

GREEN STAR SA MAURITIUS

LOCAL CONTEXT REPORT

Applying Green Star SA in Mauritius

Revision 2 – 24 February 2017





Report Acknowledgement

Revision 1

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EXECUTIVE SUMMARY

Overview of the Mauritius Local Context Report

This report applies to the Green Star SA – Office (V1.1) tool as well as rating tools for Green Star SA - Multi-Unit Residential (V1), Green star SA - Retail Centre (V1) & Green Star SA – Public & Education Building v1 and considers the applicability of the tool in Mauritius. Included in the report is a background analysis of Mauritius, as well as a credit by credit analysis. This considers the applicability of each credit to the local context.

The Green Building Council South Africa (GBCSA) is currently licensed by the Green Building Council of Australia (GBCA) to allow certification using the Green Star SA rating tools (Office v1.1, Retail Centre v1, Multi Unit Residential v1 & Public & Education Building v1) only in South Africa, Ghana, Namibia, Uganda, Nigeria, Kenya and Rwanda. Through this local context assessment, the GBCSA, in collaboration with the prospective Mauritius Green Building Council will allow for certification in Mauritius using all the Green Star SA rating tools (Office v1.1, Retail Centre v1, Multi Unit Residential v1, Public & Education Building v1) (with some minor adaptations recommended in this report).

The GBCSA would manage and allow the certification through its existing established processes, but call the certification Green Star SA - Mauritius. The GBCSA will then use the opportunity to allow capacity to grow in Mauritius through the prospective Mauritius GBC, by allowing selected Mauritius professionals to be trained as Green Star SA - Mauritius assessors who would join the GBCSA assessor teams on Mauritius projects. In addition, the GBCSA would deliver the Green Star SA Accredited Professional – New Buildings course in Mauritius, in collaboration with the prospective Mauritius Green Building Council, which would allow professionals in Mauritius to take the Green Star SA Accredited Professional online examination. The details would be agreed upon in a Green Star license agreement between the GBCSA and the prospective Mauritius GBC.

The original report (revision 1, issued in 2012) covered various changes to the Green Star SA – Office v1 tool to accommodate for the local context.

| Revision 2: Summary of Changes made to the Local Context Report Revision 1 | |
|--|--|
| 1 | Credits, where relevant and applicable to Mauritius, were added to the report for Green Star SA - Retail Centre v1, Green Star SA – Multi Unit Residential & Green Star SA - Public and Education Building v1 tools. |
| 2 | Office projects in Mauritius now must use the Green Star SA – Office v1.1 as the base reference tool for Office projects in Mauritius (i.e. registration under Office v1 is no longer available) – except for Ene-0 and Ene-1, where Mauritian office projects can still apply the Office v1 Energy Modelling Protocol because it is less stringent than Office v1.1. Refer to the Ene-1 section of this report. Refer to the GBCSA website for a list of changes between Office v1 and Office v1.1 here: https://www.gbcsa.org.za/wp-content/uploads/2013/05/Green-Star-SA-Office-v1.1-summary-of-changes-updated-June-2015.pdf |

RECOMMENDATIONS

A summary of recommended credits requiring Credit Interpretation Requests (CIR's), Technical Clarifications (TC's) or adaptations can be found below (all other credits are proposed to remain unchanged, but where projects do want to propose changes these must be applied for through the TC/CIR process on the GBCSA website):

| | CREDIT | REQUIREMENT |
|----|--|--|
| 1 | MAN-14: Life Cycles Costing | This credit is omitted. |
| 2 | IEQ-02: Air Change Effectiveness | This credit is omitted. |
| 3 | IEQ-06: High Frequency Ballasts | This credit is omitted. |
| 4 | ENE-0 & ENE-01: Conditional Requirement & Greenhouse Gas Emissions | Office v1.1 rating tool be applied to all other credits, calculations and protocols except the Energy modelling protocol for the ENE-0 and ENE-1: Greenhouse Gas Emissions credit, where the Office v1 Energy modelling protocol will be applicable to Mauritian projects. Changes to the Green Star SA – Office v1 Energy Modelling protocol should be motivated by the registered project via a mandatory CIR. Projects apply Durban's climate zone for the notional building standards. |
| 5 | ENE-07: Hot Water Energy Use – MULTI UNIT RES | Green Star SA Multi Unit Residential v1 Hot Water Calculator would need to be adapted to reflect the relevant fuel factors in Mauritius. CIR to be submitted by the project team. |
| 6 | TRA-01: Provision of Car Parking | A maximum car parking allowance of 4 bays per 100m ² GFA as per Johannesburg Town Planning Scheme is allowed for this credit |
| 7 | TRA-04 Commuting Mass Transport | Maximum points is set to 3 points instead of 5 points for this credit to reflect the local context. |
| 8 | WAT-01: Occupant Amenity / WAT-01: Potable Water-PEB | If the project is targeting the Rainwater/Storm water harvesting path in the WAT category, a CIR must be submitted to the GBCSA with local rainfall values for input into the Potable Water calculator. Due to the shortage of water, a new conditional requirement has been incorporated into this category. Project teams must achieve at least 1 point in the potable water calculator in Wat-1 to be eligible for a Green Star SA rating. |
| 9 | MAT-07: PVC Minimisation | This credit is omitted. |
| 10 | MAT-11: Local Sourcing | The credit is omitted |
| 11 | ECO-: Conditional Requirement | Definition of: Suitably qualified registered ecologist – changed to suitably qualified and experienced ecologist Prime Agricultural Land changed to 'Prime Agricultural Land (prior to Land Conversion) which falls outside of the Development Zone as prescribed by the governments Outline Planning Scheme' |

| | | |
|-----------|---------------------------------------|---|
| | | Land with confirmed presence of Red Data species or habitat for Red Data species or appropriate buffer as defined in the policies of the relevant Provincial Authority changed to 'Land with confirmed presence of Red Data species or habitat for Red Data species or protected plants as listed in the Environment Protection Act 2002 as amended 2008 and the Plant Protection Act 2006 |
| 12 | ECO-02: Reuse of Land | Definition of 'municipal urban edge' is changed to 'development zone as prescribed by the Government Outline Planning Scheme' |
| 13 | ECO-04: Change of Ecological Value | A mandatory CIR must be submitted to the GBCSA by projects to determine which South African bio-region is most applicable to the project. |

Table 1: Credits requiring Credit Interpretation Requests (CIR's), Technical Clarifications (TC's) or adaptations

ACRONYMS

| ACRONYM | TERM |
|---------|---|
| BS | British Standard |
| BREEAM | Building Research Establishment Environmental Assessment Method |
| CIBSE | Chartered Institute of Building Services Engineers |
| CIR | Credit Interpretation Request |
| ECO | Land Use and Ecology category |
| EMI | Emissions category |
| EMP | Environmental management Plan |
| ENE | Energy category |
| EPA | Environmental Protection Agency |
| ETC | Environmental Tobacco Smoke |
| FSC | Forest Stewardship Council |
| GBCA | Green Building Council of Australia |
| GBCM | Green Building Council of Mauritius |
| GBCSA | Green Building Council of South Africa |
| GS | Green Star |
| GSAP | Green Star Accredited Professional |
| GWP | Global Warming Potential |
| IEQ | Indoor Environmental Quality category |
| INN | Innovation category |
| LEED | Leadership Energy and Environmental Design |
| MAN | Management |
| MAT | Material category |
| NGO | Non-Government Organisation |
| ODP | Ozone Depleting Potential |
| OH+S | Occupational Health and Safety |
| PVC | Polychlorinated Vinyl Chloride |
| SANS | South African National Standards |
| TRA | Transport category |
| VOC | Volatile Organic Compounds |
| WAT | Water category |
| WMP | Waste Management Plan |

INTRODUCTION

01

1. INTRODUCTION

1.1. Overview of the Creation of a Mauritius Green Building Council

The Green Building Council of Mauritius was founded in 2009 by a group of Mauritian professionals, researchers and entrepreneurs. Thereafter two boards were established that consisted of a range of expertise; an advisory board along with the founding board.

1.2. Overview of the Development of the Green Star SA- Mauritius Environmental Rating Tool

As a member of the World Green Building Council and its Africa Network of Green Building Councils (ANGBC), the Green Building Council South Africa (GBCSA) allows the rating of Mauritian buildings under the Green Star SA rating system.

The Green Star SA rating system is a natural touch point for green building movements and councils in other parts of Africa. The Green Building Council South Africa works in collaboration with emerging green building councils throughout Africa and allows the adaptation of the Green Star SA tools for certification in the respective countries. To date, Local Context Reports have been developed for Nigeria, Kenya, Uganda, Ghana, Rwanda, Namibia and Mauritius.

It is important that the environmental rating tool best reflects the local context of the country therefore, as intellectual property owners of the Green Star brand, it is a prerequisite that consent from the Green Building Council South Africa (GBCSA) must be obtained for the use of Green Star SA in Mauritius through contextualisation.

1.3. Objective of the Mauritius Local Context Report – New Buildings

This report applies to the Green Star SA – Office v1.1 tool as well as rating tools for Green Star SA - Retail Centre v1, Green Star SA – Multi Unit Residential v1 & Green Star SA - Public & Education Building v1, and considers the applicability of the tool in Mauritius. Included in the report is a background analysis of Mauritius, as well as a credit by credit analysis. This considers the applicability of each credit to the local context.

1.4. Methodology

The context report therefore addresses climatic conditions and ecology, water and energy patterns, building regulations and any other Mauritius -specific circumstances which may be in conflict with

certain Green Star SA requirements. The context report also analyses the Green Star SA Design and As Built rating tools credit-by-credit, identifying any ramifications that may result from the application of the Green Star SA rating tools to the Mauritian context.

BACKGROUND

02

2. BACKGROUND

2.1. Overview of Mauritius

The Republic of Mauritius consists of a group of islands with an area of approximately 2045 km² and has an Exclusive Economic Zone of 1.9 million km². The country includes the island of Mauritius, Rodrigues and the outer islands (Agaléga, St. Brandon and two disputed territories, Tromelin and Diego Garcia). The mainland, Mauritius, has an area of 1865 km² and has a population of approximately 1.2 million inhabitants. It is located in the Indian Ocean, near the Tropic of Capricorn (20.3S, 57.5E).

Given similar conditions encountered in other islands within the Indian Ocean (the Mascareignes Island, Mayotte, Comores, Seychelles and Madagascar, perhaps even Maldives, Mozambique and coastal Tanzania), projects on those islands could use this report as a starting point, but would still have to produce their own local context report for approval with the GBCSA and GBCA.

2.2. Local Environment

2.2.1. Topography

Mauritius is divided into nine districts which consist of different cities, towns and villages. Seven districts are mainly coastal plain areas that rise to a Central Plateau (400-670 m above sea level), surrounded by discontinuous mountain ranges.



2.2.2. Climate

2.2.2.1. Temperature

Mauritius experiences a tropical climate. Summers (October-April) are warm and humid while winters (May-September) are cool and dry ((MMS) Mauritius Meteorological Services, 2010). The mean summer and winter temperature is 24.7oC and 20.4oC respectively. During the hottest months (January and February), the average daily maximum temperature can reach 29.2°C while during the coolest months (July and August), the average night temperature can drop to 16.4°C.

Although no climatic zone has been formally identified, for the purpose of an Energy Efficiency Building Code prepared by the Ministry of Public Infrastructure and Land Transport, two climate zones has been defined for Mauritius:

- Zone 1: “Coastal Area”, which is defined by an altitude of lower than 160 m (humid and sub-tropical climate).
- Zone 2: “High Lands”, which is defined by an altitude equal to or above 160 m (more temperate climate).

Rodrigues and all other outer islands fall in Zone 1.

The local climate is close to the human comfort zone, very often natural ventilation provides reasonable to good comfort, making air conditioning systems unnecessary. However, cities on the island experience heat island effect over long periods since they are considerably hotter than the surrounding countryside. This heat island effect distances the micro-climate from the comfort zone, pushing the temperatures to a level where air conditioning can't be avoided any more, considering a minimum level of environmental comfort. Higher energy demand for air conditioning means higher emissions, especially here where most electric energy comes from non-renewable sources.

2.2.2.2. Relative Humidity

Relative humidity peaks frequently above 80% during summer while in winter it is around 70-80%.

2.2.2.3. Rainfall

The mean annual rainfall is 2010 mm with summer being the ‘rainy season’. The Central Plateau receives the most rainfall (4000 mm); the eastern coastal plain receives around 1500 mm while the north western part of the island (which is on the leeward side) receives only 800 mm.

2.2.2.4. Wind

The island is exposed to South East Trade Winds for the whole year. Moreover, coastal areas benefit from sea breezes.

2.2.2.5. Cyclones

Mauritius is subject to tropical cyclones during the summer seasons. Building structures are designed to resist the strong cyclonic winds.

2.3. Key Legislative Bodies for the Environment

2.3.1. Governmental Bodies

The three main ministries which are responsible for sustainable development for buildings are:

- 1) Ministry of Environment and Sustainable Development which develops and implements environmental policy.
- 2) Ministry of Housing and Lands which develops planning policy guidelines and bills for implementation by the local councils.
- 3) Ministry of Public Infrastructure, National Development Unit, Land Transport and Shipping which were in charge of developing an Energy Efficiency Building Codes.
- 4) Ministry of Energy and Public Utilities which formulates policies and strategies in the water, wastewater, energy sectors
- 5) Ministry of local government which formulates policies and legislative framework to ensure that local authorities operate smoothly.

