

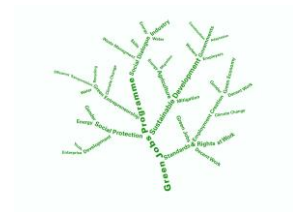


International
Labour
Office
Geneva

Skills for green jobs in Mauritius

**Unedited background
country study**

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ILO Skills and
Employability
Department

Green Jobs Programme
Job Creation and Enterprise
Development Department

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First published 2012

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ILO Cataloguing in Publication Data

Dubois, Roland; Juwaheer, Yuvna

Skills for green jobs in Mauritius / Ꞥ lead researcher Roland Dubois, researcher Yuvna Juwaheer ; International Labour Office. - Geneva: ILO, 2012

1 v.

ISBN: 9789221267454 (web pdf)

International Labour Office.

green jobs / skill / skill requirements / vocational training / training needs / training needs / human resources development / employment creation / Mauritius

13.01.3

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This report has been prepared in the framework of country-level work supported by the ILO. While following the same methodology as the one applied for the global synthesis report "Skills for green jobs. A global view" (Strietska-Ilina et al. 2011), it is not among the 21 country reports analyzed in the synthesis report.

August 2012

Table of contents

List of abbreviations	vii
1. Introduction	1
1.1 Background and rationale.....	1
1.2 Overall objective	1
1.3 Methodology	2
2. The policy context: sustainable development and the role of skills	3
2.1. Key challenges.....	3
2.2 The response strategy	4
2.2.1 Policies and strategies for sustainable development in Mauritius	4
2.2.2 Green response to the current economic crisis	5
2.3 The skills development strategy in response to greening	8
2.3.1 Working Group Education.....	8
2.3.2 Working Group Employment/Economy	8
3. Anticipation and provision of skills	17
3.1 Green structural change and (re)training needs.....	17
3.1.1 Green restructuring and its impact on the labour market	18
3.1.2 Private sector initiatives	19
3.1.2 Study framework on green restructuring	19
3.2 Identification of (re)training needs	20
3.2.1 Obstacles in making the green shift	21
3.2.2 Why re-orient? The industrial policy regime	22
3.2.3 Deepening and broadening affirmative programmes	28
3.2.4 Likely labour market changes under a green/greener economy	29
4. Conclusions	29
4.1 Main ‘greening’ shifts in the economy and labour market	29
4.2 Skills implications and development	31
4.2.1 Anticipation and identification of skill needs	31
5. Recommendations	33
5.1 Introduction	33
5.1.1 A coherent HRD strategy.....	34
5.1.2 The incorporation of Green Skills in all its Certificates and Diploma courses by 2015 of the main TVET provider, Mauritius Institute of Training and Development.....	35

5.1.3 Universities to re-structure their courses to address sustainable development by 2017	35
5.1.4 A conversion post graduate certificate/diploma.....	35
5.1.5 Joint collaboration of local public universities and the MITD.....	35
5.1.6 Institutional and human capacity building.....	35
5.1.7 Special sponsorship scheme offered by HRDC	36
5.1.8 Sensitization campaign.....	36
5.2 Implementation	36
5.3 Suggestions for an MID agenda	36
List of references.....	38

List of abbreviations

AFD	Agence Française de Développement
ESD	Education for Sustainable Development
CEB	Central Electricity Board
EU	European Union
GHG	Greenhouse gas
GRI	Global Reporting Initiative
HRD	Human Resource Development
HRDC	Human Resource Development Council
ICT	Information and communication technology
ILO	International Labour Organization
IRS	Integrated Residence Schemes
JICA	Japanese International Cooperation Agency
MCB	Mauritius Commercial Bank
MID	Maurice Ile Durable
MITD	Mauritius Institute of Training and Development
MQA	Mauritius Qualifications Authority
NCB	National Computer Board
SIDS	Small Island Developing State
TVET	Technical and Vocational Education and Training
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UOM	University of Mauritius

List of tables and figures

Table 1	List of sectors chosen for the study	Page 8
Table 2	Course modules in universities in Mauritius	Page 17
Figure 1	Land Use Pattern (hectares)	Page 32
Figure 2	Trends in area cultivated (1995-2009)	Page 33

1. Introduction

1.1 Background and rationale

Mauritius is fully engaged in developing a ‘Maurice Ile Durable’ (MID) policy, strategy and action plan. The MID vision was first announced by the Prime Minister of Mauritius in 2008. Initially the focus of the MID was geared towards minimizing the dependency on fossil fuels through increased utilisation of renewable energy and a more efficient use of energy in general on the island. It was soon realised that sustainable development in Mauritius is more encompassing and cuts across numerous sectors and is not limited to energy. Working groups with a wide range of stakeholders in the 5 Es (Environment, Energy, Education, Economy and Equity) were held from June to July 2011. Recommendations were proposed to be incorporated in the MID Policy, Strategy and Action Plan currently being developed. Moreover, existing policies such as the National Environment Policy 2007 and the Long Term Energy policy 2009-25 already pave the way for sustainable development in the island.

Meeting skills needs is a critical factor for productivity, employment growth and development in the context of MID. The International Labour Organization (ILO), as part of the Green Jobs Programme for Mauritius, wanted to undertake a study on the skills needed to realize the potential of green jobs in Mauritius. Right skills for green jobs are a key prerequisite to make the transition to a greener economy happen in Mauritius.

The study intends to assess, analyze and promote the creation of decent jobs as a consequence of the needed environmental and energy policies. Technological change, globalisation, ageing populations and climate change will dramatically increase the pace of change in labour market and skill needs, for new and current jobs alike. The growing importance of sustainable development and the shift to a low-carbon economy will also require new skills and qualifications, offering great potential for the creation of green jobs but also implying structural change and transformation of existing jobs.

The study aims at contributing to the development process of MID policy, strategy and action plan through the identification of skills for the creation of green jobs in support of the MID vision.

Today, skills gaps are already recognised as a major bottleneck in a number of sectors, such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services, manufacturing. The adoption and dissemination of clean technologies requires skills in technology application, adaptation and maintenance. Skills are also crucial for economies and businesses, workers and entrepreneurs, to adapt to changes as a consequence of the proposed MID vision.

In this context, the ILO has sponsored this policy applied research into skill needs for greener economies with respect to new and changing occupational profiles, greening existing occupations, and identifying skills and occupations that become obsolete. It is part of a series of 4 studies related to green jobs commissioned by the ILO.

1.2 Overall objective

The objective of the assignment is to identify strategic skills development responses of the country in the light of the transition towards MID. The study aims to contribute to the strengthening of the national human resources development (HRD) strategy, thus ensuring that Mauritius will avail of the appropriate human resources needed for a green economy based on decent work. The assignment aims at supporting the MID policy, strategy and action plan to be developed in Mauritius and is in line with the proposed Renewable Energy Master Plan to be developed for Mauritius.

1.3 Methodology

The project emphasised stakeholder participation in the data collection. Hence the research team endeavoured to collect and triangulate data from different sources and by different means. The following methods were applied for data collection:

- a) A list of sectors most likely to be affected by sustainable development has been drawn up according to their contribution to the GDP of Mauritius (see Table 1 below).
- b) Literature review to collect as much information as is available relating to sustainable development in Mauritius.
- c) Face-to-face interviews, with the help of a structured questionnaire, were carried out to have the inputs of a list of key stakeholders Annex 1. Only seven of the stakeholders contacted were available for the interview. Two participants out of three who were emailed the questionnaire responded positively. Hence the present analysis pertains only to the sectors covered during the interview. The other sectors concerned will be handled after the New Year break.
- d) Due to shortage of time, no focus groups could be entertained. It is hoped that at least one or two focus groups could be arranged in January 2012.

Table 1: List of sectors chosen for the study

Percentage distribution of gross domestic product by industry group 2005 - 10						
	2005	2006	2007	2008	2009	2010
Agriculture, hunting, forestry and fishing	6	5.5	4.8	4.2	3.9	3.6
Manufacturing (EPZ)	7.4	7.5	7.7	6.2	6.9	6.5
Tourism	7.7	8.5	9.4	9.2	6.6	7.0
Financial Intermediation	10.3	10.4	10.5	10.8	10.2	10.0
Construction	5.6	5.6	6.4	6.9	6.9	6.9
Wholesale and Retail Trade	11.4	11.7	11.7	10.9	10.2	10.6
Information and communication technology (ICT)	5.3	5.4	5.5	5.3	5.9	6.4

Source: Central Statistics Office.

Besides the reason mentioned in Section 1.3a, the sectors were also chosen, because they are among the highest employers in Mauritian economy. The research team was also mindful of the ILO-UNEP-IOC-ITUC study, which indicated that green jobs and jobs with “shades of green” are likely to be developed in the following sectors/industries:

- Energy supply (carbon sequestration, co-generation, and renewables);
- Transport (more fuel-efficient vehicles, car-sharing, public transport);
- Manufacturing (clean technologies, energy efficiency);

- Buildings (green buildings, retro-fitting, solar heating);
- Materials management (recycling, de-materialization);
- Retail (eco-labels, non-product services);
- Agriculture (soil conservation, water efficiency, organic farming); and
- Forestry (reforestation, agro-forestry).

2. The policy context: sustainable development and the role of skills

2.1. Key challenges

Mauritius has developed from a low-income, agrarian-based economy to a middle-income diversified economy with growing industrial, financial, information and communications technology and tourism sectors. An economic growth rate averaging 5-6 per cent yearly for the past few decades has enhanced the wellbeing of the population, as captured by its high Human Development Index of 0.804.

Rising standards of living have been accompanied by an increased demand for energy resources. Mauritius has developed a strong reliance on imported fossil fuels for its energy needs close to 82 per cent (Digest of environmental statistics, 2009), and this dependency is increasing, resulting in a rise in carbon dioxide emissions associated with the burning of fossil fuels. Mauritius had per capita carbon dioxide emission of 2.7 tons in 2010 (ibid). Thus, the proper use of the environment has become a divisive topic. For instance, the shrinking of green space in Mauritius is an indisputable fact, although the process is gradual. The spread of residential, commercial and industrial areas, together with public infrastructure, is tantamount to the replacement of natural greenery by man-made structures. Maintaining the green cover of Mauritius requires the collaboration of all stakeholders.

Mauritius is known for its valuable resources, including oceans, coastal environments, biodiversity and most importantly, human resources. Its potential is recognized, though the challenge remains whether these resources are being used in a sustainable way for the well-being of present and future generations. Mauritius faces unique challenges that derive, inter alia, from its small physical size, geographical location, which is remote and insular, its environmental fragility, as well as its disaster proneness. Indeed because of its remote position, Mauritius has developed a more fragile ecosystem. As it has limited capacity to respond, Mauritius is vulnerable to natural and environmental disasters, the most frequent ones being tropical cyclones, hurricanes and storms, and possibly tsunami.

Since Mauritius is surrounded by sea, it is prone to the impact of sea pollution and water rise causing beach erosion and coastal change. Climate change though is considered to be, by far, the most severe factor in its consequences and challenge. The 2001 report of the Intergovernmental Panel on Climate Change reaffirmed the fact that “the small island States account for less than 1 per cent of global greenhouse gas (GHG) emissions but are among the most vulnerable to the potential adverse effects of climate change and sea level rise”.

