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LOCAL CONTEXT REPORT

# GREEN STAR SA FOR USE IN NIGERIA

2014/02/14

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# LOCAL CONTEXT REPORT

## GREEN STAR SA FOR USE IN NIGERIA

Version 1

2014/02/14

### TECHNICAL WORKING GROUP



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# Executive Summary

## Overview of the Nigeria Local Context Report

This report serves as a local context assessment to allow for office, retail centre, multi-unit residential, public and education building projects in Nigeria to be certified using the Green Star SA v1 rating tools.

The Green Building Council of South Africa (GBCSA) is currently licensed by the Green Building Council of Australia (GBCA) to allow certification using the Green Star SA v1 rating tools only in South Africa (Office, Retail Centre, Multi Unit Residential, Public & Education Building), Ghana (Office), Namibia (Office) and Mauritius (Office). Through this local context assessment, the GBCSA aims to apply for approval from the GBCA to allow for certification in Nigeria using all of the Green Star SA v1 Design/As Built rating tools (with some minor adaptations recommended in this report) – this includes the following Green Star SA rating tools: Office, Retail Centre, Multi Unit Residential and Public & Education Building.

The GBCSA would manage and allow the certification through its existing established processes, but call the certification Green Star SA-Nigeria. The GBCSA will then use the opportunity to allow capacity to grow in Nigeria, by allowing selected Nigerian professionals to be trained as Green Star SA-Nigeria assessors who would join the GBCSA assessor teams on Nigerian projects. In addition, the GBCSA would deliver the Green Star SA Accredited Professional course in Nigeria, in collaboration with the GBCN, which would allow Nigerians to take the Green Star SA Accredited Professional online examination.

## 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):

Credit	Discussion	Recommendation
<b>MAN-6</b>	<p>MAN-6 should be kept in its current form, with an adaptation to include referencing the relevant sections of the Provincial Government of the Western Cape Environmental Management Plan Guidelines (2005) – refer to Table Man-6.1 of the Additional Guidance in the “Green Star SA Public &amp; Education Building v1” First Edition rating tool published in March 2013 - as equivalent to referencing Section 3 of the New South Wales (NSW) Environmental Management Systems Guidelines (2009).</p> <p><b>References</b></p> <p>For further information about the local legislation of Nigeria with regards to environmental management, refer to:</p> <p>NESREA Reg 2010 S.I No. 19 NESREA Reg 2009 S.I No. 29.</p>	Adaptation

<p><b>IEQ-11</b></p>	<p>For IEQ-11, a mandatory CIR should be issued by the project team to demonstrate compliance with the credit criteria using the relevant legislation of the country.</p> <p>Where no such legislation exists, guidance as stipulated by the South African Occupational Health and Safety Act (OH&amp;S) should be used.</p> <p><b>References</b></p> <p>For further information about the local legislation of Nigeria with regards to hazardous materials in the built environment, refer to:</p> <p>Section 10 of the National Building Code NESREA Reg 2010 S.I No. 19.</p>	<p>Mandatory CIR</p>
<p><b>ENE-0</b></p>	<p>ENE-1 should be kept in its current form with a mandatory CIR to confirm compliance route applicability.</p> <p>Reference must be made to the Green Star SA Energy Calculator &amp; Modelling Protocol Guide current at the time of project submission.</p> <p>Where project teams are uncertain of the validity of the energy modelling programme used, an enquiry can be issued to the GBCSA for confirmation of validity.</p>	<p>Mandatory CIR</p>
<p><b>ENE-1</b></p>	<p>ENE-1 should be kept in its current form with a mandatory CIR to confirm applicability.</p>	<p>Mandatory CIR</p>
<p><b>ENE-7</b></p>	<p>ENE-7 should be kept in its current form with a mandatory CIR to confirm applicability.</p>	<p>Mandatory CIR</p>
<p><b>TRA-1</b></p>	<p>TRA-1 should be adapted to refer to the Nigerian local, provincial or national authority planning allowances for the minimum or maximum values of car parking spaces provided for the project.</p> <p>For projects where the mandatory local parking requirements do not exist or are optional (or recommended), the technical manual refers to a set of 'alternative requirements' in the Additional Guidance which would be applicable to the project.</p>	<p>Adaptation</p>
<p><b>WAT-1 / WAT-1 (PEB)</b></p>	<p>As the Green Star SA Potable Water Calculator takes into account South African rainfall per region, the Green Star SA Potable Water Calculator would need to be adapted to reflect</p>	<p>Mandatory CIR</p>

the rainfall values in the different regions in Nigeria.

WAT-1 should be kept in its current form with a mandatory CIR to confirm applicability.

**MAT-11**

It is recommended to adapt the credit so that:

- One point is awarded where 20% of the total contract value is represented by materials or products (used in the construction of the project) that have been sourced from within the member states of the Economic Community of West African States (ECOWAS) region borders as defined by the ECOWAS National Unit Directory on [www.ecowas.int](http://www.ecowas.int), current at the time of project registration or more recent.
- An additional point is awarded where 10% of the total contract value is represented by materials or products (used in the construction of the project) that have been sourced from within the Nigerian borders.

Adaptation

This promotes sourcing of materials in the West African region which would be beneficial to the Nigerian local context.

**ECO-**

ECO- should be kept in its current form based on the need to encourage and recognise development on land that has limited ecological value and to discourage development on ecologically valuable sites. To determine “high ecological value” and “prime agricultural land”, a project can submit for an Eligibility Ruling at any point, before or after project registration.

Note that attention is drawn to Technical Clarification Number ECO0-T-OB1-0655 which states that if the project is a refurbishment/redevelopment that remains within the existing development footprint (and providing it is outside the required buffers of watercourses), there is no need to include confirmation from a registered ecologist. Confirmation is required and it could simply be included within the Short Report prepared by a suitably qualified professional with reference to supporting evidence (e.g. aerial photos, Google images)

Mandatory CIR

A mandatory CIR will be required to assess the project's compliance with this Conditional Requirement based on site ecological maps, to ensure approval of this conditional requirement prior to the Round 1 submission.

**References:**

For further information about the local legislation of Nigeria with regards to land use and ecology, refer to:

NESREA Reg 2009 S.I No. 26

	NESREA Reg 2009 S.I No. 27 NESREA Reg 2010 S.I No. 12 NESREA Reg 2010 S.I No. 18 NESREA Reg 2010 S.I No. 19	
<b>ECO-4</b>	ECO-4 should be kept in its current form but adaptations to the bio-regions in the calculator are required to correctly represent the equivalent ecological value of the different bio-regions in Nigeria.  A mandatory CIR must be submitted to the GBCSA by projects targeting this credit to determine which South African bio-region is most applicable to the project.	Mandatory CIR
<b>INN-1</b>	INN-1 should be kept in its current form with reference being made instead to the Nigerian context, as opposed to the South African context.	Adaptation
<b>INN-2</b>	INN-2 should be kept in its current form with reference being made instead to awarding points to an innovative initiative where there has been a substantial improvement on an existing Green Star SA / Green Star SA-Nigeria credit	Adaptation
<b>INN-3</b>	INN-3 should be kept in its current form with the applicable adaptations made to incorporate the minor changes made in the Green Star SA-Nigeria rating tool.	Adaptation

**Table 1: Summary of credits from Green Star SA v1 requiring CIR's or adaptations for use in Nigeria**

It is recommended that the balance of the credits remain in their current format with no adjustments made. This recommendation is based on the results of consultation with the Green Building Council of Nigeria and industry professionals and academics with regards to the legislation, policies and market practices in sustainability specific to the Nigerian context.