2.3.2. Legislation

2.3.2.1. Environmental Protection Act (EPA) 2002

The main environmental legislation is the Environmental Protection Act (EPA) [amended in 2008]. The Act provides the procedure for carrying out:

- (a) Environmental Impact Assessment (EIA) and,
- (b) Preliminary Environmental Report (PER) – which is for projects having less environmental impacts compared to EIA project types.

The activities requiring either an EIA or PER are available on the government website. Typically, offices are not concerned.

The Act also provides a number of regulations pertaining to ambient air quality, noise levels and hazardous waste.

(Republic of Mauritius, 2008)

2.3.2.2. Planning and Development Act 2004

Some of the objectives of the Act are to ensure that land development is properly managed and to provide for land development which is ecologically sustainable. The Act also establishes the structure and scope of Planning Policy Guidance (PPG). The PPG provides guidelines regarding space planning and allocation for services for commercial, industrial and hotels development.

PPG 5 Commercial development is the most relevant for office buildings.

(Republic of Mauritius, 2004)

2.3.2.3. Energy Efficiency Act 2011

The Act main objective is to provide for the setting up of an Energy Efficiency Management Office with the purpose of the office is to:

- Promote the efficient use of energy
- Promote national awareness for the efficient use of energy as a means to reduce carbon emissions and to protect the environment.

(Republic of Mauritius, 2011)

2.3.2.4. Draft Energy Efficiency Building Code

This Energy Efficiency Building Code has been developed as one initiative to meet the goal regarding energy efficiency in the building sector under the project: Removal of Barriers to Energy Efficiency and Energy Conservation in Buildings.

Separate Guidelines has been developed to provide detailed suggestions for good practices and examples of application. These are:

- a) Passive Solar Design Guidelines
- b) Duct and Piping Guideline

The aim of this Code is to:

- Assist architects and professional engineers to comply with the energy performance objectives prescribed in the Energy Efficiency Building Regulations (EEBR).
- Encourage the design, construction and operation and maintenance of new and existing buildings in a manner that reduces energy by the means of passive design technologies for solar design and cooling strategies.
- Provide guidance for energy efficiency buildings design and encourage the application of renewable energy in new buildings.
- Set standards for energy efficient requirements for mechanical and electrical building services and construction solutions.

The EEBC is not yet in force in Mauritius.

2.3.2.5. Building Control Act 2012

The Building Control Act aims at regulating the building works in order to ensure minimum conditions of safety and comfort. Under the current situation in Mauritius, many buildings, particularly dwellings, are drawn and designed by draughtsman with little or no design input by a registered professional and/or is constructed under no control of minimum requirements.

The Act mentions the minimum requirements that all new buildings must comply with. These requirements need to be developed and detailed further by technical specifications mentioning

Codes and Standards including Guidelines incorporated in the Regulations, codes or standards issued under this Act

(Republic of Mauritius, 2012)

2.3.2.6. Draft Energy Efficiency Building Regulations

The purpose of this document is to link the Building Control Act with the Energy Efficiency Building Code. This regulation has the objectives of:

- Providing technical requirements for compliance with minimum energy efficiency requirements for buildings.
- Defining a special compliance and inspection mechanism.

The EEBR is not yet in force in Mauritius.

Standards in use within the building sector

| Services | Main Standards / Guidelines |
|---|---|
| Architect | Planning policy guidance – Design guidance commercial development |
| | Technical sheet – Access for people with disabilities |
| Occupational health and safety | Occupational health and safety Act 2005 |
| Structural | n/a |
| Electrical | BS 7671 IEE Wiring Regulations |
| | MS 63 Requirements for electrical installations |
| | CIBSE Code for lighting |
| Heating, ventilation and air conditioning | CIBSE Guide B |
| | ASHRAE Fundamental Handbook |
| Fire safety and protection system | Fire safety guidelines (Government fire services) |
| | BS 9999 Code of practice for fire safety in the design, management and use of buildings |

It must be noted that where no standards have been available, consulting engineers and contractors have used design guidelines / methodology from manufacturers (typically French). (Danish Energy Management A/S, 2011)

2.3.2.7. Investment Promotion Act 2000

Investment Promotion Act 2000 established the legal framework for the Board of Investment of Mauritius. Its objects and functions are as follows:

- to stimulate the development, expansion and growth of the economy by promoting Mauritius as an international investment, business and service centre;
- to promote and facilitate the development of all forms of investment and business activities;
- to formulate investment promotion policies and plans and marketing strategies and undertake promotion to attract foreign and local investments; and
- to advise Government on strategies for investment policies, national investment marketing and investment after care, economic and industrial planning and country image building.

The BoI has implemented different schemes in the property development sector: Real Estate Development Scheme (RES), Integrated Resort Scheme (IRS), Property Development Scheme, Smart City Scheme...

2.3.2.8. Maurice Ile Durable (MID)

Maurice Iles Durable (MID) is a national strategic project initiated in 2007 to make Mauritius a model of sustainable development. The MID project has committed to mainstream sustainable development with particular focus on 5 main issues namely energy, environment, employment, education and equity. In order to elaborate its strategy, policy and action plan, a green paper on Mauritius was published to henceforth serve as a working document for the further consultative process with the different stakeholders. Prepared in April 2011 by the Prime Minister's Office in collaboration with the Ministry of Environment and Sustainable Development the stage of consultation was implemented in June and July 2011 through 6 working groups to cover the "5Es". A number of projects have been funded under this project; examples included grants for solar water heaters, sale of compact fluorescent lamps at cheaper price and wind farm projects.

Since 2014, this institution does no longer exist.

(Anon., 2007)

2.4. Land Use

Land is a scarce resource in Mauritius. Efficient land use is a major concern due to its limited size, relatively high population density and its economic growth.

The island is heavily dependent on its agricultural production since it guarantees the subsistence for a significant part of the population. The share of this sector to GDP has been continuously declining over the last decade i.e. dropping below 5% in 2009. The total annual food requirement of the country is 686,000 tonnes of which about 23% is met by local production. Figure 1 below shows the different uses of land in Mauritius.

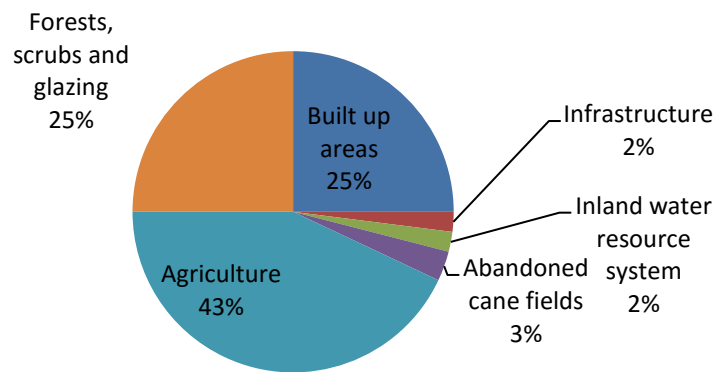


Figure 1: Land Use in Mauritius
 (Central Statistics Office, 2008)

From the pie chart in figure 1 it can be seen that agriculture retains the highest share of land use, where 93% is under sugarcane production and the rest is used for the cultivation of food crops, tobacco, tea and fruits and as farmland. However, it has shown a drop of about 6% from 1995-2005 (CSO, 2008), which is mainly due to the reform of the sugarcane industry, brought about by the loss in revenue from sugar exports following the change in EU sugar regime as well as the release of land for construction purposes. Over the years, the economy has been metamorphosed following a smart shift from a mono-agricultural model to a diversified, innovation-driven and knowledge-based economy, underpinned by a broad spectrum of business activities. One of those activities is the development of properties under the:

- Real Estate Scheme (RES) / Integrated Resort Scheme (IRS), which are programmes designed to facilitate the acquisition of residential property by non-citizens in Mauritius. The IRS is basically a project for the development and sale of luxurious residential units to foreigners.
- Smart City Scheme (SCS), which will promote targeted economic activities while at the same time consolidation the industrial and service base and an economic diversification path the promotion and uphold ecological sustainable development.
- The Property Development Scheme (PDS), which will attract investment from abroad by allowing non-citizens to acquire residential properties under the Scheme.

2.4.1. Land Conversion

The reform is formalised by the Sugar Industry Efficiency Act 2001 (Amended in 2013) which eases the land conversion process for sugar cane planters to use the land for non-sugar cane cultivation purposes. The Ministry of Agro-Industry and Fisheries reviews the land conversion permit application. The assessment criteria for assessing the application are to:

- Ensure that the level of production of sugar is sufficient to meet the commitments of Mauritius.
- Preserve agricultural land; optimising agricultural production.
- Prevent speculation in agricultural land.

- Respect outlines schemes and planning and development directives.
- Preserve irrigation areas.

(Republic of Mauritius, 2001)

(Republic of Mauritius, 2013)

2.4.2. Ecology and biodiversity

With reference to Figure 1, green areas (forests, scrubs etc) represent 25% of land use.

The Mauritian biodiversity exhibits a high level of endemism, uniqueness, and species diversity. However, the island has a highly modified ecosystem due to pressures from human activities and natural factors such as invasion by exotic species. Nowadays only 1.6% of the indigenous forests remain on the island (The Ministry of Environment and National Development, 2010).

The International Union for Conservation of Nature (IUCN) has characterised Mauritius as a Centre of Plant Diversity and ranked it third in the world (after Hawaii and Canary Islands), for having the most threatened plant species. 89 % of the Mauritius endemic flora is considered threatened. Here again, one of the reasons is the conversion of land for services, dwellings and land based pollution.

Tourism, a dominant economic factor, depends on sound environment and protected nature. Due to agriculture, Mauritius already lost most of its original fauna and flora. So the still existing fragments have to be protected, and, whenever possible, reconnected and/or extended.

2.5. Infrastructure

2.5.1. Energy

Currently around 83% of energy requirements in Mauritius are derived from imported fossil fuels, which are used mainly for generating electricity and for powering the transportation and manufacturing sectors. It is expected that energy demand will rise in future years, given the prospect of two million tourists by 2015 and further economic growth.

Figure 2 shows the different sources of energy used on the island.

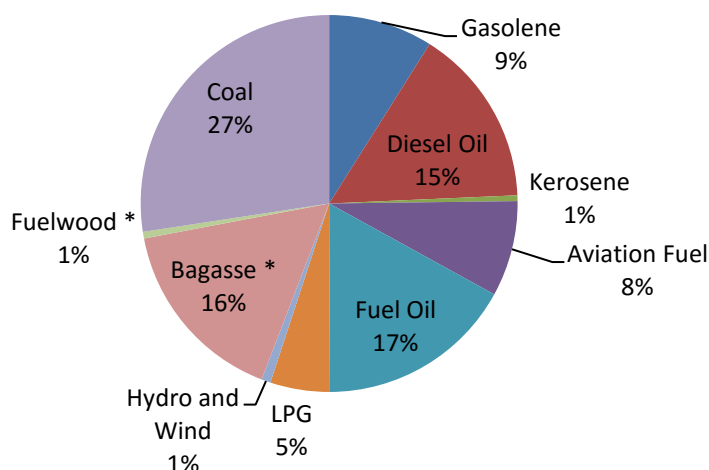


Figure 2: Energy Mix for Primary Energy Requirements

Source: (Central Statistics Office, 2009)

Between 1999 and 2009:

- There has been a decrease of 5% in the locally available renewable energy sources: bagasse and hydro.
- Import of coal has considerably increased (from 8% to 27%).
- In terms of final energy consumption by sector (shown in Figure 3), the highest consumer remains the transport sector followed by the manufacturing industry. The commercial and distributive trade (which includes the energy consumption by offices) have also increased continuously during the last decade.

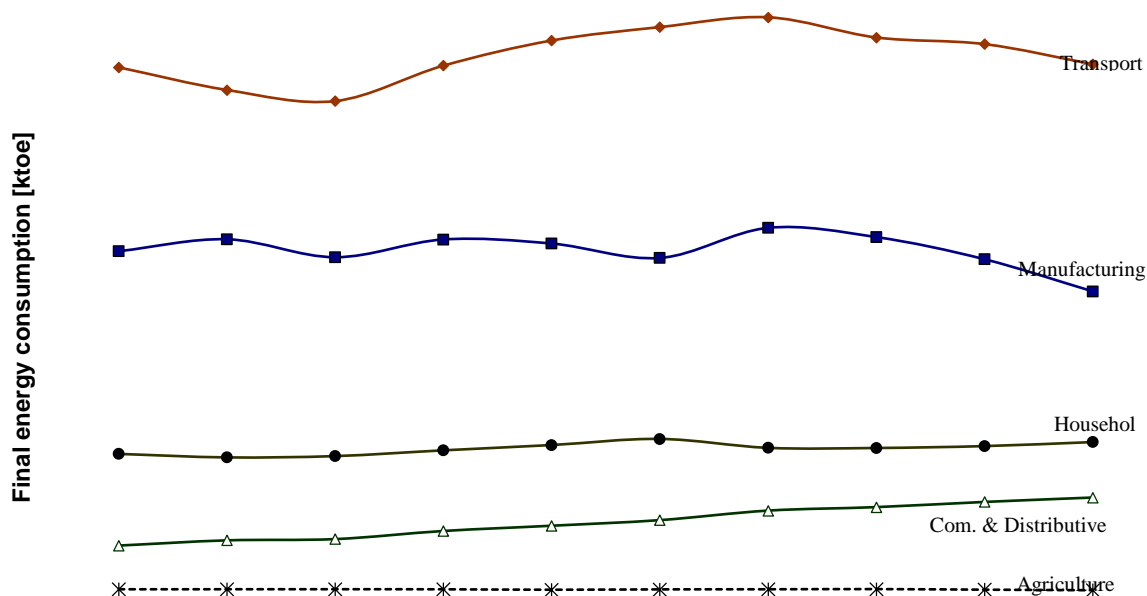


Figure 3: final energy consumption by sector from 2000-2009

Source: (Central Statistics Office, 2009)

The buildings sector accounts for about 22% of energy demand in Mauritius. From the Mauritius Energy Balance of 2010, it can be seen that the main form of energy in this sector is electricity, which accounts for 67 % of the total electricity used in Mauritius.