The unique characteristics of small islands, both geographical and economic, limit their ability for a sound management of wastes. Mauritius is more vulnerable to this issue than other developing countries, as it has an excess amount of wastes produced by tourism, earmarked to be its first economic pillar. Therefore, their disposal can often create problems as Mauritius has limited facilities. The management of toxic substances such as pesticides, waste oil, heavy metals, can also be problematic as Mauritius does not have the systems or physical capacity to isolate and dispose of such substances. Sewage treatment facilities are inadequate either because they are overloaded or because of a shortage of trained manpower. As a result, poorly - treated effluent is often discharged into the environment.

The vulnerability of Mauritius as a Small Island Developing State (SIDS) with its heavy dependence on fossil fuels and major food imports along with visible climatic changes has enhanced the need for Mauritius to adopt a different kind of economic growth. As Mrs Djaheezah Subratty (a representative of Ministry of Environment and Sustainable Development) said at the First Preparatory Committee of the 2012 UN Conference on Sustainable Development Discussion, ‘Mauritius as a SIDS believes that a green economy goes beyond a low-carbon economy, and embraces an ecosystem approach which values nature as an asset which we should cherish’. With an open economy which relies upon its natural resources and its people, including in terms of agriculture, fisheries and food security, and in terms of sectors such as tourism, manufacturing and services, a transition towards a green economy needs to be undertaken under the framework of sustainable development. This would require systematic national assessment of economic and environmental policy changes regarding key issues such as jobs and skills, investment, taxation, trade and development.

2.2 The response strategy

2.2.1 Policies and strategies for sustainable development in Mauritius

Mauritius is fully engaged in developing a ‘Maurice Ile Durable’ policy, strategy and action plan. MID was first announced by the Honorable Dr Navinchandra Ramgoolam, GCSK, Prime Minister of the Republic of Mauritius, as a long term vision aimed at promoting sustainable development. The main thrust of MID is to make Mauritius a world model of sustainable development, particularly in the context of small island states. This includes minimizing dependency on fossil fuels through increased utilization of renewable energy and a more efficient use of energy in general. The protection of the environment and the social dimension of development are also crucial aspects of MID. As Dr. Rama Sithanen, the former Mauritian Minister of Finance and Economic Development, said during the Budget 2008-09, ‘as a country that relies on around 80 per cent of its energy on imports, we (Mauritius) are extremely vulnerable’ and the MID Fund was then set up as an instrument to ‘build our energy independence whilst allowing us (Mauritius) to do our share in the fight against global warming’.

Donor agencies have also expressed strong support for enabling the materialization of the MID concept. The “Agence Francaise de Developpement” (AFD) signed a “Convention de Financement” to the amount of 1 M Euros for supporting the activities of the MID Fund in September 2009. With the help of Cybion, France, Professor Joel de Rosnay (a franco-mauritian scientist and special adviser to the PM on MID) introduced a website on the MID project, including a Web 2.0 interactive internet forum (<http://www/maurice-ile-durable.com>). It was launched by the Prime Minister in March 2009. The site hosted more than 100 original contributions and promoted a high level on dialogue. It was useful to the University of Mauritius (UOM) MID Group in defining the MID concept through a participative approach and in gauging attitudes towards MID.

In March 2009, the government organized a MID week which included a seminar at the UOM. Sensitization on the MID issue reached a climax through a series of activities widely covered by the mass media. About the same time, Joel de Rosnay’s comments on the Waste-to-Energy/Incineration Project raised much interest in the press and beyond.

The United Nations Development Programme (UNDP) was approached by the government towards supporting the MID project. A team was recruited to this effect and, later, a facilitator was also appointed in the person of Dr Francois Odendaal with the task of conducting national consultations with the aim of defining a MID policy. The latter process was expected to end in June 2010. The National Consultations were piloted by a dedicated Organizing Committee set up by the MID Fund Committee as the latter was already overloaded with proposals to consider under an initial MID strategic plan (Ministry of Public Utilities, 2008).

In September 2009, a National Steering Committee was set up at the level of the Prime Minister's Office in view of coordinating MID activities and giving a fair chance to non-energy projects under MID. Mr Osman Mahomed, Adviser to the Prime Minister, was appointed as Chairman of the Steering Committee which included representatives from parastatal bodies, UOM, as well as funding agencies like the UNDP and AFD. The latter has been a foremost supporter of MID through the provision of a credit facility of not less than Rs 1 billion available to government as well as to other stakeholders through commercial banks, for example. The AFD has given a tremendous push to the MID project, not only in terms of funds, but more importantly significant technical assistance.

A wide National Consultation Process was launched in February 2010 with the aim to come up with a Green Paper, elaborating and embodying the needs and aspirations of Mauritians and to develop a Shared Vision on MID. The Green Paper was submitted by Prof. Odendaal in April 2011 and Cabinet has been apprised of the contents of the document.

In the aftermath of the May 2010 elections, the Prime Minister set up a new Ministry of Environment and Sustainable Development, moving the MID responsibility away from the former Ministry of Renewable Energy and Public Utilities to the office of the Prime Minister. This exercise is believed to be crucial in view of facilitating the implementation of MID.

Initially the focus of the MID was geared towards increasing the use of renewable energy on the island. It was soon realised that sustainable development in Mauritius is more encompassing and cuts across numerous sectors and is not limited to energy. The government now intends to have a concrete MID Policy, a clear ten-year MID Strategy and a detailed MID Action Plan to pave the way for the sustainable development of Mauritius. In order to achieve this objective, the government has constituted six working groups to work out on the following themes, covering the 5Es of MID, namely Energy, Environment, Education, Employment and Equity. Each working group held four one-day workshops from mid June to the end of July 2011, with all concerned stakeholders from Ministries, parastatal bodies, public sector, local communities, employers, professionals, civil society as well as other associations. Reports of the MID consultative workshops were presented in August 2011 to the Minister of Environment and Sustainable Development. Taking into consideration the national MID vision, the working groups have accordingly made a series of recommendations with regard to the formulation of the MID policy, strategy and action plan. In the course of the workshops, the working groups identified concrete and coherent recommendations outlining the MID project.

The proposals of the six working groups are to be entrusted to a team of consultants who will be appointed in the near future. Furthermore, the Action Plan, which defines the priority projects to be implemented by the relevant ministries and stakeholders based on sector wise policies and strategies, is expected to be ready by early 2012. The Plan will include recommendations for an appropriate institutional and legislative framework for sustainable development to ensure a smooth implementation of the priority actions identified.

2.2.2 Green response to the current economic crisis

In 2008, Mauritius faced the prospects of US sliding into a recession, uncertain about its duration and depth and its knock on effects on Europe. The price of oil had gone up from around USD 40 a barrel some three years ago to USD 136. The petroleum import bill has risen from Rs 6.5 billion in 2000 to Rs 22.3 billion in 2007. The share of petroleum in the total import bill has gone up from 12 per cent to 18 per cent over the same period and keeps on rising. It was clear; the world has entered an era of expensive energy. As a country that relies on around 80 per cent of its energy on imports, Mauritius was extremely vulnerable. It was then that the government came up with the strategy of revamping the National Energy Fund into a MID fund.

The Fund, under the aegis of the Ministry of Public Utilities, supported action in three crucial areas:

- on the supply side
- on the demand side
- on institutional framework

A series of projects was launched to realize that vision of a green Mauritius. The response to a solar water heater scheme was beyond expectation, with some 29,000 applications compared with the target of 20,000. Rs 290 million (approximately 10 million USD) were approved for 29,000 solar water heaters. This was in excess of the Rs 250 million that was earmarked in the MID Fund.

The response was equally outstanding for the compact fluorescent lamp scheme with 1 million lamps distributed. There are significant savings for the users, the Central Electricity Board (CEB) and the nation while promoting clean energy. In less than a year, 300,000 households have switched to energy-saving lamps, amounting to around one million lamps. This reduced energy demand by 12 million KWh per year, saved Rs 52 million per year in fossil fuels and reduced CO₂ emissions by 26,000 metric tons (Ministry of Finance and Economic Development, 2008).

Over Rs 3 billion has also been invested in the construction of the Bagatelle Dam, and ancillary works, to secure additional water resources for present and future water demands of the Port Louis district and the lower parts of the Plaines Wilhems district up to the year 2050. This project is expected to start in December 2013. A new dam will be constructed at Rivière des Anguilles, in the south of the island, to improve water supply in the South at a cost of Rs 2.5 billion plus another Rs 850 million to improve the water distribution network in the South. In addition, the Government of Mauritius is investing Rs 640 million to improve the reliability of the distribution network in areas where pipes are degrading due to age.

A hydro turbine will be constructed at La Nicolière to produce 2 GWh of energy per year, save Rs 6 million per year on fuel, and reduce CO₂ emission by 2,300 metric tons per year. The installation work on 5 wind turbines in Rodrigues is in progress, financed by the MID Fund and the CEB. Energy audits were financed in 18 small and medium hotels and 14 restaurants. A study has been completed on the development of a National Grid Code to enable CEB to purchase electricity from Small Independent Power Producers that adhere to the policy of promoting clean, renewable and local energy sources. A ceiling of 2 MW was earmarked for the SSDGs and very quickly this target was reached so much so that a new target has been set.

The Land Based Oceanic Industry, which is nearing its implementation phase, will be a key contributor to generating energy savings as cold deep sea water is used for air conditioning.

Composting is now being done on an industrial scale. A public-private partnership project has been launched recently whereby 90,000 tons of municipal waste is to be composted every year. The plan is to increase the capacity to 180'000 tons of municipal waste.

AFD has provided Euro 65 million for extending the Waste Water network in the north, including Grand Baie and surrounding areas. This complements the USD 88 million being envisaged by the Japanese International Cooperation Agency (JICA) to extend the network to Triolet and neighbouring villages.

The Land Drainage Programme was set up to control flooding and accelerate water evacuation to reduce proliferation of vector-borne diseases such as Chikungunya and Dengue Fever. Of the 146 sites identified by the Emergency Rehabilitation Programme following the flash floods of March 2008, more than half have been rehabilitated. A total of 124 drain projects have been implemented across the island with 55 still on-going at a total cost of almost Rs 726 million. The

work accomplished includes: creation of large drain, 30 networks in GrosBillot, Ville Noire, Batimaraire, Souillac, Grande Rivière Noire and La Marie.

The Integrated Coastal Zone Management Framework to rehabilitate and maintain coastal stretch in both Rodrigues and Mauritius has been finalised. Coastal Protection works are being carried out on stretches of over 3.8 km at Rivière des Galets, Flic-en-Flac, Belle-Mare, Trou-aux-Biches, Bain des Dames, Petit Sable, and Bambous Virieux.

The Energy Efficiency Act which was proclaimed on the 11th November 2011, will, inter alia, introduce a regulatory framework for labelling household electric appliances on the basis of their energy efficiency and give the Ministry of Renewable Energy and Sustainable Development the authority to impose carbon taxes on energy inefficient appliances.

The Energy Efficiency Management Office will make available to the public prototype designs for homes to promote green buildings. It will coordinate with stakeholders in the construction industry and other professional sectors to promote the construction and transformation of buildings into green buildings. They will work together to raise public awareness and facilitate exchange and technological co-operation between Mauritius and other countries.

In parallel, the private sector has initiated different measures: In collaboration with the AFD, the Mauritius Commercial Bank (MCB), the leading bank in Mauritius, offers 'Green Loan' facilities to help firms save energy and reduce carbon emissions, with six firms having, to date, benefited from such facilities for a total value of Rs 235 million. More recently, a special scheme to support small power producers was successfully implemented. MCB has also just inaugurated an eco-friendly and energy-efficient building, which qualified for the BREEAM certification.