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

### **Green Star SA category weighting system**

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

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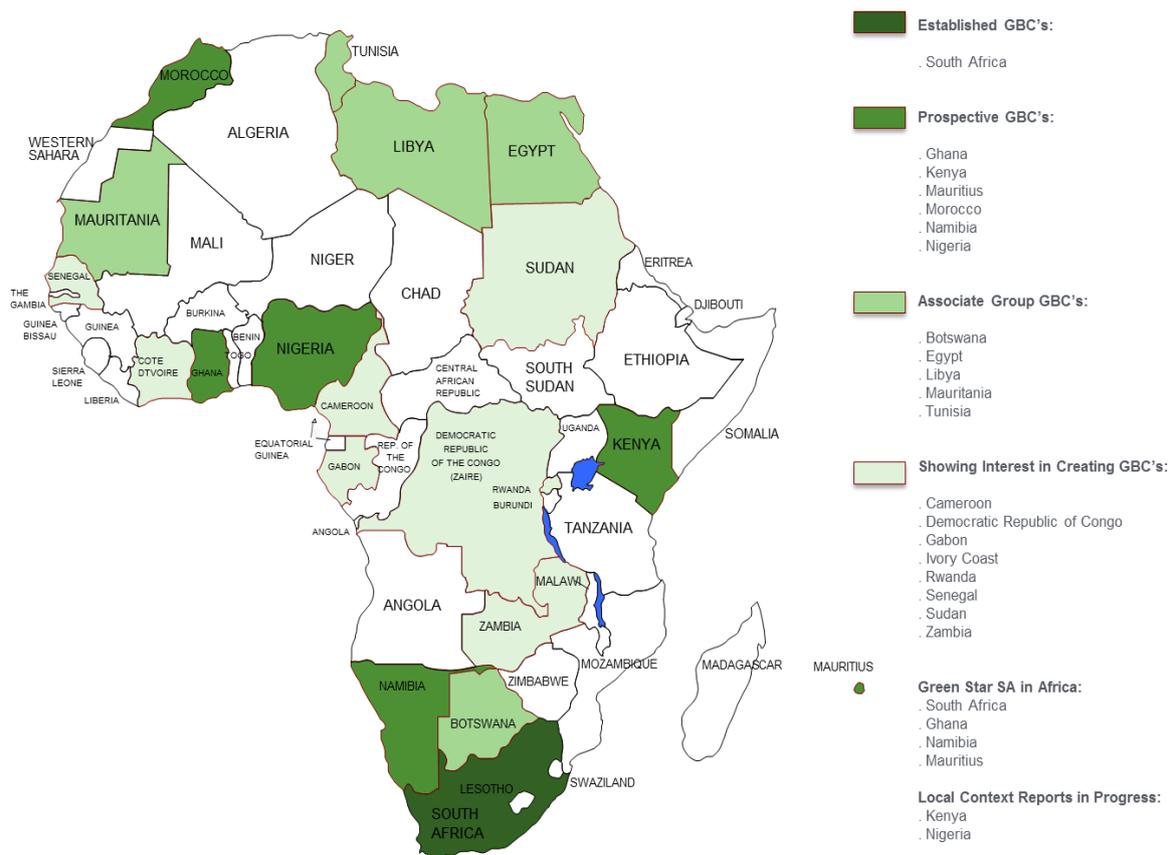
# Acronyms

<b>Acronym</b>	<b>Term</b>
ANGBC	African Network of Green Building Councils
AP	Accredited Professional
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
CIBSE	Chartered Institute of Building Services Engineers
CIR	Credit Interpretation Request
ECO	Land Use and Ecology category
ECOWAS	Economic Community of West African States
EMI	Emissions category
EMP	Environmental Management Plan
ENE	Energy category
ETS	Environmental Tobacco Smoke
FSC	Forest Stewardship Council
GBCA	Green Building Council of Australia
GBCN	Green Building Council of Nigeria
GBCSA	Green Building Council of South Africa
GS	Green Star
GWP	Global Warming Potential
HVAC&R	Heating, Ventilation, Air-Conditioning and Refrigeration
IEQ	Indoor Environment Quality category
INN	Innovation category
MAN	Management category
MAT	Material category
NESREA	National Environmental Standards and Regulations Enforcement Agency
ODP	Ozone Depleting Potential
TC	Technical Clarification
TRA	Transport category
WAT	Water category
WMP	Waste Management Plan

# Introduction

## Overview of GBCN

Nigeria has a green building council, the Green Building Council of Nigeria (GBCN), which is registered with the World Green Building Council as of January 2014 on a prospective membership level. The GBCN is newly established and has therefore not yet produced an environmental rating tool that would be used for office, retail, multi-unit residential, public and education building projects in Nigeria.



**Figure 1: The membership level of Green Building Councils on the African continent**

As a member of the African Network of Green Building Councils (ANGBC), the Green Building Council of South Africa (GBCSA) has therefore expressed a willingness to allow the rating of Nigerian buildings under the Green Star SA rating system until such a time that the GBCN is established and has capacity to develop and operate its own rating tool. However, as intellectual property owners of the Green Star brand, consent from the Green Building Council of Australia (GBCA) must be obtained for the use of Green Star SA in Nigeria through contextualisation.

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## **Objective of the Nigeria Local Context Report**

This report therefore serves as a local context assessment to allow for office, retail, multi-unit residential, public and education building projects in Nigeria to be certified using the Green Star SA v1 rating tools. This would entail collaboration between the GBCSA and the prospective GBCN to facilitate the use of the South African rating tools in Nigeria, while allowing Nigerian professionals the opportunity to participate in the tool's development, through a formal consultation process, as the council progresses.

The GBCSA would manage and allow the certification through its existing established processes. This is in line with the process embarked on by the Ghana Green Building Council, the Green Building Council of Namibia and the Green Building Council of Mauritius as facilitated by the African Network of Green Building Councils (ANGBC's).

A workshop was set up at the University of Lagos with the Green Building Council of Nigeria and industry professionals and academics on 10 October 2013 to discuss each credit in the Green Star SA rating tools available at the time and their applicability to the Nigerian context. The comments from the workshop and views expressed by the professionals and academics have been accounted for in this report.

## **Methodology**

The context report therefore addresses climatic conditions and ecology, water and energy patterns, local legislation and any other Nigeria-specific circumstances which may be in conflict with certain Green Star SA requirements. The context report also analyses the Green Star SA Design/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 Nigerian context.

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# Background

## Overview of Nigeria

The Federal Republic of Nigeria is a sovereign state in the Economic Community of West African States (ECOWAS) region spanning 923 768 square kilometres with a population, according to the UN census in 2012, of 166.6 million people. Nigeria (with geographic coordinates of 10 00 N, 8 00 E) shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east, and Niger in the north (Figure 2). Its coast in the south lies on the Gulf of Guinea on the Atlantic Ocean.

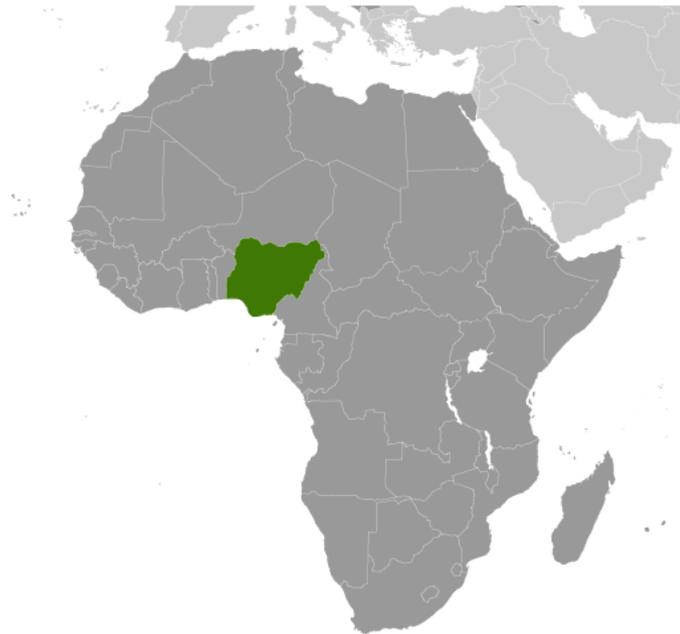


Figure 2: Nigeria (The World Factbook, 2014)



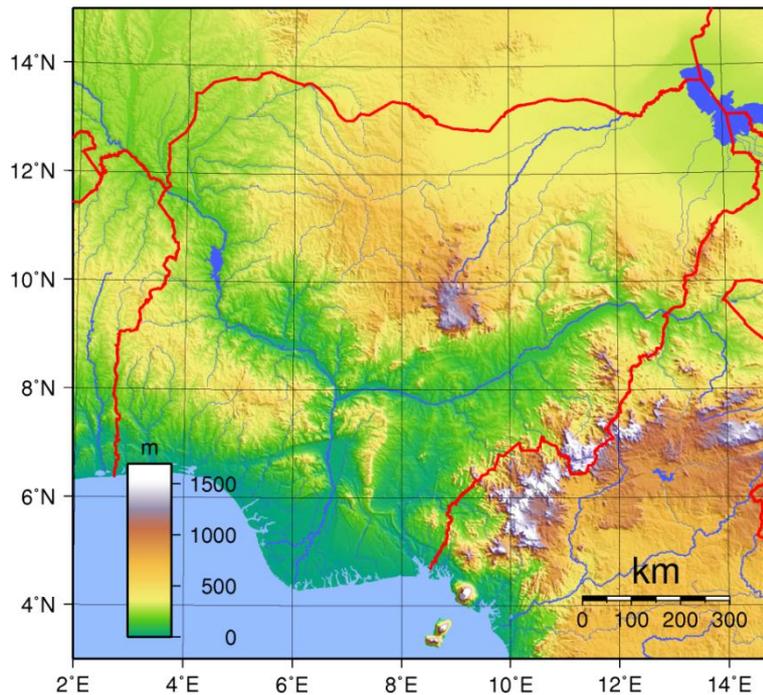
Figure 3: Regional context of Nigeria (BBC, 2013)

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## Geography

Nigeria's most expansive topographical region is that of the valleys of the Niger and Benue River valleys. Plains rise to the north of the valleys. To the southwest of the Niger there is highland, and to the southeast of the Benue hills and mountains are found all the way to the border with Cameroon. Coastal plains are found in both the southwest and the southeast.