As a developing country Mauritius is in general not characterized by very good levels of energy efficiency (on both the supply or demand sides). The annual number of building permits in Mauritius is about 7,000 (including additions), which is insignificant when compared to the number of existing buildings. Therefore, the major potential for energy efficiency improvements is located in the existing building stock.

There is an on-going concern about peak demand and some measures have been taken by the Government to curtail it (e.g. roll-out of compact fluorescent lamps for the residential sector, development of on-grid photovoltaic systems...).

2.5.1.1. Power Reliability

Power supply is reliable although businesses usually allow for standby generator set to cater for power outages especially during cyclonic conditions.

2.5.1.2. CO₂ Emissions

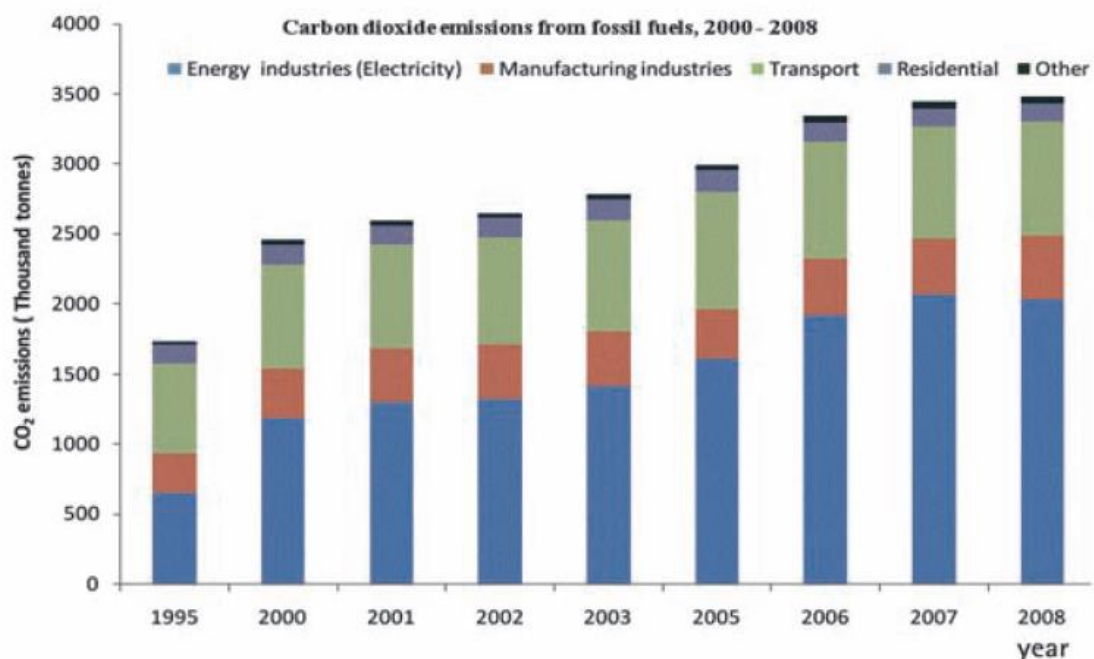


Figure 4: CO₂ emissions by sector from 1995-2008

Source: (Central Statistics Office, 2009)

Carbon dioxide emission resulting from fuel combustion went up from 1,736.9 thousand tonnes in 1995 to 3,485.8 thousand tonnes in 2008, a rise of 100.7% with an annual increase of 5.5%. Over the years, the energy industries have remained the principal source of CO₂ emission in the atmosphere. They contributed around 58% of the emissions, with 2,032 thousand tonnes in 2008. They were followed by the transport sector which contributed around 23% of the total emissions and the manufacturing industries with 13.1%. From 2007 to 2008, a 1.7% decrease of CO₂ emissions was obtained from energy industries. This could be explained by the rise in total energy production from local renewable sources which rose by 7.3% from 246 ktoe in 2007 to 264 ktoe in 2008. This was primarily due to a higher production of bagasse for electricity production.

2.5.2. Water

2.5.2.1. Supply and Infrastructure

In Mauritius, the main sources of water are rainfall, river and underground water. The island receives an average annual rainfall of about 3,700 Mm³. However, owing to its topography, hydro geological conditions and tropical location, it experiences high levels of rapid run off. Only 10 % of the precipitation goes as ground water recharge, while evapo-transpiration and surface runoff represent 30% and 60% respectively. Part of the surface runoff is conveyed to the impounding reservoirs, abstracted from rivers for domestic, agricultural and industrial uses and the remaining flows to the sea.

To date 99.7% of the population is connected to the water supply network. Housing and living conditions improved from 2000 to 2011, with a higher proportion of households receiving piped water inside their house (from 83.7% to 94.2%). In spite of this improvement some 1,400 households still do not have piped water in their premises and 600 households do not have a toilet.

Mauritius is classified as a water-stressed country and faces water scarcity problems during periods of drought. Previous experiences of water shortage in the country are an alert to the possibility of future similar or more severe situations. Thus, water cuts are frequent especially during the dry season. As such, most buildings are equipped with water tanks with usually a minimum capacity of two days. Climate change is expected to further exacerbate water scarcity as a result of decreasing rainfall and rising temperatures. Other challenges arise owing to increasing demand from a growing population, agriculture, industry and tourism. In 2010, the water consumption per capita per day was 164 L.

In 2008, the total water demand was estimated at 947 Mm³. The agricultural sector accounted for 42%, hydropower 35% and domestic, industrial and tourism 23 %.

The Government has taken measures to deal with the water shortages such as the building of dams, improved irrigation practice and campaigns for an efficient use of water.

Concerns have been raised regarding stormwater runoff as illustrated from this excerpt from the Mauritius strategy for implementation (MEND, 2009):

“An increase trend in rapid surface run off generation has been observed by the Water Resources Unit. These challenges have to be faced. Introducing more surface storage facilities is important as the country has no adequate forest cover or potential to substantially increase forest cover to modify the surface run off in the steep terrain.”

2.5.2.2. Water waste

The main sources of freshwater water pollution in Mauritius are dumping of solid waste in rivers, discharge of domestic and industrial effluents, and run-off from agricultural fields. The following measures are adopted on the island for controlling water pollution:

- Providing sewerage infrastructure and solid waste management system to prevent pollution at source.
- Requiring industries to pre-treat their effluent to prescribed standards before discharge into the sewerage system.
- Prohibiting industries which use or store large quantities of chemicals to be sited within water catchments.

In 2010, some 93,000 m³ of wastewater was captured and treated daily and it is expected that with the increase in house connection in the near future, this volume will further shoot up and reach an estimated volume of 179,000 m³ daily by the year 2015.

Currently, only 29% of the population is connected to the public sewer where around 47% of water is lost through leaks in the piping systems. The remaining 71% uses on-site disposal system. A national sewerage project is under way which aimed to connect 50% of the island by 2015 and 80% by 2030.

Wastewater treatment for office buildings depends on the location. They will be connected to the sewer network where it exists (towns and Ebene Business Park). Otherwise, package treatment plant or septic tanks are used.

2.5.3. Waste

The total amount of waste produced in 2010 was around 545,310 tonnes for a total population of 1,245,000 of which 78% was landfilled at Mare Chicose. Municipal Solid Waste (MSW) generated in Mauritius consists mostly of organic wastes, namely yard and domestic wastes, representing around 70% of the total generation.

Solid waste collection is undertaken by the local authorities in areas under their jurisdiction and disposed of at the Mare Chicose landfill via a network of transfer stations situated at St Martin, Roche Bois, Poudre d'Or, La Brasserie and La Laura. There is a target to reduce municipal waste by 25% (The Ministry of Environment and National Development, 2010).

Waste recycling is still in infancy. Only about 9% of paper, 3% of plastics and 31% of textiles are recycled (The Ministry of Environment and National Development, 2010). An NGO, Mission Verte, has provided sorting bins at different locations across the island. It also provides a list of recycling facilities.

2.5.4. Transport

Traffic congestion is a serious problem and is estimated to cost around 1.3% of GDP. The number of vehicles have almost doubled between the 1990s and 2008 (The Ministry of Environment and National Development, 2010). This expansion in the number of vehicles has also been accompanied

by a corresponding growth in energy consumption and carbon dioxide emissions. It is noted that:

- At end of December 2010, 384,115 vehicles were registered at the National Transport Authority compared to 366,520 at the end of December 2009, i.e. an increase of 4.8%.
- Some 21,643 vehicles joined the fleet whilst 4,048 were put out of circulation during the year.
- The fleet consisted largely of cars and dual-purpose vehicles (175,634 or 46%) and motorized two-wheelers (159,329 or 41%). The remaining 13% comprised of vans, lorries, trucks, buses and other vehicles.
- The number of road accidents increased by 8.8% from 19,542 in 2009 to 21,258 in 2010. Among these accidents, 153 were fatal (caused death) against 129 in the preceding year, up by 18.6%.
- The total number of vehicles (motor and non-motorized) involved in road accidents in 2010 was 41,263, that is, 3,205 or 8.4% higher than the 2009 figure of 38,058.

Traffic management measures have focussed on logistics such as opening of certain road lanes in peak hours and construction of new roads.

2.6. Green Buildings in Mauritius

2.6.1. Government Policy

2.6.1.1. Action Plan for Sustainable Buildings

Green buildings have been addressed under the Sustainable Consumption and Production (SCP) programme with an Action Plan being developed specially for buildings.

The Action Plan is intended to serve as a road map for Mauritius—to identify the most critical and practical steps needed to make sustainable building the standard practice in Mauritius. Specifically, the Plan's overall goals in the short term are to:

- Create a commonly accepted definition and language for sustainable building;
- Create a vision/message for sustainable building that will motivate people;
- Increase demand for sustainable building services/products/projects by increasing awareness and understanding, and by providing incentives; and
- Increase the supply of sustainable building services/products/projects by providing industry professionals with information, tools, resources, incentives, and rewards to enable them to undertake sustainable building practices.

The Six Strategies identified to meet the above goals are as follows:

- Develop a Shared Vision
- Develop Guidelines and a Rating system
- Devise Enabling Policies (Building Regulations and Financial Incentives)
- Create an Awards Program and Demonstration Projects
- Industry and Public Education

- Research and Development

2.6.1.2. Long Term Energy Strategy and Action plan on Energy Consumption

Energy Efficiency for Green buildings have been addressed in the long term energy strategy 2009-2025 (Ministry of Renewable Energy and Public Utilities, 2009), and in the Action Plan on Energy Consumption under the SCP programme.

The following has been proposed under the strategy:

1. Promotion of energy efficiency in design of buildings.
2. Public building will be designed to high energy efficiency standards taking into account life cycle costs.
3. Planning policy guidelines

The parts related to buildings in the Action Plan include energy audits, efficient lighting, alternative energy efficient transport, public procurement policies and research.

Various programmes such as the 'Removal of Barriers to Energy Efficiency and Energy Conservation in Buildings' have been implemented, under which standard designs, Energy Audit Management Schemes, new regulations and codes, development of software amongst others, are being developed.

LOCAL CONTEXT REPORT

03

3. LOCAL CONTEXT REPORT

3.1. Applying Green Star SA to Mauritius

3.1.1. General

This section outlines the application of Green Star SA to Mauritius from a general perspective.

It considers the typical project delivery, relevant building codes and standards, the eligibility requirements in Green Star SA, the conditional requirements and the environmental weightings of the tool.

3.1.2. Eligibility Requirements

No adaptations shall be made to the Spatial Differentiation, Space Use and Timing of Certification eligibility criteria of the Green Star SA rating tools. Conditional Requirements eligibility criterion are included in the credit by credit review.

3.1.3. Conditional Requirements

There are currently two conditional requirements in Green Star South Africa. If projects do not achieve these conditional requirements then they cannot achieve a Green Star rating. These are Eco-0, which prescribes the minimum ecological constraints for the building and Ene 0, which prescribes the minimum energy efficiency which the building must achieve.

It is recommended that Green Star SA – Mauritius include a minimum water efficiency requirement.

Details on how they can be adapted for Mauritius can be found in Section 3.3.5 of this report.

3.1.4. Environmental Weightings and Applicability to Mauritius

It has been agreed that the category weighting system should remain the same as that of the Green Star SA rating tools, until such a time as the Mauritius Green Building Council has the capacity to facilitate a revision of the category environmental weighting system.

3.2. Applying GREEN STAR SA – Credit by Credit

This report applies to the Green Star SA – Office v1.1 tool as well as rating tools for Green Star SA - Retail Centre v1, Green Star SA – Multi Unit Residential v1 & Green Star SA - Public & Education Building v1, and considers the applicability of the tool in Mauritius. Each credit's applicability to the Mauritian context is discussed and recommendations are made of where the project team must submit a Credit Interpretation Request (CIR) to the GBCSA where an alternative standard may be better suited.

3.3. Credit by Credit Review

Mauritian projects would also be required to use the latest Green Star SA TCs, CIRs and Errata relevant to rating tools, published on the GBCSA's website, which represent the current version of that specific tool.

Each credit is reviewed in the following way:

1. Aim of the credit,
2. Discussion, which outlines the views of the Mauritian professionals contacted as part of this research,
3. Requirements for the adoption of the Green Star SA tool,
4. Resources, which includes changes to the references listed in the technical manual as well as relevant Mauritian manufacturers, suppliers and consultants.