Sotravic Ltee, a private civil engineering construction company in Mauritius, is engaged in solid waste management since 2005 and has just launched a Sanitary Landfill Site at Mare Chicose, which carries a high environmental responsibility. It has installed a state-of-the-art system for the collection and destruction of GHGs financed in part by the sale of carbon credits on the world market to produce 3 MW of energy and at the same time reducing an emission of 668 000 tons of CO₂ in the atmosphere. Textile manufacturing is also going green and clean: Richfield Tang Knits Ltd, or RT Knits, a factory at La Tour Koenig, has devised a new strategy based on green production to reduce its costs of production and to improve its work environment. In this 800,000 sqft factory built on 30 acres of land, the fuel use is reduced, natural lighting is maximised, electricity is produced from the sun and rain water is collected and diverted to the boreholes from where the factory draws its water for production. Over 150 solar panels have already been installed on the roof of the building and many more will be installed after the dye plants come into operation in a year. Wind energy is used for ventilation and dust evacuation. Non-productive electricity is reduced to the minimum.

The commitment of Mauritius to the global challenge has earned international recognition and support, particularly the Prime Minister's Maurice Ile Durable initiative. In response, the AFD is piloting a new approach to budget support with Mauritius, and is providing a Euro 125 million loan for the MID agenda and a Euro 1 million grant. The European Union (EU) is topping this up with a grant of Euro 3 million and the UNDP has mobilised about USD 5 million, including contributions from the Global Environment Facility and the JICA. These added up to the Rs 140 million levied on all petroleum products, LPG and coal and that are going into the MID Fund.

The city of Port Louis has lately decided to become a "Ville Ile Durable". They are planning to install photo voltaic solar cells on the roof of the building with a view to save some Rs 1.6 m annually. They have just gone on tender and the contract has already been allocated. The mayor mentioned that they were also going to introduce 454 PV street lamps (Observer, 28 January, 2012).

Different projects are being initiated showing that Mauritius is coming to grips with sustainable development. Yet, on the other hand, it has to be emphasised that no real strategies for skills development have been established so far. Various institutions have been running training programmes in renewable energy on an ad-hoc basis.

2.3 The skills development strategy in response to greening

It has to be underlined that different groups, which were set up, have attempted to define green and greening jobs and the related education and training needed for these jobs. The proposals made by the two relevant working groups: Education and Employment are detailed below.

2.3.1 Working Group Education

A working group on education was set up by the Ministry of Environment and Sustainable Development in collaboration with the Prime Minister's office, with representatives from governmental institutions, private institutions, including various business associations ranging from the Mauritius Employers Federation, Mauritius Chamber of Commerce and Industry, non-Governmental Organizations, trade unions and the civil society, to undertake the national consultations on the theme of education.

The objectives of the working group, referred to as Working Group 5 (WG5) were to formulate, through a series of working sessions, practically acceptable proposals and associated targeted action plans in order to transform the current education system into an education for sustainable development (ESD) in order to achieve the MID vision. A two-day working session on the theme of education was carried out with representatives from the governmental and private institutions in Rodrigues. The objectives behind the national consultation process were to transform the education sector into an ESD as this will be the key driver towards transforming Mauritius into an intelligent nation state in the vanguard of global progress and innovation through the development of a culture of achievement and excellence.

2.3.2 Working Group Employment/Economy

The MID vision for the theme of employment/economy concentrates on three aspects namely the creation of more employment opportunities in an economy that is green, inclusive, resilient, robust and diversified. Second, the economy also aims at providing an eco friendly working environment that ensures work life balance for sustainable human development and family welfare. Lastly, the economy is forged so as to constantly promote green growth in line with sustainable consumption and production patterns.

The working group focuses on the economic dimension of sustainability. The themes discussed are: concept of sustainable development, green-inclusive growth, green jobs, sustainable businesses, work-life balance, sustainable consumption and production, and the different sectors of the economy namely agriculture, fishing, tourism, construction, education and transport were also covered.

In line with these sub-themes, the need for a vehicle to transform the MID vision into reality was discussed. It was agreed that this MID Commission, along with the Consultative Group and the Parliamentary Committee will ensure the implementation of actions and projects within the set time frame with the consultation of different stakeholders.

Among the various propositions made, the two relevant ones for this project were:

i) Green economy and green jobs

It was noted that it is still a problem to settle on a method for identifying what is green. Such a method would need to accurately gauge the green economy's size and rate of growth, and to identify the jobs associated with it. From the shared vision of sustainable development, it is also important to have more quality-of-life-oriented indices/sustainable indicators in measuring 'development' relative to the common purely economic indices which may fail to capture sustainable development.

The complexity in the categorisation of green occupations and activities was also discussed. In this respect, it was suggested that there needs to be a more in-depth study and analysis on measuring the creation of green jobs. The ILO, in collaboration with the UNDP and UOM, is presently conducting a research project on green jobs, which is a starting point for further in-depth study and analysis. The Working Group recognised the importance of such studies and supported this particular initiative.

ii) Global Reporting Initiative (GRI)

The WG4 also discussed the importance and relevance of greening local private and public organizations. The GRI was recognised as being a major tool for making the activities of local companies, and therefore economic activity in the country, more sustainable.

Though companies are required to report annually on the sustainability of their activities, the actual reporting mechanism does not give a real picture of the extent to which sustainable development issues are being addressed within the organisation. The GRI reporting framework is a tool that sets out proper indicators for organisations to develop and improve on. It is noted that to date, no Mauritian company has implemented the GRI reporting framework. The recommendation of the group was that as a gradual step towards the adoption of the sustainability reporting, firms should be encouraged to adopt level C¹ of the GRI and make moving up the level in the next three years a priority. This GRI could also be used as a way to identify the green skills needed in the firm for it to be able to adopt each successive level of the GRI.

Capacity building is a must in order to promote a sound ESD. In a study entitled "a survey of initiatives in current use in Mauritius for integrating ESD in technical and vocational education and training (TVET) for the tourism industry" carried out in 2009 by Roland Dubois and Koontee. Balgobin, the authors noted that "though the concept of ESD was coined some ten years ago at the second UNESCO Congress on TVET in Seoul it is unfortunate that up to now, not much has been achieved regarding its inclusion in TVET despite an action plan conceived in 2004. In Mauritius, a tremendous amount of work has been done at the level of different institutions in an incoherent manner as well as at the level of the Ministry of Environment to promote awareness with regard to the protection of our environment. It is in this respect that various sensitization campaigns have been initiated by the Ministry of Environment. Similarly, research in solid waste and renewable energy to a certain degree have been initiated by professionals, too few though to make any significant impact on our society." And they concluded by mentioning that "this case study has brought to life the naked truth of the status of ESD in the teaching of tourism studies in Mauritius. The situation might be the same if not worse in other TVET areas."

¹ For more information about GRI levels, see <https://www.globalreporting.org/resourcelibrary/G3.1-Application-Levels.pdf>

The authors agreed with the UNESCO international experts meeting in Bonn, October 2004, stating the need to re-orient TVET curricula to better prepare students and trainees with the conservation and sustainable use of resources, social equity and appropriate development, as well as with competencies to practice sustainable tasks at the workplace. Thus, training materials should be developed on ESD. There should be a training of trainers programme on how to implement ESD which would incorporate:

- an agreed definition of sustainable development
- the contents of the sustainable development
- the methodology to integrate ESD in TVET
- the pedagogical approach to training of ESD
- case studies

The above was confirmed by another study entitled “situation analysis on ESD in TVET in Mauritius” carried out in November 2011 by Roland Dubois. The findings showed that practically nothing was being done at the level of private training centres providing TVET with respect to integration of sustainable development within their programmes. This could be explained by the fact that private training centres in general are more commercially oriented and would rather complete their programmes as they are, rather than integrating additional elements of training within their training programmes. One training centre even mentioned that sustainable development was not an essential component in TVET.

Contrarily, at the Mauritius Institute of Training and Development (MITD) which is the lead public body responsible for TVET training in Mauritius, it is noted that 40 per cent of its training centres mentioned that sustainable development was fully integrated within their training programmes. Besides, other training centres were offering an awareness module on sustainable development as a standalone module. This was seen to be very encouraging in as much as interesting proposals were mentioned as to how to integrate sustainable development within their training programmes. However, no coherent policy existed at the MITD to ensure integration of sustainable development in all its TVET programmes. Successful ad hoc attempts were being made in some MITD training centres by proactive trainers, for example one training centre was offering modules in renewable energies that were well integrated in their full time training programmes. Also, short duration training programmes were also on offer such as photo voltaic cells.

The various universities in Mauritius also offer modules in their courses, as is shown in Table 2. But as the August 2011 report of the WG5 (Ministry of Environment and Sustainable Development, 2011) noted “currently training is taken care of at all levels, except that the training programmes are not well structured”. It has proposed the setting up of a National Training Strategy Programme for Mauritius by carrying out a needs analysis at different levels so as to define a series of Mauritius Qualifications Authority (MQA) approved courses. However, the focus seems to be more on core skills as opposed to technical skills, as the courses that have been proposed so far are: working in teams, collaborative works, making informed decisions, adapting to crisis situations, and developing a conscious attitude at work and also within the community.

Table 2 (a): Courses having modules on Sustainable Development (UOM)

UNIVERSITY OF MAURITIUS		
<i>Undergraduate Programmes</i>		
Courses	Modules having sustainable development	Duration (per week for the whole duration of the module)
Faculty of Engineering		
BEng (Hons) Chemical and Environmental Engineering	Intro to Env. Eng. & Renewable Energy Technologies	6.5 hrs
	Energy Engineering	3.0 hrs
	Cleaner Production Technologies	3.0 hrs
BEng (Hons) Chemical and Renewable Energy Engineering	Applied Renewable Energy Technologies	3.5 hrs
	Intro to Env. Engg. & Renewable Energy Technologies	6.5 hrs
	Energy Engineering	6.0 hrs
	Energy Management	6.0 hrs
BEng (Hons) Mechanical Engineering	Refrigeration, Air Conditioning & Energy Systems	6.0 hrs
	Energy Management	6.0 hrs
Faculty of Agriculture		
Certificate in Sustainable Forestry	Forest and Sustainable Land Management	4.0 hrs
BSc (Hons) Tourism, Leisure & Recreation Management	Sustainable Tourism	6.0 hrs
Faculty of Law and Management		
BSc (Hons) Tourism, Leisure & Recreation Management	Sustainable Tourism	6.0 hrs
BSc (Hons) Marketing Management	Sustainable Marketing: Green and Social	6.0 hrs
Faculty of Science		
Bsc (Hons) Physics with specialisation on Renewable Energy	Renewable Energy Resources	3.0 hrs
	Energy Conservation	3.0 hrs
Faculty of Social Studies and Humanities		
Bsc (Hons) Sociology	Sustainable Development and Practices	3.0 hrs

Postgraduate Programmes		
Faculty of Science		
Msc Physics with specialisation in Renewable Energy	Energy for Sustainable Development	3.0 hrs
	Renewable Energy Resources	3.0 hrs
	Energy Conservation	3.0 hrs
	Solar Energy	3.0 hrs
	Water and Wave Energy	3.0 hrs
	Wind Energy	3.0 hrs
	Bioenergy	3.0 hrs
Faculty of Engineering		
Msc Solid Waste and Resource Management	Sustainable Production Technologies	3.0 hrs
Msc Industrial Engineering & Management	Energy Management	3.0 hrs
Faculty of Social Studies and Humanities		
Msc Development Studies	Sustainable Development and Economics of Environment	3.0 hrs

Table 2 (b): Courses having modules on Sustainable Development (University of Technology)