The lowest point on Nigeria is at sea level on the Atlantic Ocean. The highest point on Nigeria is 2,419 meters above sea level at Chappal Waddi.



**Figure 4. Topographical map of Nigeria**

## Climate

The climate in Nigeria is significantly impacted by the annual migration of the intertropical belt of cloud and associated heavy rain, high humidity, and relatively low temperature.

Drier and sunnier weather, with higher temperatures, prevails on the northern side of this belt of cloud and rain. The belt of cloud and rain lies on the southern side of the point where the south-westerly to westerly winds of the Guinea monsoon give way to the northeast trade winds, or harmattan, which are dry and bring higher temperatures. The discontinuity between these winds, often called the intertropical convergence, lies over or near the coast in December and January and moves north to about 20°N by July and August. It then returns southwards rather more rapidly between September and December.

Therefore, much of Nigeria and the region to the west experiences two rainy periods as the intertropical convergence moves north or south; but in the north the two rainy seasons merge to give a single wet season between July and September.

## Northern Nigeria climatic zone

In northern Nigeria, including Kano, there is a single rainy season just after the time of high sun.

Between October and April, there is a single long dry season. At this time there is very little rain in the north and temperatures are warm to hot with a very low relative humidity. During this season the harmattan, which is often dust-laden, blows from the northeast day after day.

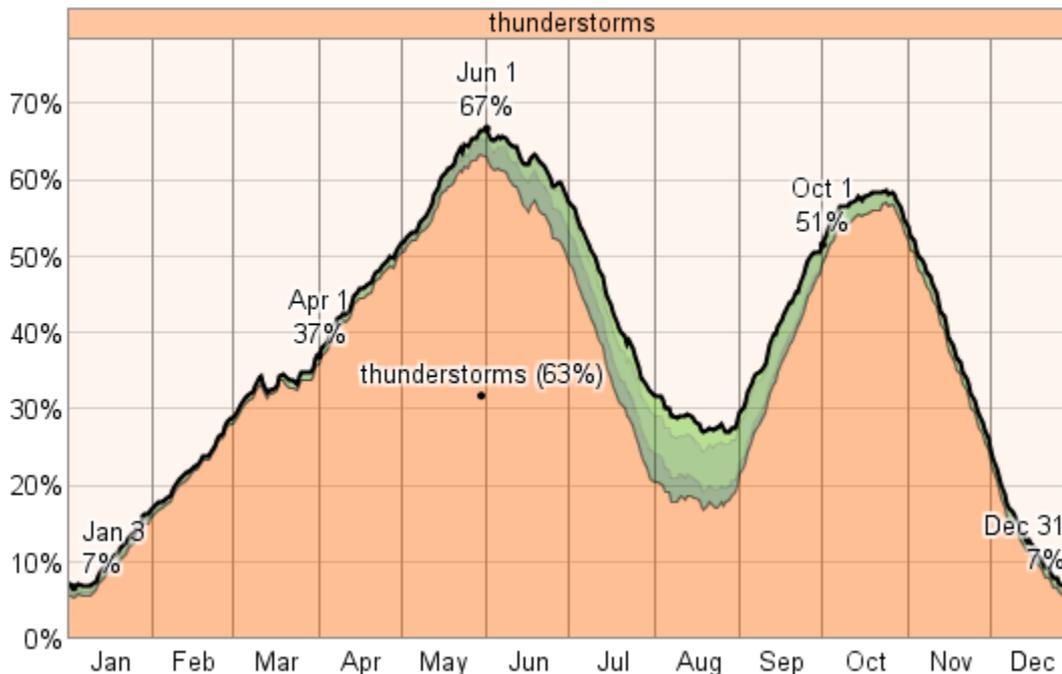
## Inland climatic zone

During the period December to February the harmattan penetrates south so that the whole region, except a strip along the coast, is affected by it. Inland, and particularly towards the north, the time of arrival of the rains and the amount of rain may vary from year to year.

## Coastal region climatic zone

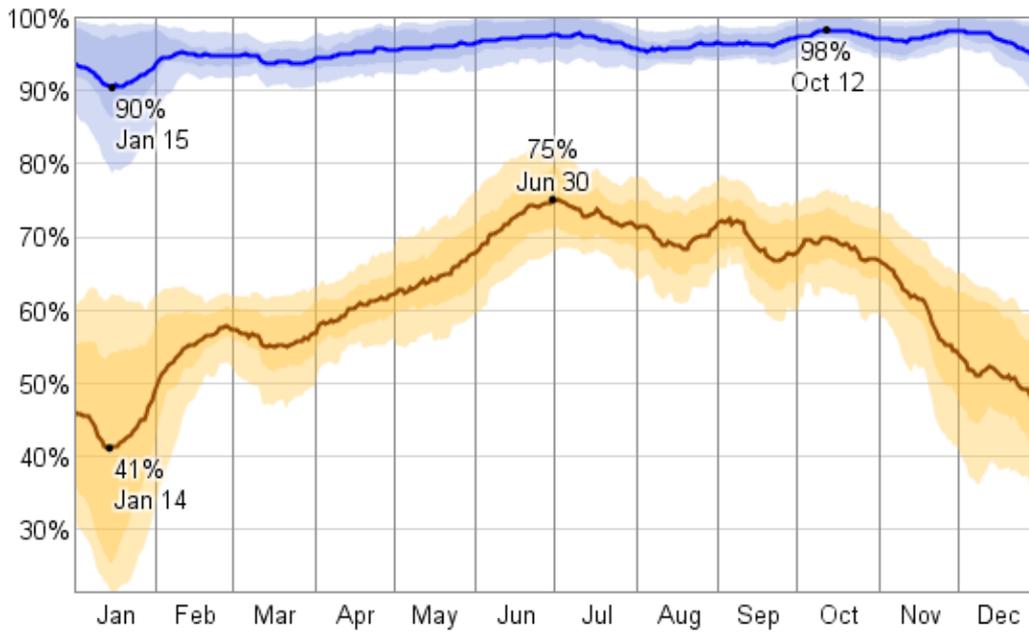
On the other hand, places on or near the coast have two rainy seasons with maximum rainfall in May or June and again in October. Although in the south near the coast no month is completely dry, there are two relatively drier periods between December and February and between July and September. The period from December to February is least likely to experience rainy days, and this dry period is more clearly recognisable than the 'little dry season' between July and September.

The wettest parts of Nigeria are the coastal region of the Niger delta and the mountainous border with Cameroon in the southeast. Here the annual rainfall exceeds 2,500 mm, as compared with 1,250-1,500 mm in in much of the west and centre of Nigeria.

