might create for SMEs and for the local market.
- iii. Definition of sustainability criteria for each sub-category of product and identification of existing means of verification and sustainability standards.

At a later stage, the market readiness analysis will inform the sustainable strategy and sustainable procurement action plans of the private sector procurers engaged in the IKI-funded Tourism project in Mauritius.

### 1.3 Approach and Methodology

The “United Nations (UN) Environment SPP Approach” was used as the reference methodology for the Transforming Tourism Value Chains (TTVC) project. The conduct of a market readiness analysis is a key step of the Approach.

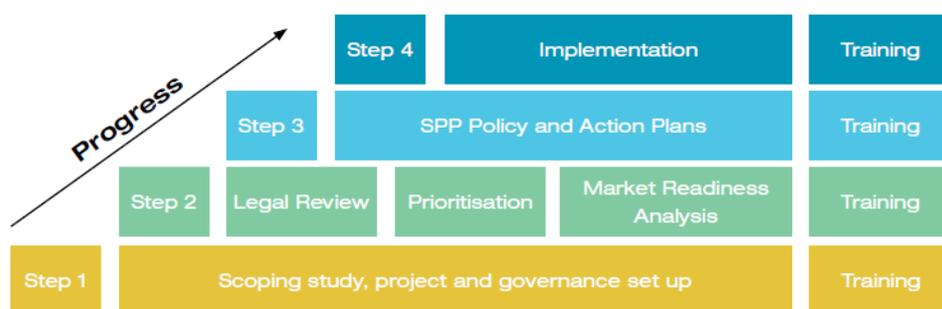


Figure 1: UN SPP Approach

A mix of triangulation of data sources and research methods was used in the study.

- *Desk Research:* This included a review and analysis of secondary sources of data from multiple sources such as Statistics Mauritius, Mauritius Chamber of Commerce and Industry (MCCI), Switch Africa Green Programme and UN Environment, and available national reports on relevant topics.
- *Key Informant & Suppliers Interviews:* A number of in-depth and semi-structured face-to-face and telephone interviews of key stakeholders including hotels and suppliers. These included 3 large hotel groups (Attitude Hotels, Indigo Hotels, Sun Resorts) and a medium hotel (Voila Hotel); industry leaders in air conditioning (Rey & Lenferna Ltd, Novengi Ltd), fresh produce (Proxifresh Co Ltd, Le Velo Vert, Farm Basket, Agribio Ltd) and alternatives to single-use plastic items that supply the accommodation sector (DACOM Ltd); and relevant organisations such as Mauritius Standards Bureau, the Energy Efficiency Management Office, Association des Hôteliers et Restaurateurs de l’île Maurice’ (AHRIM), Food and Agricultural Research and Extension Institute (FAREI), Mauritius Agricultural Certification Body (MACB), Business Mauritius, Ministry of Environment Solid Waste Management Division.

- *Other Primary Data Sources:* Information gathered during the assessment phase of the project and contained in different reports, workshops, hotspots analysis, training needs assessment and the sustainable procurement surveys were also used and fed into the Market Readiness Analysis study.

## CHAPTER TWO: PRELIMINARY COMPENDIUM OF SUSTAINABILITY CRITERIA AND MEANS OF VERIFICATION FOR THE IDENTIFIED PRIORITISED PRODUCTS AND SERVICES

### 2.1 List of Three Product Groups in Focus

The selection of the sustainable products and services categories was developed by UN Environment. The list was produced taking into account the environmental impacts of such products and services, the information provided in the country report<sup>4</sup>, particularly the hotspots analysis, and some international procurement guidelines such as the EU Green Procurement criteria. Each list contained 8 pre-selected products and services: Air conditioners and Cooling Equipment, Lighting, Fresh Produce (Fruits and Vegetables), Beef, Dairy, Beverages, Fish and seafood products, Single use plastics (e.g. toiletry, cutlery, cups, straws).

The Travel Foundation carried out an initial analysis of the list of products and services categories taking into account the hotspot analysis, the knowledge of the local consultants and the outcomes of the workshop celebrated in each country. Then, each product service category was analysed against four different criteria:

1. The demand of the product/service within the hotel sector in the country, including the potential interest of hotel in changing their procurement criteria for such products.
2. Local supply capacity.
3. Local supply from SMEs.
4. Environmental impacts.

Finally, Travel Foundation consulted different stakeholder in the country, including members of the Stakeholder Advisory Groups (STAGs) such as the main business associations such as Business Mauritius and Association des Hôteliers et Restaurateurs de l'île Maurice' (AHRIM).

The three product categories that have been prioritized to be subject of this market readiness analysis in order to understand the availability of sustainable and eco-friendly options in Mauritius are listed below:

1. Air conditioning systems
2. Fresh produce (fruits and vegetables)
3. Alternatives to non eco-friendly single-use plastic

### 2.2 Identification of Sub-Categories of Products for each Prioritised Product Group

In this section specific sub-categories of the three priority sustainable product groups are identified.

#### 2.2.1 Air Conditioning

Commercial air conditioning applications started due to the need to cool industrial processes. The first electrical air conditioning was invented by Willis Haviland Carrier in the year 1902. The discovery of Freon in 1928 by Thomas Midgley, Jr., a safer refrigerant to humans compared to the

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<sup>4</sup> UN Environment and WRAP (2019), Overview and hotspots analysis of the tourism value chain in Saint Lucia [https://www.oneplanetnetwork.org/sites/default/files/iki\\_country\\_report\\_mauritius\\_final.pdf](https://www.oneplanetnetwork.org/sites/default/files/iki_country_report_mauritius_final.pdf)

toxic and flammable gases such as ammonia, propane and methyl chloride, sparked the invention of air conditioning systems for residential, industrial and commercial applications.

In 1933, the Carrier Air Conditioning Company of America developed an air conditioner using a belt-driven condensing unit and associated blower, mechanical controls, and evaporator coil, and this device became the model in the growing U.S. marketplace for air-cooling systems.

Today's air conditioners, while operating on the same fundamental science, incorporate advancements in vapor compression, diagnostics and controls, electronic sensors, materials, refrigerants, energy efficiency and more. The air conditioning market offer a wide variety of equipment and options.

Due to the high number of applications for refrigeration and air conditioning systems and the different operating conditions of those, there are many different types of refrigerants in the market. In order to evaluate a refrigerant, the following properties and characteristics need to be considered:

- Zero Ozone Depleting Potential (ODP)
- Energy Efficiency Ratio (EER) and the Seasonal Energy Efficiency Ratio (SEER).
- Energy efficiency, have high Coefficient of Performance (COP), i.e. low indirect Global Warming Impact
- Low Global Warming Potential (GWP), i.e. low Direct Global Warming Impact
- Chemically stable at all temperatures and environments, including contaminated systems
- Compatible with all materials (metals, elastomers (plastic/rubber materials), oil, including suitable miscibility/solubility with oil)
- Toxicity
- Flammability
- Low cost
- Commercially available

An important characteristic to take into account when selecting refrigerants is their Global Warming Potential (GWP) which is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to carbon dioxide. For example, R410A has a GWP of 2,088 meaning that if one kilogram is released into the atmosphere it would have 2,088 times the harmful effect of one kilogram of carbon.

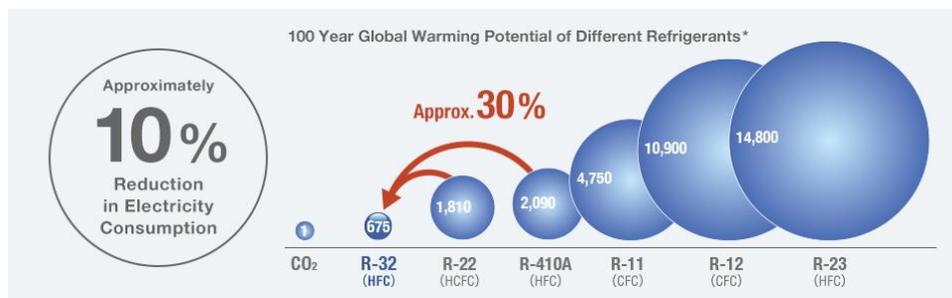


Figure 2: GWP of Different Refrigerants IPCC Fourth assessment report<sup>5</sup>

<sup>5</sup> Daikin (2019). Values for 100 year global warming potential (GWP) from IPCC Fourth Assessment Report. Comparative 100 year GWP: HFC410A, 2,090; HFC32, 675. Available at: [https://www.daikin.com/corporate/why\\_daikin/benefits/r-32/](https://www.daikin.com/corporate/why_daikin/benefits/r-32/)

The most common refrigerants used for air conditioning over the years include:

- **Chlorofluorocarbons (CFCs)**, including R12 that was the most widely used refrigerant, but due to its high potential to cause the depletion of the ozone layer has being replaced by other refrigerants. Production of new stocks ceased in 1994.
- **Hydrochlorofluorocarbons (HCFCs)**, including R22. Slightly less damaging to the ozone than R12, but also depletes the Earth's protective ozone layer and contribute to climate change. This is why R22 was phased-out under the Montreal Protocol and banned in many countries such as Europe and US in all forms.
- **Hydrofluorocarbons (HFCs)**, including R410A and R134. With no chlorine in the mix, these refrigerants were used to replace R22 as deemed safer. Air conditioners that run on R410A, can be more efficient, offer better air quality, increase comfort and improve reliability. Nevertheless, these are being targeted due to their high GWPs. A new refrigerant generation R-32 is currently receiving the most interest because R-32 efficiently conveys heat, it can reduce electricity consumption up to approximately 10% compared to that of air conditioners using refrigerant R-22. Furthermore, compared to the refrigerants widely used today such as R-22 and R-410A, R-32 has a global warming potential (GWP) that is one-third lower and is remarkable for its low environmental impact.
- **Hydrocarbons** are called natural refrigerants because they occur in the earth's material cycle, e.g. as a by-product of natural gas production, or in oil refineries. Propane (R290) has been discussed since the late 1980s as a replacement for CFCs and especially R22 (HCFC). Except its high flammability R290 has very similar properties as R22. It has a long history in refrigeration and is thus an interesting candidate. However, its flammability has limited its use. While isobutane (R600a) was introduced in household appliances in some parts of the world from the start of CFC phase out, R290 was introduced later and replaced R134a, R22 or R404A in a wide spectre of appliances<sup>6</sup>.

The table below summarises the identified and relevant sub-categories for air conditioning systems subject of this study.

Prioritised products	Sub-Categories <sup>7</sup>
<b>Air conditioning systems</b>	Regular split AC units (speed of the compressor is fixed)
	DC Inverter split system (speed of the motor of the inverter compressor is variable) with outdoor unit connected to different types of indoor units.
	DC Inverter wall mounted air conditioning units
	VRF (Variable Refrigerant Flow) air conditioning systems (multi-split)
	Chillers
	Hybrid air conditioning system, for e.g. using both chiller & VRF

<sup>6</sup> <https://www.danfoss.com/en-gb/about-danfoss/our-businesses/cooling/refrigerants-and-energy-efficiency/refrigerants-for-lowering-the-gwp/hydrocarbons/>

<sup>7</sup> UNEP (2010). *Alternatives to HCFCs in the refrigeration and air conditioning sector*. Available at: <http://www.unep.fr/ozonaction/information/mmcfiles/7436-e-hcfc-alternatives.pdf>  
 UN Environment, Global Environment Facility & United for Efficiency (U4E) (2017). *Accelerating the global adoption of energy-efficient and climate-friendly air conditioners*. Available at: <https://united4efficiency.org/wp-content/uploads/2017/06/U4E-ACGuide-201705-Final.pdf>

	Zero Ozone and low Global Warming Potential (GWP) refrigerants
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Table 1: Sub-Categories of Air Conditioning Equipment

## 2.2.2 Fresh produce

Chemical pesticides and fertilizers have been used worldwide in agriculture for decades to control pests and increase productivity. Nevertheless, they are toxic substances that have negative consequences in the environment damaging soils, water, air, and climate and in the human health. In 2017, the United Nations Human Rights Office of the High Commissioner called for a comprehensive new global treaty to regulate and phase out the use of dangerous pesticides in farming and move towards sustainable agricultural practices, stating that ‘pesticides are global human rights concern’<sup>8</sup>.

A growing number of farmers and scientist are taking agriculture towards a more sustainable path. **Sustainable agriculture** means farming in a sustainable way ensuring good stewardship of the natural ecosystems and resources that farms rely on. Among other things, this involves:

- Building and maintaining healthy soil
- Managing water wisely
- Minimizing air, water, and climate pollution
- Promoting biodiversity

**Organic farming** is a sustainable agricultural method that aims to produce food using natural substances and processes where the use of chemical pesticides, artificial fertiliser and genetically modified seeds is prohibited.

The table below summarises the identified sub-categories for sustainably produced fresh produce in Mauritius subject of this study.

Prioritised product	Sub-Categories
Fresh produce	Sustainably produced fresh vegetables and fruits (e.g. MauriGAP certified Mauritian Standard for Good Agricultural Practices MS 184:2015 )
	Organic vegetables and fruits are organic crops grown without the use of synthetic pesticides, bioengineered genes (GMOs), petroleum-based fertilizers, and sewage sludge-based fertilizers.

Table 2: Sub-Categories of sustainably produced fresh produce

## 2.2.3 Alternatives to non eco-friendly single-use plastic items

Plastic are made from synthetization of polymers, which are made of crude oil, through complex chemical reactions. Polymers do not biodegrade they just break down into smaller pieces which means that every single piece of plastic ever made still exist, apart from a very small fraction that

<sup>8</sup> <https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=21306>

has been incinerated. Most of this waste is now polluting our planet, our land, our oceans, our water, and our air.

Plastic is difficult to recycle, and according to the type of plastic the difficulty increases. Despite the fact that technology exists worldwide to recycle most types of plastic, lack of infrastructure and high cost prevents the majority of plastics from being recycled, including the most widespread type of plastic PET.

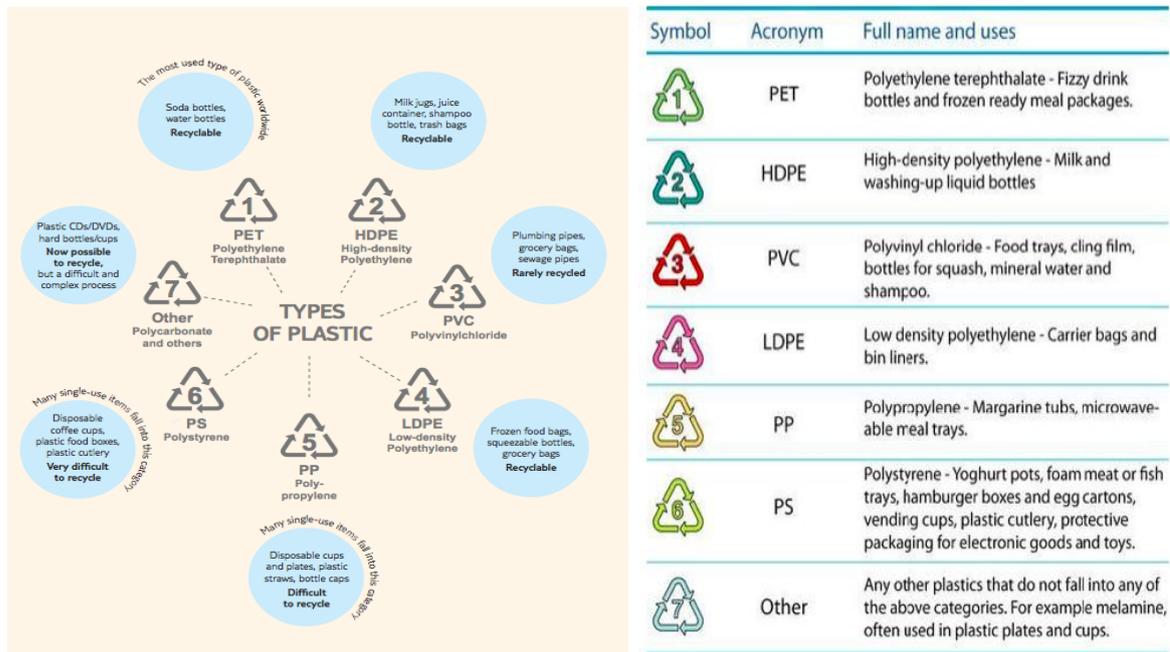


Figure 3: Type of Conventional Plastic and their Ability to be Recycled<sup>9</sup>

Figures and statistics pertaining to single-use plastics usage in Mauritius are relatively scant. However, plastics represent approximately 14% of total waste generated in Mauritius. In 2018, Mare-Chicose landfill received 543,196 tonnes of waste, therefore it can be estimated that 76,000 tonnes of plastic waste reached the landfill.

According to the Director of Solid Waste Management Division (SWMD), the following types of plastics are generated in the largest amount:

- LDPE (e.g. carrier bags, food packaging, bin liners, etc.)
- HDPE (e.g. milk and washing-up liquid bottles)
- and PET (e.g. fizzy drinks bottles).

A plastic waste characterization was carried out in 2012/2013 in two transfer stations in Mauritius.

<sup>9</sup> TUI 2019, Plastic reduction guidelines for hotels  
[https://www.tuigroup.com/damfiles/default/downloads/plastic\\_reduction\\_guide.pdf-2f4f4f0e2278382fcd50d9a530985b84.pdf](https://www.tuigroup.com/damfiles/default/downloads/plastic_reduction_guide.pdf-2f4f4f0e2278382fcd50d9a530985b84.pdf)

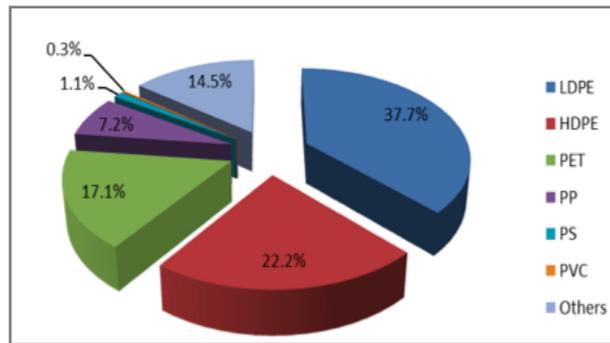


Chart 1: Share of Different Types of Plastic Wastes (Kowlessner, 2015)<sup>10</sup>

Recycling in Mauritius is very low. Only Approximately 6.3% of waste is recycled, of which approximately 40-50% of PET bottles. As of May 2019, there were 15 companies involved in plastic recycling registered at the Solid Waste Management Division<sup>11</sup>. Since coming into operation in 2005, POLYPET, a major plastic recycler, 300 Million PET bottles have been collected with an annual collection rate of 40 Million PET bottles as at 2015.

Mauritius is joining the global movement against single-use plastic items. On the 1<sup>st</sup> January 2016, the Environment Protection (Banning of Plastics Bags) Regulations 2015 came into effect prohibiting the use of plastic bags with or without handles or gussets for carrying goods purchased at a point of sale such as wholesaler or a retail outlet, a market, a fair or at hawkers. Only biodegradable and compostable plastic bags have been exempted. In addition, the Government has introduced an excise levy of Rs2.00/unit on non-biodegradable plastic containers including cups, trays, take-aways, plates and bowls amongst others, effective as from the 2<sup>nd</sup> May 2019. On the 25<sup>th</sup> June 2019, the Rodrigues Regional Assembly has approved the legislation banning the use of plastic food containers altogether on the island. Currently, the Mauritius Ministry of Environment is developing a strategy for the control of plastic pollutions.

Following this trend, the Mauritius market is also moving toward more sustainable options.

The table below summarises the identified sub-categories for alternatives to non eco-friendly single-use plastic items relevant to the Mauritius market and therefore subject of this study.

Prioritised product	Sub-Categories
Alternatives to non eco-friendly single-use plastic items	<b>BPA-free plastics</b> are plastic that do not contain bisphenol A. Exposure to BPA is a concern because of possible health effects
	<b>Biodegradable plastics</b> are plastics that can be decomposed by the action of living organisms, usually microbes, into water, carbon dioxide, and biomass. However this can only be achieved under the correct industrial circumstances and by specialist waste disposal or recycling company. Biodegradable plastics cannot be disposed of via normal recycling channels and can only be

<sup>10</sup> Kowlessner, P. (2015). *Plastics Management in Small Islands Developing States*. Available at: [http://www.uncred.or.jp/content/documents/2654Plenary%20Session\(3\)-Presentation\(6\)-Prakash%20Kowlessner.pdf](http://www.uncred.or.jp/content/documents/2654Plenary%20Session(3)-Presentation(6)-Prakash%20Kowlessner.pdf)

<sup>11</sup> <http://environment.govmu.org/English/Documents/SWMD/list%20of%20recyclers.pdf>

	composted if they meet an appropriate composting standard. It is important to note that some but not all bioplastics are biodegradable/compostable.
	<b>Bio-based plastics</b> are plastics partly or fully made from all-natural plant materials such as corn starch, sugar cane, palm leaves. Some bioplastics are industrially compostable.
	<b>Compostable plastics</b> that can be broken down in industrial composting facilities and meet recognised compostable standard (e.g. EN13432). For many standards, independent certification bodies offer product assessment and certification services often identified by a logo such as 'OK Compost' across the EU.
	<b>Recyclable plastics.</b> Nearly all types of plastics can be recycled. However, the extent to which they are recycled depends upon technical, economic and logistic factors.
	<b>Recycled plastics</b> are items that are made from plastics that have already been recycled.
	<b>PLA (Polylactic Acid)</b> is a bio-plastic that is biodegradable however, PLA is too fragile and is not compatible with many packaging manufacturing processes. Therefore it should be strengthened with additives. PLA should be composted in a composting station under the right circumstances and should not end up in landfills.
	<b>Alternative products</b> such as single-use paper or bamboo, edible straws, refillable dispensers for shower gel/shampoo/hair conditioner, shampoo bars, glass bottles, buying in bulk and using reusable bottles for hotel cleaning materials, using reusable delivery crates

*Table 3: Sub-Categories of alternatives to non eco-friendly single-use plastic items*

It is very important to highlight that many of these alternatives need specific processes and conditions in order to be composted or degraded, and unfortunately those are not easily available in Mauritius. Furthermore, it is also important to highlight that some of the alternative options could have negative consequences on the environment that need to be taken into account, for example shifting to paper alternatives and/or bamboo could increase the problem of deforestation if the demand of this products increase considerable and production is not managed sustainably. Therefore, elimination when possible should be always the priority option.