UNIVERSITY OF TECHNOLOGY, MAURITIUS		
Undergraduate Programmes		
Courses	Modules having sustainable development	Duration(per week)
School of Sustainable Development and Tourism		
Bsc (Hons) Applied Social Science	Social Sustainability	3.0 hrs
Bsc (Hons) Services Management and Marketing	Principles of Sustainability	3.0 hrs
Bsc (Hons) Tourism and Hospitality Management	Sustainable Tourism	3.0 hrs
Bsc (Hons) Sustainable Environmental Planning and Management	Principles of Sustainability	3.0 hrs
	Quantitative Methods for Sustainable Planning	3.0 hrs
	Sustainable Tourism and Conservation	3.0 hrs

	Sustainable Quality Management System	3.0 hrs
BA (Hons) Communication	Principles of Sustainability	3.0 hrs
Diploma in Tourism Management	Sustainable Tourism Development	3.0 hrs
<i>Postgraduate Programmes</i>		
Courses	Modules having sustainable development	
	School of Business Management and Finance	
Msc Project Management for Sustainable Development	Sustainable Construction Management	3.0 hrs
Msc Quality Management for Sustainable Development	Quality Management for Sustainability	3.0 hrs
	Sustainable Digital Enterprise	3.0 hrs
	School of Sustainable Development and Tourism	
MA Communication and Public Relations	Corporate Social Responsibility and Sustainability	3.0 hrs
Msc Integrated Resource Management	Environment and Sustainability	3.0 hrs
Msc in Corporate Governance and Corporate Social Responsibility	Principles of Sustainability	3.0 hrs
Msc Sustainable Environmental Management	Concept of Sustainable Development	3.0 hrs
	Energy for Sustainable Development	3.0 hrs
	Tourism for Sustainable Development	3.0 hrs
	Sustainable Agriculture and Forestry	3.0 hrs
	Sustainability and Ethics	3.0 hrs
	Corporate Sustainability and Ethics	3.0 hrs
Msc Tourism Management and Marketing	Sustainable Tourism	3.0 hrs
Postgraduate Diploma in Integrated Resort Management	Environment and Sustainability	3.0 hrs

Table 2 (c): Courses having modules on Sustainable Development (JSS Academy of Technical Education)

JSS ACADEMY OF TECHNICAL EDUCATION		
<i>Undergraduate Programmes</i>		
Courses	Modules having sustainable development	Duration (per week)
Bachelor of Engineering in Electrical and Electronics Engineering	Renewable Energy Sources	4.0 hrs

Table 2 (d): Courses having modules on Sustainable Development (Charles Telfair Institute)

CHARLES TELFAIR INSTITUTE		
<i>Undergraduate Programmes</i>		
Courses	Modules having sustainable development	Duration (per week)
Diploma of Tourism (Marketing and Product Development)	Plan and Develop Ecologically Sustainable Tourism Operations	3.0 hrs
BCom Tourism and Event Management & Public Relations	Sustainable Tourism Management	3.0 hrs
	Sustainable Event Development	3.0 hrs
BCom Tourism Management and Marketing	Tourism Management (Sustainable Directions)	3.0 hrs

Table 2 (e): Courses having modules on Sustainable Development (Eastern Institute for Integral Learning in Management University)

EASTERN INSTITUTE FOR INTEGRAL LEARNING IN MANAGEMENT (EIILM) UNIVERSITY		
<i>Undergraduate Programmes</i>		
Courses	Modules having sustainable development	Duration (per week)
Business School		
Bsc (Hons) Applied Social Science	Social Sustainability	3 hrs

Mauritius has no actual skills development strategy as part of a coherent country policy response to climate change and environmental degradation. There is very little or no policy coherence, complementarity, relevance and coordination as such. No skills response strategies are incorporated into a larger greening policy agenda. Nor is there a coherent national strategy/policy targeting to meet the skill needs for greening the economy. Only a few organizations are carrying out training in a haphazard way.

The biggest institutional bottlenecks that are hindering the skills development for a transition to a green economy in Mauritius seem to be:

- i) The absence of a clear message regarding the MID from the authority;
- ii) The lack of stakeholder support for implementation, both at a regional and international level;
- iii) The lack of the necessary institutional and planning capacity;
- iv) The absence of commitment with insufficient support in key areas;
- v) The lack of a clear policy agenda for developing skills for greening the economy;
- vi) Limited participation of key stakeholders in the implementation mechanisms in key areas.

In the context of greening the economy, skills development policies and strategies are not coordinated with, and linked to, industrial, trade, technology, macroeconomic and environmental policies. Although the MITD is trying to establish a training network between the public sector training institutions and the industrial employers, developing skills for green jobs is not a priority. This project has targeted to meet market-driven skill demand. In the same vein, there is no role of social dialogue in skills development for a greener economy. It has to be mentioned though that the energy efficiency act caters for one of its functions to devise and assist in the preparation of educational courses and school curricula on the different use of energy.

Although there is divided opinion, compulsory level education is considered crucial in promoting green skills among the population by most of the experts. However, initial TVET and continuing vocational training are also considered instrumental in greening the economy. There is virtually no role of business management education and training in promoting sustainable entrepreneurship. Generic skills, such as leadership, communication, problem solving etc, in the skills provision for green jobs have proved important, especially in the case of the NGOs. The existing education and training system including general schooling does not follow a strategy to “mainstream” sustainability and environment protection issues within the education and training system. The courses available to build green skills (listed in the tables in the text) are few and more on an ad-hoc basis rather than emanating from a proper strategy. There is no explicit policy in place.

The recommendations of the WG5 (Ministry of Environment and Sustainable Development, 2011) show that further action is required with the necessary support of the international community, to further ESD through:

- a. Supporting efforts of the respective ministries of education;
- b. Promoting comprehensive and accessible universal primary education and ensuring gender equality in all small island developing States, with major emphasis on reducing illiteracy;
- c. Promoting technical and vocational education in order to enhance skills and facilitate the entrepreneurship necessary for the pursuit of sustainable livelihoods;
- d. Strengthening distance-learning arrangements;

- e. Integrating national sustainable development strategies and environmental education within the education systems, with particular support from the United Nations Educational, Scientific and Cultural Organization and regional environmental organizations and in the framework of the Decade of Education for Sustainable Development, 2005-2015;
- f. Assisting with basic infrastructure, curriculum development, where appropriate, and teacher training, working towards an integrated gender perspective;
- g. Assisting with the further development of programmes for people with special needs, in particular children and youth, especially training at a regional level;
- h. Further strengthening the training and teaching of the principles and practices of good governance at all levels and the protection of human rights.

Effective formulation and implementation of national sustainable skill development strategies requires the involvement of a broad set of stakeholders at all levels, including government ministries, civil society organizations, private sector organizations, regional agencies and international organizations, including the United Nations Economic and Social Commission for Asia and the Pacific. Public consultation and participation must play a critical role at almost all stages of the formulation and implementation processes.

3. Anticipation and provision of skills

3.1 Green structural change and (re)training needs

Green structural change is inevitable with the changes in markets and technologies opening up new opportunities and weakening the conventional business. This is the process of innovation which Schumpeter described as ‘creative destruction’.

This has implications for employment, mainly the likely major employment shifts within and across sectors and economic activities, taking into consideration the situation of sectors which are expected to lose jobs, as well as those with employment potential, and hence the consequent needs for retraining and skills upgrading.

The Human Resource Development Council (HRDC), which is the leading body to convert the training objectives to economic objectives, has as its objects as per the HRD Act of 2003 to:

- a) promote HRD in line with national economic and social objectives;
- b) stimulate a culture of training and lifelong learning at the individual, organizational and national levels for employability and increasing productivity; and
- c) provide the necessary human resource thrust for successful transformation of the economy of the country into a knowledge economy.

As such, the HRDC has the mandate to come forward with skills required in the various sectors of the economy and is supposed to be the main institution to anticipate skills needed. One of its strategic objectives as defined in its strategy plan is to promote a national training culture, lifelong learning and employability. To achieve it, one of its actions is to develop an indicative list of skills required in line with national requirements so as to avoid the mismatch between demand and supply with a view to increase the number of multi-skilled workers/staff at organizational levels.

To date eight Sectoral Committees have been set up, namely:

- Agriculture
- Financial Services
- Information and Communications Technology
- Manufacturing
- Public Service
- Tourism
- Knowledge Hub
- Emerging Sectors

And a Special Committee on Seafood Hub and Land Based Oceanic Industry.

The objectives of the Sectoral Committees are to:

- Serve as liaison between the HRD Council and the sector;
- Advise the HRD Council on emerging economic trends and relevant training needs in the sector.

A meeting was held with the Director of the HRDC. However, when the discussion centred on green skills, it was noted that the national HRD strategy is market-driven, not environmental policy-driven. Nothing significant had been initiated yet therein. However, a project for the HRDC to finance training on photo voltaic by the MITD was being discussed at their executive committee and the Director showed strong interest towards the project.

3.1.1 Green restructuring and its impact on the labour market

From a broad conceptual perspective, the *Green jobs* report produced by UNEP, ILO, IOE and ITUC in 2008 identified four ways in which employment will be affected as economies are redirected towards greater sustainability.

First, additional jobs will be created. Second, some employment will shift – for example from fossil fuels to renewables, or from truck manufacturing to railway rolling stock manufacturing, or from landfilling and waste incineration to recycling. Third, certain jobs may be eliminated without direct replacement. Finally, the jobs of many existing workers (for example, plumbers, electricians, metal workers and construction workers) will simply be redefined as day-to-day skill sets, work methods and profiles are greened.

Two sources of structural adjustment linked to climate change and environment were identified:

- a) Destruction of natural habitats, natural resources and ecosystems leads to the decline of income-generating opportunities. Economic changes are wrought by flooding, contamination of land and water, deforestation, loss of biodiversity, etc.
- b) (New markets, technologies, (products), policies and regulations lead to the decline of certain economic sectors and the rise of others. Green structural change is induced through environmental regulations and policies, such as carbon taxation, cap-and-trade schemes and emissions targets. Likewise, green structural change is led by economic forces, as businesses take advantage of new market opportunities and develop and apply new green technologies.

Both types may cause job losses. The first source of structural change requires active adaptation measures and diversification of income opportunities. The second source requires a proactive restructuring approach at enterprise, community and national level to alleviate the negative consequences for the labour market and to realize the potential of these structural changes for economic growth and decent work (Strietska-Ilina, et al., 2011).

Green structural change is not a discrete, independent sequence of events, but part of a longer term and complex process of economic restructuring. The degree to which a country experiences green structural change depends not only on pro-environment policy and legislation but also on its stage of socio-economic development. Indeed the research of the synthesis report based on 21 country studies, 'Skills for Green jobs: a global view', demonstrated a very strong relationship between stage of development and presence of green structural change.

3.1.2 Private sector initiatives

At this stage, there is no decisive or tectonic shift toward a greener economy although we may be seeing some movement in this direction. The newspapers these days are filled with various environment-related stories. There is also increasing reporting on individual companies "going green" or becoming "greener"; indeed even the leading bank of Mauritius, the MCB has, since 2009, launched the 'Initiative 175', which endeavours to originate concerted, sustained and multiple actions in favour of energy-saving, renewable energy production and the environment.

However, the initiatives of a score or more firms to "go green" is not enough to draw the conclusion that there is now a green groundswell in the different sectors that make up the economy. There are around 2000 registered business establishments in the country. In the last establishment census (2010) by the Central Statistics Office, the country recorded 2,650 enterprises employing 603,300 workers, among which the manufacturing industry and the wholesale and retail industry are the biggest employers.