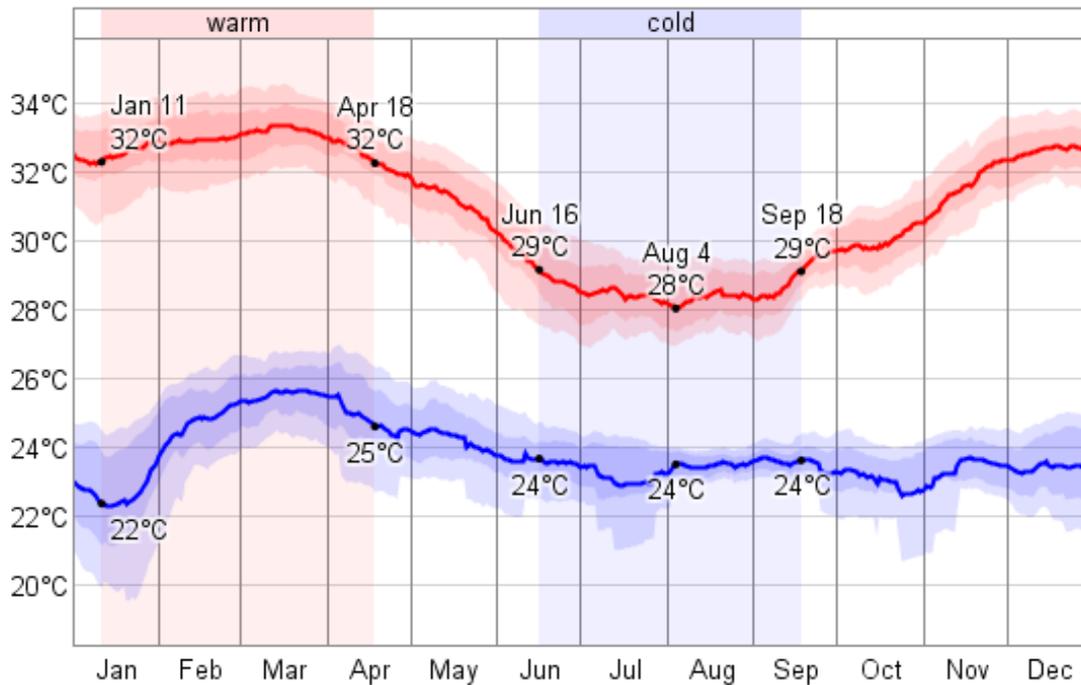


Graph 1. Coastal region: Probability of precipitation

On the coast high humidity and constant high temperatures with very little relief make the weather rather uncomfortable throughout the year.

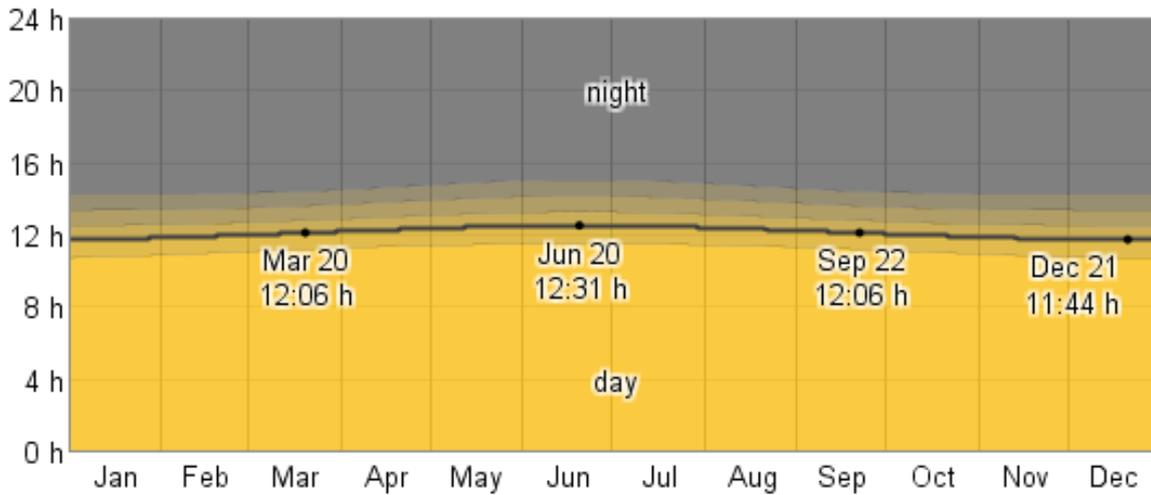


**Graph 2. Coastal region: Probability of precipitation**

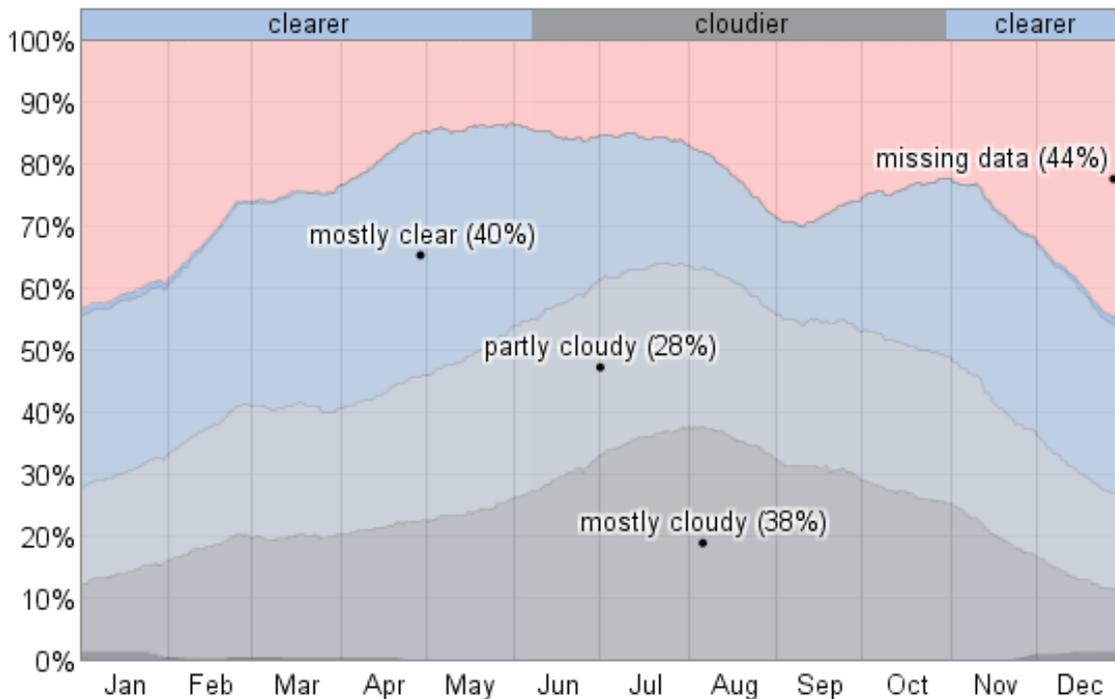


**Graph 3. Coastal region: Daily high and low temperatures**

Hours of sunshine average from six hours a day during the rainy season to as many as ten in the dry season in the north of the country. Near the coast they average about three hours a day in the wettest months to six or seven hours during the driest period of the year.



Graph 4. Coastal region: Daylight hours of sunlight and twilight



Graph 5. Coastal region: Cloud cover types

### Environmental concerns in Nigeria

The most prominent environmental concerns in Nigeria include soil degradation; rapid deforestation; urban air and water pollution; desertification; oil pollution - water, air, and soil; damage from oil spills; loss of arable land; and rapid urbanization

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**Table 1. Environmental statistics (UN Statistics, 2013)**

Environment		
Threatened species	2012	300
Forested area (% of land area)	2010	10.0
CO2 emission estimates (000 metric tons and metric tons per capita)	2009	70177/0.4
Energy consumption per capita (kilograms oil equivalent)	2009	107.0
Rainfall in the capital city, total mean (millimetres)		1221
Temperature in the capital city, mean °C (minimum and maximum)		20.2/33.0

The total renewable water sources span 286.2 cubic kilometres.

67.1% of total installed electrical capacity is generated from fossil fuels; 32.8% of total installed electrical capacity is generated from hydroelectric plants and 0.1% of total installed electrical capacity is generated from other renewable sources.

The international environmental agreements that Nigeria has signed and ratified include those related to biodiversity, climate change through the Kyoto Protocol, desertification, endangered species, hazardous wastes, law of the sea, marine dumping, marine life conservation, ozone layer protection, ship pollution and wetlands. Nigeria has a green building council, the Green Building Council of Nigeria (GBCN), which is registered with the World Green Building Council as of January 2014 on a prospective membership level.

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# Applying Green Star SA Credit by Credit

The Green Star SA v1 rating tools, namely Office, Retail, Multi-unit Residential, Public and Education Building, have been assessed for relevance on a credit by credit basis. Each credit's applicability to the Nigerian 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.

## Credit by credit review

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:

	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 Nigerian context.
	The credit should be omitted and made 'not applicable' for the Nigerian application of the tool.

- the aim of the credit is defined
- the credit's suitability to the Nigerian context is interrogated
- recommendations for minor changes, where applicable for the purpose of application within the Nigerian context, of the Green Star SA tool are made

Nigerian 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.