The details of each credit have not been provided. This section must be read in conjunction with the Green Star SA – Office v1.1 Technical Manual as well as Green Star SA v1 Technical Manuals for Retail Centre, Multi-unit Residential & Public and Education Building (available by order from www.gbcsa.org.za.)

The Green Star SA – Office v1.1 tool as well as Green Star SA v1 rating tools for Retail Centre, Multi-unit Residential & Public and Education Building, have been assessed for relevance on a credit by credit basis. Each credit's applicability to the Mauritian context is discussed and requirements are made of where the project team must submit a Credit Interpretation Request (CIR) to the GBCSA where an alternative standard may be better suited.

For each credit reviewed as part of this report, the credits are colour coded in accordance with the changes required for applicability to the local context:

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| | The credit should be kept in its current form and no adjustments need to be made. |
| | The credit requires a mandatory CIR or TC or adaptation to ensure relevance to the Mauritian context. |
| | The credit should be omitted and made 'not applicable' for the Mauritian application of the tool. |

All credits for new building tool credits have been included within the table below. All credits applicable to Green Star SA Office v1.1 tool as well as Green Star SA v1 rating tools for Retail Centre, Multi-unit Residential & Public and Education Building have been included within revision 2 of the local context report.

Mauritian projects would also be required to use the latest Green Star SA TCs, CIRs and Errata relevant to rating tools, published on the GBCSA's website, which represent the current version of that specific tool.

3.3.1. MANAGEMENT

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
|--|---|---|
| <u>MAN-01: Green Star SA Accredited Professional</u> To encourage and recognise the engagement of professionals who can assist the project team with the integration of Green Star aims and processes throughout design and construction phases. | <p>Green Star accreditation courses have been provided by GBCM & GBCSA annually. Presently, there are 10 Green Star Accredited Professionals in Mauritius.</p> <p>The credit is applicable to Mauritius</p> <p>Resources</p> <p>Green Building Council SA, n.d. "Accredited Professionals". Available at: http://www.gbcsa.org.za/education/ap_directory.php</p> <p>[Accessed 14th May 2012]</p> | MAN-01 should be kept in its current form and no adjustments need to be made. |
| <u>MAN-02: Commissioning Clauses</u> To encourage and recognise commissioning and handover initiatives that ensure that all building services can operate to optimal design potential. | <p>Although the CIBSE commissioning codes cited in the credit are included in some tender specifications, the commissioning process is rarely based on same. The documents and activities required for the second point are usually available.</p> <p>In Mauritius apart from the security systems the Air Conditioning and Mechanical Ventilation systems are considered more critical, given their obvious impact on thermal comfort and other indoor air quality issues.</p> <p>The draft Energy Efficiency building code has a clause on commissioning but does not refer to either ASHRAE or CIBSE.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Draft Energy Efficiency Building Code (Government of Mauritius)</p> | MAN-02 should be kept in its current form and no adjustments need to be made. |

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| <p><u>MAN-03: Building Tuning</u></p> <p>To encourage and recognise commissioning initiatives that ensure optimum occupant comfort and energy efficient services performance throughout the year.</p> | <p>Very few buildings are designed / built to allow building tuning, to the exception of some new projects integrating a BMS.</p> <p>There is a defects and liability period of one year during which contractors can be called in to rectify any malfunctioning of the system.</p> <p>The scope of works during the defects and liability period can be expanded to include building tuning. A re-commissioning schedule will be required to ensure minimum disruption. Moreover, for shell and core buildings, which are now tenanted, tenants should be informed of the building tuning process.</p> <p>A thorough analysis needs to take place with regards to building tuning, i.e., not only using feedback from the Facilities Manager, but also and foremost the building occupants.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None.</p> | <p>MAN-03 should be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAN-04: Independent Commissioning Agent</u></p> <p>To ensure buildings are designed with regard to future maintenance and are correctly commissioned before</p> | <p>This is not common practice in Mauritius.</p> <p>Having an independent agent in a project was debated during the presentation of the 2nd version of building code. M&E professionals in the sector generally agreed that they were in charge of the all the commissioning process. The 'commissioning agent' has been removed in the 2nd draft of EEBC.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Draft Energy Efficiency Building Code (Government of Mauritius)</p> | <p>MAN-04 should be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>MAN-05: Building User's Guide</u></p> <p>To encourage and recognise information management that enables building users to optimise the building's environmental performance.</p> | <p>Building user guide is not generally provided in projects in Mauritius. Usually, each specialist contractors would submit their commissioning report and the manuals. Training would provided mainly to maintenance staff to explain the operation of the building.</p> <p>Informing the users on how the building should function is an important aspect of making sure that the building performs to its optimum, therefore the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> <p>The credit is applicable to Mauritius</p> <p>Resources</p> <p>None.</p> | <p>MAN-05 should be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAN-06: Environmental Management</u></p> <p>To encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction.</p> | <p>The Environmental Protection Act 2002 provides a list of building/activity type which requires an EMP. The Environment Impact Assessment (EIA) consultant usually produces the latter. Office buildings are not included in this list and contractors do not provide EMP's.</p> <p>Currently new developments lack pollution prevention plans, which due to frequent tropical rain falls and strong winds cause loss of top soil and pollute water bodies.</p> <p>Environmental management will help mitigate the impact of the construction process on the environment. EIA consultants have the experience in producing EMPs and can be appointed to do same for projects.</p> <p>The EIA consultant could produce the EMP but the contractor is required to implement the recommendations in the EMP to achieve point for this credit.</p> <p>For the 2nd point, there is no building contractor certified ISO14001 in Mauritius yet. .</p> <p>Resources</p> | <p>MAN-06 should be kept in its current form and no adjustments need to be made.</p> |

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| | <p>http://environment.govmu.org/English/eia/Pages/EIA-Reports.aspx</p> <p>MAURITAS, n.d. "Accreditation of certification bodies". Available at: http://www.mauritas.org/accreditation_certification_bodies.php [Accessed 12th March 2012]</p> <p>Observatoire de l'Industrie, n.d. "Standards". Available at: http://www.industryobservatory.org/standards.php [Accessed 12th March 2012].</p> <p>2003 EPA Construction General Permit</p> | |
| <p><u>Man-07: Waste Management</u></p> <p>To encourage and recognise management practices that minimise the amount of construction waste going to disposal.</p> | <p>The Composition of waste of Mauritius in 1999 is classified as Total Municipal Waste 70%, Industrial Non Hazardous Waste 15%, Construction and Demolition Waste 11% Hazardous Material 0.2% and Sludge 0.8%</p> <p>The composition (on a weight basis) in 2002 was as followed: food waste 25%, Yard waste 43%, Plastics 13%, Paper 12%, Textiles 3% and metals 1%.</p> <p>This low percentage of construction and demolition waste does not result from a reuse/recycling strategy but mainly from the limited number of demolition / refurbishment projects. Recycling facilities for plastic, paper, glass, industrial waste, computer, oil and scrap metals exist in Mauritius.</p> <p>It is possible for the contractor or an EIA consultant to produce a waste management plan.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Ramdowar, S, 2011. "Construction and demolition waste management in Mauritius – Policy making". [online] http://www.scribd.com/doc/71330163/CnD [Accessed 13th March 2012].</p> | <p>MAN-07 should be kept in its current form and no adjustments need to be made.</p> |

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| | <p>EDULINK, 2009, "Report for the waste management in Mauritius" [online] http://www.codwap.hs-bremen.de/02%20Material/reports/CODWAP-Act4-UoM%20report%20final.pdf</p> <p>University of Mauritius 2010, "The Mounting problems with managing wastes in rapidly developing islands: The Mauritius case" [online] http://www.codwap.hs-bremen.de/02%20Material/Publication%20list/Venice2010-CODWAP_Mauritius.pdf</p> <p>Mission verte, n.d. "Prestataires locaux". [online] http://missionverte.com/ [Accessed 13th March 2012].</p> <p>MEND, 2007. "National workshop on the development of a programme on sustainable consumption and production for Mauritius (SCP)".</p> | |
| <p><u>MAN-8: Airtightness Testing</u></p> <p>To encourage and recognise measures to reduce uncontrolled air leakage in buildings, and reward the testing and achievement of good air tightness testing levels.</p> | <p>This is not a current local practice since the air required inside is normally only a few degrees different from that outside.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Draft Energy Efficiency Building Code (Government of Mauritius)</p> | <p>MAN-08 should be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAN-9: Waste Recycling Management Plan – RETAIL CENTRE</u></p> <p>To encourage and recognise management systems and building infrastructure that facilitate the reduction of the overall operational waste generation and disposal.</p> | <p>It is believed that through the development of management systems that facilitate the reduction of the overall operational waste generation and disposal, this credit will encourage the development and growth of these facilities in retail centres in the country.</p> <p>As such, the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa</p> | <p>MAN-09 should be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>MAN-10: Building Management System – RETAIL CENTRE & PEB</u></p> <p>To encourage and recognise the incorporation of Building Management Systems to actively control and maximize the effectiveness of building services.</p> | <p>Building Management Systems are computer based control systems installed in buildings to control and monitor the building's mechanical and electrical equipment as well as the water systems. Ideally the BMS, especially on large building projects, is a central integrated system monitoring and controlling the building.</p> <p>However on smaller projects where a single BMS system is not appropriate there is still benefit in installing smaller separate control systems that are linked to a central location to enable effective monitoring and control by the building facilities management team.</p> <p>Although BMS's are not commonly installed in retail centres, public and education buildings in Mauritius, it is believed that the expertise exist within the country to incorporate Building Management Systems to actively control and maximize the effectiveness of building services. As such, the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>MAN-10 should be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAN-11: Green Lease - RETAIL CENTRE</u></p> <p>To encourage and recognise initiatives taken by the building owner to encourage improved environmental behavior by tenants of the retail centre</p> | <p>Through the establishment of a contractually-binding tenancy lease agreement that requires the tenants of a retail centre to participate in the following environmental initiatives:</p> <ul style="list-style-type: none"> • Electrical energy monitoring and reporting (minimum quarterly) and have submitted an energy management plan at the beginning of each year; • Water monitoring and reporting (minimum quarterly) and have submitted a water management plan at the beginning of each year; • Waste reduction/recycling monitoring and reporting (minimum quarterly) and have submitted a waste management plan at the beginning of each year; • The preparation of a procurement policy at the beginning of each year regarding the use of environmentally friendly consumables (cleaning products, toiletry products, paper and plastic consumable products) and the building owner being required to report back to the tenants on the buildings' performance relating to energy, water, waste and procurement policies on an annual basis, market transformation within retail centres in Mauritius would occur through this credit. <p>This credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>MAN-11 should be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>MAN-12: Common Property Rules – MULTI UNIT RES</u> To encourage and recognize developers who embed legal and contractual environmental management initiatives within the formal management structures of the development.</p> | <p>Through the establishment of legal and contractual environmental management initiatives embedded within the formal management structures of the development, it is believed that within the rules of the development, the Management Entity committing to environmental initiatives would be beneficial to the common property areas of multi-unit residential developments.</p> <p>This credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>MAN-12 should be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAN-13: Learning Resources - PEB</u> To encourage and recognise sustainability initiatives implemented in the development as learning resources for building users and visitors</p> | <p>This credit has been developed to educate building occupants on how the sustainability initiatives implemented in the building work, and the associated environmental benefits of these initiatives.</p> <p>Making sustainable building initiatives and features visible and interactive can provide a valuable education and learning opportunity for building users to develop awareness about the building's impacts on the natural environment and resources. By incorporating important concepts such as energy, water and material efficiency, public and education buildings can become interactive learning tools in public and education buildings.</p> <p>This credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>MAN-13 should be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAN-14: Life Cycle Costing - PEB</u> To recognise and encourage the development of a Life Cycle Cost (LCC) analysis to consider environmentally sustainable attributes in assessing improved design, specification and Through-life maintenance and operation.</p> | <p>This credit even in South Africa is a stretch and as such the credit is omitted for projects in Mauritius, however projects could choose to target the credit under the Innovation category.</p> | <p>Man-14 credit is omitted.</p> |
| <p><u>MAN-15: Maintainability - PEB</u> To encourage and recognise building design that facilitates on-going maintenance, and minimises the need for on-going building maintenance throughout a building's lifecycle.</p> | <p>Public buildings can be complex structures with a variety of attributes which require a significant amount of maintenance. The design of these types of buildings should reflect the need for such maintenance by providing suitable access to facilities managers. When designed and managed accordingly, public buildings can minimise maintenance and operational costs, while also minimally impacting their occupants.</p> | <p>MAN-15 should be kept in its current form and no adjustments need to be made.</p> |

As such, this credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.