Thus, the green initiative of a score or so enterprises, even if they are big, does not mean the economy is now going green. The situation is complicated further by the fact that there is neither National Statistics Office data, nor NSO census/survey, on establishments going green/greener. Moreover, one should keep in mind that the establishment data does not cover the vast majority of workers who belong to the informal economy.

As to the green industries being promoted in Mauritius, these are mostly in the renewable energy sector. There are exciting investment projects, one of which is the recently launched project of Sotravic- the management and operation of a Mare Chicose Sanitary Landfill Site (as elaborated in Box 3.1 below). However, some observers lament that the renewable energy sector is still unable to attract higher level of investments. In a recent special report entitled "Nascent renewable energy industry awaiting investments", Jose Bimbo Santos (2010) wrote that one reason why the industry is not attracting investors is the fact that the location of renewable energy ventures is mostly in unprofitable remote areas where the demand for electricity is low and where renewable energy exploration/development cost is high.

3.1.2 Study framework on green restructuring

What the research team then did was to outline the possible shape of an economy-wide greening process and the likely HRD/skills requirements of such a process. To the research team, this meant assessing the existing structure of the economy and the labour market and discussing the possibility of a

high-value, labour-friendly green restructuring in order to ensure that jobs generated should be, in the words of the ILO, both “green and decent”.

There are a number of Mauritian initiatives in these various sectors/industries. However, it should be pointed out that a green shift in the economy should be able to address the green requirements of other sectors as well, in particular industries in the service sector such as tourism and those of the large informal economy. Also, a restructuring should be based on a realistic recognition of the existing economic structure, employment patterns, and likely trajectories of the economy if environmental adjustments are put in place.

Box 3.1: Case study of Mare Chicose Landfill Site

Mare Chicose Landfill is located in the south region of Mauritius in the village of Mare Chicose. The landfill is situated on a plot of land of 32 Ha and consists basically of wastes cells and infrastructures.

This site was put into operation from November 1997 and was being operated by STAM until November 2006. The new contract for Construction of Cells, Operation, Maintenance and Post-Closure management has been awarded to the Joint Venture Bilfinger Berger and Sotravic Ltee and the Joint Venture started operating the site from 1 December 2006. The contract duration is for ten years.

Waste is received from the five transfer stations located throughout the island. Wastes from the south region are directly hauled to the landfill site. The site accommodates about 1100 tons of wastes daily. The cumulative amount of waste received since November 1997 until October 2010 is around 4.3 m tons.

Leachate collected is pumped and shifted to Roche Bois Pumping station. An average volume of 500 m³ of leachate is carted away daily.

With regards to gas management, two flare stations exist on the Landfill Site each with a flaring capacity of 1500Nm³/hr. The flaring helps to reduce the effect of the Landfill gas especially methane on the environment. To be able to capture the gas, the contract has allowed for the construction of vertical gas wells in the waste cells. The length of the gas wells varies between 9m to 30m. For a better management of the gas, the JV has also invested on the construction of manifolds which are used to monitor the gas content and quality at a very professional manner.

The Joint Venture is also working with the collaboration of the Client Ministry (Ministry of Local Government and Outer Islands) on the other projects namely the Clean Development Mechanism Project under the Kyoto Protocol and the Landfill Gas to Energy project. In the Landfill Gas to Energy project, the methane captured will be used to run generators to eventually produce electricity. The Joint Venture intends to install in the beginning, 2 generators each of 1 MW.

3.2 Identification of (re)training needs

Is a green Mauritian economy attainable? We believe the answer is “yes”, but the “transition” is likely to be long and complicated. In a forum on Green Jobs organized by the DOLE’s Institute of Labour Studies (ILS, 2008) , it was pointed out that:

“...people must guard against...the idea that the transition to a sustainable green economy is inevitable...we need to have a global transition at a speed that is probably in the realm of maybe two or three decades. It has to go against the existing trends. In all the economic transition that people can think of, there have always been many losers, some winners...”

The importance of a no-nonsense drive towards a green restructuring of the economy cannot be belaboured. Such a drive would entail, in the view of the research team, the following:

- i) identification of key obstacles to a green shift and how to overcome them, including the availability of the necessary skills to make the shift possible;
- ii) a reorientation of the agro-industrial policy regime in support of the green shift;
- iii) adoption of policies addressing urgent environmental concerns (particularly climate change challenges); and
- iv) intensification and broadening of positive or affirmative environmental programmes initiated by both the public and private sectors.

Eventually, a green restructuring will naturally have serious consequences or ramifications on the labour market and the HRD/skills requirements of the workforce.

3.2.1 Obstacles in making the green shift

There are many obstacles to making a green shift. The research team has identified the following key obstacles to environment and natural resource management:

- High population growth rate, which leads to intense use and abuse of the environment;
- High poverty incidence, which pushes impoverished groups to invade and destroy various eco-systems;
- Industrialization; and
- Globalization.

On industrialization, the manufacturing sector consists of sugar milling, EPZ and other kinds of manufacturing. The manufacturing sector contracted in real terms by 5.5 per cent in 2005, compared with a growth rate of 0.3 per cent in 2004. This was due to the dismantling of the Multi Fibre Agreement and the ending of the textile quotas on 1st January 2005, as well as fierce competition with low-cost textile producing countries such as China, India and Bangladesh. This stagnation of Mauritian manufacturing does not mean less environmental degradation. Instead, such a decline gave rise to proliferation of small and medium-sized industries whose collective impact on the environment were worse than before and yet where individual operations are difficult to monitor.

On globalization, the UNDP Human Development Report (2004) cited both the positive as well as negative impact of globalization on the environment; positive because global competition puts a premium on eco-labelled products and negative because globalization can also facilitate the “dumping” into the domestic market of dirty or polluting products and technologies.

On eco labelling, SGS (formerly Société Générale de Surveillance) and other international certifying bodies give globally-competitive industries in Mauritius certifications on quality assurance (ISO 9000 series), food safety assurance (Codex HACCP/GMP), social accountability (SA 8000), environmental management (ISO 14001), and other standards imposed by the global markets. These certifications are only given by global certifying bodies after a rigorous audit of production methods,

including work processes. There are even overlaps in some of these certifications, for example, the ISO 14001 label is a certification that a product or a process has met the environmental standards for that particular product or process, while SA 8000 is a certification that an exporting company respects internationally-recognized core labour, human, and environmental rights. Incidentally, the environmental and quality certifications are also sought by companies catering to the domestic market so as to demonstrate their compliance with global assurance standards.

On the other hand, globalization can indeed facilitate the dumping of dirty products and technologies, some of which adversely affect or displace existing domestic industries in a major way. For example, the general liberalization of the vehicle market has eased the entry of second-hand vehicles from Japan, the Republic of Korea, and other countries. These imported vehicles, which outnumber the new imported vehicles in the annual registration of “new” vehicles, are accident-prone (because of conversion of the drive from a right hand to a left hand position). They also violate the Clean Air Act’s provision on air pollution, which discourages trade in polluting second-hand imports. To top it all, most of these second-hand imports are undervalued and therefore, under-taxed. This form of “technical smuggling” is happening not only in the vehicle market, but also in the markets for textiles, garments, shoes, plastics, tiles, rubber, and so on.

Most of these imports are imported below market prices and thus taxed less, representing export surpluses that are dumped by major exporters when there is overproduction of these goods and the American/ European/Japanese market become saturated. Consequently, they displace domestic producers, workers, and farmers in an unfair or uneven way. And yes, they degrade the environment because most of these products, smuggled and dumped as they are, often escape rigorous environmental and other product standard scrutiny.

Obviously, each of the above four obstacles - high population growth, high poverty rate, weak industrialization, and poor management of globalization - requires separate research and policy analysis in the context of climate change and economic-environmental policy formulation. However, in relation to the green shift framework, all these obstacles are inextricably linked to the need to reorient the existing industrial policy regime, as discussed below.

3.2.2 Why re-orient? The industrial policy regime

Mauritius has experienced its wave of industrialization in the 1990’s and this has contributed one way or another, to environmental degradation. In the case of the export-oriented industrial (EOI) era, the environmental dilapidation has continued, partly to help finance the foreign debt incurred by a globalizing, but debt-dependent, government and partly due to the deepening of the policy of opening the economy to foreign investors. By and large, the shift to the EOI policy regime failed to strengthen the industrial base of the country. While it helped create “new” or “non-traditional” export industries such as garments manufacture, the policy regime has weakened most of the industries set up before the 1990s.

The textile industry

The textile industry has been the life blood of the island’s economy for decades and has helped to transform the island into a middle-income country. Mauritius has thus moved away from being a mono-crop economy to building tourism and information and communication technologies into major economic pillars. In 2005, the textile sector experienced a negative growth rate, following the end of the Multi-Fibre Arrangement giving Mauritian garments exporters guaranteed quota markets in the developed countries. However the textile sector has been able to bounce back to a peak of 8.5 per cent in 2007. Presently, the

sector contributes 6.5 per cent to the gross domestic product, accounting for almost 11 per cent of total employment with a share of 52 per cent of exports.

This wave of industrialization in the 1990's has contributed one way or another, to environmental degradation. This was continued, partly to help finance the foreign debt incurred by a globalizing, but debt-dependent, government and partly due to the deepening of the policy of opening the economy to foreign investors. Likewise, as Maurice Vigier de La Tour, general manager of Denim De L'Ile Ltd, told delegates at the ITMF (Federation of Textile Manufacturers) conference, "Textile manufacturing by its very nature has major ecological and social impacts. However, if we want to carry on supplying garments to premier retail organizations and world-famous brands, these impacts have to be reduced."

The Mauritian textile industry has entered a new business era, one of tougher regulations, so it can no longer manufacture products or even provide services without following rigid standards. The sustainable development model is becoming the licence to operate. Indeed customers in the EU and the U.S. are asking factories around the world to sign their terms of engagement, covering a large number of topics. These include security, health and safety and working conditions of local and foreign workers. Also included are water treatment, waste disposal and recovery, transporting hazardous material, energy efficiency to ensure lower carbon dioxide emission, preventing storm pollution, domestic sewage and bio-solids management and ground and underground storage. Customers are now giving as much importance to social and environmental compliance than to the quality of the product itself, the level of service or the price advantage. Factories are being regularly audited and evaluated. If they fail the audit, business can be stopped or never take off, for instance the export sector in Mauritius has Britain's Marks & Spencer and Next, and Spain's Zara amongst its clients. These companies have developed TOEs to be respected by their suppliers.

Former Industry Minister Dharam Gokhool, in 2009, said Mauritius has got no choice but to promote a clean textile sector as part of its national strategy for a greener economy. "Otherwise, there will be irreparable loss to the trustworthiness of our industries, developed over years. We are also conscious of our own vulnerability to climatic changes and the risks to which we are exposed as a small island developing state so dependent on fossil fuel," he cautioned. Moreover the cost of production is high in Mauritius as it is geographically located far away from its main markets.

Several initiatives have been taken by the government lately in favour of a clean textile industry. These include regulations regarding industrial waste and effluent discharge regulations and standards scheduled to come into force as from 1 December, 2008. Private firms have also been undertaking great initiatives, as can be illustrated by RT Knits Limited in Box 3.2. Gokhool also mentioned changing consumer attitudes and behaviours in support of green, environmental and ecological marketing. These are no longer fashion fads. "They form part of a growing global movement in the interest of the planet," he insisted

Since the textile industry always develops new and innovative products, Francois de Grivel, chairperson of Mauritius Export Association (MEXA), estimated that henceforth industries in Mauritius should use material that is low on carbon dioxide emission. "We have no choice but to adapt to such a strategy if we want the industry to continue. A shift to a low carbon economy opens huge opportunities for value creation while making businesses more competitive through costs savings," he said.