## Eligibility criteria

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

## Green Star SA category weighting system

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

## MANAGEMENT

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b><u>MAN-1: Green Star SA Accredited Professional</u></b> 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>	<p>It is important that project members understand the eligibility criteria and credit criteria of the Green Star SA rating tools and process.</p> <p>Therefore, until such a time that the GBCN establishes a rating tool and course delivery system, it is recommended that professionals be trained under the current South African system.</p> <p>With the first Green Star SA AP course scheduled in Nigeria for 2014, it is probable that Green Star SA courses can be given in Nigeria by the GBCSA, as has been done elsewhere in Africa.</p> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAN-1 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>MAN-2: Commissioning Clauses</u></b> To encourage and recognise commissioning and handover initiatives that ensure that all building services can operate to optimal design potential.</p>	<p>The Chartered Institute of Building Services Engineers (CIBSE) is an international professional engineering association based in London that represents building services engineers and is recognised both in the United Kingdom and internationally.</p> <p>CIBSE publishes Guidance and Codes which are internationally recognised as authoritative, setting the standards for best practice in the building services profession. CIBSE commissioning codes are an ideal tool for making sure that Green Star certified buildings are among the best commissioned buildings in the world. For mechanical systems, ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) is an internationally-recognised society with more than a century of experience advancing the arts and sciences of HVAC&amp;R and related human factors. This makes ASHRAE codes a similarly suitable standard for the commissioning of mechanical systems that are in line with Green Star's aim of cutting edge practice.</p> <p>As in South Africa, Nigeria does not legislatively adhere to CIBSE and ASHRAE commissioning codes as standard practice, adoption of these codes would result in Green Star SA certified buildings utilising commissioning and handover initiatives that ensure that all building services can operate to optimal design potential. Adoption of these standards has been proven to be achievable in this context and the credit</p>	<p>MAN-2 should be kept in its current form and no adjustments need to be made.</p>

	<p>in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>MAN-3: Building Tuning</u></b> To encourage and recognise commissioning initiatives that ensure optimum occupant comfort and energy efficient services performance throughout the year.</p>	<p>Building tuning to this standard is not normally conducted in Nigeria</p> <p>There is however, a 6-12 month defects liability period on a large proportion of top tier projects. During this period consultants and contractors warrant the performance of the building and return to rectify any issues with performance.</p> <p>It would be possible to extend this existing appointment to include recommissioning of the building over a 12 month period. As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAN-3 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>MAN-4: Independent Commissioning Agent</u></b> To ensure buildings are designed with regard to future maintenance and are correctly commissioned before handover.</p>	<p>An independent commissioning agent is appointed to ensure that all systems are working efficiently and that all corrective measures are taken in cases where systems are faulty.</p> <p>This independent commissioning agent would be an experienced professional whose responsibility is to be an objective advocate of the building owner, to be involved from the beginning of schematic design through practical completion and to provide commissioning advice to the project team.</p> <p>None of the professionals present at the workshop were aware of anyone providing independent commissioning services in Nigeria. However, as an independent experienced Nigerian contractor could be appointed to fulfil this role, it was agreed that achieving this credit would be possible in the Nigerian context and that the credit is relevant in its current form.</p>	<p>MAN-4 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>MAN-5: Building User's Guide</u></b> To encourage and recognise information management that enables building users to optimise the building's environmental performance.</p>	<p>When this credit was presented, it was noted by the professionals at the workshop that the Building User's Guide would have been particularly useful for some of the projects that had been completed.</p> <p>There are various instances of projects in Nigeria where tenant behaviour had compromised the performance of the building. It was noted that this could have been avoided had the tenants understood how to use the building correctly. The guide provides a valuable resource for familiarising the users about the building systems and how to use the building in order for it to function efficiently.</p>	<p>MAN-5 should be kept in its current form and no adjustments need to be made.</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 Nigeria as it is in South Africa.</p>	
<p><b>MAN-6: Environmental Management</b> To encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction.</p>	<p>Environmental management in construction should not be a region-specific practice but should be practiced across all regions in order to minimise the disturbance that construction activities have on the environment.</p> <p>With regards to the comprehensive, project-specific Environmental Management Plans (EMPs) throughout the construction phase of the projects:</p> <p><b>BREEAM Environmental Management Plan</b></p> <p>In projects where professional teams use British standards in building design, projects may prefer to reference BREEAM MAN-03 Construction Site Impacts where this credit refers to an Environmental Checklist in section 2.2.5 of the England and Wales Environment Agency’s ‘Building a Better Environment: A Guide for Developers’.</p> <p>As this Environmental Checklist, however, is less comprehensive than the NSW checklist, it is advised that the EMPs as required by BREEAM are amended by the project teams to meet Section 3 of the New South Wales (NSW) Environmental Management Systems Guidelines checklist requirements of this credit.</p> <p><b>Provincial Government of the Western Cape Environmental Management Plan</b></p> <p>In projects where professional teams use South African standards in building design, projects may prefer to reference the relevant sections of the Provincial Government of the Western Cape Environmental Management Plan Guidelines (2005) as evidenced by correlation with Table Man-6.1 of the Additional Guidance in the “Green Star SA Public &amp; Education Building v1” First Edition rating tool.</p> <p>In such an instance, it is viewed that referencing Table Man-6.1 of the Additional Guidance in the “Green Star SA Public &amp; Education</p>	<p>MAN-6 should be kept in its current form, with an adaptation to include referencing the relevant sections of the Provincial Government of the Western Cape Environmental Management Plan Guidelines (2005) – refer to Table Man-6.1 of the Additional Guidance in the “Green Star SA Public &amp; Education Building v1” First Edition rating tool published in March 2013 - as equivalent to referencing Section 3 of the New South Wales (NSW) Environmental Management Systems Guidelines (2009).</p>

	<p>Building v1” rating tool is equivalent to referencing Section 3 of the New South Wales (NSW) Environmental Management Systems Guidelines (2009).</p> <p>With regards to the ISO14001 accreditation of the contractor:</p> <p><b>ISO14001 accreditation</b></p> <p>Although it was noted that there are currently no ISO14001 certified contractors in Nigeria, ISO14001 is an international standard that is not region specific. The necessary market transformation could come to effect through this credit in order to achieve the second point.</p> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa, with an adaptation to include referencing the relevant sections of the Provincial Government of the Western Cape Environmental Management Plan Guidelines (2005) - refer to Table Man-6.1 of the Additional Guidance in the Green Star SA Public &amp; Education Building v1 rating tool published in March 2013.</p> <p><b>References</b></p> <p>For further information about the local legislation of Nigeria with regards to environmental management, refer to:</p> <p>NESREA Reg 2010 S.I No. 19 NESREA Reg 2009 S.I No. 29.</p>	
<p><b><u>MAN-7: Waste Management</u></b> To encourage and recognise management practices that minimise the amount of construction waste going to disposal.</p>	<p>At present, basic waste management process are followed on some projects in Nigeria. Scrap metal can be sold to resellers and some plastics can be recycled for reuse. As to other recyclable waste generated, however, there is little evidence that it is currently recycled.</p> <p>In spite of this, it is believed that a waste management programme could be instated for projects in Nigeria to recycle at least 30% of construction waste.</p> <p>Waste recycling is an income source for contractors and it is environmentally beneficial. This credit will encourage the development and growth of these facilities in the country fostering entrepreneurship within Nigeria.</p>	<p>MAN-7 should be kept in its current form and no adjustments need to be made.</p>

	Therefore, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa	
<p><b><u>MAN-8: Airtightness Testing</u></b> 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>The professionals at the workshop indicated that they were not aware of any air tightness tests conducted on buildings in Nigeria. In addition, it was noted that air infiltration was typically an energy issue in climates where there is a significant difference between inside and outside temperatures.</p> <p>Owing to these temperature differentials, airtightness is a particularly important aspect of energy efficient buildings in Nigeria.</p> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	MAN-8 should be kept in its current form and no adjustments need to be made.
<p><b><u>MAN-9: Waste Recycling Management Plan - RETAIL</u></b> To encourage and recognise management systems and building infrastructure that facilitate the reduction of the overall operational waste generation and disposal.</p>	<p>Refer to the discussion on the management of other recyclable waste generated in Nigeria in MAN-7.</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 developments in the country.</p> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	MAN-9 should be kept in its current form and no adjustments need to be made.
<p><b><u>MAN-10: Building Management System – RETAIL &amp; PEB</u></b> To encourage and recognise the incorporation of Building Management Systems to actively control and maximise 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. 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, public and education buildings in Nigeria, it is believed that the expertise exists within the country to incorporate Building Management Systems to actively control and maximise the effectiveness of building services. As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	MAN-10 should be kept in its current form and no adjustments need to be made.