### **2.3 Review of the Sustainability Criteria of these Products Sub-Categories, inclusive of their Environmental, Social and Economic Characteristics**

An assessment was carried out to identify the sustainability attributes of each of the three prioritised products. Using the Life Cycle Thinking Approach, the environmental and socio-economic impacts generated by these products throughout their life cycle, from extraction of raw materials to the waste disposal at the end of their life, were established. The analysis also includes the assessment of the positive environmental, economic and social issues impacts that could be obtained through the purchase of alternative products.

A review of the literature on sustainability criteria and interviews with main suppliers were also carried out to determine the environmental sustainability, economic sustainability and social impacts for each of the selected products.

The following table provides a summary of the identified environmental, economic and social criteria for the purchasing of air conditioning equipment

Environmental Sustainability Criteria/Impacts	Economic Sustainability Criteria/Impacts	Social Sustainability Criteria/Impacts
<ul style="list-style-type: none"> <li>• EU Energy Efficiency Ratio (EER/SEER) -Classes (A to G) classification</li> <li>• Global Warming Potential (GWP) of the refrigerant</li> <li>• Ozone Depletion Potential (ODP) of the refrigerant</li> <li>• Noise Pollution</li> <li>• High carbon footprint linked to the imports of the AC equipment</li> <li>• Use of other natural resources, for e.g. chillers require higher water consumption</li> <li>• End-of-life waste disposal, refrigerant recovery and recycling of parts</li> <li>• Recyclability of parts: Refrigerant recovery and local recycling of metal and plastic parts</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of electricity consumption – the higher the EER/SEER, the lower its carbon footprint</li> <li>• Affordability/ Initial investment</li> <li>• Estimated useful life</li> <li>• Maintenance costs</li> <li>• Cost of end-of-life waste disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Occupational safety &amp; health of workers (for e.g. some refrigerants such a R-32 is mildly inflammable)</li> <li>• Training for air conditioning technicians</li> <li>• Fair wages</li> <li>• Good labour practices and working conditions (hygiene/working hours/min wages)</li> <li>• General health and safety of residents e.g. fire due to poorly maintained AC, refrigerant leakage etc.</li> </ul>

Table 2: Sustainability Criteria for Air Conditioning Systems

### 2.3.2 FRESH PRODUCE

The following table provides a summary of the identified environmental, economic and social criteria for the purchasing of fresh produce.

Environmental Sustainability Criteria/Impacts	Economic Sustainability Criteria/Impacts	Social Sustainability Criteria/Impacts
<ul style="list-style-type: none"> <li>• Land usage and quality of soil – Improved soil biodiversity and reduction in nutrient losses</li> <li>• GHG emissions per unit area: reduced emissions and consider the overall ecosystem</li> <li>• Agricultural inputs – reduce chemical leaching by limiting or eliminating chemical inputs</li> <li>• Energy Usage - reduced energy use by decreasing agrochemical needs which require high quantities of fossil fuel to be produced</li> <li>• GHG emissions (CO<sub>2</sub>): Help mitigate greenhouse effect by sequestering carbon in the soil</li> <li>• Water consumption (irrigation, washing)</li> <li>• Biodiversity conservation</li> <li>• Waste (excess/ hazardous)</li> </ul>	<ul style="list-style-type: none"> <li>• Food security and self-sufficiency: Lower yields</li> <li>• Cost savings - non application or decreased use of synthetic fertilizers, pesticides and herbicides</li> <li>• Affordability/ Cost – The initial investment is high e.g. greenhouse construction cost, irrigation system etc.</li> <li>• Loss of revenue -The two-year land conversion process results in loss of revenue for the planters</li> <li>• Presence of monopsony</li> <li>• Higher Operational Costs: Organic farming is labour-intensive</li> <li>• Premium Price - Opportunity for local farmers to command a premium price for their produce</li> <li>• Price distortion</li> </ul>	<ul style="list-style-type: none"> <li>• General working conditions (hygiene/working hours/min wages)</li> <li>• Occupational Safety &amp; Health: Less exposure to hazardous chemicals by farm employees and the consumers</li> <li>• Social security: Contracts between farmers and traders/hotels</li> <li>• Fair Trade</li> <li>• Training and education - Opportunity for an organic farm school</li> <li>• Consumer health and safety: (product safety)</li> <li>• Traceability of the supply chain</li> <li>• Livelihood and business opportunities in processing</li> </ul>

<ul style="list-style-type: none"> <li>• Emission to air (excluding GHG)</li> <li>• Emission to water: less groundwater pollution by synthetic fertilizers and pesticides</li> <li>• Local farming: Lower carbon emissions due to shorter transport</li> <li>• Traceability of the produce</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of certifications and laboratory tests</li> </ul>	<p>agricultural waste: manure production and composting</p>
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Table 3: Sustainability Criteria for Fresh Produce (Organic and Sustainable Farming)<sup>12</sup>

### 2.3.3 ALTERNATIVES TO NON ECO-FRIENDLY SINGLE-USE PLASTICS

The following table provides a summary of the identified environmental, economic and social criteria for the purchasing of alternatives to non-eco-friendly single use plastics.

Environmental Sustainability Criteria/Impacts	Economic Sustainability Criteria/Impacts	Social Sustainability Criteria/Impacts
<ul style="list-style-type: none"> <li>• Raw material source – Sustainable sourcing of materials and feedstock, fair trade</li> <li>• Use of renewable energy in the production/manufacturing</li> <li>• Carbon Footprint: Imports of products have higher carbon footprint</li> <li>• Pollution: no bisphenol A (BPA) release in landfills, reduced ocean pollution</li> <li>• Recyclability: recycling and composting</li> <li>• Biodegradable</li> <li>• Compostable</li> <li>• Fair trade and sustainable practices of manufacturer of alternatives (e.g. bamboo plantations)</li> <li>• Bulk Purchase and reduced packaging</li> <li>• Waste disposal: Decreased waste to landfills</li> </ul>	<ul style="list-style-type: none"> <li>• Affordability / cost</li> <li>• Estimated useful life</li> <li>• Cost of end-of life waste disposal: less pressure on municipal waste collections and landfill</li> <li>• Impact on the marine ecosystem and ocean pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Fit-for-purpose</li> <li>• Job creation</li> <li>• Fair labour practices and fair trade</li> <li>• Health and safety: less harmful to human health</li> <li>• Less effect on the world's fish supply and increased livelihood of fishermen</li> </ul>

Table 4: Sustainability Criteria for Alternatives to Single-Use Plastics

### 2.4. Identification of Available Means of Verification for the Sustainability Criteria

Products properties and attributes are complex and subsequently their potential environmental impacts. Environmental standards and ecolabels aim to define and communicate to distributors,

<sup>12</sup> Switch Africa Green (2016). *Promoting Sustainable Agriculture through Green Retailing and Green Hospitality – Demand Side Mapping Report.*

suppliers and buyers those impacts in a clear manner in order to equip them with the necessary information to enable them to make the right choice according to their needs.

This section presents the available means of verification identified for Mauritius for the prioritised products and sub-categories. These includes nationally and internationally recognised ecolabels, voluntary sustainability standards, basic information required by law, laboratory tests, and product declarations, which can serve to verify the sustainability attributes of the prioritised products.

#### **2.4.1 Energy Labels and Standards for Air Conditioners**

The Mauritian Standards for energy labelling are based on the EU Energy Efficiency labelling, while those for energy performance have been based on relevant European EN and/or international ISO standards.

The EU Energy Label is an energy consumption labelling scheme established by **EU Directive 92/75/EC** initially introduced in 1994. With a comparative scale from Class A (green, most efficient) to G (red, least efficient), the concept has been a key driver in helping consumers choose products which are more energy efficient while reducing greenhouse gas emissions. Similarly, it encourages manufacturers to drive innovation by developing more energy efficient technologies.

As appliances have become increasingly energy efficient, they are therefore ranked within the A+, A++ and A+++ grades. Given the confusion created to consumers, the decision has been taken to phase out these rankings over the next few years. The new grading system will revert back to the A to G rankings (without the A+, A++ and A+++). Yet, this scale will run alongside the current grades for some time until completely phased out and the new labels will be visible as from 1<sup>st</sup> of March 2021.

Mauritian Standards have been developed by the Mauritius Standards Bureau for room air conditioner (RAC) and refrigerators and freezers.

A voluntary scheme for energy efficiency labelling of household electrical appliances was first introduced in January 2014 in Mauritius. The labelling of appliances, with the collaboration of importers and dealers, provide information on energy consumption and efficiency to help customers make better purchasing decisions. The list of electrical appliances covered by the scheme include room air conditioners. Dealers of electrical appliances can participate in the scheme to promote their environmentally friendly products. Regulations were made under the Energy Efficiency Act 2011 to make labelling of electrical appliances mandatory as from July 2017.

The Energy Efficiency (labelling of regulated machinery) Regulations 2017 that came into operation in July 2017, provides mandatory energy efficiency labels for household dishwashers, electric ovens and refrigerators in Mauritius. Energy efficiency labels must be clearly displayed on each these appliance types at the point of sale. According to the Energy Efficiency Management Office, the regulations will be extended to cover air conditioners in 2019<sup>13</sup>.

The **MS 200:2013, MS 200:2013** 'Energy Efficiency and Labelling Requirements of Household Air Conditioners' is an adoption of Commission Delegated Regulation (EU) No. 626/2011 and assesses energy efficiency of ductless air conditioners based on SEER/SCOP only. It also mentions **EN14511**

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<sup>13</sup> [http://eemo.govmu.org/English/Documents/Energy\\_Labelling.pdf](http://eemo.govmu.org/English/Documents/Energy_Labelling.pdf)

(Parts 1 - 4) which specify the test conditions and test methods to determine energy performance of ACs.

To reduce the number of energy inefficient appliances on the market, a 25% additional levy is applied on inefficient ACs belonging to class D rating (2.6 W/W) of the now repealed EU Directive 2010/30/EU21.

**ISO 5151:2017** has been adopted by most countries as a reference test standard for measuring air conditioners' cooling capacity and efficiency. However, not all economies are aligned with ISO 5151:2017, and some differences remain between test methods. The Energy Efficiency Ratio (EER) and the Seasonal **Energy Efficiency Ratio** (SEER) are commonly used to rate the energy efficiency of air conditioners.

- The EER is the ratio of the cooling capacity and the power consumed when measured at full load (i.e. measures efficiency at a single point—the maximum cooling capacity or the design point).
- The SEER is designed to rate part-load performance (i.e. efficiency is measured considering variations in the outdoor air temperature and the effect of the cooling load). Alternatively known as the cooling seasonal performance factor (CSPF), the SEER represents the expected overall performance of an air conditioner for a typical year's weather in a given location.

Countries adopt an EER or an SEER metric based depending on the local context (climate, market share of inverter air conditioners, verification testing requirements, among others).<sup>14</sup>

The **Coefficient of Performance** (COP) is a measure of the amount of power input to a system compared to the amount of power output by that system. The COP is therefore a measurement of efficiency; the higher the number, the more efficient the air conditioning system is.

The table below summarized the available means to verify the sustainability criteria for air conditioning equipment presented in section 2.3.1.

Sustainable product	Ecolabel/ standard/ certification/ regulations
Air conditioning systems	Mauritius regulations: <ul style="list-style-type: none"> <li>• Environmental Protection (environmental standards for noise) regulations 1997</li> <li>• Energy Efficiency (labelling of regulated machinery) Regulations 2017. Energy Labels in Mauritius:               <ul style="list-style-type: none"> <li>MS 201 Household refrigerating appliances</li> <li>MS 205 Household electric dishwashers</li> <li>MS 204 Household electric ovens</li> </ul> </li> <li>• Occupational Safety and Health (Noise at Work) Regulations 2012</li> </ul>
	EU Energy efficiency labelling: <ul style="list-style-type: none"> <li>• EU energy label energy consumption labelling scheme:</li> <li>• EU No 206/2012: Coefficient of Performance (COP); Seasonal Energy Efficiency Ratio (EER/ SEER)</li> </ul>

<sup>14</sup>UN Environment Programme, GEF & U4E (2017) "Accelerating the global" (See Chapter 2, footnote 3)

Sustainable product	Ecolabel/ standard/ certification/ regulations
	EU Energy noise standards: <ul style="list-style-type: none"> <li>• EU Energy Label: Sound pressure ≤ 32 dB (A) (refrigerators); Sound power ≤ 42 dB (A) (refrigerators);</li> <li>• EU No 206/2012; Sound power in dB (A) level for rated capacity is within requirements (indoor and outdoor)</li> </ul>
	International Standards in Refrigeration and Air-Conditioning (UNEP) for refrigerants: <ul style="list-style-type: none"> <li>• Zero Ozone Depleting Potential (ODP)</li> <li>• Low Global Warming Potential (GWP)</li> <li>• Level of flammability and toxicity of refrigerant</li> </ul>
	International Standards Organisation (ISO) standards and certification for air conditioning: <ul style="list-style-type: none"> <li>• ISO 5151:2017 (determine capacity and efficiency ratings of air cooled air conditioners and air-to-air heat pumps)</li> <li>• ISO/TC 86 (standards for refrigeration and air conditioning)</li> <li>• ISO 5149:2014 (Refrigerating systems and heat pumps)</li> <li>• ISO 13253:2017 (Ducted air-conditioners and air-to-air heat pumps)</li> <li>• ISO 15042:17 (Multiple split-system air conditioners and air-to-air heat pumps)</li> <li>• ISO 16358:1:2013: Air-cooled air conditioners and air-to-air heat pumps</li> <li>• ISO 14001:2015 (Environmental management systems)</li> </ul>

Table 7: Overview of Certification Schemes to Enable Verification for the Sustainability Criteria of Air Conditioning Equipment

## 2.4.2 Labels and Standards for Fresh Produce

Ecolabels, certification schemes and standards relevant to fresh produce in Mauritius are described in this section.

### **MauriGAP**

The Mauritius Agricultural Certification Body (MACB), operating under the aegis of the Ministry of Agro-Industry and Food Security, is a certification body set up in June 2016 for the certification of agricultural systems. It provides third-party certification services for sustainable agricultural production practices. MACB performs audits on sustainable agricultural production systems and provides assurance that agricultural commodities are produced, packed, handled and stored according to specific agricultural standards. This government-owned body presently offers free of cost services to allow farmers from grass root level to adopt good agricultural practices.

Presently, MACB is issuing certification for MauriGAP – MS 184:2015 Part I, a standard which establishes basic requirements for sustainable crop production. The main requirements are good agricultural practices (GAP) for food safety, environmental issues, quality, traceability and workers safety, health and welfare<sup>15</sup>. Other certification schemes in the pipeline include:

<sup>15</sup><http://environment.govmu.org/English/Documents/switch%20africa%20green%20project/day2/MauriGAP%20Certification%20and%20Application.pdf>

- MauriGap Level II
- MauriGap Level III (Equivalent to GlobalGAP<sup>16</sup> the worldwide standard for agricultural practices)
- Organic Standard

### **QuantiLAB and VegMe™**

QuantiLAB is an accredited Mauritian laboratory from MAURITAS (Mauritius Accreditation body), assessed by SANAS (South African body responsible for the accreditation of laboratories). Now certified ISO 17025, the laboratory is equipped with state-of-the-art equipment and is a multidisciplinary laboratory able to offer services to various markets, including food, agro-industries, cosmetic and pharmaceutical industries, amongst others. QuantiLAB is equipped to conduct pesticide residue analysis and it has been contracted to analyse pesticide residues on specific horticultural commodities, marketed by Proxifresh Co Ltd., a company specialised in the import, export and distribution of fruits and vegetables in Mauritius. This latter company markets sustainably grown products under the ecolabel 'VegMe™'. The VegMe™ label is currently mostly used on imported baby vegetables. There is ample scope for this brand to be adopted for produce that will be marketed in and exported from Mauritius.

### **FieldGood™**

FieldGood™ is not a certification but an ecolabel developed by ENL Agri Ltd for several commodities (salad tomatoes, sweet peppers (different colours), cucumbers and lettuce) produced mostly under protected greenhouses. These horticultural produce are grown with great care in accordance with the principles of sustainable agriculture and abiding to 'Good Agricultural Practices' or GAP standards. Its lettuce plantations have been certified MauriGAP since February 2018.

### **Les Jardins de Medine™**

The agricultural cluster of the Medine Group has over 200 hectares of land under cultivation of fruits and vegetables with an average yearly production of 3,700 tonnes<sup>17</sup>. Since the launch of 'Les Jardins de Medine' ecolabel in September 2012, the products are sold mainly on supermarket shelves. Emphasis is laid on good agricultural practices and the company is Hazard Analysis and critical Control Point (HACCP) certified.

### **Le Velo Vert™**

Le Velo Vert is also an ECOCERT certified organisation which is involved in the production and distribution of organic fresh produce. Founded in 2012 by Geraldine d'Unienville, the NGO aims to promote the development of organic farming in Mauritius. It has since created a distribution company which regroups all its affiliated farmers. The organisation has created its own ecolabel 'Le Velo Vert' in 2017 which is based on ECOCERT strict organic farming norms and practices for local farmers who wish to be affiliated to the company as the ECOCERT certification is deemed not

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<sup>16</sup> [https://www.globalgap.org/uk\\_en/](https://www.globalgap.org/uk_en/)

<sup>17</sup> Peryagh, S. (2018). *Agriculture raisonnée des jardins de Médine: 3,700 tonnes de légumes attendues*. Defimedia.info. Available at: <https://defimedia.info/agriculture-raisonnee-des-jardins-de-medine-3-700-tonnes-de-legumes-attendues>

accessible to all. Le Velo Vert comprises of 28 local planters; of which 12 are fully affiliated including APEIM and the remaining are in the conversion process. It distributes approximately four to five tonnes of organic produce per month.

The 'Le Velo Vert' label costs Rs24,000 for its affiliation and the revenue is used mainly to perform laboratory tests by Quantilab for soil and water analysis, which cost 500 Euro and 100 Euro respectively.

### **BioLoKal<sup>M</sup>**

Recently launched in 2019, 'BioLoKal' is a local ecolabel created by the non-profit organisation, Vert Deux Mains, to promote the development of organic farming in Mauritius. The objective is to facilitate access to an organic certification that is affordable, particularly for small planters. The label is based on IFOAM Organics International 'Participatory Guarantee Systems (PGS)' which are locally focused quality assurance systems. PGS certify producers based on active participation of stakeholders and based on foundation of trust, social networks and knowledge exchange. The label was created by Farm Basket which was founded in October 2016 by Ravi Rambujoo

The 'BioLokal' label costs Rs24,100 per year per planter for affiliation, irrespective of the number of arpents. A one-off training fee of Rs10,000 is also levied for new members. It is worth highlighting that no laboratory tests are performed.

### **ECOCERT labelling**

Established in France in 1991, ECOCERT is an internationally reputed and accredited certification body. ECOCERT has become a benchmark in organic certification and it provides services in over 120 countries worldwide. ECOCERT does not hold an office in Mauritius but is present in Madagascar, Reunion and South Africa. Association de Parents D'enfants Inadaptés de L'île Maurice (APEIM), a not-for-profit organisation of parents of handicapped children of Mauritius, has become one of the first recipients of ECOCERT certification in Mauritius.

APEIM undertakes organic crop production over acreage of one arpent at Trianon and Bonne- Mère in Mauritius. ECOCERT certification is facilitated by the not-for-profit organisation, Fondation Ressources et Nature (FORENA), for a number of interested organisations and small farmers falling under its umbrella. Small farmers/ organisations are mentored by FORENA on the preparatory steps towards organic certification, which includes inter alia, a tedious land conversion process. Organic certification has a cost associated to it and FORENA ensures that organic certification is affordable to its members by providing financial help to farmers and a cost-sharing mechanism.

AgriBio Ltd. is another ECOCERT certified organisation since May 2013, which is involved in the cultivation of fruits and vegetables in Mauritius in the region of Bambous. The company is run by a French agronomist, Daniel Bernasconi, and has over 4 Arpents of land under cultivation in the region of Bambous. Its major buyers today include mostly individual customers although at its beginning, it used to deliver to luxury 5-star hotels.