Green and clean textile and garment manufacturing forms part of a greater concept called “Mauritius, a Sustainable Island” (MSI) launched by the government last year. This is an ambitious project aimed at making of the small island an integrated system of energy production, distribution and saving. Protecting the environment through supporting initiatives aimed at efficient use of energy, recycling of waste and use of renewable energy and helping textile industries in their endeavour to adopt greener technologies are also part of this concept.

Joël de Rosnay, special adviser to the Prime Minister and Chief Executive of Biotics International, said that sustainable energy is a sine qua non not only for the development but the very survival of the textile industry “and more so in a small island like Mauritius”. Working with this concept, he said that the MSI project is expected to increase the country’s level of energy autonomy by 65 per cent in 2028 through efficient use of energy and the production of energy from a mix of renewable sources, such as the sun, wind, biomass and waves.

From the foregoing short narrative on the industrial policy experience of the country, it is obvious that a Mauritian greening process must address the challenge of overhauling the present EOI policy regime. An overhaul is also necessary to resolve basic policy contradictions as to whether to go green or not.

Likewise, most of the domestic manufacturing industries had also disappeared. What has remained on the industrial front are mostly firms under the global production chains of transnational firms such as the export-oriented garment firms. Many of these firms have invested in environmental programmes because of the ISO 14001 requirement of the export market. However, such programmes are usually part of the global standards being observed by transnational firms.

The agricultural industry

Another area of contradiction is agriculture. In Mauritius, the decline in area under vegetation is too alarming to escape our attention. A look at official statistics reveals that we may be moving towards an irreversible situation. Sugar cane fields, which represent our traditional green cover, have seen a drastic drop of 22 per cent of their area over the last 20 years. The reasons for this drop are multiple although stand out prominently. The first is the partial abandonment of cane growing as an economic activity. The triggering factor leading to this undesirable situation is the phasing out of our preferential trade agreements which, in turn, has transformed cane growing into a low-profit activity (The European Sugar Sector, 2006). The second reason is the intensified physical development taking place almost everywhere in the country which is encroaching upon arable land. The extension of our road networks, coupled with what can be generally classified as residential development projects (residential “*morcellements*”, IRS, RES, VRS, etc.) as well as other commercial and industrial projects, are all taking a heavy toll on our green areas.

Our forest reserves are undergoing a similar decline in acreage. One report of the Ministry of Environment and Sustainable Development graphically shows how our native forests have thinned down over the years to an area which can barely be recognised on the map. The maps shown in the report suggest that in 1997, less than 2 per cent of our native forest was left. Over the period 1995 to 2009, 27.6 per cent of our privately-owned forests have disappeared. However, state-owned forests have maintained their acreages. In other sub-sectors of agriculture, the picture is equally dismal. The two other cash crops, which add to our green cover, namely tea and tobacco plantations, have seen very drastic reductions in area occupied. Although in absolute terms, these areas are less important than sugar cane and forest land, a reduction of approximately 75 per cent for the tea sector and 71 per cent for the tobacco sector, over the last 20 years, has further exacerbated the loss of our green cover.

Box 3.2: A case study of Richfield Tang Knits Limited

Richfield Tang Knits Ltd, or RT Knits as it is known, has devised a new strategy based on green production to reduce its costs of production and to improve its work environment. The company is betting on the availability of sunshine and the stable direction of the wind 10 out of 12 months yearly.

“Our factory is geared towards the principle of sustainable development and environmental concerns. We want the factory to become energy-efficient by using more renewable energy sources, recycling and using recycled materials, using less water and achieving the lowest carbon emission per garment manufactured,” project manager Patrick Koo told IPS.

These interventions will reduce production costs for its investors. It will also mean that its 1,600 employees work in a better environment. And clients will be buying products manufactured in the greenest way possible.

In this 800,000 sq ft factory built on 30 acres of land, the fuel use is reduced, natural lighting is maximized, electricity is produced from the sun and rain water is collected and diverted to the boreholes from where the factory draws its water for production.

Over 150 solar panels have already been installed on the roof of the building and many more will be installed after the dye plants come into operation in a year. Wind energy is used for ventilation and dust evacuation. Non-productive electricity is reduced to the minimum.

“Just by using the sun and the wind allows us to reduce our fuel consumption by 30 per cent right now. Our plan is to reduce it further to 50 per cent in the near future,” Koo enthused, adding that RT Knits is guided by a vision for clean and green manufacturing.

Maximizing the use of renewable energy was planned well ahead of soaring oil prices. For Koo, the rise in oil prices and the government’s project of “Making Mauritius a Sustainable Island” have come together. But, “whatever the oil prices in the future, our strategy will always aim at promoting and protecting our environment,” he concluded.

Figure 1: Land Use Pattern (proportion of hectares)

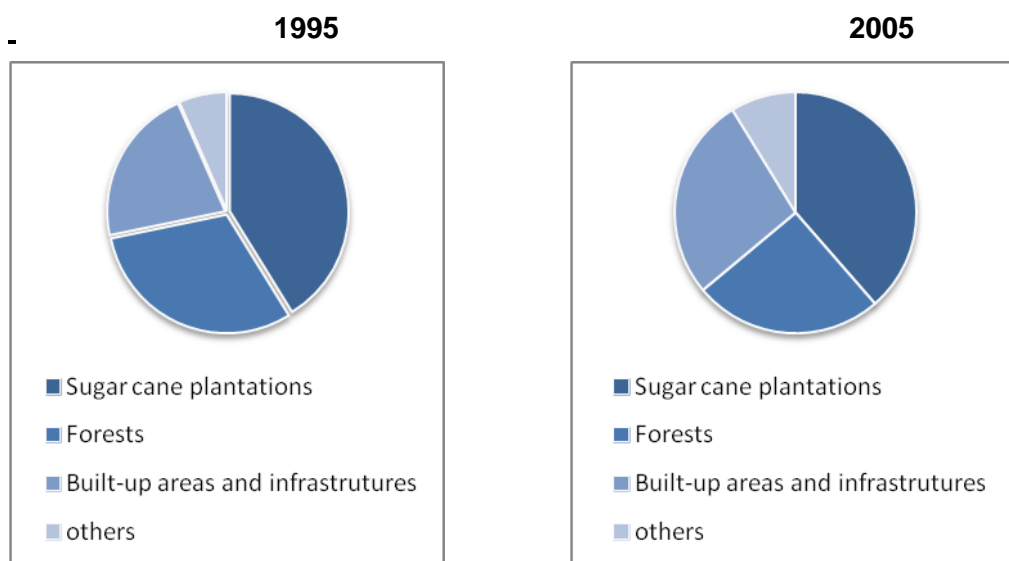
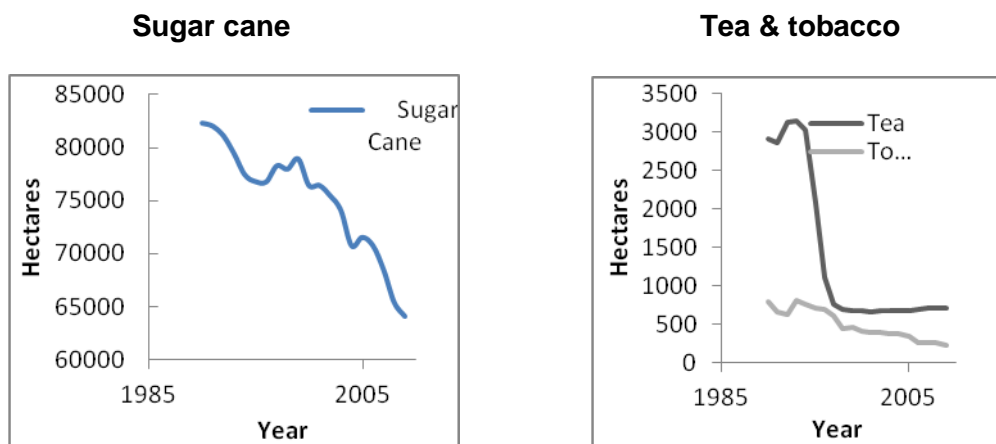


Figure 2: Trends in area cultivated (1995-2009)



Certainly, much of the infrastructural development taking place is much needed in most cases. The fact remains that, for those crops generating cash, namely sugar cane and tea, it is mainly declining prices and rising costs which are threatening farmers.

The downsides: An end to genetically modified organisms farming and an introduction to organic farming is likely to reduce agricultural production and exports in the short term. Major plantation producers and exporters have been warning of the collapse of the export industry and jobs in the plantations if aerial spraying is banned, as demanded by environmental NGOs. This was mainly due to the decision of the EU to cut its guaranteed sugar import price and hence reduce the price of sugar imported from Mauritius by 36

per cent over the four-year period 2006-09. As to the employment-disemployment effects of restructuring in industry, particularly in manufacturing, it should be pointed out, that many marginal and energy-inefficient manufacturing firms in the country recently disappeared with the onset of globalization and the rise of China as a major economic power.

ICT sector

The ICT industry emits 2 per cent of global CO₂ emissions, most resulting from the power consumption of PCs, servers and cooling systems. With the ongoing MID campaign, it is important for the ICT industry to turn to a greener way of doing things since by doing so, not only the environment is being preserved, but also there are major cost cuts that prove to be very beneficial to such green organizations. Green ICT concept relates to practices in designing, manufacturing and disposing of computers, servers and associated subsystems such as monitors, printers and, communications, storage and networking systems in an efficient and effective manner with residual or no impact on environment. It also strives to achieve economic viability while improving systems performance and promoting social and ethical responsibility.

The Ministry of Information and Communication Technology, along with then National Computer Board (NCB), have taken up various initiatives. For instance, on the World Telecommunication Information Society Day, the NCB organized a half-day workshop on '*Green Information and Communication Technologies*'. The result of that workshop was a Green ICT policy document, which will promote the green ICT concept and also act as a roadmap to sustain green ICT initiatives as well as devise and implement strategies in the field of green ICT and e-waste management. The NCB, in collaboration with the Mauritius Research Council and the University of Technology is also undertaking a survey of CO₂ emission as a result of ICT usage in companies in Mauritius. The Government of Mauritius has also upheld several initiatives to promote green ICT: they include the future construction of a green data centre to host ICT business centres in Flic-en-Flac, e-government initiatives that reduce paperwork and the need for citizens to travel to avail of government services, the expected introduction of the *Work from Home* concept which promises to provide a lasting solution to traffic congestion problems, together with the adoption and promotion of eco-friendly practices and standards in procurement of hardware and software.

Reducing the environmental impact of ICTs through ICT applications, makes considerable demands on management skills, as environmental skills are needed in addition to ICT-related skills. Furthermore, using ICT applications necessitates a minimum awareness about the environmental implications of personal behaviour. Governments are engaged in increasing public knowledge about ICT and its effects on the environment, as well as supporting environmental related ICT skills and education. This also includes using e-learning for increasing environmental understanding and awareness.

- **Consumer and user education**

Intelligent ICT solutions such as smart homes will not reduce energy consumption if users continue to dissipate energy by not changing their behaviour patterns. Consumer and user education is thus an important complementary element to policies and programmes on ICT and the environment.