<p><b><u>MAN-11: Green Lease - RETAIL</u></b> To encourage and recognise initiatives taken by the building owner to encourage improved environmental behaviour 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 development to participate in the following environmental initiatives:</p> <ul style="list-style-type: none"> <li>• Electrical energy monitoring and reporting (minimum quarterly) and have submitted an energy management plan at the beginning of each year;</li> <li>• Water monitoring and reporting (minimum quarterly) and have submitted a water management plan at the beginning of each year;</li> <li>• Waste reduction/recycling monitoring and reporting (minimum quarterly) and have submitted a waste management plan at the beginning of each year;</li> <li>• 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 developments in Nigeria would occur through this credit.</li> </ul> <p>The professionals at the workshop were not aware of a contractually-binding green lease having been implemented in projects in Nigeria. This credit in its current form is equally relevant and applicable in Nigeria 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>
<p><b><u>MAN-12: Common Property Rules – MULTI UNIT RES</u></b> To encourage and recognise 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>The professionals at the workshop were not aware of developers implementing common property rules in projects in Nigeria. This credit in its current form is equally relevant and applicable in Nigeria 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><b><u>MAN-13: Learning Resources - PEB</u></b> 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</p>	<p>MAN-13 should be kept in its current form and no adjustments need to be made.</p>

	<p>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>The professionals at the workshop were not aware of the implementation of interactive learning resources such as these in public and education buildings and commended the positive impact and affluence towards sustainability that these resources would have on the occupants. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>MAN-14: Life Cycle Costing - PEB</u></b> 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>Life-cycle cost (LCC) refers to the total cost of ownership over the life of an asset. Costs considered include the financial cost which is relatively simple to calculate and also the environmental and social costs which are more difficult to quantify and assign numerical values.</p> <p>Building systems / initiatives with the best environmental outcome do not always necessarily reflect the lowest capital expenditure cost. However, when compared in terms of life cycle costs, these sustainable initiatives often perform better than or close to the conventional solutions. Thus by encouraging Life Cycle Costing as a decision making tool, environmentally preferable initiatives are given the opportunity to be considered equitably, avoiding the initial capital expenditure barrier.</p> <p>The business case for sustainability is a challenge encountered irrespective of what region in Africa the project may occur. Therefore, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAN-14 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>MAN-15: Maintainability - PEB</u></b> 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.</p> <p>When designed and managed accordingly, public buildings can minimise maintenance and operational costs, while also minimally impacting their occupants. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAN-15 should be kept in its current form and no adjustments need to be made.</p>

## INDOOR ENVIRONMENT QUALITY

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b>IEQ-1: Ventilation Rates</b> To encourage and recognise designs that provide ample amounts of outside air to counteract build-up of indoor pollutants.</p>	<p>The professionals at the workshop indicated that for building design where outside air provisions were provided, if at all, Nigerian professions tended to use CIBSE Guide B2 to determine ventilation rates.</p> <p>Owing to the low prevalence of smoking, 8L/s/person would therefore typically be used – however using CIBSE Guide B2 is best practice and is not binding by the current Nigerian building code standard legislation.</p> <p>As this is the case, it is recommended that IEQ-1 be kept in its current form, for the purposes of consistency.</p> <p>If the professional team, however, wishes to use an alternative standard (i.e. CIBSE) then they should submit a CIR to the GBCSA provided the alternative standard is equally or more stringent than SANS 10400-O.</p>	<p>The current building code standard used in Nigeria for naturally and mechanically ventilated spaces is not more stringent than SANS 10400-O, therefore IEQ-1 should be kept in its current form and no adjustments need to be made.</p>
<p><b>IEQ-2: Air Change Effectiveness</b> To encourage and recognise systems that effectively deliver optimum air quality to any occupant throughout the occupied area.</p>	<p>The effective distribution of air in a space is an important element in providing a good indoor environment.</p> <p>It was noted that it may be a challenge to prove compliance using Computational Fluid Dynamics (CFD) modelling, required in cases where displacement ventilation has not been adopted. Expertise in CFD modelling could however be sourced through skill transfer initiatives between Nigeria and South Africa</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>IEQ-2 should be kept in its current form and no adjustments need to be made.</p>
<p><b>IEQ-3: Carbon Dioxide Monitoring and Control</b> To encourage and recognise the provision of response monitoring of Carbon Dioxide levels to ensure delivery of optimum quantities of outside air.</p>	<p>The professionals at the workshop indicated that they were not aware of any buildings in Nigeria which currently monitored carbon dioxide levels in office spaces.</p> <p>They did however understand how such a system would work and such expertise would be available in Nigeria.</p> <p>Should the natural ventilation of the project be designed to CIBSE Guide B2 standards rather than SANS 10400-O, the professional team should</p>	<p>The current building code standard used in Nigeria for naturally and mechanically ventilated spaces is not more stringent than SANS 10400-O, therefore IEQ-3 should be kept in its current form and no adjustments need to be made.</p>



	submit a CIR to the GBCSA provided the alternative standard is equally or more stringent than SANS 10400-O.	
<p><b><u>IEQ-4: Daylight</u></b> To encourage and recognise designs that provide good levels of daylight for building users.</p>	<p>The professionals at the workshop indicated that they designed to maximise natural light, but were not aware of any buildings in Nigeria which had undertaken daylight modelling.</p> <p>Expertise in daylight modelling could however be sourced through skill transfer initiatives between Nigeria and South Africa. The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-4 should be kept in its current form and no adjustments need to be made.
<p><b><u>IEQ-5: Daylight Glare Control</u></b> To encourage and recognise buildings that are designed to reduce the discomfort of glare from natural light.</p>	<p>Glare can be controlled by fixed shading devices, and screens and blinds having a visual light transmittance of less than 10%. This should be considered good practice in Nigeria as it is in South Africa.</p> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-5 should be kept in its current form and no adjustments need to be made.
<p><b><u>IEQ-6: High Frequency Ballasts</u></b> To encourage and recognise buildings that increase workplace amenity by avoiding low frequency flicker that may be associated with fluorescent lighting.</p>	<p>The professionals at the workshop indicated that they specified ballasts of this standard, but they were often value engineered out of the project.</p> <p>This makes a credit such as this well placed in the Nigerian context.</p>	IEQ-6 should be kept in its current form and no adjustments need to be made.
<p><b><u>IEQ-7: Electric Lighting Levels</u></b> To encourage and recognise base building provided office lighting that is not over designed.</p>	<p>Lighting levels for office tenancy areas in Nigeria are typically designed according to the CIBSE Lighting Guide 7 (Office Lighting) 2005 which recommends light levels of 300 lux for purely screen based work or 500 lux for mixed or mainly paper-based tasks. The current Nigerian building code standard therefore adopts these guidelines, requiring illumination levels in offices to be maintained in accordance with an approved code of practice and specific to the space use.</p> <p>CIBSE Lighting Guide 7 (Office Lighting) 2005, however, also stresses the importance of reducing glare and the benefits of indirect lighting and illuminating the surfaces of the office (i.e. walls and ceiling) to minimise contrast. Lighting that is too dim or too bright can cause discomfort and strain for office occupants, yet a building owner and lighting designer usually provide office-standard lighting before the office space has a tenant and the usage of the space is unknown, resulting in ceiling mounted light fittings being used to provide an illumination level suitable for reading almost everywhere, even though only about 5-10 percent of the office space will require this lighting level.</p>	IEQ-7 should be kept in its current form and no adjustments need to be made.

	<p>Mindful of the building code of Nigeria, it was however agreed to keep IEQ-7 in its current form. It was noted that the balance of the required maintained illuminance levels could still be achieved through the use of task lighting which can be provided to allow occupants to control the lighting on their workspace and provide higher lighting levels when required. This would encourage and recognise base buildings that provided office lighting that is not over designed and is more suited to the needs.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa</p>	
<p><b><u>IEQ-8: External Views</u></b> To encourage and recognise designs that provide occupants with a visual connection to the external environment.</p>	<p>The professionals at the workshop indicated that buildings were already designed to maximise external views to the floor plate. In addition, this credit is not region-specific and projects should aim to provide external views to the occupants.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-8 should be kept in its current form and no adjustments need to be made.
<p><b><u>IEQ-9: Thermal Comfort</u></b> To encourage and recognise buildings that achieve a high level of thermal comfort.</p>	<p>While some professionals are not aware of the thermal comfort assessment methods, namely ASHRAE Standard 55-2004 Acceptability Limits or Predicted Mean Vote (PMV) levels calculated in accordance with ISO7330 using standard clothing and metabolic rate values, it was confirmed by the professionals at the workshop that these forms of assessing thermal comfort could be used within the Nigerian context to compile the thermal comfort report or short report.</p> <p>As this credit aims to encourage projects to design for comfort, rather than temperature, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-9 should be kept in its current form.
<p><b><u>IEQ-10: Individual Comfort Control</u></b> To encourage and recognise designs that facilitate individual control of thermal comfort.</p>	<p>Most projects in Nigeria do not provide individual thermal comfort control every 30m<sup>2</sup> owing to the cost limitations of the user controls. However, if one negates the impacts of costs, however, this credit is achievable in this context and should be considered best practice.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-10 should be kept in its current form and no adjustments need to be made.