### **Fair Trade**

Fairtrade standards comprise minimum social, economic and environmental requirements, which producers must meet to be certified, plus progress requirements that encourage the continuous improvement of farmers' organisations or the situation of estate workers.

Fairtrade offers farmers and workers in developing countries a better deal, and the opportunity to improve their lives and invest in their future. Fairtrade gives consumers the opportunity to help reduce poverty and instigate change through everyday shopping.

When a product carries the FAIRTRADE Certification Mark, it means the producers and traders have met Fairtrade Standards. Fairtrade Standards include social, environmental and economic criteria, as well progress requirements and terms of trade. The Standards are designed to support the sustainable development of small-scale producers and agricultural workers in the poorest countries in the world.

The table below summarized the available means to verify the sustainability criteria of fresh produce presented in section 2.3.2.

Sustainable product	Ecolabel/ standard/ certification
Fresh produce	Mauritius ecolabels and certifications: <ul style="list-style-type: none"> <li>· MauriGAP</li> <li>· <u>VegMe<sup>TM</sup>*</u></li> <li>· <u>FieldGood<sup>TM</sup>*</u></li> <li>· <u>Les Jardins de Medine<sup>TM</sup>*</u></li> <li>· <u>Le Velo Vert<sup>TM</sup>*</u></li> <li>· <u>BioLoKal<sup>M</sup>*</u></li> </ul> <p><i>*These labels are not certified by a third party</i></p>
	International certifications and standards: <ul style="list-style-type: none"> <li>· ECOCERT organic certification organization</li> <li>· FairTRade registered certification label for products sourced from producers in developing countries</li> <li>· ISO 26000 guidance standard on social responsibility</li> </ul>

Table 8: Overview of Certification Schemes to Enable Verification for the Sustainability Criteria of Fresh Produce

### 2.4.3 Labels and Standards for Alternatives to Single-Use Plastics

Sub-categories for alternatives to single-use plastics include a wide variety of items made from many different materials and with different characteristics. Industry standards have been developed to help evaluate those characteristic and properties establishing minimum requirements in order to be classified as recyclable, compostable, biodegradable, etc. As of yet there are no national standards developed in Mauritius for these types of products but this section provides an overview of the international standard that can be used in Mauritius to help consumers understand the product they are buying.

**ASTM International Standards (ASTM)** is an international standards organisation that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems and services. Biodegradable plastics under specific composting conditions or compostable plastics can be certified under **ASTM D6400-12**. The latter is used for labelling of plastics designed to be aerobically composted in Municipal or Industrial Facilities.

The specification standard is consistent with standards in Europe. Plastic products can provide proof of their compostability by successfully meeting the harmonised **European standard, EN 13432 or EN 14995**.

The standard **EN 13432:2000** ‘Requirements for Packaging Recoverable through Composting and Biodegradation—Test Scheme and Evaluation Criteria for the Final Acceptance of Packaging’ covers the requirements for packaging recoverable through composting and biodegradation and test scheme and evaluation criteria for the final acceptance of packaging. Its scope is specifically compostability and anaerobic digestibility of packaging.

The International Standards Organization (ISO) has also developed **ISO 17088**, ‘Specification for Compostable Plastics’ which is the equivalent of the European and US standards.

In addition, **EU No 10/2011** standard pertains to regulations on plastic materials and articles intended to come into contact with foods.

The Mauritius Standard Bureau has specifically advised to opt for the following applicable standards for biodegradable and compostable plastics<sup>18</sup>.

Type of Plastic Bags	Applicable Standards
Biodegradable Plastics	EN 13432
Compostable Plastic Bag	ASTM D6400-12 EN 13432 EN 14995 ISO 17088

Table 9: Mauritius Standard Bureau’s Standards for Biodegradable and Compostable Plastic Bags

With respect to alternatives made from other type or materials such as paper, wood, bamboo to be used as substitutes to single-use plastics (i.e. paper or bamboo straws, biodegradable food trays and take-away cartons) the **Forest Stewardship Council (FSC)** is an internationally recognised label that provides a credible link between responsible production and consumption of forest products enabling consumers and businesses to make informed purchasing decisions that benefit people and the environment.

The table below summarized the available means to verify the sustainability criteria of alternative to single use plastics presented in section 2.3.1.

Sustainable product	Ecolabel/ standard/ certification
Alternatives to single use plastics	<ul style="list-style-type: none"> <li>· <b>ASTM D 6400</b> labelling of plastics designed to be aerobically composted in Municipal or Industrial Facilities.</li> <li>· <b>ISO 17088</b> specifications for compostable plastics</li> <li>· <b>EN 13432/14995</b> Packaging waste directive and standards for compostability</li> <li>· <b>EU No 10/2011</b> on plastic materials and articles intended to come into contact with food</li> </ul>

<sup>18</sup><http://environment.govmu.org/English/Documents/banning%20of%20plastic/INSTRUCTIONS%20FOR%20registered%20Manufacturer%20of%20bio%20com%20bags%20july%20%202016.pdf>

Sustainable product	Ecolabel/ standard/ certification
	<ul style="list-style-type: none"> <li>· <b>Forest Stewardship Council (FSC)</b> certification responsible approach to purchasing wood or fibre based products.</li> <li>· <b>ISO 26000</b> guidance standard on social responsibility</li> </ul>

*Table 10: Overview of Certification Schemes to Enable Verification for the Sustainability Criteria of Alternatives to Single Use Plastics*

## 2.4.4 Other Instruments/Tools for Certification or Verification of the Sustainability of Priority Goods and Services

### 2.4.4.1 Mauritian Standard on Sustainable Tourism

The **Mauritian Standard on Sustainable Tourism (MS 165:2019)** was developed to guide the sustainable development of the tourism industry in Mauritius.

The standard was first introduced in 2014 by the Mauritius Standards Bureau (MSB), with the support of the Ministry of Tourism, the Tourism Authority and other key stakeholders. The Third Edition of the MS 165 dated 2019 has been officially recognised by the Global Sustainable Tourism Council (GSTC). Promoting the adoption of M165 is one of the programmes within the Ministry of Tourism Strategy 2018-2021.

The Mauritian Standard on Sustainable Tourism has been developed to guide the sustainable development of the tourism industry in Mauritius. The document specifies requirements for a management system for sustainable tourism that can be used by any tourism business or any tourism related activity to enhance its sustainability performance, regardless of size, type, location and nature. The requirements are organised around the following themes:

1. social and economic benefits
2. benefits to cultural heritage
3. environmental aspects

The standard includes a section on sustainable procurement.

It can be used for certification either independently, aligned or integrated with any other management system standards. It can also be used for the award of an eco-label and other voluntary programs.

MSB has established a National Sustainable Tourism Management Systems Certification Scheme relating to MS 165 and initiated the GSTC Accreditation procedure. MSB as the certification body is currently working to establish rules and procedures for the application of the standard, transparent and impartial certification procedures, and auditors who are technically competent in sustainable tourism and conformity assessment to achieve accreditation. GSTC Accredited status is intended to ensure confidence and credibility of sustainable tourism certification, and worldwide acceptance.

The certification scheme is intended to certify and attest through audits that the operators and their respective operations comply with the requirements of the standard, the associated deliverables and steps with the aims and objectives to enhance sustainability performance.

#### **2.4.4.2 Made in Moris**

The ***Made in Moris*** is a national label attesting the local origin of a product, according to criteria of transformation and added value, and subjected to a precise specification. It is a tool to differentiate Mauritian products from imported products, and to stimulate the supply and demand of these local products. It is also a tool for valuing Mauritian skills, production and know-how.

The brand values local products, skills and know-how, quality, innovation. It also allows new production lines, job creation, competitiveness and continuous improvement. Adhering to Made in Moris is also a commitment to the common values of the brand: citizen, responsible, determined, unifying, innovative and sustainable.

It is not enough for a company to manufacture in Mauritius in order to affix the logo on its products. It is necessary to meet various criteria of quality and social responsibility.

## CHAPTER THREE: ANALYSIS OF SUPPLY

This section aims to assess the capabilities of the local or regional market to supply the products/services in focus at a competitive price and analyse the potential threats or opportunities for the local economy. This chapter also analyses the availability of products describing the market players involved and their current market share of the products in focus in the country. Finally, it identifies the main obstacles limiting the supply of the products as well as the potential threats and opportunities for the local production, which could arise from the introduction of these procurement criteria in the procurement of goods/services of local hospitality stakeholders and compliance with an ecolabel scheme.

### 3.1. Supply Analysis of Air Conditioning Equipment

#### 3.1.1 Identification of the Level of Availability and the Market Share of Air Conditioning Equipment in the Country

According to Elahee (2014), the import of air conditioning units had increased significantly from 2011 to 2013<sup>19</sup>. More than 95% of these units are imported from China and the main refrigerant being used in these units is R410A.

The chart below depicts the total imports of air conditioning units over the past five years with an increase of 75% from 33,795 units in 2017 to 59,034 units in 2018. The HS codes taken for the figure computation include: HS 841510, HS 841581, HS 841582 and HS 841583.

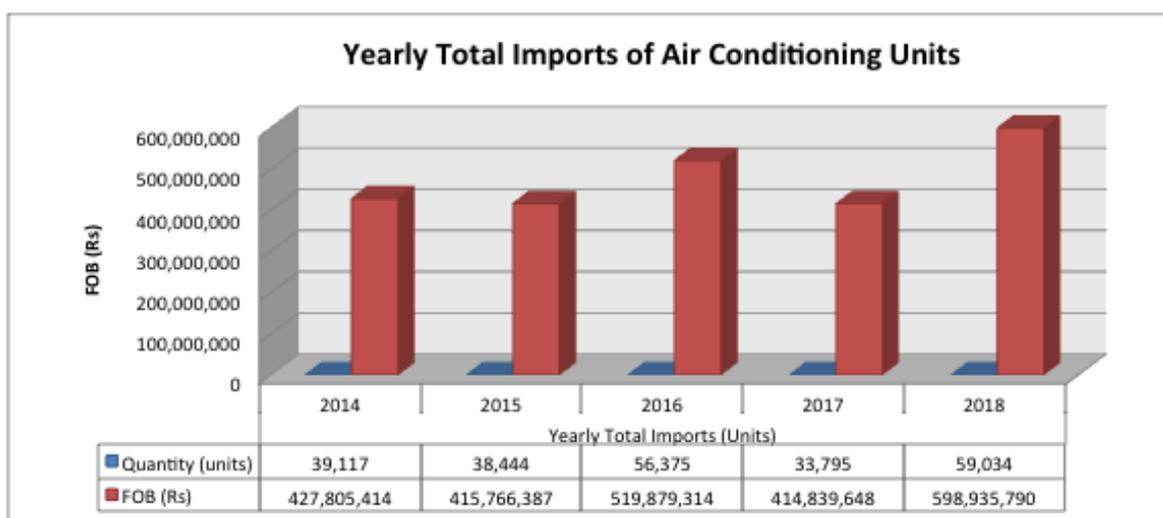


Chart 1: Yearly Total Imports of Air Conditioning Units between 2014 and 2018<sup>20</sup>

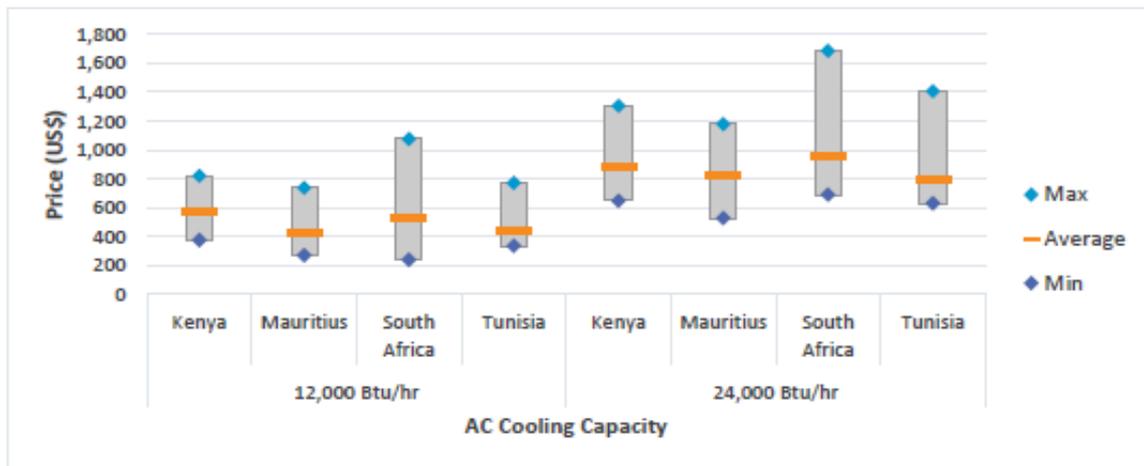
The energy efficiency of an air conditioner is measured by the energy efficiency ratio (EER). The EER is the ratio of the cooling capacity (in British Thermal Units per hour) to the power input (in watts). The higher the EER rating, the more efficient is the air conditioner. Air conditioners with higher EER rating can save hotels money in the long run as these appliances are constantly running. A preliminary survey of air conditioners available in the market in Mauritius under the “Africa Air

<sup>19</sup> Elahee, M. K. (2014). *Energy Management and Air-Conditioning in Buildings in Mauritius: Towards Achieving Sustainability in a Small-Island Developing Economy Vulnerable to Climate Change*. 6<sup>th</sup> International Conference on Sustainability in Energy and Buildings, SEB-14.

<sup>20</sup> MCCI (2019). *Trade Statistics*. Available at: <https://www.mcci.org/en/our-services/trade-tools/trade-statistics/>

Conditioner Market Scoping Study”<sup>21</sup> revealed that the EER of air conditioners is quite high. In addition, the Energy Efficiency Label is displayed on most of the air conditioners on sale.

The study involved analysis of available information on split AC and window AC products in nine key markets in Africa, including Mauritius. The report provides an overview of the size and characteristics of AC markets, including origin and product type, share of imports versus local manufacturing, energy performance, and refrigerants used.



\*Data available for 322 AC units.

Chart 2: Price of Air Conditioning Units in Africa<sup>22</sup>

According to this study, energy efficient and green air conditioning systems that are available on the market are becoming increasingly compliant to international standards.

The growth in tourist arrivals was estimated to 4% in 2018 and is forecasted to be similar in 2019. The gradual increase in tourist arrivals and tourist nights has an impact on AC usage and therefore indirectly influences the demand for ACs. It can be inferred that the supply of ACs to hotels will augment as this tendency persists in the coming years. Air conditioning represents an average of 42% of energy consumption in large hotels<sup>23</sup> this implies that investment in energy efficient air conditioners can considerably reduce the electricity bill.

Additionally, Mauritius is currently suffering the consequences of climate. Analyses of temperature recorded at Mauritius and its outer islands show a definite warming trend. According to the Mauritius Meteorological services, average temperature at all stations is rising at the rate of 0.15 °C per decade and has risen by 0.74 – 1.2 °C when compared to the 1961-90 long term mean. At some urban areas the temperature has risen by even greater amounts.

Regulations and legislation are also being implemented in Mauritius such as the mandatory energy auditing for larger energy consumer and initiatives such as the Programme National d’Efficacité Energetique<sup>24</sup> that intend to increase and encourage energy efficiency in the hospitality sector and other sectors.

<sup>21</sup> CLASP (2018). Africa Air Conditioner Market Scoping Study (August 2018).

<sup>22</sup> CLASP (2018). Africa Air Conditioner Market Scoping Study (August 2018).

<sup>23</sup> <http://www.pnee.mu/>

<sup>24</sup> <http://www.pnee.mu/>

All this information leads to the conclusion that the demand of more efficient air conditioning equipment will only continue increasing in the coming years.

### 3.1.2 Description of the Market Players involved

Some of the major players in the Heating, Ventilation and Air Conditioning (HVAC) systems in the local construction industry include Manser Saxon/Tornado, Rey&Lenferna, Novengi, Fortress among others.

All air conditioning units in Mauritius are currently imported and no local manufacturing plant exists. Air conditioning can be classified into three categories, namely residential, light commercial and commercial as detailed below:

- **Residential:** Portable AC, DC inverter wall mounted type unit, floor ceiling type indoor unit, ceiling conceal
- **Light Commercial:** Wall mounted type, floor mounted, ceiling conceal (expensive), VRF ceiling/ cassette, roof top unit, duct split unit, inverter Mini chiller
- **Commercial:** Roof top unit, large duct split unit, chiller (air-cooled/water-cooled scroll chiller, screw chiller, centrifugal chiller), VRF ceiling/ cassette

The air conditioning industry is inclined to transition to more sustainable and environmentally friendly alternatives. Demand is driving the supply side, as more hotels are asking for environmentally and budget-friendly air conditioning solutions. With air conditioning accounting for half of their electricity consumption and backed by their need to comply to specific sustainability charter as requested by sustainability and green certifications, such as EarthCheck, Green Globe among others, the major hotel groups are keen to find energy efficient and environmentally-friendly air conditioning solutions.

The main importers and distributors of air conditioning units are listed in the table below.

COMPANY	MAIN BRANDS	RESIDENTIAL	LIGHT COMMERCIAL	COMMERCIAL
<b>The Brand House/ Goupille</b>	Galanz, Samsung	✓	✓	
<b>Tornado</b>	TCL Daekin Clint	✓	✓	✓
<b>Chemco</b>	Aux	✓	✓	
<b>Rey &amp; Lenferna</b>	Midea, Trane Stulz	✓	✓	✓
<b>Fortress</b>	MDV, LG	✓	✓	✓
<b>Novengi (Harel Mallac)</b>	Gree Haier	✓	✓	✓
<b>Sirud</b>	Carrier Topcool Hitachi	✓	✓	✓
<b>JL Aircon</b>	CIAT	✓	✓	✓
<b>AURS</b>	Samsung, Chigo, Whirlpool	✓		
<b>Redline Marketing</b>	Sharp	✓		
<b>Le Warehouse Ltd / 361</b>	Ocean, Westpoint	✓		
<b>Lo Thiap Hing</b>	Mitsubishi	✓		

<b>LMY</b>	Midair	✓	✓
<b>J. Kalachand &amp; Co Ltd.</b>	BelAir	✓	✓
<b>Frigoplus</b>	Americool	✓	✓
<b>Ignitech Ltd</b>	Ignitech	✓	✓
<b>GM Punjabi &amp; Co Ltd.</b>	Hisense	✓	✓
<b>Nemorin</b>	Airwell	✓	

Table 11: Main Importers and Suppliers of Air Conditioning Brands

The following chart shows the major brands of split air conditioning units.

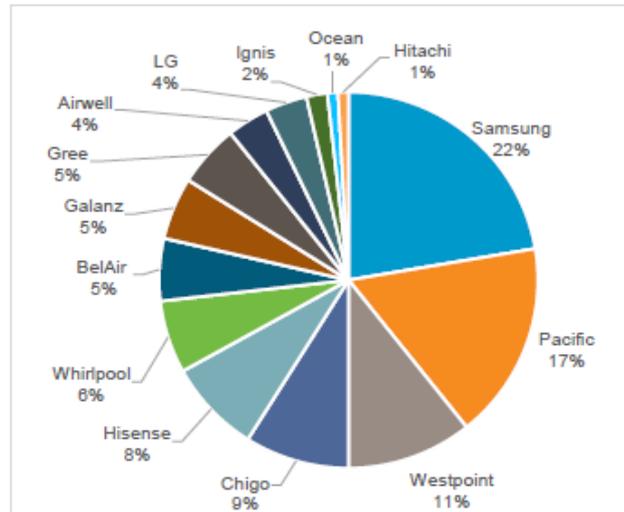


Chart 4: Market Share of Air Conditioning Units<sup>25</sup>

Most of the AC equipment commercialised in Mauritius is being imported from China and they are still using R-410A as refrigerant, which has a high global warming potential (GWP) of 2,090 as compared to R-32 which has a GWP of 675 only.

ACs operating with R-32 efficiently conveys heat and can therefore reduce electricity consumption up to approximately 10% compared to other refrigerants. It has a global warming potential (GWP) that is one-third lower and low environmental impact as compared to widely used refrigerants such as R-22 and R-410A. It was introduced in Japan and other developed countries in 2015.

Interviews carried with both hotels and suppliers revealed that, as of date, only one HVAC Company, Novengi Ltd (previously known as 'Harel Mallac Engineering') has started to commercialise air conditioning units operating with R-32 refrigerant since end of 2018. In addition, only Novengi Ltd is currently importing the R-32 refrigerant although other industry players do have the potential to import and sell it as well.

The only setback to the widespread adoption of R-32 pertains to its mildly inflammable nature, which warrants proper training of technicians during installation and maintenance and its slightly higher price. The transition to equipment with R-32 refrigerant is hypothesised to be relatively smooth, albeit proper training of AC technicians is provided, and key stakeholders sensitised.

<sup>25</sup> CLASP (2018). Africa Air Conditioner Market Scoping Study (August 2018).

It is argued that R-32 is the optimal choice of refrigerant for use in air conditioning equipment because of the following benefits<sup>26</sup>:

- Low GWP (675)
- Zero ozone depleting potential (ODP)
- Is ideal for the next generation of equipment
- Offers higher efficiency and longer pipe runs
- Is compliant with new standards
- Requires less refrigerant volume per kilowatt
- Is affordable and readily available
- Is a single component refrigerant, meaning it is easier to reuse and to recycle. It is also relatively inexpensive to produce, is easier to handle because it does not separate and utilises familiar technology, keeping costs similar.
- R-32 is also low-toxic, is difficult to ignite and does not explode.