3.3.2. INDOOR ENVIRONMENTAL QUALITY

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
|---|---|---|
| <p><u>IEQ-01: Ventilation Rates</u></p> <p>To encourage and recognise designs that provide ample amounts of outside air to counteract build-up of indoor pollutants.</p> | <p>The ventilation rate is usually taken from CIBSE Guide B and the system is designed to provide a minimum of 8 l/s/p. The Occupational & Safety Act 2005 states that:</p> <p>"Effective and suitable provision shall be made for securing and maintaining the adequate ventilation of every workroom by the circulation of fresh or artificially purified air of suitable temperature and relative humidity and for rendering harmless, so far as is practicable, all impurities generated in the course of any process or work carried on in the workroom as may be injurious to health."</p> <p>Under our climatic conditions, comfort in residential buildings can be provided without air conditioning during long periods of the year, if efficient natural ventilation and a favourable micro-climate are guaranteed. This has to be taken into consideration when new developments are planned.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - CIBSE, 2005. CIBSE Guide B Heating, Ventilation, Air Conditioning and Refrigeration. CIBSE: Norfolk. | <p>IEQ-1 to be kept in its current form and no adjustments need to be made.</p> |

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| | <ul style="list-style-type: none"> - BSI, 2007. Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics. - Draft Energy Efficiency Building Code – Government of Mauritius | |
| <p><u>IEQ-02: Air Change Effectiveness</u></p> <p>To encourage and recognise systems that effectively deliver optimum air quality to any occupant throughout the occupied area.</p> | <p>IEQ-2: Air Change Effectiveness credit omitted from Office v1.1.</p> | <p>IEQ-2 credit is omitted.</p> |
| <p><u>IEQ-03: Carbon Dioxide Monitoring and Control</u></p> <p>To encourage and recognise the provision of response monitoring of Carbon Dioxide levels to ensure delivery of optimum quantities of outside air.</p> | <p>CO2 monitoring has not been installed in any known projects although it has been proposed especially for car park ventilation.</p> <p>A recommended design condition in the Draft Energy Efficiency Building Code is a CO2 level less than 1000ppm.</p> <p>Resources</p> <ul style="list-style-type: none"> - CIBSE, 2005. CIBSE Guide B Heating, Ventilation, Air conditioning and Refrigeration. CIBSE: Norfolk. - CIBSE, 1997. CIBSE Application Manual 10 Natural ventilation in non-domestic buildings. CIBSE: Norfolk. | <p>IEQ-3 to be kept in its current form and no adjustments need to be made..</p> |

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| <p><u>IEQ-04: Daylight</u></p> <p>To encourage and recognise designs that provide good levels of daylight for building users.</p> | <p>Although buildings allow for daylight, there are no requirements / targets for daylighting. Electrical engineers are usually proficient in lighting software such as Dialux from which daylight factor and illuminance can be obtained.</p> <p>A study comparing classrooms with and without daylight shows significantly better performance of students in day-lit rooms: daylight improved performance by up to 15%. A Passive Solar Design Guidelines have been drafted for Mauritius, and daylighting is a section dealt within same.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - Passive Solar Design Guidelines – Government of Mauritius | <p>IEQ-04 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-05: Daylight Glare Control</u></p> <p>To encourage and recognise buildings that are designed to reduce the discomfort of glare from natural light.</p> | <p>The Draft Passive Solar Design Guidelines includes information on glare control.</p> <p>For compliance with the Draft Energy Efficiency Building Code, sun shading strategies are required to reduce direct sunlight, hence glare.</p> <p>Daylight glare control is usually in the form of internal blinds. Other sun shading solutions are used on projects that reduce daylight glare.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None</p> | <p>IEQ-05 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-06: High Frequency Ballasts</u></p> <p>To encourage and recognise buildings that increase workplace amenity by avoiding low frequency flicker that may be associated with fluorescent lighting.</p> | <p>IEQ-6 High Frequency Ballasts credit omitted from Office v1.1</p> | <p>IEQ-6 credit is omitted.</p> |

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| <p><u>IEQ-07: Electric Lighting Levels</u></p> <p>To encourage and recognise base building provided office lighting that is not over designed.</p> | <p>Engineers use the recommended lux levels from CIBSE Code for lighting or manufacturers' data. Task lighting is designed to achieve between 300-500lux. This is also the recommended range given in the Draft Energy Efficiency Building Code. However the code provides the maximum lighting power allowance of 10 W/m² for offices.</p> <p>Very few projects use light modelling to eventually design accordingly. An office with ample daylighting will have same light fittings as another office with lesser exposure to daylighting.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Draft Energy Efficiency Building Code – Government of Mauritius</p> | <p>IEQ-07 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-08: External Views</u></p> <p>To encourage and recognise designs that provide occupants with a visual connection to the external environment.</p> | <p>There are no specific requirements from building regulations with regards to the need of access to external views.</p> <p>The credit is applicable to Mauritius</p> <p>Resources</p> <p>None.</p> | <p>IEQ-08 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-09: Thermal Comfort</u></p> <p>To encourage and recognise buildings that achieve a high level of thermal comfort.</p> | <p>Consultants are generally not conversant with the use of either ASHRAE 55 or PMV.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - Aynsley, R., 1999. Estimating summer wind driven natural ventilation potential for indoor thermal comfort. Journal of Wind Engineering and Industrial Aerodynamics, 83(1-3), pp.515-525. | <p>IEQ-09 to be kept in its current form.</p> |

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| | - Draft Energy Efficiency Building Code – Government of Mauritius | |
| IEQ-10: Individual Comfort Control To encourage and recognise designs that facilitate individual control of thermal comfort. | This credit is applicable to Mauritius. Resources None. | IEQ-10 to be kept in its current form and no adjustments need to be made. |
| IEQ-11: Hazardous Materials To encourage and recognise actions taken to reduce health risks to occupants from the presence of hazardous materials. | SA OHS Act is more stringent than the Mauritian OHS Act. The credit is applicable to Mauritius. Resources <ul style="list-style-type: none"> - Ministry of Environment, 2001. "Environmental Protection (Disposal of Hazardous Waste) Regulations". - Ministry of Health & Quality of Life, 2005. "Occupational Health & Safety Act 2005". | IEQ-11 to be kept in its current form and no adjustments need to be made. |
| IEQ-12: Internal Noise Levels To encourage and recognise buildings that are designed to maintain internal noise levels at an appropriate level. | The Environmental Protection (Control of Noise) Regulations 2008 do not provide any recommendations regarding acceptable noise levels in working places. The Occupational Health and Safety Act 2005 states that: <i>"Where in any place of work persons are employed in any process involving exposure to noise or vibration which may constitute a danger to their health, effective means shall be provided for the reduction of such noise or vibration within the place of work."</i> The internal noise levels are typically designed to BS standards. It is noted that there are no acoustic engineers in Mauritius. An M&E consultant with experience acting as an acoustics consultant could act as an acoustic engineer. The credit is applicable to Mauritius. | IEQ-12 to be kept in its current form and no adjustments need to be made. |

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| | Resources <ul style="list-style-type: none"> - Ministry of Health & Quality of Life, 2005. "Occupational Health & Safety Act 2005". | |
| <u>IEQ-13: Volatile Organic Compounds</u> To encourage and recognise specification of interior finishes that minimise the contribution and levels of Volatile Organic Compounds (VOCs) in buildings. | Architects and designers are generally aware of VOCs and motivated to minimise the use of products with high VOCs contents. Paint suppliers offer low VOCs / no VOCs products. The credit is applicable to Mauritius. Resources None | IEQ-13 to be kept in its current form and no adjustments need to be made. |
| <u>IEQ-14: Formaldehyde Minimisation</u> To encourage and recognise the specification of products with low formaldehyde emission levels. | At present, wood products are imported without any particular reference to Formaldehyde content. The credit is applicable to Mauritius. Resources None | IEQ-14 to be kept in its current form and no adjustments need to be made. |
| <u>IEQ-15: Mould Prevention</u> To encourage and recognise the design of services that eliminate the risk of mould growth and its associated detrimental impact on occupant health. | Dehumidification is carried out by the AC system itself. There is no evidence that humidity sensors have been installed in any building ductwork. Although not common practice, the use of humidity controls and monitoring is relevant to Mauritius, where mould is a problem due to badly ventilated spaces. The credit is applicable to Mauritius. Resources | IEQ-15 to be kept in its current form and no adjustments need to be made. |

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| | None. | |
| <p>IEQ-16: Tenant Exhaust Riser</p> <p>To encourage and recognise the design of buildings with a general exhaust riser that can be used by tenants to remove indoor pollutants from printing and photocopy areas</p> | <p>For legal requirements, the Occupational Health and Safety Act 2005 states that:</p> <p><i>"where in any place of work persons are employed in any process involving exposure to ultra-violet, infra-red and any other non-ionising radiation which may constitute a danger to their health, effective means shall, so far as is reasonably practicable, be provided for the reduction of such non-ionising radiation within the place of work".</i></p> <p>In addition, it also advocates the effective and suitable provision to be made for securing and maintaining ventilation to render harmless impurities produced during work related activities. It must be noted that the Environmental Protection (Standards of Air) Regulations 1998 provide the maximum limit for Carbon Monoxide and Ozone in ambient air (See Table IEQ16.1 below).</p> <p>The provision for a tenant exhaust riser is feasible.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - Ministry of Health & Quality of Life, 2005. "Occupational Health & Safety Act 2005". - Ministry of Environment, 1998. "Environmental Protection (Standards of Air) Regulations 1998". <p>Table IEQ 16.1 : Ambient Pollutants</p> | <p>IEQ-16 to be kept in its current form and no adjustments need to be made.</p> |

| | <table><tr><th>Pollutant</th><th>Acceptable Limits</th></tr><tr><td>CO</td><td>25mg/m3 in 1h; 10mg/m3 in 8h</td></tr><tr><td>Ozone</td><td>100ug/m3 in 1h</td></tr></table> | Pollutant | Acceptable Limits | CO | 25mg/m3 in 1h; 10mg/m3 in 8h | Ozone | 100ug/m3 in 1h | |
|--|---|--|-------------------|----|------------------------------|-------|----------------|--|
| Pollutant | Acceptable Limits | | | | | | | |
| CO | 25mg/m3 in 1h; 10mg/m3 in 8h | | | | | | | |
| Ozone | 100ug/m3 in 1h | | | | | | | |
| <p><u>IEQ-17: Environmental Tobacco Smoke (ETS) Avoidance</u></p> <p>To encourage and recognise the air quality benefits to occupants by prohibiting smoking inside the building.</p> | <p>Smoking in indoors areas is not allowed in Mauritius since the 1st March 2009 following the introduction of Public Health (Restriction of tobacco products) Regulations 2008. The objectives of this regulation are to "reduce tobacco use, decrease exposure to tobacco smoke and promote smoking cessation among smokers". Although the regulations allow for dedicated smoking area in the working place, this is rarely allocated in new buildings</p> <p>The regulations are enacted and thus smoking in indoor areas is banned. There is generally no signage or space to designate outdoor smoking areas. The favoured location ends up being the balcony areas.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none">- Government Information Service, 2009. "Smoking and Drinking Prohibited in Public Places since 1 March 2009". Available at: http://www.gov.mu/portal/site/Mainhomepage/menuitem. [Accessed: 08th March 2012].- Ministry of Health and Quality of Life, 2008. "Public Health (Restrictions on Tobacco Products) Regulations 2008". Available at: http://www.gov.mu/portal/goc/moh/file/tobacco1.pdf [Accessed: 08th March 2012]. | <p>IEQ-17 to be kept in its current form and no adjustments need to be made.</p> | | | | | | |

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| <p><u>IEQ-18: Places of Respite and Connection to Nature – RETAIL CENTRE</u></p> <p>To encourage and recognise developments that create approximately designed areas where retail centre staff and visitors can relax in a place of respite which has a connection to nature.</p> | <p>Places of respite which have a connection to nature provide retail centre staff and visitors with approximately designed areas in which to relax and decrease stress levels commonly induced by excessive time spent confined indoors.</p> <p>Where the place of respite is outdoors, the area should have low noise exposure (from traffic and building services, shading to at least 35% of its area; and be screened from significant prevailing winds. Where the place of respite is indoors, the area should have a Daylight Factor (DF) of at least 2.5% and meet the credit criteria of IEQ-01. This can be achieved within the Mauritius context and, with the minor changes for IEQ-01, the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>IEQ-18 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-19: Private Outdoor Space - MULTI UNIT RES</u></p> <p>To encourage and recognize dwelling designs which improve the health and wellbeing of the occupants by providing private outdoor space.</p> | <p>Private outdoor spaces accessible for private use by the dwelling occupants only, directly adjacent to, and accessible from, the associated dwelling and at least 1m² per occupant or at least 6m² improve the health and wellbeing of the occupants in multi-unit residential developments as it provides the occupants with private places of respite in nature.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>IEQ-19 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-22: Universal Access - MULTI UNIT RES</u></p> <p>To recognize design that provides universal access, to and within dwellings, to meet the changing needs of occupants.</p> | <p>Facilities for persons with disabilities within multi-unit residential developments are often neglected resulting in difficulties for occupants within the developments who have differing needs.</p> | <p>IEQ-22 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>IEQ-23: Stairs - PEB</u></p> <p>To encourage and recognise designs that promotes the wellbeing of occupants by encouraging the use of stairs as an alternative to vertical transportation by lift.</p> | <p>Lifts in multi storey buildings is often the main form of vertical transport. This can largely be attributed to the fact that stairs are ‘hidden’ away and used for emergencies only. By making stairs more prominent their use could be more attractive with added health benefits as a result.</p> | <p>IEQ-23 to be kept in its current form and no adjustments need to be made.</p> |

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| | <p>Provision of attractive stairs promotes the use of stairs and thereby giving occupants the option to improve their physical wellbeing. Provided that cognisance is made for the provision for persons with disabilities, designs that promote the use of stairs within public and education buildings can easily be achieved within the Mauritian context.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa</p> | |
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3.3.3. ENERGY