<p><b><u>IEQ-11: Hazardous Materials</u></b> To encourage and recognise actions taken to reduce health risks to occupants from the presence of hazardous materials.</p>	<p>The effects on the health of human beings that hazardous materials have can be irreversible. The correct disposal of such materials can save lives and should not be compromised in any regional context.</p> <p>It is therefore recommended that where project teams target this credit, a mandatory CIR is issued to demonstrate compliance with the credit criteria using the relevant legislation of the country. Where no such legislation exists, guidance as stipulated by the South African Occupational Health and Safety Act (OH&amp;S) should be used.</p> <p>Note that one point is awarded where a comprehensive hazardous material survey has been carried out on the project site as defined by the relevant legislation; and whenever asbestos, lead or polychlorinated biphenyls (PCBs) were found, they have been removed in accordance with the standards listed in Table IEQ-11.1 or equivalent, or removed in accordance with more stringent standards or legislation available used in Nigeria.</p> <p><b>References</b></p> <p>For further information about the local legislation of Nigeria with regards to hazardous materials in the built environment, refer to:</p> <p>Section 10 of the National Building Code NESREA Reg 2010 S.I No. 19.</p>	<p>For IEQ-11, a mandatory CIR should be issued by the project team to demonstrate compliance with the credit criteria using the relevant legislation of the country.</p> <p>Where no such legislation exists, guidance as stipulated by the South African Occupational Health and Safety Act (OH&amp;S) should be used.</p>
<p><b><u>IEQ-12: Internal Noise Levels</u></b> To encourage and recognise buildings that are designed to maintain internal noise levels at an appropriate level.</p>	<p>The professionals at the workshop were not aware of the SANS 10103:2 standard. Whilst there are guidelines on external noise pollution, the professionals noted that there is no specific standard for noise levels in office buildings in Nigeria.</p> <p>Green Star SA addresses the required internal noise levels which would be optimal for indoor environment quality. The credit in its current form is, therefore, equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>IEQ-12 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>IEQ-13: Volatile Organic Compounds</u></b> To encourage and recognise specification of interior finishes that minimise the contribution and levels of Volatile Organic Compounds (VOCs) in buildings.</p>	<p>The professionals at the workshop were aware of the impact of VOCs but were not aware of any specific products available in Nigeria actively marketed as having low VOC levels. The companies contacted were similarly aware of the impact of VOCs and noted that most of their products complied.</p> <p>As many paint, adhesives, sealant and carpet products are imported to</p>	<p>IEQ-13 should be kept in its current form and no adjustments need to be made.</p>

	<p>Nigeria by both international and local suppliers, they should be incentivised to import low VOC products to foster market transformation.</p> <p>Therefore the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b>IEQ-14: Formaldehyde Minimisation</b> To encourage and recognise the specification of products with low formaldehyde emission levels.</p>	<p>Emphasis is not normally placed on specifying materials with low formaldehyde in Nigeria. No formaldehyde in composite wood products should be considered good practice but unfortunately not many international and local suppliers in Nigeria provide low formaldehyde products. It is concluded that the inclusion of this credit will foster market transformation.</p> <p>Therefore the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-14 should be kept in its current form and no adjustments need to be made.
<p><b>IEQ-15: Mould Prevention</b> To encourage and recognise the design of services that eliminate the risk of mould growth and its associated detrimental impact on occupant health.</p>	<p>The professionals at the workshop were not aware of any office buildings in Nigeria which were designed to prevent mould in ductwork through direct humidity control.</p> <p>In addition, buildings are mostly designed without heating. This means that an additional heating system would need to be installed in a traditional cooling based dehumidification system.</p> <p>The professionals conducted for this research noted that while installing this additional system would be unlikely, the credit could still be achieved in the Nigerian context.</p>	IEQ-15 should remain in its current format and no adjustments need to be made.
<p><b>IEQ-16: Tenant Exhaust Riser</b> 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>Many projects are not aware of the pollutants emitted by printing equipment and hence do not provide a means to exhaust the pollutants. This credit however provides awareness and can be easily achieved to provide a healthy indoor environment.</p> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	IEQ-16 should be kept in its current form and no adjustments need to be made.
<p><b>IEQ-17: Environmental Tobacco Smoke (ETS) Avoidance</b> To encourage and recognise the air quality benefits to occupants by prohibiting smoking inside the building.</p>	<p>The professionals at the workshop were not aware of any office buildings in Nigeria which were designed to include ETS avoidance policies. They noted that these would not be difficult to provide, however, as the prevalence of smoking in Nigeria is low.</p> <p>Tobacco smoke is unhealthy for human beings when inhaled. This credit</p>	IEQ-17 should be kept in its current form and no adjustments need to be made.

	<p>can be easily achieved and is an important factor for occupant well-being. As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>IEQ-18: Places of Respite and Connection to Nature – RETAIL</u></b>          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 Nigerian context and, with the minor changes recommended for IEQ-01, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>IEQ-18 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>IEQ-19: Private Outdoor Space - MULTI UNIT RES</u></b>          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>This is an important consideration for multi-unit residential developments which can easily be achieved within the Nigerian context. The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>IEQ-19 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>IEQ-22: Universal Access - MULTI UNIT RES</u></b>          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>The current building code standards used in Nigeria for facilities for persons with disabilities is not more stringent than SANS 10400-S, therefore IEQ-22 should be kept in its current form and no adjustments need to be made.</p>	<p>The current building code standards used in Nigeria for facilities for persons with disabilities is not more stringent than SANS 10400-S, therefore IEQ-22 should be kept in its current form and no adjustments need to be made.</p>

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**IEQ-23: Stairs - PEB**

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.

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.

Provision of attractive stairs promotes the use of stairs and thereby giving occupants the option to improve their physical well-being. 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 Nigerian context.

The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.

IEQ-23 should be kept in its current form and no adjustments need to be made.

# ENERGY

AIM OF CREDIT	DISCUSSION	RECOMMENDATION														
<p><b>ENE-0: Conditional Requirement</b> 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>There are no energy efficiency requirements legislated by the current Nigerian building code standards. As such, it is recommended that Compliance Route 1 (SANS 204 compliance), Route 2 (ASHRAE) and Route 3 (Energy Modelling) remain options and are made available to projects in Nigeria seeking Green Star SA-Nigeria certification.</p> <p>Where applicable, changes to the Green Star SA Energy Calculator and Modelling Protocol Guide should be motivated by the registered project through the mandatory CIR.</p> <p>For the mandatory CIR, should the project team elect to use an alternative standard to SANS 204 for Compliance Route 1, the following aspects would need to be addressed and the equivalent, or more stringent, attributes clearly demonstrated:</p> <table border="1" data-bbox="824 707 1697 1423"> <tbody> <tr> <td data-bbox="824 707 1144 799">Section 4.1: Model Notional SANS204 Building</td> <td data-bbox="1151 707 1697 799">Title</td> </tr> <tr> <td data-bbox="824 804 1144 896">Section 4.1: Model Notional SANS204 Building</td> <td data-bbox="1151 804 1697 896">"generally as defined by SANS 204-3:2008 ... deemed to comply clauses"</td> </tr> <tr> <td data-bbox="824 901 1144 959">Section 5.1: General modelling parameters</td> <td data-bbox="1151 901 1697 959">N/A</td> </tr> <tr> <td data-bbox="824 963 1144 1021">Section 5.2: Building Envelope</td> <td data-bbox="1151 963 1697 1021">"Fabric based on SANS204-3"</td> </tr> <tr> <td data-bbox="824 1026 1144 1299">Section 5.2: Building Envelope</td> <td data-bbox="1151 1026 1697 1299">"Windows U value 5.6 and SHGF 0.77 (clear single glazing, timber framed). Windows to be distributed on all sides of the building such as to achieve compliance with the SANS204-3 formula. Roof lights at 10% of floor area, with U value 2.5 and SHGF 0.35. Walls insulated to R = 2.2. Roof insulated to R = 2.7 to 3.7 depending on climatic zone"</td> </tr> <tr> <td data-bbox="824 1303 1144 1361">Section 5.3: Internal Design Criteria</td> <td data-bbox="1151 1303 1697 1361">"Notional SANS 204 building"</td> </tr> <tr> <td data-bbox="824 1366 1144 1423">Section 5.3: Internal Design Criteria</td> <td data-bbox="1151 1366 1697 1423">"24°C in summer and 20°C in winter"</td> </tr> </tbody> </table>	Section 4.1: Model Notional SANS204 Building	Title	Section 4.1: Model Notional SANS204 Building	"generally as defined by SANS 204-3:2008 ... deemed to comply clauses"	Section 5.1: General modelling parameters	N/A	Section 5.2: Building Envelope	"Fabric based on SANS204-3"	Section 5.2: Building Envelope	"Windows U value 5.6 and SHGF 0.77 (clear single glazing, timber framed). Windows to be distributed on all sides of the building such as to achieve compliance with the SANS204-3 formula. Roof lights at 10% of floor area, with U value 2.5 and SHGF 0.35. Walls insulated to R = 2.2. Roof insulated to R = 2.7 to 3.7 depending on climatic zone"	Section 5.3: Internal Design Criteria	"Notional SANS 204 building"	Section 5.3: Internal Design Criteria	"24°C in summer and 20°C in winter"	<p>ENE-0 should be kept in its current form with a mandatory CIR to confirm eligibility.</p> <p>Reference must be made to the Green Star SA Energy Calculator &amp; Modelling Protocol Guide current at the time of project submission.</p> <p>Where project teams are uncertain of the validity of the energy modelling programme used, an enquiry can be issued to the GBCSA for confirmation of validity.</p>
Section 4.1: Model Notional SANS204 Building	Title															
Section 4.1: Model Notional SANS204 Building	"generally as defined by SANS 204-3:2008 ... deemed to comply clauses"															
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Section 5.3: Internal Design Criteria	"Notional SANS 204 building"															
Section 5.3: Internal Design Criteria	"24°C in summer and 20°C in winter"															