HVAC suppliers are currently encouraging the use of AC split units with DC inverter technology, VRF system and more environmentally friendly refrigerants such as the R410A. When asked which sustainable HVAC system would be most suitable to the hospitality industry, the use of Variable Refrigerant Flow (VRF) system and DC inverter split units using R410A or R32 refrigerant were advocated.

Variable refrigerant flow (VRF) systems are in fact slowly gaining in popularity and are used as an enhanced version of multi-split systems. It consists of a single outdoor condensing unit, multiple indoor units serving various zones, refrigerant piping with brand selectors and associated controls<sup>27</sup>. Modern VRF systems provide some major advantages, such as zoning, individual temperature control, minimized ductwork, excluding the need for secondary fluids (chilled-water or hot-water distribution), and associated costs.

VRF systems use R410A refrigerant as the heat-transfer fluid and the working fluid, achieving a very high energy efficiency ratio (EER) of 15 to 20 and integrated energy efficiency ratio (IEER) of 17 to 25. They are 20% to 30% more efficient than conventional HVAC systems due to partial load operation, speed modulation, zoning capabilities, and heat-recovery technology.

The advantages of VRF systems can be summarised as follows:

- Increased energy efficiency and energy savings, for an average of 20% to 30% energy savings relative to variable air volume systems with reheat and constant air volume systems with gas heat
- Very good part-load performance due to inverter-duty variable-speed compressors modulating the capacity from 10% to 100%
- Good zoning control, providing simultaneous cooling and heating with heat recovery
- Reduced ductwork and duct losses are confined to the ventilation air system (approximately 20% of the conventional HVAC system).

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<sup>26</sup> Dickinson, C. (2017). *R32 refrigerant – why the change and why now?* Mitsubishi Electric. Available at: <https://es.mitsubishielectric.co.uk/the-hub/whychangetor32>

<sup>27</sup> <https://www.csemag.com/articles/back-to-basics-vrf-systems/>

The disadvantages of VRF systems include:

- The need for a dedicated ventilation system to deliver the outside air to various zones
- Long refrigerant lines and a large number of branch connections could result in refrigerant leakage
- The need for condensate drain lines for each VRF indoor unit
- Use of supplemental heat may be required for a quick warm-up
- Compliance with maximum allowable refrigerant quantities within a given volume.

### **Sea Water Air Conditioning System**

The Deep Ocean Water Application (DOWA) project involves the construction and operation of an innovative Sea Water Air Conditioning (SWAC) system that pumps cold water from the Indian Ocean and uses it for air conditioning purposes in buildings located in the heart of Port Louis and other nearby locations<sup>28</sup>. The project is promoted and developed by Urban Cooling Ltd, a subsidiary of Sotravic Ltd.

The Sustainable Energy Fund for Africa (SEFA) has approved a US \$1-million project preparation grant at the end of December 2013 to support the development and installation of the SWAC System in Mauritius. This low-carbon technology will lower building cooling costs using cold ocean water and will thus contribute to an annual reduction of 51,000 tons of CO<sub>2</sub> emissions and 13 MW energy saving. It will also generate 40 direct green jobs for skilled local engineers and technicians, and potentially create many more indirect jobs in downstream businesses such as aquaculture, pharmaceutical and bottling specialty water.

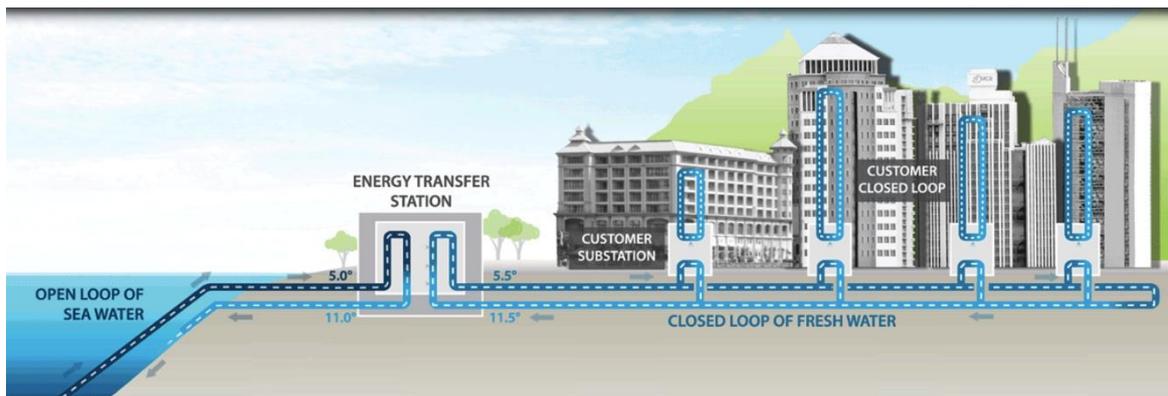


Figure 4: DOWA Port-Louis Seawater Air-Conditioning System

Therefore, hotels such as Labourdonnais Waterfront Hotel and Le Suffren Hotel & Marina buildings will only require minimal electricity to run their fan coil units and pumps, thus removing the costly energy consuming chiller system. The Ministry of Social Security, National Solidarity and Environmental and Sustainable Development has granted an Environmental Impact Assessment (EIA) license to Urban Cooling Ltd for the DOWA project in December 2017. The Offtake Agreement is currently being finalised by the Government of Mauritius with expected construction set to start during the last quarter of 2019 and the operational date planned for 2021.

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<sup>28</sup> World Bank Group (2017). *The Ocean Economy in Mauritius: Making it Happen, Making it Last*. Available at: <http://documents.worldbank.org/curated/en/193931508851670744/pdf/120633-WP-PUBLIC-329p-Mauritius-text-10-20-17-web.pdf>

### 3.1.3 Identification of the Main Obstacles Limiting the Supply of Air Conditioning Equipment

The figure below gives an indication of the prices of standalone air conditioning units in Mauritius.

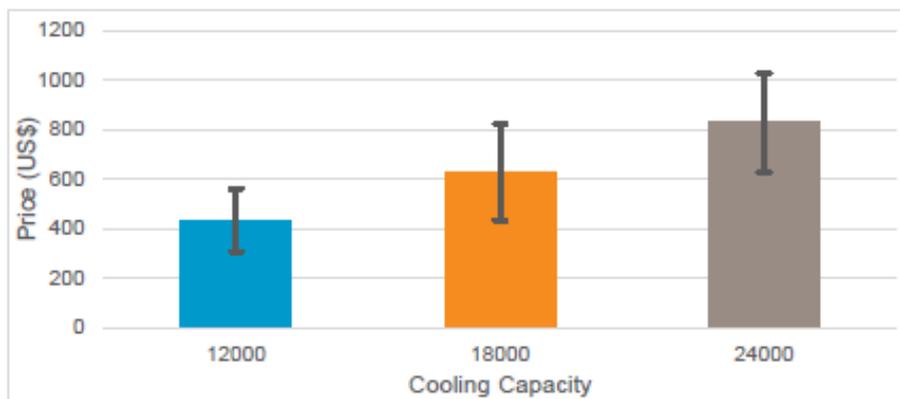


Chart 5: Average Price of Standalone Air Conditioning Units in Mauritius<sup>29</sup>

Shifting to more sustainable options would undoubtedly require significant investment by hotels in more advanced technology and in eco-friendlier refrigerants.

According to interviews with hotels and suppliers Hotels in Mauritius mainly use chillers or AC split units air conditioning or a combination of both. The majority of hotels have already swapped their old AC split units using R-22 refrigerant for more energy-efficient DC inverter wall-mounted split units using R-410A.

The interviewed HVAC suppliers highlighted that relatively new air conditioning technology such as the VRF would be more environmentally friendly and cost-effective in terms of initial installation, energy consumption and maintenance costs.

In the report *A Study on Market Readiness in Sustainable Public Procurement in Mauritius (Jogoo, 2010)*, it was found that the costs of sustainable products are higher on average and stand-alone AC units (using zero-ODP and low-GWP refrigerants and which are energy efficient) tended to be 20% - 40% more expensive. This market study reveals that the price of DC Inverter AC units using R-32 has significantly gone down and is now less than 10% higher.

In addition, these costs reflect the initial equipment cost and do not take into account the lifecycle cost. If lifecycle costing was considered, the benefits that would accrue to both the individual organisation and the environment would have by far offset the costs, given lower operating costs and the significant drop in electricity consumption, which can be as much as 30% compared to an AC unit using R-22 refrigerant.

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<sup>29</sup> CLASP (2018). *Africa Air Conditioner Market Scoping Study (August 2018)*.

However, some large hotels have already opted for chillers as cooling system. The initial investment in chillers is much higher (as from Rs1Million) and the extensive water piping system makes it difficult for existing hotels to change to the VRF system. Therefore, the latter is deemed more suited for new hotel projects or hotels undergoing major renovation such as Long Beach Hotel, which recently adopted the VRF.

Another hurdle for shifting to the more sustainable refrigerant R-32 pertains to its mild flammability as well as its slightly higher price for both the refrigerant and the AC unit. The following comparative tables provided by Novengi Ltd illustrate the price differential:

REFRIGERANT GAS	PRICE (Rs)
Refrigerant Gas R-410A (11.3K)	3,200
Refrigerant Gas R-32 (11.3K)	4,500

Tables 12: Price Comparisons between Refrigerant R-410A and R-32<sup>30</sup>

AIR CONDITIONING DC INVERTER	PRICE (Rs)
GREE LOMO COOL & HEAT DC INVERTER 12,000 BTU – R-410A	12,800
GREE LOMO COOL & HEAT DC INVERTER 12,000 BTU – R-32	13,900
...	
GREE LOMO COOL & HEAT DC INVERTER 18,000 BTU – R-410A	15,000
GREE LOMO COOL & HEAT DC INVERTER 18,000 BTU – R-32	16,400
GREE LOMO COOL & HEAT DC INVERTER 24,000 BTU – R-410A	24,600
GREE LOMO COOL & HEAT DC INVERTER 24,000 BTU – R-32	25,200

Tables 13: Price Comparisons of AC Units Operating with the Two Refrigerants<sup>31</sup>

Importers, in particular, showed their uneasiness with regards to the storage of inflammable refrigerants such R-32 and hydrocarbons (e.g. Propane), exiting controls and trained personnel for handling of these refrigerants in the maintenance and operation sector. An appropriate occupational safety & health regulatory framework, as well as skilled technicians for handling of the refrigerants, are therefore required. Training institutions (UDM and MITD) should provide support by providing training for technicians on the use of natural refrigerants<sup>32</sup>.

According to the same report developed by GIZ<sup>33</sup>, another barrier to the adoption of the eco-friendly refrigerant is the inability to retrofit existing AC units. It is deemed more practical to go for new cooling equipment instead of retrofitting of air conditioners due to safety aspects and leakages. The lack of ready-made solutions, especially of technical expert knowledge, for large air conditioning systems and the absence of a feedback mechanism between manufacturer and supplier were also identified as key barriers to the adoption of ozone and climate friendly technology.

<sup>30</sup> Novengi Ltd (2019). *Prices of refrigerant R-32 vs. R-410A and air conditioning units operating with R-32 vs. R-410A.*

<sup>31</sup> Novengi Ltd (2019). *Prices of refrigerant R-32 vs. R-410A and air conditioning units operating with R-32 vs. R-410A.*

<sup>32</sup> Ministry of Social Security, National Solidarity, and Environment and Sustainable Development and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) (2017). *Report of National Workshop - Policy and Technology Recommendations for the RAC Sector in Mauritius.* Available at: <http://environment.govmu.org/English/DOCUMENTS/OZONE%20DAY%202017%20-%20NATIONAL%20WORKSHOP%20AND%20REGIONAL%20WORKSHOP.PDF>

<sup>33</sup> Ibid

Other identified key obstacles include:

- knowledge transfer through training programmes
- setting up or updating existing regulation and policy
- demand for clean technologies by end-users, yet unwillingness to invest in cutting-edge solutions

### **3.1.4 Analysis of the Potential Threats and Opportunities for the Local Production which could Arise from the Introduction of these Procurement Criteria in the Procurement of Goods/Services of Local Hospitality Stakeholders and the Compliance with an Ecolabel Scheme.**

The risk to local production does not arise, as there are no local manufacturing units of air conditioning in Mauritius. Nevertheless, re-training of workforce to keep pace with rapidly changing technology and capacity building are deemed imperative to ensure that existing HVAC companies are able to meet new industry standards. Current HVAC suppliers would also face more difficulty in selling their current air conditioning inventory, which have a lower energy efficiency rating (less than 'A') and as such might not comply with the desired SEER or COP performance indexes.

Additionally, the new generation refrigerant has only been recently introduced and significant training is required for AC technicians to be able to install the AC units operating with R-32 which is known for its mild flammability. Opportunities certainly present themselves in the form of HVAC companies specialising in environmentally friendly air conditioning systems such as the DOWA project or using renewable resources such as solar-powered air conditioning.

Furthermore, the Energy Efficiency Management Office is currently working on the development of a framework for the Installation and maintenance of air conditioners. Training materials are being developed and training will be provided to AC technicians.

## **3.2. Supply Analysis of Fresh Produce**

### **3.2.1 Identification of the Level of Availability and the Market Share of Fresh Produce in the Country**

Since the mid-seventies, various policies have been implemented in Mauritius in view of achieving self-sufficiency, increasing food self-reliance, reducing dependency on imports and developing the agro-processing sector. However, in spite of various measures, the overall results have been below expectation. According to the Mauritius Chamber of Agriculture, this is mainly due to the fact that Mauritius suffers from a number of inherent constraints, which have hampered the development of the agribusiness sector with many, if not all of these, stemming from the characteristics shared by small island states. These include, inter alia, a narrow domestic market, pressure on land and other natural resources, generally unfavourable agronomic and climatic conditions (draughts, cyclones, heavy rainfalls, flash floods) and the limited range of crops, which can be grown on a sufficiently large scale to be economically viable<sup>34</sup>.

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2017	2018
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<sup>34</sup> <https://chamber-of-agriculture.mu/agriculture-in-mauritius/non-sugar-sector/>

	Area harvested (hectares)	Production (tonnes)	Yield per hectare (tonnes)	Area harvested (hectares)	Production (tonnes)	Yield per hectare (tonnes)
<b>TOTAL Food</b>	<b>7,780</b>	<b>106,621</b>	<b>13.7</b>	<b>7,646</b>	<b>96,847</b>	<b>12.7</b>
<b>Crops</b>						
<i>Of which</i>						
Potato	710	14,124	19.9	719	17,033	23.7
Rice (paddy)	56	160	2.9	13	19	1.5
Maize	59	442	7.5	64	387	6.0
Groundnut	91	269	2.9	87	214	2.5
Onion	247	5,134	20.8	275	3,440	12.5
Ginger	48	562	11.8	40	368	9.2
Garlic	14	96	7.0	10	71	7.1
Chillies	281	2,030	7.2	264	1,389	5.3
Tomato	722	10,651	14.8	683	9,190	13.5
Beans and Peas	300	1,794	6.0	260	1,443	5.6
Cabbage	256	4,779	18.6	235	3,642	15.5
Cauliflower	103	1,723	16.8	90	1,382	15.4
Bringal	273	3,099	11.3	255	2,495	9.8
Creepers*	2,367	28,914	12.2	2,342	25,253	10.8
Greens*	247	2,406	9.7	244	2,085	8.5
Mixed	1,098	13,035	11.9	1,071	11,060	10.3
<b>Vegetables*</b>						
Banana	507	8,644	17.0	492	7,333	14.9
Pineapple	401	8,760	21.8	502	10,043	20.0

Table 14: Locally Grown Food Crops: Area Harvested, Production and Yield per Hectare, 2017-2018<sup>35</sup>

\*creepers include: bittergourd, calabash, chouchou, courgette, cucumber, patole, pipengaille, pumpkin, squash, and voehm

\*greens include: "brede baton blanc/vert/de chine/chouchou/giraumon/malabar/tom pouce

\*Mixed vegetables include: beet, broccoli, carrot, echalotte, eddoes, ladies finger, leek, lettuce, manioc, petsai, sweet pepper and sweet potato

As depicted in Table 11, the area of land under cultivation decreased by 1.7% from 7,780 hectares in 2017 to 7,646 hectares in 2018 while production of fresh fruits and vegetables decreased by 9.2% from 106,621 tonnes to 96,847 tonnes in 2018, due to unfavourable climatic conditions.

The main vegetables of economic importance locally grown in Mauritius are creepers (22%) such as cucumber, pumpkin, zucchini, bittergourd, water melon, among others; tomato (14%), potatoes (7%), carrots (5.9%), crucifers (4.6%) like cabbage and cauliflower; chili (4.5%), brinjal (4%), onion (3%), okra, garlic, beans, beetroot, and some fine herbs according to the 2014 census of Agriculture from Statistics Mauritius.

Agricultural production activities are undertaken mainly by a large number of small producers, around 9,000 and by a few companies in the corporate sector involving mainly large sugar estates. Hydroponic vegetable production for mainly sweet pepper, lettuce, cucumber and salad tomatoes covers an area around 64 hectares and is undertaken by some 375 hydroponic producers<sup>36</sup>. Land

<sup>35</sup>Statistics Mauritius (2018). *Agricultural and Fish Production: Year 2018*. Available at:

[http://statsmauritius.govmu.org/English/Publications/Documents/2019/EI1437/Agri\\_Fish\\_Prod\\_Yr18.pdf](http://statsmauritius.govmu.org/English/Publications/Documents/2019/EI1437/Agri_Fish_Prod_Yr18.pdf)

<sup>36</sup> Switch Africa Green (2016). *Promoting Sustainable Agriculture through Green Retailing and Green Hospitality – Demand Side Mapping Report*

under hydroponic cultivation is expected to increase. Government is introducing a Sheltered Farming Scheme in November 2019 as announced in the 2018/19 Budget Speech and this is expected to lead to an increase in hydroponic cultivation. The Ministry of Agro-Industry and Food Security (MAIFS) anticipates the hydroponic production to reach around 4,267 tonnes of salad tomato, 658 tonnes of sweet pepper, 116 tonnes of melon, 3 million units of English cucumber, and 1 million heads of lettuce by 2020. Seasonal crops of strategic importance such as potatoes, onions and garlic are mostly imported. According to the Mauritius Agricultural Certification Body (MACB), the interest in good agricultural practices is on the rise owing to the general public's increasing concern for chemical residues and their associated health concerns.

Fruit production takes place over an area of about 3,065 hectares and is estimated to 42,660 tonnes per year. The main fruits produced include banana (24%), pineapple (31%) as well as seasonal fruits such as litchi (16%) and mangoes (6%). Some fruits are produced in the backyard and orchards. The corporate sector is also involved in fruit production like pitaya, passion fruit, papaya, litchi, jujube and citrus over an area of about 500 hectares. Some fruits like pineapple and litchi are also exported and exporters have significantly improved their production and post-harvest practices in line with global standards. Production of fruits and vegetables is market led and detrimental to producers<sup>37</sup>.

The country has achieved close to 100% self-sufficiency in fresh vegetables and tropical fruits. However, imports of some vegetables including potato and onion are required to meet local consumption during the off-season and following natural disasters. Imports of vegetables have increased by about 51% from 2015 to 2017. It should be noted that imports of vegetables are properly regulated under the Use of Pesticides Bill (check) by the NPPO of the Ministry of Agro-Industry and Food Security and proof of good agricultural practices must be established prior to clearance. It is not mandatory to have GloblaGAP for imported fresh produce and the importer can submit other relevant certificate(s) from a competent authority certifying the pesticides in the agricultural produce do not exceed the pesticides level Maximum Residue Level (MRL).

	Flows in USD		Evolution	
	Year 2015	Year 2016	Year 2017	2017/2015
<b>Imports of vegetables into Mauritius</b>	1,464,565	2,079,323	2,210,037	+50.9%

Table 15: Imports of Vegetables into Mauritius, 2015-2017<sup>38</sup>

The total consumption of fresh fruits and vegetables by tourists is estimated at 10,000 tonnes per year<sup>39</sup>.

### 3.2.2 Description of the Market Players involved

As described in the previous section, agricultural production activities are undertaken principally by a large number of small producers (estimated to be around 9,000), and by large sugar estates such as the Médiine agricultural cluster, ENL Agri, Rose-Belle Sugar Estate, Compagnie de Beau Vallon Ltd among others. Following the acquisition of the majority shareholding of The Union

<sup>37</sup> Ibid

<sup>38</sup> UN Comtrade (2019). *United Nations Commodity Trade Statistics Database*.

<sup>39</sup> report on national wholesale market, *Cabinet Gressard Consultants*, 2014

Sugar Estates in 2011, Compagnie de Beau Vallon Ltd provides for 25% of the country's annual potato production through its subsidiary, CopéSud.

The majority of hotels purchase their fresh produce via specialised wholesalers and distributors which operate in the fresh produce supply chain, namely: SKC Surat Co. Ltd, Proxyfresh Ltd, A & R Veerapen Co. Ltd, Chinatamby Co.ltd, Agronet Ltee, B.M Subratty and sons, Freshlink Ltd, Frigonoor Ltd, Societe Afzul Hosany Fils and Cie, Jardin de Medine (Medine Ltd), Agrex (an ENL Agri subsidiary marketing its 'Field Good' range of vegetables).