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
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| <p><u>ENE-0: Conditional Requirement</u></p> <p>To encourage and recognise designs that minimise the greenhouse gas emissions associated with operational energy consumption, and maximise potential operational energy efficiency of the base building.</p> | <p>The Energy Efficiency Act and Building Control Act are the 2 main pieces of legislation in force dealing with energy efficiency in buildings. The following bills that are in draft form:</p> <ul style="list-style-type: none"> ▪ Energy Efficiency Building Regulations ▪ Energy Efficiency Building Code <p>The EEBC provides a compliance route using the performance approach with building modelling.</p> <p>There are no standards in Mauritius for notional buildings. Therefore, SANS 204 can still be used using the location, which has the most similar climatic conditions as Mauritius which is Durban.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - Hui, S. C. M., 1997. Overall thermal transfer value (OTTV): how to improve its control in Hong Kong, In Proc. of the One-day Symposium on Building, Energy and Environment, 16 October 1997, Shangrila Hotel, Kowloon, Hong Kong, HKIE BS Division/CIBSE/ASHRAE/PolyU, pp. 12-1 to 12-11. - CLG, 2010. Non domestic building services compliance guide. Available at: http://www.planningportal.gov.uk/uploads/br/non-domestic_building_compliance_guide_2010.pdf. [Accessed on 15th March 2012]. - Draft Energy Efficiency Building Code – Government of Mauritius | <p>It is recommended that ENE-0 be maintained in its current form, but that projects apply Durban's climate zone for the notional building standards.</p> <p>Office v1.1 rating tool be applied to all other credits, calculations and protocols except the Energy modelling protocol for the ENE-0 and ENE-1: Greenhouse Gas Emissions credit, where the Office v1 Energy modelling protocol will be applicable to Mauritian projects.</p> <p>Changes to the Green Star SA – Office v1 Energy Modelling protocol should be motivated by the registered project via the mandatory CIR.</p> <p>Conditional Requirement, therefore all projects must submit a CIR and receive a</p> |

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| | | final ruling before Round 1 can be submitted to the GBCSA. |
| <u>ENE-01: Greenhouse Gas Emissions</u> To encourage and recognise designs that minimise the greenhouse gas emissions associated with operational energy consumption | Refer to ENE 0. Resources None. | Refer to ENE 0. |
| <u>ENE-02: Energy Sub-metering</u> To encourage and recognise the installation of energy sub-metering to facilitate on-going management of energy consumption. | Sub metering is common practice in Mauritius. Energy consumption for Air conditioning is also sub-metered on the majority of project using a centralised system. The credit is applicable to Mauritius. Resources <ul style="list-style-type: none"> - Mauritius Environment Outlook Report Summary for Decision-Makers - Digest of Energy and Water Statistics – 2010, Ministry of Finance and Economic Development, Republic of Mauritius, October 2011] - Enkvist et al., McKinsey & Company, 2007 (page 38) - Republic of Mauritius, 2000 and 2011 Housing Census - Smart Meter Requirements - Dutch Smart Meter specification EnergieNed - Reference: B101 - Date: February 4th, 2008 - Version: 2.1 final - Organisation Internationale de Metologie Legale - OIML R49 Draft Energy Efficiency Building Code – Government of Mauritius | ENE-02 to be kept in its current form and no adjustments need to be made. |

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| <p><u>ENE-03: Lighting Power Density</u></p> <p>To encourage and recognise designs that provide artificial lighting with minimal energy consumption.</p> | <p>The Draft Energy Efficiency Building Code provides for lighting power allowances and recommended luminance, which is higher than what is prescribed in the GBCSA Office Tool V1.1.</p> <p>This credit is applicable to Mauritius.</p> <p>Resources</p> <p>Draft Energy Efficiency Building Code</p> | <p>ENE-03 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ENE-04: Lighting Zoning</u></p> <p>To encourage and recognise lighting design practices that offer greater flexibility for light switching, making it easier to light only occupied areas.</p> | <p>Lighting zones are usually defined on a case by case basis. Advanced lighting system has been installed in some buildings. The draft EEBC provides a section on lighting control requirements.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None.</p> | <p>ENE-04 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ENE-05: Peak Energy Demand Reduction / ENE-5 Maximum Electrical Demand Reduction - PEB</u></p> <p>To encourage and recognise designs that reduce peak demand on energy supply infrastructure.</p> | <p>Standby generator sets are used for backup power due to power outages (especially during and in the aftermath of cyclonic conditions).</p> <p>Renewable energy - PVs have been installed following a pilot feed in tariff system implemented by the CEB.</p> <p>Solar thermal collectors are not installed in office buildings due to low demand.</p> <p>The standard used to calculate the peak energy demand for the base building should be similar to ENE 0 and 1.</p> <p>Resources</p> <p>None.</p> | <p>ENE-05 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>ENE-06: Thermal Energy Sub-Metering – RETAIL CENTRE</u></p> <p>To encourage and recognise the installation of thermal energy sub metering to facilitate ongoing management of thermal energy consumption.</p> | <p>Sub-metering of thermal energy consumption is not a very common practice. Most retail buildings meter energy consumption per tenant and not all substantive thermal energy uses where flow temperature, return temperature and mass flow rate are measured.</p> <p>This credit should therefore remain to encourage responsible thermal energy monitoring. The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>ENE-06 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ENE-7: Hot Water Energy Use - MULTI UNIT RES</u></p> <p>To encourage and recognise dwelling designs that reduce greenhouse gas emissions associated with domestic hot water production.</p> | <p>Several designs within multi-unit residential developments can be incorporated to reduce greenhouse gas emissions associated with domestic hot water production. This could include the use of more efficient domestic hot water fixtures and fittings, the installation of solar or other forms of renewable energy hot water geysers or heat recovery plants.</p> <p>The reduction of greenhouse gas emissions associated with domestic hot water production should be a priority irrespective of region, such that the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> <p>The Green Star SA Multi Unit Residential v1 Hot Water Calculator would however need to be adapted to reflect the relevant fuel factors in Mauritius. This would be project-specific and a mandatory CIR would need to be submitted to confirm applicability</p> | <p>For ENE-7, the Green Star SA Multi Unit Residential v1 Hot Water Calculator would need to be adapted to reflect the relevant fuel factors in Mauritius.</p> <p>This would be project-specific and a mandatory CIR would need to be submitted to confirm applicability.</p> |
| <p><u>ENE-8: Common Property Energy Use - MULTI UNIT RES</u></p> <p>To encourage and recognise designs that reduce energy use associated with common property lifts, car park ventilation and lighting.</p> | <p>It is important that the energy use associated with common property lifts, car park ventilation and common property lighting in multi-unit residential developments is reduced.</p> <p>Where projects wish to apply other standards than those in the Green Star SA tool (SANS 10400-O)</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa, therefore ENE-08 should be kept in its current form and no adjustments need to be made.</p> | <p>ENE-08 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>ENE-9: Low Emission Energy Generation - MULTI UNIT RES</u></p> <p>To encourage and recognise designs that incorporate on-site energy generation systems utilising renewable or low emission energy sources.</p> | <p>It is encouraged that designs incorporate on-site energy generation systems utilising renewable or low emission energy sources..</p> <p>Up to four points can be achieved in the Mauritian context, such that the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>ENE-09 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ENE-10: Energy Efficient Appliances - MULTI UNIT RES</u></p> <p>To encourage and recognise initiatives which reduce energy consumption associated with major appliances.</p> | <p>It is encouraged that initiatives are implemented which reduce energy consumption associated with major appliances. As such, points are awarded where a minimum of two applicable appliances are provided within the scope of the main contract; and applicable appliance provided is certified with a minimum 'B' rating of the European "Energy Rating" labelling system.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>ENE-10 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ENE-11: Unoccupied Spaces - PEB</u></p> <p>To encourage and recognise designs that minimise or eliminate energy use for spaces when unoccupied.</p> | <p>Depending on the climate of the location, HVAC systems use between 10% and 30% of the total electricity used in buildings. Therefore, by reducing the amount of energy spent on heating and cooling in a building, users can reduce both greenhouse gas emissions and operational costs significantly.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>ENE-11 to be kept in its current form and no adjustments need to be made.</p> |

3.3.4. TRANSPORT

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
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| <p><u>TRA-01: Provision of Car Parking</u></p> <p>To encourage and recognise developments that facilitate the use of alternative modes of transportation for commuting to work.</p> | <p>The Mauritian PPG 5 Commercial Development does not define a maximum parking allowance but a minimum of 1 bay for each 60m² of gross floor area.</p> <p>The reduction in parking space has not resulted to a marked alternative transport means. For instance, the transport strategy in Cybercity in Ebene, was initially to reduce car-parking allowance to encourage use of public transport. This unfortunately has lead to 'rogue parking' where car owners park on any public areas found and to uncontrolled traffic jam. The Business Park Of Mauritius Ltd (BPML) in charge of development in CyberCity has finally authorized a construction of a new parking tour of 900 parkings in order to reduce this nuisance.</p> <p>We need to consider the aim of credit together with the traffic and rogue parking impacts for the short term in our transport strategy.</p> <p>A maximum car parking allowance of 4 bays per 100m² GFA as per Johannesburg Town Planning Scheme is allowed for this credit as the ratio of number of cars registered/population are the same for city of Johannesburg and Mauritius. 1 point is achieve by: providing 25% less parking than the maximum parking allowance and 2 points by providing 50% less parking than the maximum parking allowance.</p> <p>Resources</p> <p>Standards: South African standards reference the DOT parking guidelines or 4 bays per 100m².</p> <p>http://www.zimride.com</p> <p>http://www.lemauricien.com/article/parking-sauvage-construction-d-tour-900-vehicules-ebene</p> | <p>Tra-01 to be kept in its current form.</p> <p>A maximum car parking allowance of 4 bays per 100m² GFA as per Johannesburg Town Planning Scheme is allowed for this credit.</p> |

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| <p><u>TRA-02: Fuel-Efficient Transport</u></p> <p>To encourage and recognise developments that facilitate the use of more fuel efficient vehicles for work commuting.</p> | <p>Carpooling/car sharing is rarely used as an alternative to public transport by people who own a private means of transport. It is, also, more common where company provide company cars to some of their employees. There is no requirement in PPGs for parking allocation for car pool vehicles.</p> <p>Some hybrid cars have started to emerge in the local market. Government has provided incentives upon the acquisition of such cars.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None.</p> | <p>TRA-02 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>TRA-03: Cyclist Facilities</u></p> <p>To encourage and recognise developments that facilitate the use of bicycles by occupants and visitors.</p> | <p>Cycling is mostly a leisure activity in Mauritius. There are no cycling paths and cycling may not be a safe way to travel especially over the long distances from home to work. Bicycle racks are difficult to find, which creates a further obstacle to the frequent and daily use of this mean of transport.</p> <p>The climatic conditions are favourable for the use of bicycles: the local climate is close to the comfort range during most days of the year and most cities and villages count with a relatively flat topography. With the decentralisation of offices from the Capital, Port Louis, we have noted an emergence of offices in Quatre- Bornes, Rose-Hill and Vacoas (Previously mainly residential zones). The use of bicycles as a means to commute to work will be easier and safer.</p> <p>Moreover, PPG 5 recommends that it should be possible for people to make the local journey on foot, by bicycle or by public transport.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None.</p> | <p>TRA-03 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>TRA-04: Commuting Mass Transport</u></p> <p>To encourage and recognise developments that facilitate the use of mass transport for work commuting.</p> | <p>Mauritius is an island where public transport is available to the main business hubs only.</p> <p>The existing public transport system is very limited, based on bus lines, taxis and private contract vans Moreover, Mauritius does not have a public rail network.</p> <p>A new scoring system is allowed for this credit to reflect the local context: the credit will have a maximum of 3 points with the following breakdown</p> <p>Score 10: 1point, Score 20: 2 points, Score 40: 3 points using the GBCSA transportation calculation tool</p> <p>Government of Mauritius is promoting new development zone where public transport is not yet in place. TRA4-T-OB1-0580 allows projects to consider future transport services</p> <p>Resources</p> <p>None.</p> | <p>Tra-04 to be kept in its current form but maximum points and score is adjusted to reflect local context as followed:</p> <ul style="list-style-type: none"> • Score 10: 1point, • Score 20: 2 points, • Score 40: 3 points <p>using the GBCSA transportation calculation tool.</p> |
| <p><u>TRA-05: Local Connectivity</u></p> <p>To encourage and recognise office buildings that are integrated with or built adjacent to community amenities and/or dwellings in order to reduce the overall number of automobile trips taken by building users.</p> | <p>PPG 5 does not mention any requirements for local connectivity.</p> <p>This credit is applicable to Mauritius. More and more office parks are being built with facilities such as banks, pharmacies and convenience stores.</p> <p>Resources</p> <ul style="list-style-type: none"> - Design Guidance – Residential Development (revised). Ministry of Housing and Lands. December 2011 - Neufert. Architect’s Data. 3rd Edition (English Version) - Neufert. Les éléments des projets de construction. 9th Edition (French Version) - Neufert. Bauentwurfslehre. 39th Edition (German Version) | <p>Tra-05 to be kept in its current form and no adjustments need to be made.</p> |

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| | <ul style="list-style-type: none"> - Pedestrian & Bicycle Planning – A Guide to Best Practices. Victoria Transport Policy Institute. Canada, 20 February 2012. Available at: www.vtpi.org/nmtguide.doc | |
| <p><u>TRA-06: Trip Reduction – Mixed Use – RETAIL CENTRE</u></p> <p>To encourage & recognise retail centres that are built in mixed use areas in order to reduce the overall number of car trips taken by patrons.</p> | <p>Similar to TRA-5, the choice of site often depends on the availability of a suitable site. When faced with multiple options for a site, this credit aims to encourage retail developments that incorporate effective car-based trip reduction measures such as the provision of quality pedestrian, cycling and public transport access.</p> <p>Mixed use development or retail centres within mixed use areas, and within walking distance, encourage shoppers and retail employees living nearby, to make a modal switch from using cars to walking or cycling. Besides reducing congestion and pollution, walking and cycling can also bring health benefits to the public and should be encouraged.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa, therefore TRA-6 should be kept in its current form and no adjustments need to be made.</p> | <p>TRA-06 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>TRA-07: Vehicle Operating Emissions – RETAIL CENTRE & PEB</u></p> <p>To encourage & recognise retail centres that reduce vehicular emissions resulting from traffic congestion by upgrading road infrastructure around the centre.</p> | <p>Usually, ‘delay’ and ‘number of stops’ are used to determine the existing, existing plus development and post road improvements operational condition of an intersection. The higher the delay and number of stops the higher the CO₂ emissions per vehicle will be.</p> <p>Car emissions are a major source of air pollutants, such as oxides of nitrogen, particles and ozone. Poor air quality has been shown to aggravate asthma, bronchitis and cardiac problems. Carbon dioxide from vehicle emissions is also known as a contributing factor to global climate change. Road infrastructure improvements are necessary to reduce the traffic impact of the development to acceptable levels.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa, therefore TRA-07 should be kept in its current form and no adjustments need to be made.</p> | <p>TRA-07 should remain in its current form and no adjustments need to be made.</p> |