An Action Plan for Green IT, for instance, will highlight children and young people as the largest group of private ICT consumers. It envisions increasing their environmental awareness by using their favoured communication platforms such as online computer games or social networking sites. Additionally, each ministry can inform its employees about their everyday electricity consumption.

Japan's Green IT initiative aims at increasing society's environmental awareness through measurement and visualisation of the net impact of ICTs on the environment. Korea's Ministry of Public Administration and Security (MOPAS), as another example, has established a task force for green informatisation, which is developing a comprehensive plan to supply information on greening government's computing resources. Other examples include Hungary's promotion of "environmental information technologies" in order to monitor and publish environmental data of public interest.

According to calculations by consultants A.T.Kearney, worldwide IT now generates CO₂ emissions of about 600 million metric tons a year and if the sector continues growing at the current rate, emissions in Germany alone are expected to increase by another 60 per cent by the year 2020. Green IT can help curb this alarming trend: by consistently implementing known energy-conserving approaches, the CO₂ emitted by IT systems can be nearly halved, as per the 2009 white paper on ICT, '*The greening of business*' published by T-Systems International GmbH, Germany.

- **Energy management skills and expertise**

The lack of energy management skills and expertise is a major obstacle which companies face during their path to Green ICT. (IDC, 2008; Wikiberg, 2008). Besides the provision of best practices, a small number of governments also provide Green ICT-related training for managers and their employees.

Through its *Save Energy Now Initiative*, the United States is providing training to enhance energy management skills. Such training in Mauritius can be accompanied with regular publications about best practices and improvements in energy efficiency technologies.

One possibility is to ensure that the green ICT skills be integrated in all diploma and degree courses being offered in the various training institutions in Mauritius to ensure a future population of engineers and technicians conversant with eco friendly utilisation of ICT. In parallel, the public at large must be sensitised through the media to the huge emission of CO₂ by computers and to the criteria to be used in the purchase of IT equipment.

As to the new but emerging renewable energy sector, there are a few investment projects in place. However, the sector as a whole has not yet really taken off. But in general, there are no signs of disemployment; there are instead indications of increased job creation once a renewable energy investment project takes off, simply because such a project is really a new investment project and employment opportunity.

3.2.3 Deepening and broadening affirmative programmes

As detailed in Chapter 1, Mauritius has a fairly comprehensive body of environmental laws, ranging from reforestation to solid waste management and renewable energy development. There should be a no-nonsense drive to implement them and there is a need to resolve apparent contradictions.

There are also outstanding environmental initiatives, such as solid waste disposal facility development in Mare Chicose as mentioned above. The challenge lies in making such programmes or initiatives widespread and sustainable. Elections every four years means many environmental programmes in hotly-divided cities and towns are sometimes not sustained due to changes in government leadership.

Added to these are the various initiatives hatched or launched by different NGOs and private sector groups, usually through their respective foundations. Again, these initiatives should be encouraged. However, these should not be used as an excuse for the government to avoid undertaking the necessary

coordinating and leadership roles in a comprehensive programme on the environment. Some environmental problems are simply too big for private sector groups, no matter how generously funded.

3.2.4 Likely labour market changes under a green/greener economy

Most of the environmental care and rehabilitation programmes are labour-intensive and are, therefore, job-creating. The shift to sustainable agriculture, more energy-efficient service and manufacturing industries, more value-adding industrial and mining practices (to minimize or reduce tendency towards polluting extractive practices), eco-friendly or eco-oriented service industries (e.g., eco-tourism), green building and environmentally-friendly transport are all likely to create more and better jobs for a larger number of Mauritian workers.

4. Conclusions

This report presents an unfinished piece of applied research. It purported to cover seven key sectors of the Mauritian economy. However, due to shortage of time as the project started late, not all sectors have been analysed so far. Besides it was not possible to have focused meetings with all stakeholders earmarked. It is proposed to complete the interviews during the month of January after the year-end break and submit a full-fledged report by the end of January 2012.

Suffice to note though that Mauritius has taken the initiative to be an environment-friendly nation as can be witnessed by the commitment of the Prime Minister and the Government of Mauritius since early 2000. Besides, a new Ministry of Environment and Sustainable Development was created in 2010. In addition it can be seen that different sectors, most particularly, the construction sector, are doing quite a lot to be eco-friendly. But are the different measures supported by competent people who have been equipped to make the green change?

From the different education and training offered by the different training institutions in Mauritius, it can be seen that some attempts have been initiated, in a rather haphazard way. But is this enough? What are the right skills that Mauritius needs in order to ensure a whole embracing movement towards a green economy? This is what the last part of the study to be completed in January 2012 will demonstrate.

4.1 Main 'greening' shifts in the economy and labour market

The move to a green economy is a long and never-ending process involving different projects of varying magnitudes. On the one hand, renewable energies projects such as wind farms, coal thermal power stations, solar energy projects involving solar photo voltaic cells, solar water heaters, solar refrigeration, recycling wastes to produce energy, and other projects such as recycling of wastes for composting, recycling water for use other than drinking, energy conservation projects through greening of existing facilities and use of energy efficient utilities are being initiated and implemented in Mauritius.

The study has noted that certain projects have been initiated since the MID concept was first coined in 2008 by the Prime Minister of Mauritius. The AFD, one of the main funding partners of Mauritius, has earmarked some Mauritian Rupees 12bn (USD 360 million) directly or indirectly in major MID related projects with a view to assist Mauritius in its strategy to modernise its processes, increase productivity and competitiveness within the move towards a sustainable development. This fund has been allocated to the Government of Mauritius as well as to the private sector.

The issue, therefore, is not whether Mauritius should embrace sustainable development or not. Policy-wise, the government has taken the affirmative side. The core issue, however, is the consistency and decisiveness of the country in implementing existing policies in support of sustainable development. To these concerns, another policy issue should be added: coherence. Are existing economic and development policies coherent or aligned with sustainable development? Apparently they are not. This is why in the context of this study, there must be a green shift in the economy. Green/greening jobs can only be generated by a green/greening economy. Furthermore, the green laws will only work in a green economy.

The problem is that this green shift is not easy. There are many obstacles, be they political or institutional.

Yet, different initiatives have been launched by the Government of Mauritius, for example the different participative workshops with over 300 participants organized on the five Es, namely Energy, Environment, Education, Employment and Equity; the setting up of the secretary of the MID as well as the MID Fund amongst others. The private sector on its part has played a significant contribution with different initiatives taken in the tourism, manufacturing, agricultural and construction sectors. The MCB, for instance, has sponsored a daily TV sensitisation programme for a long period on the need to be consumer green. However, many of these green projects are like isolated trees in a vast, denuded forestland. There is a huge realm of possibilities in greening the economy because of the anticipated flow of investments on renewable energy. Moving towards the goal of sustainable development requires fundamental changes in human attitudes and behaviour – in our personal lives, in our community activities, and in our places of work.

Successfully making these changes is critically dependent on education and training. It requires green skills to develop projects in renewable energies such as wind farm, sea waves, etc., and new design of buildings (residential and/or commercial) necessitating new orientation, architecture, types of materials to be utilised, etc., and greening skills in areas of energy conservation, energy saving, energy audit amongst others. It has to be emphasised that the majority of Mauritians own their house and there is a great need to show them why and how and assist them to economise and save energy, use recycled water and harvest rain water.

Hence, to take the green initiative further and implement real green projects, there is need to have people who are equipped with green skills. How prepared is the labour market for this green shift? The study has shown that very few courses presently offered by the Mauritian institutions have inbuilt sustainable development modules. For example, at the UOM, out of over 130 undergraduate courses only eight have components of sustainable development. At post graduate, the figure is not better as only four out of 50 have sustainable development inbuilt. The situation is not better at the University of Technology, Mauritius with five out of 56 undergraduate courses and eight out of 39 postgraduate courses having sustainable development integrated therein. In private institutes offering degree courses, the situation is even worse with only five courses having sustainable development. A survey of the TVET trainers provided the main barriers to the introduction of incorporating training in sustainable development within their training programmes as a lack of expertise amongst their trainers, curriculum too crowded and lack of time to update courses as well as a lack of perception of big environmental problems.

On the other hand, from the labour market data compiled by this study, a number of conclusions may be drawn:

- A green shift is job creating (in all the sectors cited in the study) and will help alleviate unemployment;

- The leading labour market problem in the country is the lack of effective domestic labour demand, especially for those possessing elementary and secondary education only. The rise and expansion of green projects such as organic farming, solid waste management, hydro power development will help stimulate and sustain demand for this sector of the workforce;
- Labour displacement due to a green shift is minimal or likely to be so. Most of the industries targeted by the MID campaign will cause more upgrading of the skills of workers.

4.2 Skills implications and development

4.2.1 Anticipation and identification of skill needs

From the meetings held, all the stakeholders agreed with the MID project and the need to move towards a green economy. However, it was perceived that the MID concept was still not very clear to all people and more work should be done to make people conscious of the major environmental problems looming ahead.

Different adhoc training initiatives are being offered by different institutions/government agencies without a clear coherent strategy stating the types of training to be provided to the different categories of people, the providers of the training, the level and duration of the training to be delivered, etc. Such an approach is worth doing in the absence of the strategy, but it is not sustainable. It evidently leads to a skills gap although some participants at the workshop felt that there were no skills gaps. His arguments lie on the fact that many graduates in agriculture remain unemployed at their end of their studies. I would argue that this may be certainly construed as a skills mismatch as these graduates have been given skills that do not match those demanded by industries.

It has to be emphasised that the different stakeholders were very willing to talk about the different skills that they feel should be made available in their different sectors. An inexhaustive list of such skills has been compiled and a sample is enclosed for perusal. They were also of the view that the information/training should be made available right across the whole spectrum of organizations right from the Board of Directors down to the lowest grades in the organization. Certain core skills cut across the hierarchical levels such as good knowledge of MID and sustainable development, possess strategic and leadership skills, risk analysis skills and an holistic approach to problems.

On the other hand, for the general public, there should be lots of sensitisation using the TV programmes and campaigns on how anybody could measure one's own carbon footprint. Housewives are important players in the battle towards a green economy. They should be sensitised, for instance on the type of cleaning materials to be used, on the management of their electricity contribution, amongst others.

The tourism sector

The tourism sector is already implementing certain projects necessitating green skills such as waste management, recycling of water, desalination, solar water heaters amongst others. However, should there be an increase in the above initiatives, there would certainly be a shortage of green skills. Besides, they proposed that training should be provided as to the following:

- Plan and implement minimal impact operations
- Plan and develop ecologically sustainable tourism operations
- Participate in environmentally sustainable work practices

- Develop workplace policy and procedures for sustainability

The agricultural sector

The representative of the agro industries was of the view that the jobs more likely to be affected by the movement towards green economy are organic farming, sugar cane biomass fuels as well as the farmers who have been concerned by the reconversion of their lands following the introduction of Integrated Residence Schemes (IRS) projects.

They also proposed that the following training/sensitisation, inter alia should be initiated:

- Degree course in agriculture with core subjects in green skills
- Change from a consumer 'brown' society to a green one
- Sensitization on climate change
- Compost/waste management

In addition, at least 1000 persons should be equipped to have a roof garden, balcony garden or kitchen garden.

The construction sector

The construction sector should be the sector where the demand is the biggest as it is a sector that has been growing at the rate of 6 to 7 per cent per year over the last years. And it certainly involves different types of professionals starting from the architects, engineers, project managers, operators etc depending upon the type and size of construction.