SKC Surat Co. Ltd. Is undoubtedly the market leader and has a market share of about 55% in the fruits market and about 10% share in the vegetables market in Mauritius. Its sales constitute about 50% to hotels and 50% to supermarkets<sup>40</sup>.

### Organic Farming & Organic Fresh Produce

As one of the pioneers in organic farming in Mauritius since 2012, **Le Velo Vert** has been actively promoting no chemical farming philosophy and sensitising the public about the health benefits of eating locally grown organic fresh fruits and vegetables. As of to date, the organisation has 28 local farmers affiliated to it and the total land surface area under organic farming currently stands at 28.3 Arpents (including APEIM) with an additional 107 Arpents presently undergoing the conversion process.

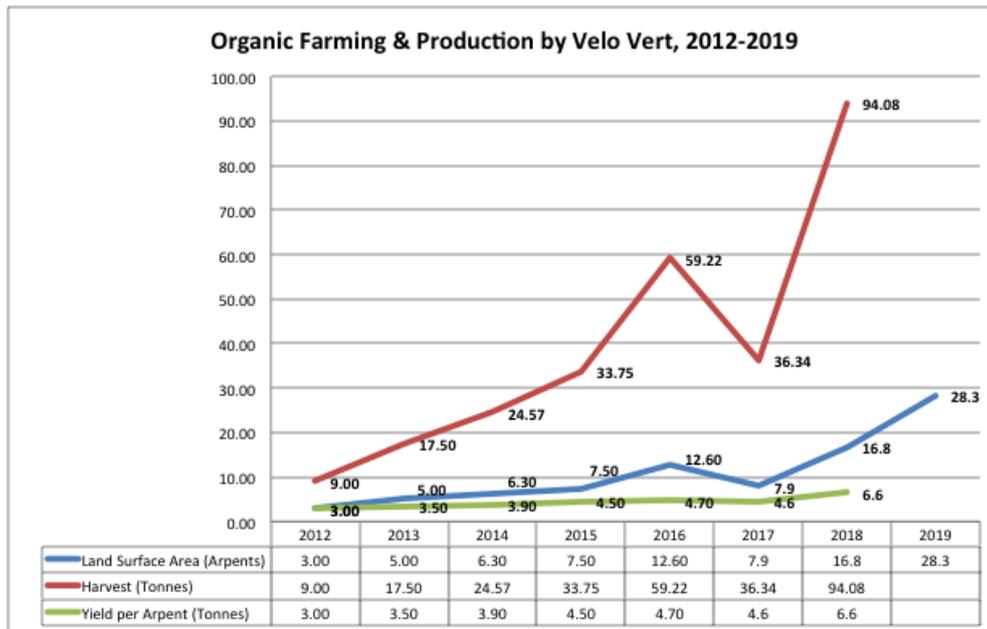
District	No. of Planters	Land Surface under cultivation (arpents)	Potential Land Surface for cultivation (arpents)
Flacq	5	3.80	13.00
Grand Port	4	4.40	15.40
Moka	3	2.30	2.10
Pamplemousses	2	1.00	2.50
Plaine Wilhems	2	2.00	2.00
Riviere du Rempart	2	3.00	3.00
Riviere Noire	4	2.50	15.00
Savanne	6	9.30	54.00
<b>TOTAL</b>	<b>28</b>	<b>28.30</b>	<b>107.00</b>

Table 16: Le Velo Vert's No. of Farmers & Land under Organic Farming in 2018

Compared to its humble beginning of 3 Arpents under cultivation, the organisation has steadily increased its production capacity; except for 2017 where they lost a major plantation due to non-renewal of the lease on agricultural land. There has been a marked increase of 68% of land under cultivation from 16.80 Arpents in 2018 to 28.30 Arpents in 2019.

Le Velo Vert produces about 94.08 tonnes of local organic produce which it sells via 350 'baskets' on a weekly basis mainly to individual customers, school canteens, companies and occasionally to a few hotels.

<sup>40</sup> SWITCH Africa Green (2016). *Promoting sustainable agriculture through green retailing and green hospitality - Demand side mapping.*



*Chart 6: Le Velo Vert Organic Farming and Production, 2012-2019*

According to Le Velo Vert, the price differential between conventional farming (whereby chemical fertilisers and pesticides are used) and **organic farming is approximately 15% higher and 30% for fruit vegetables** category such as zucchini, squash and pumpkin.

Similarly, **Agribio Ltd** harvests about 14 to 15 tonnes of organic produce annually on 3.92 Arpents of land, which it sells directly to individual customers both at the farm and via home delivery. All the produce is ECOCERT certified and cultivated under the stringent European organic agricultural practices.

A third major player is **Farm Fresh**, which distributes the organic produce of 6 planters which, altogether have a total of 16 Arpents (with 9 Arpents certified BioLoKal) under bio farming. The company sells directly to individual customers via home delivery and through the brand 'New Earth' distributed by Innodis Ltd in main supermarkets. According to Farm Fresh, organic produce price is approximately 30%-50% higher than their conventional counterparts.

According to Mauritius Agricultural Certification Body (MACB) and distributors such as Le Velo Vert and Farm Fresh, due to increased customer demand for organic produce and the higher price they could sell their harvests, local planters are more and more interested in embracing organic farming. However, the lengthy land conversion process (2 years), the initial loss of revenue as a result of the land conversion, and the heavy investments required to both obtain and abide by the organic label or ECOCERT certification requirements have proven to be major deterrents. Similarly, the initial investment in infrastructures such as greenhouses, sheltered farming and irrigation technology is relatively high and local planters are struggling to find the financial resources to shift to more sustainable agricultural practices. The MAIFS now offers a scheme to subsidise cost of certification (cash grant of Rs 100,000) and through the SFWF subsidy on organic inputs.

### **3.2.3 Identification of the Main Obstacles Limiting the Supply of Fresh Produce**

The future supply of certified or organic fresh vegetables is uncertain given the following issues:

- **The Limited Number of Organic Planters.** The production of organic produce remains relatively low (with the main producers such as Velo Vert currently producing about 100 tonnes and 15 tonnes by Agribio Ltd among others). However, there is increasing interest and other players are now entering this niche market such as Farm Basket, which distributes the organic produce of 6 planters who collectively have 16 Arpents of land under organic cultivation.
- **The Limited Number of Certified Planters.** Based on our interview with MACB, the number of certified MAURIGAP farmers and fields is estimated to be 70 (less than 1% of 9000 planters). Since its inception in 2016, the number of certified planters (including small and medium-sized ones such as Top Nature (which produces about 250 tonnes of hydroponic tomatoes) and big ones such as planters of SKC Surat & Co. Ltd and ENL Agri) has been steadily increasing as illustrated in Table 14. Both MACB and FAREI forecast that the number of planters adopting good agricultural practices will keep increasing as demand for sustainable and organic farming from more educated and health-conscious clientele, rises.

	2016	2017	2018	June 2019
Number of Certified MAURIGAP farmers	2	36	73	75

Table 17: Number of Certified MAURIGAP Farmers, 2016-2018<sup>41</sup>

- **Capacity problems of the MACB (certification body).** The certification body was not fully operational until recently owing to inadequate staffing and resources. The MAIFS has now decided for human resource optimisation to have the MSB as the certification body instead of the MACB whose staff will be redeployed.
- **Limited capacity of the Food Technology Laboratory** operated by the Ministry of Agro-Industry and Food Security (MAIFS).
- **Private laboratory tests deemed too expensive** (about Rs15,000 to Rs20,000 per test at QuantiLAB)
- **Low scope of production and limited capacity.** Local suppliers of fresh produce enjoy the benefit of lower transportation costs over international suppliers of fresh produce. Furthermore, the cost of MauriGAP certification (no fee) and support of FAREI represent other advantages for local growers. Yet, their low scope of production and limited capacity represent significant weaknesses for locals as compared to international suppliers.

According to the representatives of Food and Agricultural Research and Extension Institute (FAREI) and the MACB, the prices of certified fresh fruits and vegetables are higher than non-certified ones by 15% to 25% while organic produce could be higher by 15%-50%. Yet, a quick survey conducted at Food Lovers Market in January 2019 (refer to Appendix 1) shows that the differences in prices vary among the various types of vegetables. According to representatives

<sup>41</sup> Mauritius Agricultural Certification Body (MACB)

of MACB, FAREI and the market leader in supplying fresh produce, SKC Surat & Co. Ltd., a few hotels, especially in the luxury market, are prepared to pay the premium price of fresh produce. A few hotels, especially large hotels (with more than 80 rooms) have already started buying certified products (both local and imported) but this number remains significantly low.

The supply hotspots analysis undertaken by University of Mauritius, FAREI and the Centre for Sustainable Consumption and Production (CSCP) in 2016 under the Switch Africa Green Programme in Mauritius indicated the following issues:

- Over dependence and irrational use of agrochemicals, fertilisers and pesticides, for vegetable production.
- At the social level, unattractive working conditions associated with limited social security provisions and lack of information and traceability of products in the supply.
- Presence of oligopsony: Small farmers are reliant on middlemen to reach hotels which prefer to deal with one supplier or a few rather than doing business with multiple small individual farmers.
- Small farmers are also unable to achieve economies of scale due to limited financial and production capacity, lack of logistics and refrigerated delivery vehicles for timely delivery, limitations in terms of set quality standards for the hotel industry, long payment credit terms demanded by hotels and lack of credibility.

Furthermore, key issues and challenges related to local supply chain for fruits and vegetables were identified as follows:

- Resistance to change and unwillingness to take risks
- Limited marketing skills of farmers and market intelligence
- Supply-side constraints (high costs of key inputs, limited capacity and inability to earn economies of scale, inadequate skills and knowledge, lack of flexibility, etc.)
- No proper logistics for storage of fruits and vegetables by farmers (absence of a cold chain for small farmers)
- Limited implementation capability of quality standards
- Payment system by hotels is not convenient to farmers – hotels are taking too much time to pay (> 3 months)
- Limited access to finance
- Established cartels and business relations
- No legal framework on traceability of produce/activities
- Reluctance to group marketing/contract farming
- Aging farmer population

According to Mr. Sylvain Chung Ting Wan, Principal Extension Officer at FAREI, and Mr. Bala Krishna Ponnusawmy, former Officer-in-charge of MACB, the following problems confronted by planters in their quest to supply hotels directly:

- Hotels want to buy a variety of vegetables everyday or every two days in small quantities for each vegetable. However, small planters generally produce and sell one or few vegetables in large quantities. Middlemen are therefore required as supply does not match demand.
- When delivering products directly to hotels, suppliers have to queue up at the delivery bay and wait for their turn. Planters are unwilling to waste their time.

- Hotels take a credit term of a minimum of three months and supermarkets around six months to effect payment.
- Planters do not have the resources like the middlemen to procure and operate cold rooms to store their produce and logistics to distribute them to hotels.
- The use of net houses by planters protects vegetables from pests and enables reduced use of pesticides but these greenhouses are beyond the reach of many small planters as it requires a minimum investment of Rs 700,000 to 800,000. However, the MAIFS now offers a part funding scheme (Rs up to 400,000) to finance investment in greenhouses.
- Monopoly by the middleman who supplies both vegetables and fruits (most of which are GlobalGAP certified) to hotels.
- Lack of support from other intermediaries, not willing to support planters in becoming MauriGAP certified i.e. lack of remunerative price for certified produce.

In parallel, the main impediments to the expansion of *organic farming* include:

- **Lack of land for cultivation:** According to the survey respondents, it is difficult to be granted agricultural leases in Mauritius for further expansion. With larger plantations, the price of organic produce would likely decrease owing to economies of scale.
- **Lack of raw materials:** Imports of non-treated organic seeds are currently prohibited. The current legislation is deemed too strict for 'non-treated' seeds as ample laboratory tests and other certificates are required prior to import clearance.
- **Lack of training in bio-farming, lack of knowledge sharing and research & development**
- **Cost of certifications:** Internationally recognised organic certifications such as ECOCERT are relatively expensive and the farmers have to budget for their yearly auditing fee. In contrast, the rise of local ecolabels in Mauritius should be closely regulated by the relevant authorities to ensure strict compliance with international norms. A legal framework for the sector is in preparation.
- **Lack of locally produced 100% bio-compost:** There is currently no 100% natural organic compost produced at industrial scale. The FERRICH brand, which is currently produced from organic municipal waste materials, does not comply with the strict traceability norm of bio-farming.
- **High operational costs:** Organic farming is labour-intensive; for example, extra labour is required to clear the land from weeds before planting and this is done fully manually.
- **Lack of laboratory facilities for tests and the associated Costs:** The majority of planters have highlighted the need to have access to adequate laboratory facilities for relevant tests and of getting the test results in a timely manner. QuantiLAB is deemed too expensive with the tests costing around Rs15,000 to Rs20,000 each.
- **The initial land conversion time:** The shift to organic farming requires a land conversion period of 2 years during which the planters would inevitably suffer from a lack of revenue as their reduced harvests cannot yet command the premium price of organic produce.

#### **3.2.4 Analysis of the Potential Threats and Opportunities for the Local Production which could Arise from the Introduction of these Procurement Criteria in the Procurement of Goods/Services of Local Hospitality Stakeholders and the Compliance with an Ecolabel Scheme**

The major threat which might arise from the introduction of sustainable procurement criteria and compliance with ecolabels is the direct threat to the livelihood of local planters. Less than 1% of total land under crop plantation is either MauriGAP or ECOCERT certified. Similarly, less than 1% of total planters are practising bio-farming or good agricultural practices.

Should hotels include sustainability criteria in their procurement process, it would certainly fuel demand for certified and organic produce. This will prompt both the planters and wholesalers to adopt good agricultural practices while promoting bio-farming among local planters. The current supply of both, certified and organic produce, is currently low and cannot meet actual local demand from individual customers. Unless major public sensitisation campaigns are conducted and certification becomes mandatory, it could take decades for the supply of certified produce to match the current market demand.

All the suppliers advocate for Government intervention in the form of regulatory compliance of all fresh produce to be certified as well as professionalising the sector. A list of measures to be implemented by MAIFS was suggested by the surveyed fresh produce suppliers and includes:

- Providing Government subsidies and low-interest loans for sheltered farming, greenhouses and other equipment and raw materials. This has been implemented.
- Assisting the current planters financially throughout the transition process during which the loss of revenue is at its most critical,
- Subsidising or paying for the ECOCERT organic certification or equivalent, already implemented, as well as subsidising the laboratory tests to be done.
- Removing VAT, taxes and duties on farming equipment. A bio farming promotion scheme is currently available.
- Setting up a proper farming school and Research & Development unit
- Setting up of a local production of 100% bio-compost and an organic seeds nursery unit
- Professionalising the sector by assigning a code to each planter for traceability of their fresh produce and providing adequate training to planters
- Reducing red tape and streamlining the heavy bureaucratic and lengthy process for government grants and subsidies
- Sensitising and encouraging youngsters to enter the agri-business

As the demand for certified and organic fresh produce grown locally increases, the amount of chemical agricultural inputs is likely to decrease; paving the way for more natural manure, compost, bio-fertilisers and creating opportunities for their local production.

According to the Digest for Agricultural Statistics (2017), an estimated 35,380 tonnes of chemical fertilisers were utilised in the fields in 2018. The sugar estate plantations account for the bulk of the fertiliser usage. The level of imports for major chemical agricultural inputs over the past years is depicted in the following table:

Agricultural Inputs	2014		2015		2016		2017	
	Quantity (tonnes)	Value (Rs '000)	Quantity (tonnes)	Value (Rs '000)	Quantity (tonnes)	Value (Rs'000)	Quantity (tonnes)	Value (Rs'000)
<b>Fertilisers</b>	53,276	683,475	32,861	450,753	47,766	544,902	44,405	486,916
<b>Insecticides</b>	810	133,514	963	152,593	836	124,594	697	96,189
<b>Fungicides</b>	240	51,042	207	48,546	239	58,899	205	48,389
<b>Weedkillers</b>	1,098	198,908	1,204	227,662	1,292	240,493	1,269	227,475

Table 18: Imports of Major Agricultural Inputs, 2013-2017<sup>42</sup>

<sup>42</sup> Statistics Mauritius (2017). *Digest for Agricultural Statistics (2017)*.

In line with the likely increase in demand for natural agricultural inputs, the Biofert Company Ltd was set up in 2015 by the Mauritius Chemical & Fertilizer Industry Limited (MCFI) in collaboration with The Mauritius Cooperative Agricultural Federation Ltd (MCAF) and Indian Farmers Fertiliser Cooperative Limited (IFFCO). The company promotes a range of biofertilisers on the local market and will further diversify its portfolio of bio-fertilisers targeting the bio-farming sector<sup>43</sup>.

In the same line, there are ample business opportunities for both industrial and small-scale composting plants. In Mauritius approximately 54% of waste is organic waste highlighting the high potential and opportunities for compost and/or biogas production.

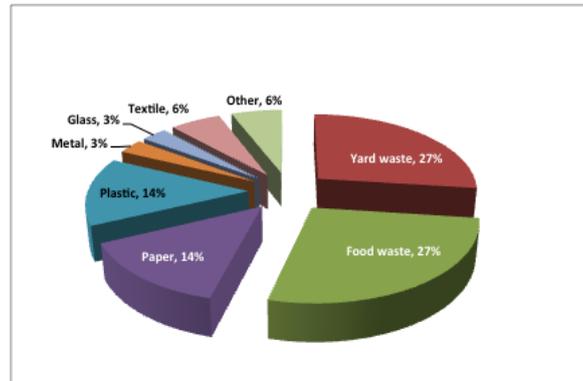


Chart 7: Types of Waste Generated in Mauritius<sup>44</sup>

Organic growers have highlighted the importance of having a local bio-compost unit which would be more suitable to bio-farming where traceability of agricultural inputs is important.

Along the same line, hotel groups such as Beachcomber are also pursuing this green avenue by converting their yard wastes into compost.

### 3.3 Supply Analysis of Alternative to Single-Use Plastics

#### 3.3.1 Identification of the Level of Availability and the Market Share of Alternatives to Single-Use Plastics in the Country

Alternatives to single-use plastics for the hospitality industry have steadily increased over the past few years. Most of these items are imported and local production is scarce.

An interview with DACOM, the leading hotel amenities supplier for the hospitality industry in Mauritius, revealed that demand for single-use plastic room amenities is on the decline while eco-friendly substitutes have gained traction. The shift started merely two years ago. In 2018, the company sold 250,000 single-use plastic straws whilst demand for biodegradable straws currently stands at 500,000 units per quarter.

<sup>43</sup> MCFI (2018). *Annual Report (2018)*. Retrieved from: [https://www.mcfi.mu/sites/mcfi/files/MCFI\\_AR\\_2018\\_FOR%20WEB.pdf](https://www.mcfi.mu/sites/mcfi/files/MCFI_AR_2018_FOR%20WEB.pdf)

<sup>44</sup> Ministry of Social Security, National Solidarity and Environment and Sustainable Development (2018). *Solid Waste Management in Mauritius*. The Solid Waste Management Division. Available at: <http://environment.govmu.org/English/Pages/swmd/SWMD-Solid-Waste-In-Mauritius.aspx>

Demand for refillable shower gel, shampoo and hair conditioner dispensers is also on the rise with the company recently launching a new service which involves collecting the dispensers, sanitising the latter and refilling the products based on ECOCERT norms. Unfortunately, the pumps cannot be sanitised and hence are non-reusable. The pumps are then sent to a recycling company. The supplier also emphasises that hotels are the driving forces behind the green shift and are continuously on the lookout for eco-friendly alternatives whilst influencing their suppliers along the supply chain to adopt more environmentally practices such as 'no packaging' amongst others.

These means that suppliers can adapt their product catalogues to the hotels needs. Any items demanded by hotels could be easily imported from the international market by the local suppliers from certain amount of units.

### 3.3.2 Description of the Market Players involved

The market for alternatives to single-use plastics is at a very early stage. The suppliers providing more eco-friendly alternatives are mainly those who have been in the industry for decades and currently are responding to the industry's demand for more sustainable alternatives. **DACOM** is the main provider of hotel amenities with an estimated market share of 75% and a portfolio of clients comprising of the main large hotels groups such as LUX, Beachcomber, Sun Resorts, Attitude Hotels, Veranda Resorts, Heritage Le Telfair, among others. The company places significant emphasis on the quality of its products and it received the Cosmos certification for its products by ECOCERT in April 2018. Its local manufacturing unit is also certified ISO 9001:2015 and ISO 22716 for good manufacturing practices.

The ECOCERT Cosmos certification guarantees that the use of raw materials and perfumes from natural origin are without GMO, nanomaterials and synthetic colorants and allows traceability from raw materials to the finished products. In line with its environmental policy, DACOM is limiting the use of plastics as much as possible through a number of key measures:

- By using materials made from renewable resources
- By reusing packaging as much as possible without compromising the physio-chemical and microbiological quality
- By using materials that contain a maximum of recycled content whenever feasible
- By limiting cartons or other packaging during the delivery of its products

Another key supplier, which has positioned itself in the alternatives to single-use plastics segment (food and industrial packaging) is **Mascatrans Co. Ltd** located in Riche Terre. The company is not a local producer but an importer and distributor of a range of environmentally-friendly products such as paper straws, biodegradable straws, 100% biodegradable and compostable food trays, take-away boxes, cups and wooden cutlery.