3.3.5. WATER

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
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| <p><u>WAT-1: Occupant Amenity Water / WAT-1: Potable Water – PEB</u></p> <p>To encourage and recognise designs that reduce potable water consumption by building occupants.</p> | <p>Water efficient fixtures are available and have been used in some projects.</p> <p>Office projects typically do not have any greywater or blackwater recycling facilities, although some of them have black water treatment plant. On some projects, rainwater harvesting has been proposed mainly for irrigation purposes.</p> <p>Mauritius benefits from a decent amount of annual rainfall every year. Yet with bad management and logistics surrounding the issue, the country faces droughts on a yearly cycle.</p> <p>If the project is targeting the Rainwater/Storm water harvesting path in the WAT category, a CIR must be submitted to the GBCSA with local rainfall values for input into the Potable Water calculator.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None.</p> | <p>Wat-01 to be kept in its current form.</p> <p>The project team should submit a CIR with rainfall values relevant to their site to the GBCSA such that these values can be entered in the potable water calculator, if applicable.</p> <p>Due to the shortage of water, a new conditional requirement has been incorporated into this category. Project teams must achieve at least 1 point in the potable water calculator in Wat-1 to be eligible for a Green Star SA rating.</p> <p>Information on how to do this can be found in the GBCSA Potable Water and Sewerage Calculator Guide,</p> |

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| | | available from the GBCSA website. |
| <u>WAT-02: Water Meters</u> To encourage and recognise the design of systems that both monitor and manage water consumption | <p>Generally, for single occupant building, a main meter is installed. For multiple tenants, one meter is allowed per tenant.</p> <p>It is possible to install additional meters. The credit is applicable to the local context; however with the cost/m³ of potable water being relatively cheap as compared to developing countries, the cost/benefit of installing water meters to monitor any leakage may become a discussion topic.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Central Water Authority</p> <p>ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE - OIML R49</p> <p>Casa Azul – Construção Sustentável [Caixa Econômica Federal]</p> | WAT-02 to be kept in its current form and no adjustments need to be made. |
| <u>WAT-03: Landscape Irrigation</u> To encourage and recognise the design of systems that aim to reduce the consumption of potable water for landscape irrigation. | <p>The use of rainwater for landscape irrigation is used in some projects.</p> <p>The credit is applicable to Mauritius</p> <p>Resources</p> <p>None.</p> | WAT-03 to be kept in its current form and no adjustments need to be made. |

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| <p><u>WAT-04: Heat Rejection Water</u></p> <p>To encourage and recognise design that reduces potable water consumption from heat rejection systems.</p> | <p>Water cooled systems are rarely used in Mauritius, especially for offices.</p> <p>However Mauritius has a consequent growing building industry, as the economy improves water-cooled systems would become more of a common place. The rating tool should take this into account and mitigate for this now.</p> <p>Moreover, climate is similar to Durban and large percentage of buildings in Durban use water cooled systems</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>None.</p> | <p>WAT-04 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>WAT-05: Fire System Water Consumption</u></p> <p>To encourage and recognise building design which reduces consumption of potable water for the building's fire protection and essential water storage systems.</p> | <p>Potable water is often used for building's fire protection.</p> <p>It is to be noted that there is no fire engineer in Mauritius. An M&E consultant is generally responsible for fire services in a building. Therefor, the M&E consultant could act as the fire engineer</p> <p>The credit is applicable to Mauritius</p> <p>Resources</p> <p>None.</p> | <p>WAT-05 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>WAT-07: Potable Water Efficient Appliances - MULTI UNIT RES</u></p> <p>To encourage and recognise initiatives which reduce water consumption associated with major appliances.</p> | <p>Various initiatives can be implemented in multi-unit residential developments to reduce the water consumption associated with major appliances.</p> <p>These initiatives could include the provision of clothes washes for a minimum of 90% of dwellings or the provision of communal laundry area(s).</p> | <p>WAT-07 to be kept in its current form and no adjustments need to be made.</p> |

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| | <p>These initiatives could also include the provision of dishwashers where all dishwashers provided achieve a minimum water efficiency of 7.2 litres/kg.</p> <p>The credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | |
| <p><u>WAT-08: Swimming Pool / Spa Water Efficiency - MULTI UNIT RES</u></p> <p>To encourage and recognise designs that reduce potable water consumption associated with swimming pools and spas.</p> | <p>Swimming pools lose water through evaporation and also through filter cleaning and backwashing.</p> <p>Therefore, to achieve this credit, for any pool within the multi-unit residential development, a pool blanket is provided; and the pool filtration system avoids the requirement for backwashing; and for any spa within the development, a spa cover is provided. Alternatively, no pool(s) and or spa(s) are provided in the development.</p> <p>As such, the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>WAT-08 to be kept in its current form and no adjustments need to be made.</p> |

3.3.6. MATERIALS

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
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| <u>MAT-01: Recycling Waste Storage</u> To encourage and recognise the inclusion of storage space that facilitates the recycling of resources used within buildings to reduce waste going to disposal. | The credit is applicable to Mauritius. | MAT-01 to be kept in its current form and no adjustments need to be made. |
| <u>MAT-02: Building Reuse</u> To encourage and recognise developments that reuse existing buildings to minimise materials consumption. | Currently there are some new projects which are considering renovations instead of demolition and reconstruction. The credit is applicable to Mauritius.. | MAT-02 to be kept in its current form and no adjustments need to be made. |
| <u>MAT-03: Reused Materials</u> To encourage and recognise designs that prolong the useful life of existing products and materials. | In some building recycled wood and stones are used. The will to embark on new product with longer lifetime with no previous history on the product is fairly limited. Invariably this means more expensive materials. The market is very much concerned with first costs. The credit is applicable to Mauritius. | MAT-03 to be kept in its current form and no adjustments need to be made. |
| <u>MAT-04: Shell and Core or Integrated Fit-out</u> To encourage and recognise base building delivery mechanisms that eliminate the need for immediate tenant refits. | For shell and core buildings, common areas are fitted out while only the main electrical and water supply is provided for each tenant area. In addition, an electrical point is provided in each tenant space to provide electrical power to contractors who will carry out future fit out. On some projects with centralised systems, air conditioning is taken to the tenanted areas. The credit is applicable to Mauritius. | MAT-04 to be kept in its current form and no adjustments need to be made. |

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| <p><u>MAT-05: Concrete</u></p> <p>To encourage and recognise the reduction of embodied energy and resource depletion occurring through use of concrete.</p> | <p>With the geographical location and the occurrence of cyclones in the region on an annual basis, the construction industry is reluctant to find alternatives since concrete structure has stood the test of time over the last 40 odd years. There is also a proposal for a plant to produce cement with fly ash.</p> <p>The credit is applicable to Mauritius. There is a need to show that alternative suitable materials exist besides concrete.</p> | <p>MAT-05 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAT-06: Steel</u></p> <p>To encourage and recognise the reduction in embodied energy and resource depletion associated with reduced use of virgin steel.</p> | <p>Steel is recycled in Mauritius. Recycled steel is mainly used as reinforcement to concrete structures.</p> <p>The credit is applicable to Mauritius.</p> | <p>MAT-06 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAT-07: PVC Minimisation</u></p> <p>To encourage and recognise the reduction in use of Poly Vinyl Chloride (PVC) products in buildings.</p> | <p>MAT-7: PVC Minimisation credit omitted from Office v1.1</p> | <p>Mat-07 credit is omitted.</p> |
| <p><u>MAT-8: Sustainable Timber</u></p> <p>To encourage and recognise the specification of reused timber products or timber that has certified environmentally-responsible forest management practices.</p> | <p>Since most timber is imported, using a certified source should not be difficult. In the past this has proven to be costly to source certified wood.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Forest Stewardship Council principles and criteria. Available at: www.fscus.org</p> | <p>MAT-08 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAT-9: Design for Disassembly</u></p> <p>To encourage and recognise designs that minimise the embodied energy and resources associated with demolition.</p> | <p>There are projects that are looking at this as there are developments in sensitive areas and the structures are temporary and thus need to be easily disassembled.</p> <p>Since concrete framed buildings are widely used in Mauritius, disassembly is less possible than steel or timber frame structures. However in office buildings cladding systems or curtain walling are used.</p> | <p>MAT-09 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>MAT-10: Dematerialisation</u></p> <p>To encourage and recognise designs that produce a net reduction in the total amount of material used.</p> | <p>There is no awareness of dematerialisation amongst the design teams on projects</p> <p>The initiatives can be accommodated.</p> | <p>MAT-10 be kept in its current form and no adjustments need to be made.</p> |
| <p><u>MAT-11: Local Sourcing</u></p> <p>To encourage and recognise the environmental advantages gained, in the form of reduced transportation emissions, by using materials and products that are sourced within close proximity to the site.</p> | <p>Mauritius is an island with limited resources, or unexploited resources. It thus has to import almost all construction materials except for materials of basaltic sources. At the same time, the island faces serious challenges due to huge amounts of waste being generated daily.</p> <p>The credit is not relevant to the local market. However, few initiatives to research on alternative materials have been conducted in Mauritius. Sourcing within the region could be spinning a positive economic impact rather than a reduction in travel related emissions). The credit was developed however in South Africa to address emissions and not economic issues.</p> | <p>Mat-11 credit is omitted.</p> |
| <p><u>MAT-12: Efficient Dwelling Size - MULTI UNIT RES</u></p> <p>To encourage and recognise multi-unit residential developments with efficiently sized dwelling units and reduced material consumption.</p> | <p>This credit aims to encourage more efficient use of space in dwelling unit design, and to discourage the over-sizing of residential units. Through designing more efficient spaces, various benefits can be achieved. These include reduction in the use of materials and resources, densification, efficiencies of space use and smarter design.</p> <p>All the benefits listed above are key in moving the residential market forward towards better design principles and more efficiently sized residential developments.</p> <p>The credit in its current form, therefore, is equally relevant and applicable in Mauritius as it is in South Africa, with the availability of building resources and compliance with the credit criteria completed automatically by the 'Efficient Dwelling Size Calculator' within the rating tool spreadsheet.</p> | <p>MAT-12 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>MAT-13: Masonry - MULTI UNIT RES & PEB</u></p> <p>To encourage and recognise designs that minimise the embodied energy and resources associated with a reduction of virgin material in masonry units.</p> | <p>Reducing the mass of a masonry unit reduces the embodied energy of the product and reduces transport related greenhouse gas emissions. It also leads to reduced loading on structures, which can lead to reductions in the size of structural members. This would have a significant impact on the masonry used in multi residential and public and educational buildings as thus the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>MAT-13 to be kept in its current form and no adjustments need to be made.</p> |
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3.3.7. LAND USE AND ECOLOGY

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
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| <p><u>ECO-: Conditional Requirement</u></p> <p>To encourage and recognise development on land that has limited ecological value and to discourage development on ecologically valuable sites.</p> | <p>Most development in Mauritius is on greenfield sites. In addition, the Government policy has been to facilitate land conversion especially for small sugar cane planters.</p> <p>This credit should be adjusted to accommodate the local context, since many developments take place on agricultural lands. Sugar was the main industry. The sugar industry was protected with a preferential price. With the drop in the price of Sugar, this made it not economically viable to use such amount of land for sugar planting. Therefore, some of the land is being converted into development zones.</p> <p>Land conversion is required for converting agricultural land, and this goes through a process before obtaining approval. Limited indigenous vegetation remains on the island, and this should be protected.</p> <p>The definitions must be changed in order to include the possibility to have green building on agricultural land that has been earmarked by Government for development.</p> <p>The criteria should be changed as follows:</p> <p>Suitably qualified registered ecologist – change definition to suitably qualified and experienced ecologist</p> <p>Prime Agricultural Land - change definition to 'Prime Agricultural Land (prior to Land Conversion) which falls outside of the Development Zone as prescribed by the governments Outline Planning Scheme'</p> | <p>It is recommended that ECO 0 is maintained as a conditional requirement.</p> <p>However, the definitions are changed as per Discussion.</p> |