The skills needed by the architects have been mentioned to be as follows:

- able to incorporate environmental and energy management practices and processes in building design and construction
- how to apply sustainable building design principles to water management systems
- build thermally efficient and sustainable structures
- minimise water on the building and construction site
- carrying out energy audits
- handle painting and decorating materials efficiently
- develop workplace policies and procedures for sustainability

For the engineers and energy managers, the following skills are required:

- techniques to save energy
- techniques to protect environment
- renewable energies (conservation measures)
- management of electrical/electronic installations
- audit of energy consumption in buildings and industry

Obviously for the other categories of people involved in the construction sector, the skills required may be different as follows.

For building contractors, they need to:

- have knowledge on how to construct future green buildings and for retrofitting actual buildings
- have use of run offs and rain ponds to collect water

Technicians:

- design and install PVs
- design and install solar water heaters

Obviously practising professionals can only follow short specific training programmes.

Manufacturing sector

The manufacturing sector is another sector employing over 50,000 people and contributing about 6 to 7 per cent to the GDP of Mauritius. Below is a list of skills needed as per stakeholders surveyed.

- know how to sustain process improvements
- Use sustainable energy practices and sustainable environmental practices
- Participate in environmentally sustainable work practices
- Implement and monitor environmentally sustainable work practices
- Develop workplace policy and procedures for environmental sustainability
- Identify and minimise environmental hazards
- Contribute to sustainability related audits
- Develop strategies for more sustainable use of resources
- Optimise sustainability of a process or plant area
- Apply proactive maintenance strategies to sustainability
- Contribute to sustainability related audits
- Develop strategies for more sustainable use of resources
- Develop strategic sustainability plans
- Design sustainable product or process
- Conduct sustainability water audit
- Assess the environmental impact of a project process/activity
- Identify and improve sustainability interactions relations with the community

5. Recommendations

5.1 Introduction

The study has depicted that the important green collar skills include:

- planning and design;
- business leadership and entrepreneurship;
- project management and procurement;
- specific business management expertise (such as for architectural practice, farming, specialist manufacturing or retail);
- trade skills (such as green plumbing, construction of energy efficient buildings, renewable energy, low input gardening). Some of these skills, not necessary exhaustive, may be of concern to the informal sector. For example the case of the vulnerable groups of people digging for metals and/or other valuable materials in dumping grounds;
- assessment of project requirements (such as specification of inputs, system specifications, access to finance, approvals requirements, total costs) and outcomes (such as water and energy use, efficiency, market value);

- sensitisation, marketing and communication.

The move to a green economy is an on-going process. The following sections will discuss the measures required to include skills development as a crucial pillar in the country's greening strategy:

- i) a coherent HRD strategy;
- ii) re-orient TVET curricula and incorporation of green skills in all certificates and diploma courses of the main vocational provider, MITD;
- iii) restructuration of all the courses of the UOM to include a module on Sustainable Development;
- iv) conversion post-graduate certificate/diploma course;
- v) joint projects to be collaborated by the local universities and the MITD;
- vi) institutional and human capacity building;
- vii) scholarship scheme of HRDC;
- viii) sensitization program by the Government of Mauritius, through the Energy Efficiency Management Office.

5.1.1 A coherent HRD strategy

Such a strategy should be developed at the earliest to propose the green skills needed in line with the MID vision, where and who to acquire these skills, who should provide these skills, what the training providers should deliver in order to avoid skills mismatch, amongst others. In that context, regular social dialogue should take place between employers, unions and education/training stakeholders to ensure appropriate national unit standards and developed and accredited. The Mauritius Qualifications Authority should set up an Industry training advisory committee to develop unit standards for each economic sector.

Training and capacity building at the work place and within society is relatively poorly structured. In order to sensitise people there is a need for capacity building at all levels. Teachers need to be trained so as to address the concept of sustainable development (human and moral values, holistic development of Mauritius, greening of the environment).

Experts from organizations involved in environmental protection, renewable energy and home economics, should interact more actively at school and community levels, and for this they need to be trained. Sufficient institutional as well as human resource capacity should urgently be built in green skills in order to respond to potential demand. As such, training of trainers should be a major input.

Some other ways where training in green skills should be further encouraged is through:

- post graduate part time conversion course graduates and/or professionals;
- more scholarships in sustainable development;
- proper career guidance to help students choosing careers in green jobs or looking for studies having sustainable development inbuilt;
- introduction of green skills in all training programmes;
- topping up training for those who are already practicing;
- association of professionals to encourage their members to equip themselves with green skills.

5.1.2 The incorporation of Green Skills in all its Certificates and Diploma courses by 2015 of the main TVET provider, Mauritius Institute of Training and Development

- (i) Re-orient TVET curricula to better prepare trainees with the conservation and sustainable use of resources, social equity and appropriate development in order to mitigate negative effects on the climate as well as with competencies to practise green jobs at the workplace. To do this, all national certificates and diplomas offered by the MITD and accredited by the MQA should be reviewed to ensure integration of components of green skills into all TVET programmes.
- (ii) Develop training materials to be used in the training of green skills in TVET.

5.1.3 Universities to re-structure their courses to address sustainable development by 2017

All courses offered by local universities should have modules which will include activities on sustainable development. All research undertaken at University levels should necessarily have a component that addresses the welfare of the citizens. Courses on offer should be linked to the needs of the community and the country. Undergraduate courses should necessarily have a compulsory component on social service and volunteerism.

The Ministry of Tertiary Education should ensure that the courses on offer address these components. Local universities should interact more closely with government and private institutions to carry out more research having a bearing on sustainable development.

5.1.4 A conversion post graduate certificate/diploma

This conversion course could be structured and set up by the universities for all professionals such as architects, engineers, managers, etc just like the conversion course offered in IT when IT was in its nascent stage.

5.1.5 Joint collaboration of local public universities and the MITD

Joint projects on sustainable development should be encouraged and a fund must be set up to finance such projects. Only recently students of the Faculty of Engineering of the UOM and students of the MITD worked on such projects and this joint initiative was a success.

5.1.6 Institutional and human capacity building

Training and capacity building at the work place and within society is relatively poorly structured. In order to sensitize people there is a need for capacity building at all levels. Teachers need to be trained so as to address the concept of sustainable development (human and moral values, holistic development of Mauritius, greening of the environment).

Experts from organizations involved in environmental protection, renewable energy, and home economics should interact more actively at school and community levels, and for this they need to be trained.

Sufficient institutional as well as human resource capacity should urgently be built in green skills in order to respond to potential demand. As such training of trainers should be a major input.

5.1.7 Special sponsorship scheme offered by HRDC

The HRDC should offer a scholarship scheme for approved training programmes and extend the Pre-Operational Training Incentives (POTI) Scheme to companies sponsoring potential employees in green skills.

5.1.8 Sensitization campaign

The Government of Mauritius, through the Energy Efficiency Management Office, must ensure structured sensitization campaign of all Mauritians with respect to green skills. TV programmes should be broadcasted everyday to show housewives who are important stakeholders as to why and how to be part of the green skills movement. They have to be taught as to why and how they should use sustainable cleaning materials, to have their own backyard or kitchen garden, control their electrical appliances, etc.

5.2 Implementation

Each of the recommendations has a necessary but not sufficient contribution to meeting the challenges of promoting a happier and more sustainable society. This of itself raises serious policy and implementation challenges, as carriage for these different strands is divided between departments and levels of government.

The next step in achieving the transition to a high performing sustainable economy is to deliberately create linkages between the different key stakeholders. Policy frameworks can provide incentives for environmental performance based on robust independent accreditation. Training programs can be linked to supply chains so that designers and trades people are familiar with green raw materials and system components. Policy should provide direct support and incentives for investment in green collar skills and training (expanding the supply of these skills), as well as enhancing the demand for green products and services.

This implies that systematic attention to human skills and labour will play an important role in implementing worthwhile national action to address climate change. Human skills, passion, and ingenuity are central to each component of a coherent strategy, and to meeting the multiple challenges ahead.

5.3 Suggestions for an MID agenda

Due to time constraint, our study has been limited to 5 main formal sectors, namely the agriculture, tourism, construction, manufacturing and textile, and ICT industries. The scale of the challenges ahead will require more research and activity across all sectors, including the informal sector which our study has not been able to consider. Furthermore the booming ICT industry in Mauritius offers immense opportunities for further research.

Undertaking this project has also suggested a number of clusters of issues for further exploration:

Skills coordination: Overcoming the skills shortages would be assisted by the development of a shared broad understanding of the types of skills required, and the likely demand for these over the periods 2010-15 and 2015-20. This would assist the task of developing appropriate training pathways, accreditation

systems, and coordination with key stakeholders (such as technology providers, educators, and employer and industry groups). It would also help to provide the confidence needed by people considering whether they should acquire one or more different types of green collar skills, and help identify the specific ‘skill packages’ likely to be in demand.

Unit standards followed by training manuals would have to be designed for the different training areas proposed in order to ensure rationalisation of the training to be provided. This is a lengthy process and must start immediately.

Specific research questions include: Many questions have not yet been answered and there is still tremendous research work that remains to be done to answer these questions.

How might robust broad estimates of future skill requirements be developed? Who is best placed to inform these? Who should lead this process and how might it be resourced? How should this information be disseminated, and to whom? What processes would be effective for keeping these estimates up to date, ensuring that different views are reflected appropriately.

What training pathways – including accredited training courses, changes to the curriculum of existing qualifications, apprenticeships and trade certificates, and other on-the-job training – are likely to be most effective? How can skills training keep pace with changes in technologies and provide the flexibility to respond to evolving market conditions? Who will develop the unit standards and the training materials? Who will finance this?

What are the distinctive roles and contributions of different stakeholders, including large and small businesses, education providers, industry bodies, government, and the research sector? What are the options for harnessing these distinctive strengths and achieving synergies across stakeholder contributions?

These questions need to be answered so that the different stakeholders know clearly their roles and responsibilities in order to avoid any possible confusion. Only then, could a coherent approach be put in place towards a green sustainable Mauritius.

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Annex 1

Key stakeholders

1	Osman Director Chairman of MID project	
2	Vasant Jogoo, Chairman of MID Fund	14 Nov 2011 at 13.00
3	Dr Soonarane, Ministry of Public Utilities	12 Dec 2011 at 10.00
4	Construction sector: Bushan Ramloll, President of BACECA	20 Jan 2012 at 15.00
5	Pierre Ah Sue, MD of Sotravic, private company involved in gas to electricity project	
6	Tourism Sector: Patrice Legris/Jocelyn Kwok, Association of Hotel and Restaurant de l'île Maurice	9 Jan 2012 at 9.00
7	Manufacturing sector: Lilowtee, Mauritius Export Association	Questionnaire administered
8	Agriculture: Linda Mamet, Director of Regional Training Centre	15 Nov at 13.30
9	Energy Sector: Central Electricity Board, S Thanoo, Managing Director	15 Nov 2011 at 11.00
10	IT	
11	Transport:	11 Jan 2012 at 9.00
12	Environment:	
13	Patrick Koo, Director of RT Knits, textile company	Questionnaire administered by email
14	K Sadien, president of Government services employees	

	association	
15	Azad Jeetun, Director of Mauritius Employers Federation	Wednesday 22 Nov
16	Areff Salaroo, president of the Association of HR Professionals	Questionnaire administered by email
17	R Auckloo, Director of Human Resource Development Council	22 December 2011
18	P. Mauree, Independent Architect	Skype conversation on 11 Dec
19	K Elahee, Chairman of Energy Efficiency Committee	15 Nov at 15.30
20	M. Zidov, Independent Researcher and Ecological Networker at Ecological Living in Action	Email quest on 8 Dec