Other smaller sized new entrants catering mainly to the individual consumers market include **L'Ecolo - le coin zero Déchet**, **Le Marchand** and **Good Old Thyme** located in Curepipe.

**VIV Distributors Ltd** is also a major supplier in the environmentally responsible on-site water bottling systems in Mauritius. Established in 2015, VIV Distributors Ltd is currently one of the leading suppliers of table water systems and customised designer reusable glass bottles to the hotel and entertainment industry on the Island.

Actual local production of plastic substitutes is meagre with the majority of eco-friendly products imported from overseas such as Vietnam, China, Indonesia among others. One SME, called **Outgrowing Ltd** in Bel Ombre, benefitted from training and a financing of Rs240,000 by 'L'Organisation Internationale pour la Migration (OIM)' to undertake the production of 100% natural and biodegradable plates made from palm leaves<sup>45</sup>. These eco-friendly plates range from 10 to 30 cm diameter and corresponding unit price from Rs10 to Rs30.

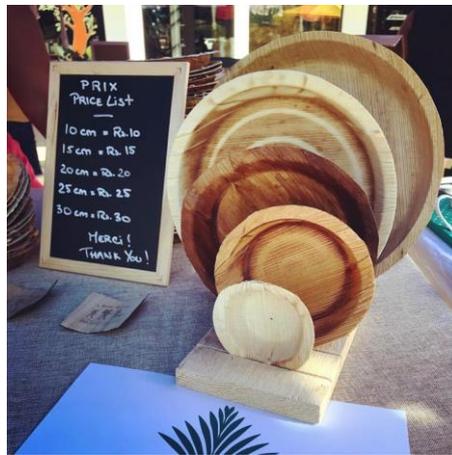


Figure 5: Biodegradable Plates Made from Palm Leaves in Mauritius

### 3.3.3 Identification of the Main Obstacles Limiting the Supply of Alternatives to Single-Use Plastics

With regard to the transition to more sustainable and greener alternatives, both interviewed suppliers and hotel representatives assert that the unavailability of locally-made substitutes, heavy reliance on imports (implying higher carbon footprint) and cost are the primary obstacles for sourcing substitutes to single-use plastics.

The initial costs of the greener alternatives are higher than those of single-use plastic items. The price differential between a plastic item as compared to its substitute tends to be approximately twice the price as depicted in the table below.

SINGLE-USE PLASTIC ITEMS	Price* per Unit (Rs excl. VAT)	ALTERNATIVES TO SINGLE-USE PLASTIC ITEMS	Price per Unit (Rs excl. VAT)
Plastic straw	0.04	Bio-degradable plastic straw	0.46
Plastic brush	1.70	Bamboo brush	2.97
Plastic comb	1.94	Bamboo comb	5.02

Table 19: Price Comparison between a Plastic Item Compared to its Eco-Friendly Substitute <sup>46</sup>

<sup>45</sup> La Redaction (2012). *Outgrowing Ltd: Des assiettes écologiques à base de feuilles de palmiste*. Lexpress.mu. Available at: <https://www.lexpress.mu/article/outgrowing-ltd-des-assiettes-écologiques-à-base-de-feuilles-de-palmiste>

<sup>46</sup> DACOM (2019). *Table of price comparisons between single-use plastic items and alternatives to single-use plastic items*.

As indicated before there is no local production of alternatives to single use plastics. This means that sometimes the products requested by hotels are not readily available.

Another factor is the lack of adequate recycling infrastructure and processes. The main reason suppliers and buyers would invest in importing and buying alternatives is to reduce the impact on the environment. As discussed in previous sections, many of the substitutes to conventional single use plastic required industrial processed and/or certain condition in order to be recycled, biodegraded, composted, etc. In Mauritius there is lack of recycling practices and recycling infrastructure, therefore many of these items end-up in landfills.

### **3.3.4 Analysis of the Potential Threats and Opportunities for the Local Production which could Arise from the Introduction of these Procurement Criteria in the Procurement of Goods/Services of Local Hospitality Stakeholders and the Compliance with an Ecolabel Scheme**

Sustainability criteria if embedded into hotels' procurement will inevitably threaten existing local producers of conventional single-use plastic products such as plastic bottles for room toiletries, or products which use single-use plastics as main packaging component such as plastic water bottles, soft drinks, among others. Nevertheless, local production is very low, representing a small percentage of the plastic consumed in Mauritius.

Additionally, if driven by hotel demand, these local suppliers could be encouraged to shift to the production of alternatives to single-use plastic items and new business opportunities could arise. As the bulk of alternatives on the market are imported, opportunities do exist to introduce local production of more environmentally friendly products and recycling plants.

Innovation can spur major breakthroughs in finding appropriate alternatives to single-use plastics in Mauritius. An example is the 'Vegan Bottles' created by French Engineer, Nicolas Moufflet. Founded in 2015, his company **Lyspackaging** has pioneered the production of bottles and flasks made from sugarcane and 'without a single drop of oil'. The process is heavily patented and kept secret. It is known that the technology uses bagasse, the waste product of sugarcane. Transformed into vegetable plastic, bagasse retains its ability to be recycled or composted. These vegetable bottles are still 30% more expensive to buy. The company has manufactured about 8 million 'vegan bottles' since 2017. With respect to its end of life, the bottles would be suitable for industrial composting or biodegradable to produce compost or biogas<sup>47</sup>.

The prospect for the production of alternatives to single-use plastics by using local resources such as sugarcane is certainly promising and calls for major investments from the private sector, Government and international institutions as well as continuous R&D.

However, prospective hotel buyers have sounded a note of caution. Although local companies would enjoy the benefit of being closer to customers as compared to international suppliers, the narrow scope of operations of local suppliers would not allow them to reap the same economies of scale that international suppliers enjoy. As a result, the variety and prices offered by international suppliers might still be lower than those offered by local suppliers of alternatives to single-use plastics.

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<sup>47</sup> Edouard, O. (2019). *Ecologie: nous aurons bientôt une bouteille en canne à sucre*. Lexpress.mu. Available at: <https://www.lexpress.mu/article/352392/ecologie-nous-aurons-bientot-une-bouteille-en-canne-sucre>

## CHAPTER FOUR: ANALYSIS OF DEMAND

This chapter presents the perspective of the Mauritian hospitality sector and the evolution of the national demand for the sustainable products in focus. It also identifies the main barriers and opportunities for the procurement and purchase of more sustainable products/services by the hospitality sector stakeholders. This includes any previous attempts made to source more sustainable products by buyers from the hospitality sector, assess whether suppliers were engaged in the process as well as the outcome of these attempts. Furthermore, the analysis pinpoints any changes undergone by the hospitality procurement process in order to integrate sustainability criteria.

### 4.1 Evolution of the National Demand for the Products in Focus

Figures and statistics pertaining to the demand of the products in focus in the Mauritian hospitality sector are relatively scarce. Furthermore, there is no aggregated data for the demand of these products specifically for the hospitality sector, as purchases data for these products are generally not recorded by the hotels or compiled by hotel associations such as ARHIM. As a result, figures and tourism indicators from Statistics Mauritius will be used as the basis for this study; the rationale being that demand for these products are intrinsically linked to the number of tourist arrivals, tourist nights, number of hotel rooms, room occupancy among others.

According to Statistics Mauritius, the number of tourist arrivals for the year 2018 increased by 4.3% to attain 1,399,408 compared to 1,341,860 for the year 2017 while the number of nights spent by tourists increased by 4.8% from 13,640,751 to 14,296,274. The average length of stay also increased marginally from 10.3 to 10.4 nights. The room occupancy rate of all licensed hotels in operation averaged 75%, compared to 77% in 2017.

	2016	2017	2018
Number of licensed hotels	111	111	113
Number of rooms	13,547	13,511	13,523
Number of bed places	29,139	29,650	30,296
Room occupancy rate (%)	73	77	75
Bed occupancy rate (%)	65	68	67
Average length of stay (nights)	10.4	10.3	10.4
Tourist nights ('000)	13,118	13,641	14,296
Tourism earnings (Million Rs)	55,867	60,262	64,037
Tourism earnings per tourist (Rs)	43,809	44,909	45,760
Number of tourist arrivals	1,275,227	1,341,860	1,399,408

Table 20: Tourism Industry Indicators, 2016-2018, Source: Statistics Mauritius

At the end of December 2018, there were 56 'large' hotels (hotels with more than 80 rooms) in operation with a total room capacity of 10,469 with 23,942 bed places. These 'large' hotels represent 50% of all licensed hotels in operation but make up 77% of total room capacity and 79% of total bed places.

The forecast of 1,450,000 tourist arrivals for the year 2019 is maintained, representing an increase of 3.6% over the figure of 1,399,408 in 2018. The Bank of Mauritius forecasts tourism earnings for the year 2019 at Rs 67.5 billion compared to Rs 64.0 billion recorded in 2018.

The following table reveals the evolution of the number of tourist arrivals in Mauritius over the past decade and shows the gradual increase of tourism arrivals until 2017. This continues to be the case with 1.4 million in 2018 and a forecast of 1.9 by 2028, suggesting that demand from products will continue to increase.

Country of residence	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	18,852	10,363	11,493	15,726	17,009	18,340	17,434	17,835	18,559	21,271
Austria	8,974	8,106	9,255	8,822	8,151	7,932	8,303	11,425	16,643	17,596
Belgium	11,796	10,254	10,214	12,029	10,967	11,562	11,465	14,223	15,675	16,420
Czech Republic	4,166	3,487	3,477	4,081	5,247	5,545	6,852	7,265	8,503	10,495
France	260,054	275,599	302,185	282,469	256,929	244,737	243,655	254,323	271,963	273,419
Germany	61,484	51,279	52,886	56,331	55,186	60,433	62,212	75,237	103,761	118,856
India	43,911	39,252	49,779	53,955	55,197	57,253	61,162	72,135	82,670	86,294
Italy	66,432	56,736	56,540	52,747	40,009	31,145	29,553	29,185	31,337	35,101
Malagasy Rep.	10,905	8,333	9,833	11,449	13,563	13,941	13,038	12,215	11,740	12,730
Netherlands	6,051	5,527	4,865	5,179	4,434	4,498	4,795	6,926	10,080	13,269
People's Rep. of China	8,425	6,925	7,609	15,133	20,885	41,909	63,363	89,584	79,374	72,951
Reunion Island	96,174	104,946	114,914	132,535	144,340	143,174	141,659	143,845	146,203	146,040
Russian Federation	6,763	5,628	6,615	12,224	19,429	14,903	13,287	11,406	9,295	11,153
Seychelles	10,604	7,532	10,160	8,485	6,779	7,183	6,926	5,652	6,393	6,258
S. Africa, Rep. of	84,448	74,176	81,458	86,232	89,058	94,137	93,075	101,943	104,834	112,129
Spain	12,001	9,549	8,096	9,801	9,473	8,428	8,632	10,013	15,304	15,252
Sweden	8,305	5,060	4,496	4,325	4,295	4,576	6,452	11,634	14,551	15,516
Switzerland	16,037	15,349	18,577	24,362	26,002	27,751	29,273	30,680	36,272	40,252
United Arab Emirates	4,109	3,141	3,470	3,780	5,403	8,159	8,000	9,049	9,614	11,866
United Kingdom	107,919	101,996	97,548	88,182	87,648	97,963	115,239	129,754	141,904	149,807
U.S.A	7,089	6,951	7,316	6,870	6,374	5,741	7,139	8,546	8,524	9,655
Other Countries	75,957	61,167	64,041	69,925	79,063	83,193	86,820	98,377	132,028	145,530
<b>All Countries</b>	<b>930,456</b>	<b>871,356</b>	<b>934,827</b>	<b>964,642</b>	<b>965,441</b>	<b>992,503</b>	<b>1,038,334</b>	<b>1,151,252</b>	<b>1,275,227</b>	<b>1,341,860</b>

Table 21: Tourist Arrivals based on Country of Residence, 2008-2017<sup>48</sup>

To picture the current demand of the selected products by the hotel sector, interviews with 4 hotels were carried out. These hotels included 3 large groups and 1 medium hotel.

#### 4.1.1 Demand Analysis for Air Conditioning Equipment

Air conditioners systems are only purchased once over a length of time depending on the type of system used, and usually during the construction or renovation phase of the hotel. This is why

<sup>48</sup> *Digest of International Travel and Tourism Statistics 2017, Statistics Mauritius*

the demand analysis must take into consideration the initial investment, maintenance and the lifespan of the AC solution installed. Additional purchases are made whenever the replacement is needed or the facility is expanded. Replacement only happens if the equipment breaks down and the repair costs is deemed higher compared to the purchase of a new AC unit.

The local demand for ACs is affected by temperature and normally peaks in the summer months from October to March. Increased AC usage in Mauritius is also due to higher temperature in different regions affected by heat-island effect and the reduction in green cover, growing population density, increasing tourist arrivals and rising vehicle population (Elahee, 2014).

The majority of hotels are located on the coastal regions where temperature is at its highest. As such, hotels account for a high proportion of overall air conditioning usage on the island. Our survey with hotels Maintenance Managers and leading HVAC suppliers reveals that hotels where the rooms are clustered in large buildings mainly use chiller units whereas hotels which have individual bungalows opt for splits air conditioning units as shown in the table below. A more recent interview with a leading HVAC supplier highlighted the fact that the VRF system is now being favoured for new hotel developments in light of its more environmentally friendly and economical nature, lower initial cost compared to chiller, high energy saving, and lower maintenance costs.

According to interviews with hotels and suppliers in Mauritius hotels mainly use chillers or AC split units air conditioning or a combination of both. The majority of hotels have already swapped their old AC split units using R-22 refrigerant for more energy-efficient DC inverter wall-mounted split units using R-410A.

This finding aligns with the findings of the survey conducted by Dreepaul (2017) in which he estimated that 48% of hotels use split units and 47% chiller units, with 5% using both.

Air conditioning equipment type	Percentage of Hotels
Split units	48%
Chiller units	47%
Both Split and Chiller units	5%

Table 22: Types of Air Conditioning Used in Hotels<sup>49</sup>

Furthermore the report found that of the 48% of hotels that had split air conditioners, 55% were still using the ozone depleting Hydrochlorofluorocarbons (HCFC) refrigerant R-22.

Air conditioning equipment type	Refrigerant Type					TOTAL
	R-22 (HCFC)	R-410A (HFC)	R-134A (HFC)	R-407C (HFC)		
Split units	48%	55%	45%	0%	0%	100%
Chiller units	47%	20%	24%	30%	26%	100%
	15 hotels in total					

Table 23: Air Conditioning Refrigerant Used by the Hospitality Industry<sup>50</sup>

<sup>49</sup> Survey conducted by Dreepaul (2017)

<sup>50</sup> Survey conducted by Dreepaul (2017)

The report also concluded that smaller hotels with number of rooms ranging from 40 to 75 favour the use of split units as they are cheaper to install and easier to maintain.

Air conditioners are major energy consuming appliances in small and medium hotels. Air conditioning consumes 35%-50% of total energy in small and medium hotels (NPCC, 2016). Most ACs in small and medium hotels are non-inverter types. Inverter-type ACs consume 30%-50% less energy compared to non-inverter ones.

Types of Air Conditioner	Percentage of total air conditioners used in Small and Medium Hotels
Window type	15%
Split type	33%
Fan coil unit	52%

Table 24: Types of Air Conditioner Used In Small and Medium Hotels<sup>51</sup>

With the complete phasing out of R-22 by 2030, it can be foreseen that split air conditioner with HCFCs as refrigerant will disappear from the hospitality sector in the coming 6 years. It is estimated that some 3,000 split unit room air conditioners exist in hotels in Mauritius with a stored amount of 3 tons of HCFC. Through renovations and in some cases reconstruction, the hotel industry in Mauritius is gradually moving away from HCFCs. However, the import of HCFCs remains significant for maintenance of existing equipment (about 137 tonnes of HCFC in 2015). Likewise, a few chillers in the hotel sector still run on R-22. Dreepaul (2017) identified 15 with an average charge of 50 kg per chiller. Other chillers in this sector are on the HFC namely, R-134A, R-407C and R-410A. It is estimated that 750 kg to 1 ton of HCFC R-22 are being used in chillers in hotels in Mauritius.

During the interviews with the hotel groups carried out under this research it was noticed that the majority of respondents were neither aware of the existence of the R-32 refrigerant nor its inherent benefits. Results of the survey also confirm that stakeholders are well aware of the issue of global warming as related to HFC and HCFC refrigerants and are well acquainted with the fact that natural refrigerants are the alternative solutions. High energy efficiency, good thermodynamic properties together with smaller charges, low price and good COP make HCs an excellent alternative for small and medium air conditioning applications. However, it is established that HFCs are not adequate solutions when considering environmental safety; the challenge is to find better alternatives from an energy efficiency and environment point of view. In Mauritius the focus is now on natural refrigerants such as hydrocarbons.

As specific data on the demand for air conditioning units are not available, data on imports of ACs have therefore been used as a proxy to evaluate their demand. Air conditioning equipment is classified as HS code 8415 which is defined as “Air conditioning machines comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated; parts thereof”. The table below shows the evolution of imports of air conditioning equipment from 2015 to 2017, an increase of 15.2% (in value terms) can be noted.

Country	Flows in USD			Evolution 2017/2015
	Year 2015	Year 2016	Year 2017	

<sup>51</sup> NPCC (2016), Gap Analysis Report (Mauritius) for Small and Medium Hotels

Imports by Mauritius from the World	12,545,473	16,684,723	14,451,355	+15.2%
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Table 25: Imports of Air Conditioning Equipment by Mauritius (2015 to 2017)<sup>52</sup>

The general increase in temperature, as well as the gradual increase in tourism nights, that is, 7% in 2015, 9% in 2016, 4% in 2017 and 4.8% in 2018, are expected to impact on AC usage and this tendency will inevitably influence the demand for AC in the tourism and hospitality sector.

In a survey conducted in Mauritius (from July to Sept. 2017)<sup>53</sup>, a constant increase in the number of AC equipment on the market was noted. Unitary Air Conditioning systems were seen to be the largest contributor in RAC emissions (Mt CO<sub>2</sub>eq) compared to other sectors:

- Unitary Air Conditioning - 53%
- Industrial Refrigeration - 9%
- Commercial Refrigeration - 10%
- Domestic Refrigeration - 5%
- Mobile Air Conditioning - 21%
- Chiller - 2%

#### 4.1.2 Identification of main Obstacles and Opportunities for the Purchase of more Sustainable Air Conditioning Equipment by Hospitality Sector Stakeholders

The primary barrier that the tourism and hospitality establishments in Mauritius are currently facing is related to the high initial investment required for purchasing more sustainable AC solutions.

The awareness and knowledge on more sustainable options. As indicated before, the majority of Hotel Maintenance Managers interviewed were not aware of the new greener R-32 refrigerant. Sensitisation and market awareness campaigns are deemed important to inform consumers on the most efficient options available in the market (i.e. R-32).

The actual application of more sustainable AC solutions is impaired by current practical constraints, the majority being summed up below:

- Most large hotels constructed decades ago had opted for the chiller units and the water piping system in place cannot be retrofitted for refrigerant flow.
- Lifespan of existing chillers in hotels can be more than 10-15 years and the initial investment in the chiller units is significantly higher and payback period longer, thereby making it fairly difficult for hotels to change to more sustainable AC solutions except during

<sup>52</sup> UN Comtrade (2019). *United Nations Commodity Trade Statistics Database*. Available at: <http://www.mauritiustrade.mu/en/market-survey/import-export-flows#resultats>

<sup>53</sup> Ministry of Social Security, National Solidarity, and Environment and Sustainable Development and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) (2017). *Report of National Workshop - Policy and Technology Recommendations for the RAC Sector in Mauritius*. Available at: <http://environment.govmu.org/English//DOCUMENTS/OZONE%20DAY%202017%20-%20NATIONAL%20WORKSHOP%20AND%20REGIONAL%20WORKSHOP.PDF>

- major hotel renovation. For example, Long Beach Hotel (a SUN Resorts hotel) which was recently renovated has changed from chiller to VRF system.
- Hotels have limited annual capital expenditure budget and the swap to eco-friendly AC split units is therefore effected on an annual phasing-out basis. For instance, out of approximately 1200 rooms at Attitude Group of Hotels, only about 40 AC units are still on R22 and replacement has been planned for this year. Over the past 4 years, there has been a consistent capital expenditure earmarked for the replacement of R22 Air Conditioning Units according to Attitude Hotels Maintenance Manager.
  - The VRF technology is fairly recent and lack of information, local knowledge and implementation could delay its adoption. Similarly, the lack of awareness of the low GWP refrigerant, R32 and the pre-requisite to have trained technicians for its installation are major barriers to its market penetration.
  - Existing hotels were not initially designed with the potential installation photovoltaic panels and the use of solar energy to power hotel's AC system

### **Sustainability Criteria in the Procurement Process of Air Conditioning Systems for the Hospitality Sector**

It is worth highlighting that during the procurement process, the hospitality establishments lay significant emphasis on the energy efficiency and the environmentally friendly aspect of the AC solutions being sourced. Tenders, which are issued by local Mechanical & Electrical Engineering Companies or Mechanical, Electrical and Plumbing (MEP) Engineering companies such as Prodesign, IBEC, Pro Five, Sigma Engineering among others encompass a number of sustainable procurement criteria, the main ones listed below:

- The Energy Efficiency Ration (EER), the higher the better and Coefficient of Performance (COP)
- The noise level
- Weather-resistant materials such as anti-rust
- Maintenance costs (All systems should be serviced regularly, with 1 general maintenance and 2 routine maintenance)

Although the environmental component is important to the majority of hospitality players surveyed, the potential to lower the electricity consumption is the overriding driving force when it comes to the selection of a suitable air conditioning system.