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| | <p>Vegetation of high ecological value - no change to definition</p> <p>Land with confirmed presence of Red Data species or habitat for Red Data species or appropriate buffer as defined in the policies of the relevant Provincial Authority - to change definition to 'Land with confirmed presence of Red Data species or habitat for Red Data species or protected plants as listed in the Environment Protection Act 2002 as amended 2008 and the Plant Protection Act 2006</p> <p>Land within 100m of a wetland or river - no change to definition.</p> <p>Resources</p> <ul style="list-style-type: none"> - Forests and Reserves Act 1983 and Rivers and Canals Act 1863 | |
| <p><u>ECO-01: Topsoil</u></p> <p>To encourage and recognise construction practices that preserve the ecological integrity of topsoil.</p> | <p>Normally on all projects the topsoil is persevered for re-use.</p> <p>The credit is applicable to Mauritius.</p> | <p>ECO-01 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ECO-02: Reuse of Land</u></p> <p>To encourage and recognise the reuse of land that has previously been developed and where the site is within an existing municipally approved urban edge.</p> | <p>PPG 5-Commercial development provides a list of requirements pertaining to various locations where commercial development is possible. These are:</p> <ul style="list-style-type: none"> ▪ central business district (CBD) ▪ edge-of-centre and out-of-town ▪ local centres ▪ corner shops <p>There is no reference to a “municipality urban edge” in the Mauritian legislation. “Municipal urban edge” should be changed to</p> | <p>It is recommended that ECO-02 is maintained in its current form, but the “municipal urban edge” should be changed to “Development Zone as prescribed by the governments Outline Planning Scheme” to target the 2nd point of this credit</p> |

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| | <p>“Development Zone as prescribed by the governments Outline Planning Scheme”</p> <p>Project in Mauritius can target the 2nd point of this credit is within the “Development Zone as prescribed by the governments Outline Planning Scheme”</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - Ministry of Housing and Lands, 2004. Design Guidance Commercial Development. - Neufert. Architect’s Data. 3rd Edition (English Version) - Pedestrian & Bicycle Planning – A Guide to Best Practices. Victoria Transport Policy Institute. Canada, 20.February 2012. Available at: www.vtpi.org/nmtguide.doc | |
| <p><u>ECO-03: Reclaimed Contaminated Land</u></p> <p>To encourage and recognise developments that reclaim contaminated land that otherwise would not have been developed.</p> | <p>There are not as many contaminated sites as in developed countries as there are not many industrial processes done due to the lack of resources.</p> <p>The credit is applicable to Mauritius</p> | <p>ECO-03 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ECO-04: Change of Ecological Value</u></p> <p>To encourage and recognise developments that maintain or enhance the ecological value of their sites.</p> | <p>Government policy has focussed on increasing awareness on endangered species and establishing conservation programme in nature reserves. There has been no promotion of biodiversity for construction projects.</p> <p>From a project that is currently under construction, the ecological value of the site has been enhanced, previously the area was not fit</p> | <p>Eco-04 to be kept in its current form.</p> <p>A mandatory CIR must be submitted to the GBCSA by projects to determine which South African bio-region is most applicable to the project.</p> |

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| | <p>for construction, until the promoter invested heavily to revitalise the land and use it for construction.</p> <p>Sensitive areas are denoted on the Development Outline Scheme. This Outline Scheme is consulted prior to handing of development permits.</p> <p>Wetlands are protected by the Ramsar convention.</p> <p>There are no bio-regions defined in Mauritius. Although sensitive areas are defined, with corruption, development still occurs.</p> | |
| <p><u>ECO-05: Urban Heat Island – RETAIL CENTRE</u></p> <p>To recognise and reward initiatives taken to reduce the heat island effect of the buildings which impact on microclimates, human and wildlife habitats.</p> | <p>The Urban heat island negatively impacts not only residents of urban related environs, but also humans and their associated ecosystems located far away from cities. In fact, UHI's have been indirectly related to climate change due to the contribution to the greenhouse effect, and therefore, to global warming. Therefore, the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa.</p> | <p>ECO-05 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>ECO-06: Outdoor Communal Facilities - MULTI UNIT RES</u></p> <p>To encourage and recognise designs which enable residents to engage in a broad range of outdoor activities in common areas.</p> | <p>There is a growing body of evidence that demonstrates how communal green spaces can offer lasting economic, social, cultural and environmental benefits. Projects catering for resident's assembly type activities offer a unique opportunity to promote the concept of shared land use by providing such communal facilities thus encouraging multi-unit residential developments with real character and a sense of place.</p> <p>This is relevant for the Mauritius context as it is for the South African context, as such ECO-06 should be kept in its current form and no adjustments need to be made.</p> | <p>Eco-06 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>ECO-07: Urban Consolidation - MULTI UNIT RES</u></p> <p>To encourage and recognise designs which make use of compact development patterns to increase land utilisation efficiency.</p> | <p>Urban consolidation is the process of increasing or maintaining the density of housing in established residential areas, with the aim of urban consolidation to reduce development on the fringe areas of the city.</p> <p>By making use of compact development patterns, land utilisation efficiency is increased as well as local connectivity (refer to TRA-5), trip reductions within mixed use developments (TRA-6) and the sharing of precinct bulk infrastructure, mass commuting transport systems and local amenities.</p> <p>The credit aims to encourage and recognise the efficient use of land by multi-unit residential developments.</p> <p>As such, the credit in its current form is equally relevant and applicable in Mauritius as it is in South Africa</p> | <p>Eco-07 to be kept in its current form and no adjustments need to be made</p> |
| <p><u>ECO-08: Community Facilities - PEB</u></p> <p>To encourage and recognise integrated planning and shared land use in developments through the provision of on-site outdoor facilities for use by the local community.</p> | <p>This is relevant for the Mauritius context as it is for the South African context, as such ECO-08 should be kept in its current form and no adjustments need to be made.</p> | <p>Eco-08 to be kept in its current form and no adjustments need to be made</p> |

3.3.8. EMISSIONS

| AIM OF CREDIT | DISCUSSION | RECOMMENDATION |
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| <u>EMI-01: Refrigerants/Gaseous Ozone Depleting Potential (ODP)</u> To encourage and recognise the selection of refrigerants and other gases that do not contribute to long-term damage to the Earth's stratospheric ozone layer. | HVAC engineers have been specifying zero ODP refrigerants such as R410a for a few years now. Refrigerant such as R22 is still available on the market. The credit is applicable to Mauritius | EMI-01 to be kept in its current form and no adjustments need to be made. |
| <u>EMI-02: Refrigerants/Gaseous Global Warming Potential (GWP)</u> To encourage and recognise the selection of refrigerants that reduce the potential for increased global warming from the emission of refrigerants to the atmosphere. | Although the engineers are aware of low GWP refrigerants, these are not specified and used as they are not available on the market yet. The credit is applicable to Mauritius. | EMI-02 to be kept in its current form and no adjustments need to be made. |
| <u>EMI-03: Refrigerant Leaks</u> To encourage and recognise building systems design that minimises environmental damage from refrigerant leaks. | There is an awareness of the monitoring systems, but these are not commonly used. The credit is applicable to Mauritius. | EMI-03 to be kept in its current form and no adjustments need to be made. |
| <u>EMI-04: Insulant ODP</u> To encourage and recognise the selection of insulants that do not contribute to long-term damage to the Earth's stratospheric ozone layer. | Consulting engineers and contractors are aware of such products which are sometimes specified. The credit is applicable to Mauritius. | EMI-04 to be kept in its current form and no adjustments need to be made. |
| <u>EMI-05: Watercourse Pollution</u> To encourage and recognise developments that minimise storm water run-off to, and the pollution of the natural watercourses. | The policy on protection of water resources have been laid down in the National Development Strategy 2003 - policy No.WS2 as follows: <i>"the natural functions and habitats of water resources including rivers, rivulets, aquifers, boreholes, groundwater, surface water and marine water"</i> | EMI-05 to be kept in its current form and no adjustments need to be made. |

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| | <p><i>resources will be protected from adverse effects of development either through incorporation of environmental mitigation measures in development schemes, prohibition of development in buffer zones (no development allowed within a 200 m radius of boreholes) and/or the protection and maintenance of natural habitat adjoining such resources. “</i></p> <p>Stormwater runoff causes erosion and pollution but if properly managed can reduce costs by using the water for non-potable purposes like irrigation (landscaping) or toilet flushing. Stormwater runoff can also cause erosion, which is responsible for the loss of valuable topsoil and its subsequent loss of soil fertility and biodiversity.</p> <p>The credit is applicable to Mauritius in its current form as it is in South Africa.</p> | |
| <p><u>EMI-06: Discharge to Sewer</u></p> <p>To encourage and recognise developments that minimise discharge to the municipal sewerage system.</p> | <p>Typically, grey and black water treatment is not carried out in office buildings due to costs and availability of municipal sewer line.</p> <p>It is often the case that the wastewater department requires the building to connect to the municipal sewer, even though on-site treatment is proposed.</p> <p>It must be noted that the wastewater treated at Grand Baie and St Martin treatment station is used for irrigation (MEND, 2009) Several office projects are now being done on the coastal zones where the water table is high. Since some of the coastal zones are not sewered, a treatment plant is installed.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <ul style="list-style-type: none"> - MEND, 2009. Mauritius Strategy for Implementation National Assessment Report 2010. [online] www.gov.mu | <p>EMI-06 to be kept in its current form and no adjustments need to be made.</p> |

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| <p><u>EMI-07: Light Pollution</u></p> <p>To encourage and recognise developments that minimise light pollution into the night sky.</p> | <p>According to PPG 5 Design Guidance Commercial development, use of floodlighting should be indicated to local planning authority and such lighting should not cause light pollution to neighbouring areas.</p> <p>The credit is applicable to Mauritius.</p> <p>Resources</p> <p>Planning policy guidance – Ministry of Housing and Lands</p> | <p>EMI-07 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>EMI-8: Legionella</u></p> <p>To encourage and recognise building systems design that eliminates the risk of Legionnaires’ disease (Legionellosis).</p> | <p>Evaporative cooling towers are rarely used in Mauritius due to the humidity level. Suppliers are aware of this problem on hot water systems.</p> <p>However Mauritius has a consequent growing building industry, as the economy improves water-cooled systems would become more of a common place. The rating tool should take this into account and mitigate for this now.</p> <p>Moreover, climate is similar to Durban and large percentage of buildings in Durban use water cooled systems</p> <p>The credit is applicable to Mauritius.</p> | <p>EMI-08 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>EMI-9: Boiler and Generator Emissions</u></p> <p>To encourage and recognise the use of boilers and generators that minimise harmful emissions.</p> | <p>The available generator sets presently comply with EU Stage II.</p> <p>The credit is applicable to Mauritius..</p> | <p>EMI-09 to be kept in its current form and no adjustments need to be made.</p> |
| <p><u>EMI-10: Kitchen Exhaust Emissions – RETAIL CENTRE</u></p> <p>To encourage and reward designs that avoid kitchen exhaust fumes being expelled directly into the adjacent spaces that people occupy.</p> | <p>Kitchen exhaust emissions expelled by retail tenants directly into the adjacent spaces have a negative and unhealthy impact on the people occupying these spaces.</p> <p>As such, the credit is equally relevant and applicable in Mauritius as it is in South Africa in its current form.</p> | <p>EMI-10 to be kept in its current form and no adjustments need to be made.</p> |

3.3.9. INNOVATION

The innovation credits should remain as they are except reference must be made to Mauritius and not South Africa. This is an important category because it addresses what could possibly be important factors not addressed by the tool while encouraging innovation.

Projects can achieve up to a total of 10 Innovation points for the below:

- Office v1.1
- CUSTOM

Projects can achieve up to a total of 5 Innovation points for the below:

- Retail v1
- PEB v1
- MUR v1

REFERENCES

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4. REFERENCES

- (MMS) Mauritius Meteorological Services, 2010. *Climate of Mauritius*, Port Louis: Mauritius Meteorological Services.
- Anon., 2006. *The Climate Of Mauritius*. [Online]
Available at: http://www.geography-site.co.uk/pages/countries/climate/mauritius_climate.html
- Anon., 2007. *Maurice Ile Durable*. [Online]
Available at: <http://mid.govmu.org/portal/sites/mid/index.html>
[Accessed 17 February 2017].
- Central Statistics Office, 2008. *Annual Digest of Statistics 2008*, Republic of Mauritius: Ministry of Finance and Economic Development.
- Central Statistics Office, 2009. *Annual Digest of Statistics 2009*, Republic of Mauritius: Ministry of Finance and Economic Development.
- Danish Energy Management A/S, 2011. *Energy Efficiency Building Regulation - Final Draft*, s.l.: Danish Energy Management A/S.
- Green Building Council of South Africa, 2010. *Green Star SA Retail Technical Manual*. v1 ed. South Africa: GBCSA.
- Green Building Council of South Africa, 2011. *Green Star SA Multi Residential Technical Manual*. v1 ed. South Africa: GBCSA.
- Green Building Council of South Africa, 2013. *Green Star SA Public & Education Technical Manual*. v1 ed. South Africa: GBCSA.
- Green Building Council of South Africa, 2014. *Green Star SA Office Technical Manual*. v1.1 ed. South Africa: GBCSA.
- Ministry of Renewable Energy and Public Utilities, 2009. *Long-Term Energy Strategy 2009-2025*, Port Louis: Republic of Mauritius.
- Republic of Mauritius, 2001. *SUGAR INDUSTRY EFFICIENCY ACT 2001*. Port Louis: Republic of Mauritius.
- Republic of Mauritius, 2004. *THE PLANNING AND DEVELOPMENT ACT 2004*. Port Louis: Republic of Mauritius.
- Republic of Mauritius, 2008. *ENVIRONMENT PROTECTION ACT (2002) AS AMENDED IN 2008*. Port Louis: Republic of Mauritius.
- Republic of Mauritius, 2011. *ENERGY EFFICIENCY ACT 2011*. Port Louis: Republic of Mauritius.
- Republic of Mauritius, 2012. *THE BUILDING CONTROL ACT 2012*. Port Louis: Republic of Mauritius.
- Republic of Mauritius, 2013. *THE SUGAR INDUSTRY EFFICIENCY (AMENDMENT) ACT 2013*. Port Louis: Republic of Mauritius.
- The Ministry of Environment and National Development, 2010. *Mauritius Strategy for Implementation - National Assessment Report 2010*, Port Louis: Republic of Mauritius.