The transition to low GWP refrigerant can be accelerated with Government intervention by providing the market with guidance to favour low GWP refrigerants within the industry<sup>54</sup>. This could be achieved by lowering import tax or providing green subsidy on R-32 AC equipment with more sustainable refrigerants (i.e R-32) as well as on PV solar systems to power the hotels' air conditioning systems.

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<sup>54</sup> Ministry of Social Security, National Solidarity, and Environment and Sustainable Development and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) (2017). *Report of National Workshop - Policy and Technology Recommendations for the RAC Sector in Mauritius*. Available at: <http://environment.govmu.org/English//DOCUMENTS/OZONE%20DAY%202017%20-%20NATIONAL%20WORKSHOP%20AND%20REGIONAL%20WORKSHOP.PDF>

Sensitisation and awareness campaigns by both local authorities and HVAC suppliers focusing on the financial saving and lower operational costs (that is, the long-term savings from electricity costs more than offset the initial investment of the sustainable AC system) would enable a smooth transition towards greener alternatives in the hospitality sector.

That could be used as an opportunity to embed more sustainable criteria regarding AC solutions into tourism, sustainability and/or green building certifications such as EarthCheck, Green Globe, Travelife, Green Building Council, LEED, BREEAM, among others which would also pave the way to a faster adoption. Similarly, the inclusion of Building Management Systems, with energy efficiency minimum requirements, during the construction phase of hotel buildings should be pursued to enable the shift to greener and smarter air conditioning systems.

#### **4.1.3 Demand Analysis for Fresh Produce**

Demand for fresh produce varies with each establishment. It depends on the size of the hotel, the types of dining options, food & beverages offered, and onsite restaurants available. Larger hotels catering to hundreds of guests would have the highest requirements, especially if they offer open buffets featuring salads, and fresh fruit selection and fruit juices. The majority of hotels favour local seasonal fruits such as pineapples, lychees, mangoes, pawpaw, passion fruits, watermelon among others when they are in season during summer. Fresh fruits and vegetables are perishable, and they therefore need to be purchased frequently and in small quantities to maintain their freshness.

A survey was carried out under the SWITCH Africa Green Project to examine the demand for quality fruits and vegetables in Mauritius and a report entitled *“Promoting sustainable agriculture through green retailing and green hospitality - Demand side mapping”* (2016) was produced. A semi structured survey involving face to face interviews with 10 AHRIM Procurement Managers was carried out in May 2016. The key findings related to the hospitality sector include the following:

- Procurement of fresh produce is either done at group level (Attitude, LUX, SUN Resorts, Starwood) or at individual hotel level (e.g. Maritim, Hilton, Beachcomber, Sofitel, Oberoi, Preskil)
- The fresh produce is mainly supplied by well-reputed distributors such as SKC Surat & Co Ltd, Chinatamby, Proxifresh Co Ltd, Sabzie, Bazaar des iles, ENL Agri which are HACCP certified.
- The fresh produce are delivered to the hotels on a daily basis (except Sundays) or twice weekly.
- Larger hotels and luxury resorts are willing to pay a higher price for MaurigAP certified fresh fruits and vegetables. However the premium should not be greater than 10%. In contrast, small hotels are unwilling to pay their produce at a higher price as operational costs must be kept as low as possible.
- It is common for international tour operators to enquire about the quality/sustainable production practices of food being provided in the hotel and/or to conduct routine audits in hotels. They often require hotels to procure quality products from HACCP/ ISO certified suppliers.

During the survey carried out with both the hospitality Procurement Managers and fresh produce suppliers, the criteria which rank the highest in the procurement decision are as follows:

- Price and quality (that is aesthetic and visual appeal) of the produce. The aesthetic criteria is a constraint to organic produce where they might have spots /blemishes associated with the natural production practices.
- Reliability/availability of a range of fresh fruits and vegetables and ability to meet orders at a moment notice
- Frequency of delivery
- Use of refrigerated delivery vans and good food hygiene and food handling and storage practices in line with HACCP quality norms
- Proven track record of previous business dealings and financial background of the supplier
- Credit payment facilities extended to hotels, about 45-60 days
- Traceability of vegetables produced

Although ‘traceability’ is mentioned, the responsibility however rests on the shoulders of the fresh produce suppliers with hotels taking little to no accountability. Large and medium hotels tend to have a system of traceability of the fresh produce purchased. They value the introduction of an ecolabel for fresh produce (MAURIGAP, a minimum quality assurance programme that focuses on food safety while ensuring sustainable production practices). Working with a certified fresh produce supplier is considered to be very important for hotels especially for food safety reasons.

During the interviews with hotels under this study, certifications and good agricultural practices or eco-labels such as MauriGap, GLOBALGAP, Ecocert or other local organic labels were acknowledged as important but rarely translated into actual purchases, this is mainly due to the higher prices of certified fresh produce.

English name	Local name	Denomination	Price (Rs.)		Difference (%)
			Normal	MauriGAP Certified	
Cabbage	Chou vert	Unit	43.00	60.00	40%
Zucchini	Courgette	Unit	70.00		
Brinjals/ Eggplant	Bringelles	Kg	84.00		
Bottle gourd	Calebasses	Kg	40.00		
Yellow scallop squash	Patisson	Unit	140.00		
Chow chow	Chouchou	Kg	90.00		
Tomatoes	Tomates	Kg	160.00	300.00	88%
Carrots	Carotte	Kg	70.00	100.00	43%
English cucumber	Concombre vert	Unit	35.00	45.00	29%
Green peppers	Poivron	Unit	25.00	35.00	40%
Leek	Poireau	Unit	15.00	30.00	100%
Snake gourd	Patol	Kg	76.00		
Pumpkin	Giraumon	Kg	40.00		

Beetroot	Betterave	Unit	30.00		
Bittergourd	Margoze	Kg	33.00		

Table 26. Current prices of vegetables in Mauritius 2019. Subject to season, type and size.

Nonetheless, demand for sustainable produce is slowly gaining traction with the large hotel establishments, which have sustainability at heart becoming more conscious about purchasing sustainable produce and are seeing growing demand from guests. For example, SUN Resorts through its SUNCARE programme which is aligned to UN’s Global Compact “10 Principles”<sup>55</sup> has set up a Sustainable Procurement Committee in 2018 to ensure that the environmental and social risks associated with the manufacture, delivery and end-of-life of purchased goods are being managed responsibly.

#### 4.1.4 Identification of main Obstacles and Opportunities for the Purchase of more Sustainable Fresh Fruits and Vegetables by Hospitality Sector Stakeholders

The main barrier for the procurement of sustainable fresh produce is the higher prices. Most hotels surveyed are unwilling to pay the premium price for certified local produce or organic produce and the price is the main criterion in their procurement process.

Hotels also use the wet market (‘bazar’) prices of fresh produce as basis for negotiation with suppliers which is deemed unfair by the latter owing to their significantly higher operational costs such as HACCP certification, use of refrigerating delivery vehicles etc.

Another barrier is the current lack of local supply. Even if hotels would be willing to absorb the higher cost, local supply would not be able to meet the current demand from hotels.

Suppliers maintain that tourists generally presume that the fresh fruits and vegetables are grown according to good agricultural practices, and there is no request to hotels to prove the source of their products.

There are some hotels that are committed to sustainability and are currently working to overcome these barriers. Attitude Hospitality is working closely with local farmers in the vicinity of their hotels to find solutions and guarantee the supply of local sustainable fresh produce for their guests. They group is assisting farmers to get MauriGAP certified by entering into long-term contract and purchasing the bulk of their products such as tomatoes grown via hydroponics farming while shortening the credit payment period to 45 days. By working with local farmers in the neighbourhood of the hotels, they are also reducing the carbon footprint linked with transportation while helping small players in the community (See Annex 1, Attitude Hospitality Case Study: Accompanying Local Suppliers in Transforming their Farming Practices).

By working with local farmers hotels can increase the quality of their products, improve their hotel image with guest by adequate communication strategy, benefit local economy and be ahead of upcoming legislation and mandatory requirements.

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<sup>55</sup> <https://www.unglobalcompact.org/participation/report/cop/create-and-submit/active/411781>

There is a general consensus within suppliers, hotels and other stakeholders that the demand for sustainable fresh fruits and vegetables is likely to increase in the coming years and local supply will inevitably follow. Demand will be driven by global consumer trends towards healthy living, organic products, as well as increased consumer education and awareness of the numerous health concerns associated with chemical agricultural residues in fresh fruits and vegetables.

Government intervention in the form of subsidies and schemes for promoting sustainable agriculture and bio-farming, lowering of taxes for farming and irrigation equipment, green agricultural loans, financial support for accreditation with internationally recognised eco-labels and certifications, public sensitisation campaigns on the threats inherent to chemical agricultural produce and regulatory compliance of good agricultural practices by farmers would lead to the increase in supply of certified local produce. To this end, a number of measures have been announced in the recent budget 2019-2020, among which the construction of 100 additional sheltered farms over the next two years at Melrose, Plaine Magnien, Solitude, Beau Climat and Caroline for young agro-entrepreneurs.

The national wholesale market (2020) should also contribute towards the marketing of certified produce through improved transparency, traceability and marketing between the different actors.

#### 4.1.5 Demand Analysis for Alternatives to Single-Use Plastics

With more and more hotel groups embracing sustainability and obtaining international sustainability certifications such as EarthCheck, Travelife, demand for alternatives to single-use plastics by the hospitality industry is on the rise. Our survey reveals that popular measures include amongst others, the banning of plastic straws, stirrers, take-away food containers, use of refillable shower gel and shampoo dispensers, biodegradable straws and refillable water bottles.

The following table is based on interviews carried out with the voluntary large hotel groups and the main suppliers in Mauritius and provides an overview of single-use plastic items most commonly used in the various hotel departments and alternatives that are currently being adopted.

Plastic Items	Alternatives to Single-Use Plastics
Water bottles found in minibars/conference and meeting rooms	<ul style="list-style-type: none"> <li>• Refillable glass bottles</li> <li>• Water dispenser or refill station, glass jars</li> <li>• Hotels are setting up their onsite water bottling plants</li> </ul>
Fizzy soft drinks	<ul style="list-style-type: none"> <li>• Remove the PET bottles and use the glass bottles on consignment from the suppliers</li> </ul>
Amenities/toiletries	<ul style="list-style-type: none"> <li>• Soap, shower gel, shampoo refillable dispensers</li> <li>• Amenities are only provided for luxury suites (or on request)</li> </ul>
Plastic bag in bins	<ul style="list-style-type: none"> <li>• Hotels are stopping to use plastic bin liners</li> </ul>
Plastic wrapped slippers	<ul style="list-style-type: none"> <li>• Slippers are no longer wrapped individual and placed in cotton bags, in bathrobes' pockets or in the closet</li> </ul>
Pens	<ul style="list-style-type: none"> <li>• Pencils or wooden/bamboo pens</li> </ul>
Laundry plastic bags	<ul style="list-style-type: none"> <li>• Reusable laundry bags (cotton/linen)</li> </ul>
Tea/Coffee Stations	<ul style="list-style-type: none"> <li>• No single packaged tea bags. Use glass jar to store the tea bags</li> <li>• Favour locally grown organic/fair trade coffee and tea</li> <li>• Dispose of the plastic capsules sustainably e.g. Nespresso recycling programme</li> </ul>
Toothbrush	<ul style="list-style-type: none"> <li>• Wooden/bamboo toothbrush</li> </ul>

<b>Shower Caps</b>	<ul style="list-style-type: none"> <li>No shower caps (on request only)</li> </ul>
<b>Straws</b>	<ul style="list-style-type: none"> <li>No straws policy (on request only)</li> <li>Reusable straws (steel, bamboo), paper straw or edible straws</li> <li>Biodegradable straws</li> </ul>
<b>Stirrers</b>	<ul style="list-style-type: none"> <li>No stirrers (on request only)</li> <li>Reusable stirrers (steel/bamboo/wooden/glass)</li> </ul>
<b>Plates and cutlery, take-away boxes</b>	<ul style="list-style-type: none"> <li>Reusable cutlery (metal) and porcelain/china crockery</li> <li>Reusable hard plastic plates and cutlery</li> <li>Single-use compostable/biodegradable plates and cutlery (wooden/cardboard/bamboo/palm leaves/corn/wheat)</li> <li>Ban of polystyrene food containers and use of biodegradable and compostable food cartons for lunch boxes</li> </ul>
<b>Housekeeping cleaning materials</b>	<ul style="list-style-type: none"> <li>Use of refillable flasks from suppliers</li> <li>Buy in bulk and bigger bottles from suppliers</li> <li>Use of the 'pouch dosage system'</li> </ul>
<b>Plastic bags and bin liners</b>	<ul style="list-style-type: none"> <li>Remove plastic bags where possible</li> <li>Compostable/biodegradable bags</li> </ul>
<b>Hotel delivery and supplies</b>	<ul style="list-style-type: none"> <li>Work closely with suppliers to reduce and substitute plastic packaging for eco-friendly alternatives</li> <li>Reusable crates and cloth bags (e.g. laundered linen and towels)</li> </ul>
<b>Plastic give-aways</b>	<ul style="list-style-type: none"> <li>Sustainable giveaways e.g. local crafts made from coconut/palm/pandanus leaves and locally produced sugar, tea etc</li> <li>Favour local craftsmanship, artisans and micro entrepreneurs</li> </ul>
<b>Room communication collaterals</b>	<ul style="list-style-type: none"> <li>Avoid printed brochures and favour re-usable communications or digital communication on the Hotel TV channel on TV</li> </ul>

*Table 27: Alternatives to Single-Use Plastic Items in Hotels in Mauritius*

Although there is no disaggregation in data on single-use plastic usage in the hospitality sector in Mauritius, a snapshot of the monthly consumption of a typical 272-bedroom hotel with a 76% occupancy rate is presented in the following table.

Single-Use Plastic Items used in hotel housekeeping	Quantity per month (units)
Plastic laundry bags	200
Big plastic bags	1,200
Bin liners	2,800
Shower caps	600
Stirrers	100
Water bottles	2,500
<b>Room toiletries</b>	
<ul style="list-style-type: none"> <li>Body lotions</li> </ul>	140
<ul style="list-style-type: none"> <li>Hair conditioners</li> </ul>	210
<ul style="list-style-type: none"> <li>Shampoo</li> </ul>	630
<ul style="list-style-type: none"> <li>Shower gel</li> </ul>	1,400

*Table 28: Single-Use Plastic Items Used in Housekeeping in a 272-bedroom hotel with 76% Occupancy*

These single-use plastic items represent Rs 800,000 on an annual basis. This budget could be reshuffled to purchasing more sustainable alternatives. Indeed, the higher cost of alternatives to

single-use plastics could be balanced though a mix of combined measures involving elimination, reduction and replacement. For example, the cost saving for eliminating shower caps and/or the saving from drastically reducing the straws could be invested in sourcing more sustainable items such as paper straws, made only available on request.

#### **4.1.6 Identification of main Obstacles and Opportunities for the Purchase of more Alternatives to Single-Use Plastics by Hospitality Sector Stakeholders**

In general hotels in Mauritius are moving towards the banning of single-use plastic items such as plastic straws, stirrers, shower caps and toiletries. Nevertheless, the luxury brand image associated with the hotel resorts in Mauritius comes with certain expectations, and hoteliers are concerned about their reputation if they do not provide amenities that guests are used to find in hotel rooms such as room toiletries, shower caps and straws for cocktails among others. Hotels struggle to find adequate replacements since some substitutes have certain limitations. For example, depending on the quality, paper straws can fall apart while in the drink.

In contrast, smaller and mid-sized hotels which offer lower room rates than luxury hotels cannot adopt the more costly eco-friendly items and have therefore opted to ban plastic straws altogether.

The majority of hotel interviewees expressed the inherent difficulty for finding appropriate substitutes for single-use plastics and at affordable prices. It is widely acknowledged that once the market becomes more competitive, prices will inevitably go down, as has been the case in other parts of the world.

In some cases, the issue is the availability of more eco-friendly options produced locally. In fact, the majority of existing substitutes are imported from overseas and their comparatively higher carbon footprint remains a bone of contention for the hospitality stakeholders.

Additionally, there is a lack of knowledge within the sector on sustainable alternatives and their availability in Mauritius. According to the organisation 'travel without plastic', the obstacles to adoption of the alternatives to single use plastic include<sup>56</sup>:

- The attitude of decision-makers in hotels and Top Management's buy-in
- Cost of alternatives to single-use plastics
- Lack of knowledge of alternatives by decision-makers in hotels
- Availability of alternatives
- Concerns over health and safety
- Concerns of the true environmental impact of the alternatives
- Worried about customer reactions
- Not knowing how to communicate the changes to customers
- It could make extra work for staff

Suppliers and hotels are optimistic that with better regulatory framework and incentives coming from the Government, a shift in both demand and supply can be expected. They are calling for Government intervention and policy changes in the form of subsidies or lower custom duties on

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<sup>56</sup> <https://www.travelwithoutplastic.com/about>

the imports of these alternatives to single-use plastic items and increase research and development to spur local production of biodegradable items similar to Outgrowing Ltd.

Legislation and Government policy would constitute the primary enablers of decreasing single-use plastics consumption in Mauritius.

By introducing bans and sustainability criteria for these items in their procurement policy, hotels can place themselves ahead of legislation and be ready for the upcoming changes.

Additionally, it makes business sense. If adequate policies and strategies are put in place the cost benefit of eliminating single use plastics can be substantial. For instance, eliminating the consumption of water plastic bottles to be substituted with water dispenser or refillable glass bottles, or replacing room amenities for refillable dispensers can reduce cost in short-medium term (see Annex 2, Heritage Resorts Case Study: Elimination of single-use plastics).

Finally, it can be used as a valuable marketing and brand image tool. Plastic pollution is a global issue at the forefront of global environmental campaigns. By joining this movement and properly communicating to customers, hotels can attract a growing market of environmentally conscious tourists while helping to protect Mauritius tourism industry starred by its stunning nature and paradise beaches.

## CHAPTER FIVE: DEFINITION OF SUSTAINABILITY CRITERIA

### 5.1 Definition of sustainability criteria and means of verification of the three product/service sub-categories in focus

Based on the information presented in preceding Chapters 2, 3 and 4, this chapter develops a list of sustainability criteria and means of verification of the three products in focus which can be used by buyers from the hospitality sector. These criteria are realistic and relevant to the country's demand and supply characteristics and the majority of which have been validated by our survey respondents.

The following tables summarises the validated sustainability criteria for the three products in focus, with emphasis laid on the environmental sustainability criteria.

#### 5.1.1 Air Conditioning

Regarding air conditioning systems, the primary sustainability criterion pertains to its energy efficiency while good working conditions and fair-trade practices are at the forefront of social considerations. As for the economic criteria, it is important to have qualified after-sales and maintenance services by HVAC companies.

Aspect	SUSTAINABILITY CRITERIA	MEANS OF VERIFICATION
<b>Environmental criteria</b>		
<b>Energy Use</b>	Energy efficiency ratio EER, SEER, COP	<ul style="list-style-type: none"> <li>EU Energy efficiency labelling indicating average annual energy consumption (Class A to G), COP, EER/SEER and other related info provided by AC manufacturers</li> </ul>

		<ul style="list-style-type: none"> <li>• ISO certifications for testing and rating for performance</li> <li>• Mauritius energy efficiency regulations</li> <li>• The Mauritius Building Energy Audit Tool (MBEAT) available at the Energy Efficiency Management Office (EEMO)</li> </ul>
<b>Refrigerant</b>	Use of low-impact refrigerant (e.g. R-32)	<ul style="list-style-type: none"> <li>• HVAC suppliers and AC installation technicians product specifications and technical sheets.</li> <li>• ISO certifications</li> <li>• International Standards in Refrigeration and Air-Conditioning (UNEP) for refrigerants</li> </ul>
<b>Noise Emissions</b>	Sound output – power and pressure in dB (A)	<ul style="list-style-type: none"> <li>• Environmental Protection (environmental standards for noise) regulations 1997</li> <li>• Occupational Safety and Health (Noise at Work) Regulations 2012</li> <li>• EU Energy noise standards</li> </ul>
<b>Materials</b>	<p>No hazardous materials including toxic substances and heavy metals</p> <p>Percentage of plastic materials/components which can be recycled</p> <p>Material components are modular, detachable, easy to dismantle and can be individually replaced</p>	<ul style="list-style-type: none"> <li>• HVAC suppliers and AC installation technicians product specifications and technical sheets</li> <li>• Manufacturer or HVAC Company has an Environmental Management System (EMS) in place such as ISO 14001</li> </ul>
<b>Packaging</b>	Environment-friendly packaging (no PVC or chlorine)	<ul style="list-style-type: none"> <li>• Manufacturer product specifications and technical sheets</li> <li>• Manufacturer/HVAC suppliers have EMS in place such as ISO 14001</li> </ul>
<b>Installation &amp; Maintenance</b>	Installation and servicing by qualified / certified technician	<ul style="list-style-type: none"> <li>• Manufacturer product specifications and technical sheets</li> <li>• After-sell service and/or training provided by supplier</li> </ul>
<b>Disposal</b>	Proper disposal of equipment after life	<ul style="list-style-type: none"> <li>• Manufacturer product specifications and technical sheets</li> <li>• HVAC suppliers have EMS in place and proper waste disposal programme</li> <li>• Manufacturer gives end-of-life instructions for end of life disposal</li> <li>• HVAC supplier has a buy-back program</li> </ul>
<b>Economic criteria</b>		
<b>Energy consumption</b>	Cost of Operation (electricity consumption) and initial investment in AC equipment	<ul style="list-style-type: none"> <li>• Electricity bill and initial quotations from HVAC companies</li> <li>•</li> </ul>
<b>Life of product</b>	Estimated useful life of the AC system	<ul style="list-style-type: none"> <li>• Product description and technical sheets</li> </ul>

		<ul style="list-style-type: none"> <li>• HVAC company expert advice</li> </ul>
<b>Service provided</b>	After-Sales and Maintenance Costs over the lifetime of the AC system	<ul style="list-style-type: none"> <li>• HVAC Service Level Agreement</li> </ul>
<b>Social criteria</b>		
<b>Occupational safety &amp; health</b>	Equipment is in safe conditions for operation and maintenance	<ul style="list-style-type: none"> <li>• Supplier provide equipment guarantee</li> <li>• After-sell service and/or training provided by supplier</li> <li>• Supplier complies with H&amp;S regulations.</li> <li>• Supplier has an occupational health and safety certification (i.e. OSHAS 18001)</li> </ul>
<b>Training for air conditioning technicians</b>	Technicians are properly trained	<ul style="list-style-type: none"> <li>• Supplier provide proper training for technicians</li> </ul>
<b>Fair trade</b>	Product has been manufactured under environment, social and economic ethical conditions ethical conditions.	<ul style="list-style-type: none"> <li>• Ecolabels (i.e. Fair Trade).</li> </ul>

Table 29: Sustainability Criteria and Means of Verification for Air Conditioning Systems

### 5.1.2 Fresh produce

Aspect	SUSTAINABILITY CRITERIA	MEANS OF VERIFICATION
<b>Environmental criteria</b>		
<b>Local Production</b>	Organically produced - Uses only organic inputs for farming, no agrochemical inputs (e.g. chemical fertilisers, pesticides, herbicides), crop rotation among others	<ul style="list-style-type: none"> <li>• Laboratory Tests for chemical residues (e.g. QuantiLAB)</li> <li>• Organic Certification via ECOCERT</li> <li>• Affiliation with local ecolabels such as Le Velo Vert, BioLokal</li> <li>• Site visits and inspections of farms</li> <li>• Increased import of bio inputs</li> </ul>
	Sustainable Farming: Adopting good agricultural practices and limited/rational use of agrochemicals	<ul style="list-style-type: none"> <li>• Laboratory Tests by the MAIFS for MRLS at farm gate and markets</li> <li>• Laboratory Tests for chemical residues (e.g. QuantiLAB)</li> <li>• Certification of Good Agricultural Practices e.g. MauriGAP, GLOBALGAP</li> <li>• Site visits and inspections of farms</li> <li>• Reduced import of agro-chemicals</li> </ul>
<b>Traceability</b>	Traceability and documentation of goods / Chain of custody	<ul style="list-style-type: none"> <li>• Distributors' chain of supply and records</li> <li>• Certification of Good Agricultural Practices</li> </ul>
<b>Food waste</b>	Minimal waste during harvest Supplier has a strategy for processing or selling of 'misfit' fruits and vegetables minimising waste	<ul style="list-style-type: none"> <li>• Certification of Good Agricultural Practices (i.e. MauriGAP)</li> <li>• Yield records</li> </ul>

<b>Packaging</b>	Minimal packaging with little to no plastic packaging and use of reusable delivery crates, Packaged with recyclable materials, No hazardous or toxic materials in packaging	<ul style="list-style-type: none"> <li>• Certification of Good Agricultural Practices</li> <li>• Sustainability reports</li> <li>• Environmental management system in place</li> </ul>
<b>Storage and Transport</b>	Minimal energy use during storage  Short distance travelled during delivery	<ul style="list-style-type: none"> <li>• Supplier has an environmental/energy management system in place</li> <li>• From 'farm to table' delivery method</li> <li>• Local farmers</li> </ul>
<b>Economic criteria</b>		
<b>Price</b>	The price of the product is according to its quality  Local suppliers are flexible to support buyer manage the higher costs in exchange of continuous demand	<ul style="list-style-type: none"> <li>• Certification of good agricultural practices</li> <li>• Agreement between supplier and buyer</li> </ul>
<b>Social criteria</b>		
<b>Food/product safety</b>	Availability of safe fresh produce for human consumption free from dangerous amounts of chemical such as pesticides and fertilizers  Fresh produce is traceable	<ul style="list-style-type: none"> <li>• Results of MRL tests</li> <li>• Certification for Maximum Residue Level (MRL)</li> <li>• Certification of good agricultural practices</li> <li>• Company profiles</li> </ul>
<b>Occupational safety &amp; health</b>	Supplier ensure healthy and safe conditions for workers	<ul style="list-style-type: none"> <li>• Supplier complies with H&amp;S regulations</li> <li>• Supplier holds a H&amp;S certification (i.e. OSHAS 18001)</li> </ul>
<b>Training for workers</b>	Workers are trained on sustainable farming practices	<ul style="list-style-type: none"> <li>• Farmer provides training for workers on sustainable farming practices and safety</li> </ul>
<b>Fair Trade</b>	Product has been manufactured under environment, social and economic ethical conditions	<ul style="list-style-type: none"> <li>• Ecolabels (i.e. Fair Trade)</li> <li>• Corporate social responsibility policy and reports</li> </ul>
<b>Improving livelihood of farmers and business opportunities</b>	Supplier support local small farmers and communities  Supplier support the creation of other business supporting their communities	<ul style="list-style-type: none"> <li>• Product procured from small farmers</li> <li>• Supplier intermediary profiles, websites, sustainability reports</li> <li>• Industry association, feedback from farmers</li> </ul>

Table 30: Sustainability Criteria and Means of Verification for Fresh Produce

### 5.1.3 Alternatives to single use plastics

Aspect	SUSTAINABILITY CRITERIA	MEANS OF VERIFICATION
<b>Environmental criteria</b>		

<b>Raw material: Biodegradable (Bio-based and Compostable Plastic), recycled</b>	Partly or fully made from renewable natural resources such as corn starch, potato starch, sugar cane or palm leaves  Biodegradable through industrial composting  ‘Food grade plastics’ - Safe to be in contact with food  Made from recycled plastics	<ul style="list-style-type: none"> <li>• Compliance with ISO Standards and ASTM certification: ISO 17088, EN 13432, EN 14995, ASTM D 6400</li> <li>• EU No 10/2011 certification for food safety</li> <li>• Suppliers’ technical product sheets / product description</li> </ul>
<b>Raw material: Paper / Bamboo/ Wood Substitutes</b>	Traceability of origin/chain of custody  Made from sustainable sourced materials (i.e. paper, wood, bamboo)  Product made from materials ethically sourced and manufactured	<ul style="list-style-type: none"> <li>• Forest Stewardship Council (FSC) and other ecolabels</li> <li>• Ecolabels (i.e. Fair Trade)</li> <li>• Corporate social responsibility policy and reports of manufacturers</li> <li>• ISO certification e.g. ISO 26000 guidance standard on social responsibility</li> </ul>
<b>Packaging</b>	Supplier minimise packaging materials, particularly non environmentally friendly	<ul style="list-style-type: none"> <li>• Manufacturer product specifications and technical sheets</li> </ul>
<b>Waste Disposal</b>	Biodegradable plastics with the ASTM D6400-12 standard can be aerobically composted in Municipal or Industrial facilities.  Can be composted or recycled by local recyclers for exports	<ul style="list-style-type: none"> <li>• Compliance with ISO Standards and ASTM certification: ISO 17088, EN 13432, EN 14995, ASTM D 6400</li> <li>• Suppliers provide guarantee that product can be recycled locally or that there is proper local collection to be exported and adequately recycled</li> </ul>
<b>Environmental management</b>	control, Manufacturer has an environmental management system and minimise energy use  Manufacturer tracks carbon emissions  Manufacturer has a solid waste management plant	<ul style="list-style-type: none"> <li>• Manufacturer is certified ISO 14001 for environmental management systems and/or energy management systems</li> <li>• Manufacturers’ company profile/ sustainability report/ environmental compliance certificates</li> <li>• Manufacturers’ company profile / environmental compliance certificates</li> </ul>
<b>Socio-economic criteria</b>		
<b>Occupational safety &amp; health</b>	Supplier ensure healthy and safe conditions for workers	<ul style="list-style-type: none"> <li>• Supplier complies with H&amp;S regulations</li> </ul>

		<ul style="list-style-type: none"> <li>• Supplier holds a H&amp;S certification (i.e. OSHAS 18001)</li> </ul>
<b>Employment</b>	Creation of employment for locally produced substitutes	<ul style="list-style-type: none"> <li>• Sustainability reports, annual reports, company websites</li> <li>• 'Made in Mauritius' label</li> </ul>
<b>Livelihoods</b>	Reduced impact on marine ecosystem (including fish supply) and ocean pollution	<ul style="list-style-type: none"> <li>• Annual fish catch, reports from relevant Government bodies and Mauritius Fishermen Co-operative Federation</li> </ul>

*Table 31: Sustainability Criteria and Means of Verification for Alternatives to Single-Use Plastics*

While the environmental criteria may differ for each product category, it can be argued that all product categories should be evaluated under similar set of social and economic criteria. For instance, all product categories can influence the structure of employment based on gender equality and diversity, comply with relevant labour laws, provide good employment conditions and adopt sound occupational health and safety measures for their employees. Moreover, the practice of transparent and fair trade practices and good corporate social responsibility are also deemed to be important socio-economic sustainability criteria during the selection of suppliers during the procurement process.

## CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Conclusions

This section aims to summarise the recommendations for hospitality sector procurers to introduce and develop sustainable strategies and procurement action plans to increase the consumption of sustainable products.

#### 6.1.1 AIR CONDITONING

The main barrier for the procurement of efficient air conditioning seems to be the higher prices and investment. The business case needs to be shown to hospitality procurers. Awareness, training, information and financial incentives should be the approach to drive the shift.

- **Awareness and training** must be provided to both **hotel procurers and hotel maintenance managers** in order to increase their knowledge and understanding of the complexity of air conditioning equipment as well as stay abreast of new cutting-edge technology. This will allow them to make more informed decision and chose the right equipment according to their necessities, maximising energy efficiency.
- HVCA suppliers should provide **information and advice on technical aspects** including key performance indicators pertaining to the AC equipment (such as EER, SEER, COP, noise level, anti-rust product feature) and refrigerants used (zero ODP and low GWP refrigerants) to support procurers during the purchasing decision to choose the most energy efficient option according to their needs and resources.
- Budget measures in 2018-2019 made mention of **mandatory energy labelling of ACs** although this not been implemented to-date given certain issues raised by importers regarding the applicability of the existing Mauritian Standard MS 200:2013. Furthermore, the procurement exercises for setting up the testing facilities for ACs at the MSB have failed. The EEMO is presently considering alternative means to assess energy performance of ACs being imported in Mauritius. **Energy Efficiency labelling** on all AC equipment should be made mandatory. This will promote sales of the most energy efficient appliances. Labelling requirements for AC equipment should also encompass the type of refrigerant used and its corresponding GWP index.
- **Electricity Usage Projection.** Hotels should request a reliable and accurate forecasting model for electricity consumption for various HVAC options being considered prior to purchase. This will provide a more realistic 'overall lifetime operating cost' of the air conditioning system, thereby justifying an AC system, which might initially be more expensive but has significantly lower operating costs.
- **Setting of Minimum Energy Performance Standard (MEPS).** As indicated in section 2.4.1 there is a 25% levy on importation of inefficient air conditioners having an energy efficiency class lower than B. Further needed efforts should establish a MEPS that can be imported in the islands. AC equipment with low upfront cost and having lower energy efficiency as compared to MEPS needs to be banned from the market given it high inefficiency and operating cost for the end users.

- **Awareness on the most sustainable and efficient options in the market** such as new generation refrigerant R-32, which has a significantly lower GWP and is more energy efficient, being available on the local market should be increased. Hotels should privilege the adoption of DC Inverter split units using R-32 for maximum energy performance and lower carbon footprint. In addition, if the equipment uses R-32 refrigerant, ensuring that the HVAC supplier has qualified technicians trained in handling R-32 refrigerant is deemed of utmost importance. The **transition to low GWP and energy-efficient refrigerants** could be achieved by providing incentives to favour energy-efficient systems using low-GWP refrigerants or imposing higher customs duty on systems using high-GWP refrigerants.
- One of the main barriers for choosing more advanced cooling technologies such as VRF is associated with their initial heavy investment. The purchase of an air conditioning system is a major capital expense for hotels. **Innovative equipment financing plans** such as green equipment leasing, OPEX (monthly operating expense financing plan offered by HVAC suppliers) should be proposed to the hospitality players.
- **After-sales service and the maintenance costs** of the AC equipment throughout its lifetime should also be factored during the procurement process.
- **Mapping and benchmarking codes of practice** of local HVAC companies with those at international level would also help raise the quality standards of local air conditioning suppliers.

Overall, it is important to make energy use transparent, inform end-users about life-cycle costs, ban inefficient products from the market and provide incentives to accelerate market penetration of R-32 refrigerant.

Consumers, including hotels, are influenced by the price of the products, therefore it is important to show the business case and demonstrate to hotels that an initial investment in more efficient technology will pay-back in a short-medium term period and will help them to reduce their energy consumption and make big saving in a long term period. To this end, incentives and sensitisation campaigns must be implemented to promote use of environmentally friendly products.

The success of the above measures relies on the availability of adequate funds and funding sources such as public organisations (Green public procurement, GreenTax, Rebate schemes) or private sector (Green loan financing schemes with resellers and Green loan financing schemes with commercial end users of RAC appliances). The Green Climate Fund, Global Environment Facility, Multilateral Fund, NAMA facility and the African Development Bank could also be tapped to support the adoption of green cooling technologies/ systems<sup>57</sup>.

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<sup>57</sup> Ministry of Social Security, National Solidarity, and Environment and Sustainable Development and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) (2017). *Report of National Workshop - Policy and Technology Recommendations for the RAC Sector in Mauritius*. Available at: <http://environment.govmu.org/English/DOCUMENTS/OZONE%20DAY%202017%20-%20NATIONAL%20WORKSHOP%20AND%20REGIONAL%20WORKSHOP.PDF>

Moreover, energy efficiency labelling of air conditioners is still voluntary. The introduction of new legislation in 2019 will help hotels and consumers make more informed decision and choose the most suited energy efficiency grade of the cooling system they are purchasing.

### 6.1.2 FRESH FRUITS & VEGETABLES

Organic and certified produce have yet to feature in the procurement process of hospitality stakeholders. The industry recognises that the transition to organic and certified fresh fruits and vegetables such as MauriGAP is not on their agenda for the foreseeable future owing to two main impediments: (a) the premium price these products command (b) lack of supply of locally grown certified produce.

- The current local supply of certified fresh produce does not cover the demand from hotels. Measures must be taken to **increase local production of certified and/or organic products**.
- MauriGAP certification is a voluntary certification. The **development and enforcement of more strict regulations on mandatory good agricultural practices** would promote the adoption of MauriGAP and/or other agricultural standards to increase the local supply of certified and/or organic fresh produce.
- Although MauriGAP certification is free other organic certifications are costly. Moreover, the laboratory tests on agrochemical residues are also expensive and together with a lengthy and tedious accreditation process, are restricting the overall growth of sustainable agriculture in Mauritius. **Financing mechanisms** from the Ministry of Agro-Industry and Food Security and relevant subsidies would **assist the local growers** such as:
  - package of incentives comprising financial assistance and other accompanying measures from MAIFS to trigger greater interest and encourage venture of small-scale farmers in MauriGAP certification for their fresh produce.
  - Lease of State lands: facilitating access of small holder farmers to State lands to sustain their initiatives in leveraging production potential for higher scale economies in biopharming systems.
- The majority of hotels typically use middlemen and big suppliers for their fresh produce. Nonetheless, by **working directly with local farmers** in the vicinity of the hotels and having formalised agreements with them, hotels could ensure their demand is covered supporting local farmers to increase the sustainability of their business and income and encouraging them to improve their agricultural practices and get certified. This would also help to reduce the emissions from transportation and engaging positively with the local community.
- Good agricultural practices and organic farming are still being introduced in Mauritius nevertheless, according to the organic farmers interviewed a wide **range of measures are needed** to attain Government's vision to achieve 50% of vegetables and fruits production as per bio-norms, some of those are listed below:

- Increase in agricultural leases of State land by the Government to allow current and potential planters to scale their plantations; leading to a higher yield and corresponding lower prices of certified produce.
- More conducive legal framework with regards to the imports of 'non-treated seeds' and providing adequate infrastructures such as organic seeds nursery unit, 100% organic composting plant and an organic farming school / research and development unit
- Increase capacity-building of local farmers and promote sharing of knowledge and technical know-how
- Government financial support during the initial two-years land conversion process during which the planters' revenue plummets
- More Government schemes and incentives to support the local market such as financial assistance, subsidies and tax exemption on equipment (e.g. sheltered farming, greenhouses, irrigation, and other equipment)
- Professionalising the sector, educating local planters and improving traceability of products
- Promoting the local production by providing Government subsidies on sustainably grown fruits and vegetables

### 6.1.3 ALTERNATIVES TO SINGLE-USE PLASTICS

The majority of hotel establishments consider finding alternatives to single-use plastics as critically important, with a significant number of hotels already implementing measures to limit the use of single-use plastics across the hotel operations. A few respondents highlighted the importance of setting up full-fledged local recycling plants as the majority of recyclers are exporting the plastics to other countries such as South Africa to be recycled. Moreover, hospitality players stand ready to purchase eco-friendly products from local producers.

- It is important to acknowledge that the main objective of hotels should be to **eliminate and reduce the consumption of single use plastic items**. When this is not possible alternative options described in this study should be considered although based on the understanding that they might also have negative environmental impacts.
- **Sustainability criteria** should be introduced by hospitality procurers when sourcing alternatives to single-use plastics according to relevant sustainability standards ensuring they can be adequately disposed at the end of their life cycle, for example locally recycled or can biodegrade.
- The **selection of suppliers** should be based on the later own sustainability profile. This will lead to suppliers offering more environmentally friendly and 'plastic-free' products and adopting sound environmental management practices in their own operations and in fine, contribute to the development of a circular economy.
- Provision of **training and awareness** on single-use plastic reduction and alternative options is crucial to enable hotels to introduce these suitability criteria in their tender requirements and to understand the negative impacts of these alternatives products even if they are certified and classified as eco-friendly options.

- The majority of substitutes are imported, even if they are more eco-friendly options, this increases their carbon footprint. This highlights the need of **imposing bans**, mainly on unnecessary items such as plastic straws, plastic water bottles and shower caps.
- **Educating and sensitising guests and tourists** during their stay is critical in decreasing the use of single-use plastics in hotels. Most often, guests are sensitive to these environmentally friendly measures and find them most commendable.
- The current **regulatory framework** is deemed insufficient to reduce the consumption of conventional single-use plastics. Formulation and enactment of policy to ban and restrict this consumption in line with global trends should be a priority for the local government. The Mauritius government is currently working in different policies and strategies to combat plastic pollution. The hospitality sector should also advocate for sectoral policies and agreements.
- Lowering the price of current alternatives to single-use plastics will further increase its widespread adoption. Government can intervene by providing **incentives** to both manufacturers/importers of alternatives to single-use plastics and hotel establishments, which adopt the latter.
- Following the recent budget 2019-2020, Government is promoting plastic **waste recycling** by increasing the financial incentive for export of used PET bottles from Rs5 to Rs15 per kg. Further efforts should focus on the development of a **plastic waste circular economy approach for Mauritius and the IOC region**.
- **Research and development and investment** in new technology such as the production of 'vegan bottles' from sugar cane would be a welcome measure in reducing the consumption of single-use plastics on the island. Similarly, more local recycling plants, which can recycle a wide range of plastic types, would be needed.
- Hospitality establishments should continue to **work closely with their suppliers** and look for possible avenues to reduce unnecessary plastic packaging in hotel operations and food & beverage. By incorporating sustainability criteria in their procurement process, suppliers to the hospitality industry will need to adhere to more environmentally sound practices and provide more sustainable products. In addition, recycling of plastics needs to be fully adopted by hotels.
- Joining forces with international initiatives such as the **Global Tourism Plastic Initiative**<sup>58</sup> **making pledges** to reduce problematic single use plastics would also help to raise awareness and would enable hotels, businesses, governments, and other tourism stakeholders to take concerted action, leading by example in the shift towards circularity in the use of plastics.

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<sup>58</sup> <https://www.oneplanetnetwork.org/sustainable-tourism/global-tourism-plastics-initiative>

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