Section 5.4: HVAC Systems Simulation	“Notional SANS 204 building”
Section 5.4: HVAC Systems Simulation	“Heating is to be provided ... as per the actual design”
Section 5.4: HVAC Systems Simulation	“per SANS 204-3:2008” (occurs twice)
Section 5.4: HVAC Systems Simulation	“To satisfy SANS204-3”
Section 6.1: Extract and Miscellaneous Fans	“per SANS 204-3:2008” occurs twice
Section 10: Fuel factors	“An average fuel factor for South African mains electricity is used by the calculator, which is defined as 1.2kgCO2/kWh ... it will be necessary to revise the fuel factors in future Green Star SA tool and versions.”

The Conditional Requirement will not be met unless:

- The software used for modelling complies with the requirements and verification methods detailed in the Green Star SA Energy Calculator and Modelling Protocol Guide of the rating tool, current at the time of project registration or more recent;
- Energy modelling for the project was undertaken using the methodology, as detailed in the Green Star SA Energy Calculator and Modelling Protocol Guide of the rating tool, current at the time of project registration or more recent; and
- Each variable in the Greenhouse Gas Emissions Modelling Report (e.g. building form, materials or air-conditioning system) is referenced consistently throughout the rest of the submission (i.e. in related credits such as IEQ-1 ‘Ventilation Rates’ or ENE-5 ‘Peak Energy Demand Reduction’) and is clearly justified by the documented design or the as-built evidence (dependent on the stage of assessment).

Where professional teams are uncertain of the validity of the energy modelling programme used, an enquiry can be issued to the GBCSA for confirmation of validity.

**ENE-1: Greenhouse Gas Emissions**

To encourage and recognise designs that minimise the greenhouse gas emissions associated with operational

Refer to the discussion in ENE-0.

Routes 1, 2 and 3 specify the reduction of energy consumption in

ENE-1 should be kept in its current form with a mandatory CIR to confirm applicability.



<p>energy consumption.</p>	<p>buildings. These building codes also specify passive design systems that help reduce the energy demand.</p> <p>Further to this, however, it is noted that on-site energy generation has not been commonly adopted in Nigeria owing to the cost of installation.</p> <p>As such, ENE-1 should be kept in its current form with a mandatory CIR to confirm applicability.</p>	
<p><b><u>ENE-2: Energy Sub-metering</u></b> To encourage and recognise the installation of energy sub-metering to facilitate on-going management of energy consumption.</p>	<p>Sub-metering is not a very common practice in Nigeria. Most buildings meter consumption per tenant and not necessary per major energy use. This credit should therefore remain to encourage responsible energy monitoring.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ENE-2 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ENE-3: Lighting Power Density</u></b> To encourage and recognise designs that provide artificial lighting with minimal energy consumption.</p>	<p>The professionals at the workshop noted that efficient lighting design in Nigeria could be as low as 8W/m<sup>2</sup> for office plates.</p> <p>Whilst most lighting was designed to 15W/m<sup>2</sup>, lower levels are achievable using currently available technology.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ENE-3 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ENE-4: Lighting Zoning</u></b> To encourage and recognise lighting design practices that offer greater flexibility for light switching, making it easier to light only occupied areas.</p>	<p>Efficient lighting and use thereof is considered an important aspect of energy efficiency in buildings in Nigeria, but not practised widely enough. Lighting zoning for spaces of no more than 100m<sup>2</sup> in size is not commonly practiced but can be easily achieved. The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ENE-4 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ENE-5: Peak Energy Demand Reduction / ENE-5 Maximum Electrical Demand Reduction - PEB</u></b> To encourage and recognise designs that reduce peak demand on energy supply infrastructure.</p>	<p>Running on stand-by generation is common in Nigeria such that a large majority of buildings are supplied by electricity from stand-by generation. As such, Nigerians understand the need to reduced peak demand on energy supply infrastructure.</p> <p>In achieving this credit, project teams should however be aware that:</p> <ol style="list-style-type: none"> <li>(1) Load lopping cannot be used.</li> <li>(2) Stand-by generators can only be used where they are “designed and integrated for the purpose of peak energy demand reduction and can be activated automatically and without causing a blackout”, as stated in the Green Star SA technical manual.</li> </ol>	<p>ENE-5 / ENE-5 (PEB) should be kept in its current form and no adjustments need to be made.</p>

	<p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>ENE-6: Thermal Energy Sub-Metering - RETAIL</u></b> 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 in Nigeria. Most retail buildings meter energy consumption per tenant and not all substantive thermal energy uses where flow temp, return temp &amp; 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 Nigeria as it is in South Africa.</p>	<p>ENE-6 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ENE-7: Hot Water Energy Use - MULTI UNIT RES</u></b> 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 Nigeria 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 Nigeria. This would be project specific and a mandatory CIR would need to be submitted to confirm applicability.</p>	<p>ENE-7 should be kept in its current form with a mandatory CIR to confirm applicability.</p>
<p><b><u>ENE-8: Common Property Energy Use - MULTI UNIT RES</u></b> 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>For car park ventilation, it is noted that the current building code standard used in Nigeria for naturally and mechanically ventilated spaces is not more stringent than SANS 10400-O.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa, therefore ENE-8 should be kept in its current form and no adjustments need to be made.</p>	<p>The current building code standard used in Nigeria for naturally and mechanically ventilated spaces is not more stringent than SANS 10400-O, therefore ENE-8 should be kept in its current form and no adjustments need to be made.</p>

<p><b><u>ENE-9: Low Emission Energy Generation - MULTI UNIT RES</u></b>          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. With the prevalence of geothermal energy or high heat sources in Nigeria, the potential exists for co-generation or tri-generation to encourage systems utilising renewable or low emission energy sources.</p> <p>Up to four points can be achieved in the Nigerian context, such that the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ENE-9 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ENE-10: Energy Efficient Appliances - MULTI UNIT RES</u></b>          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>Appliances certified with a minimum 'B' rating of the European "Energy Rating" system can be made available in the Nigeria market.</p> <p>This credit should therefore remain to encourage the use of energy efficient appliances. The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ENE-10 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ENE-11: Unoccupied Spaces - PEB</u></b>          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>For natural ventilation, it is noted that the current building code standard used in Nigeria for naturally and mechanically ventilated spaces is not more stringent than SANS 10400-O.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>The current building code standard used in Nigeria for naturally and mechanically ventilated spaces is not more stringent than SANS 10400-O, therefore ENE-11 should be kept in its current form and no adjustments need to be made.</p>

## TRANSPORT

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b><u>TRA-1: Provision of Car Parking</u></b> To encourage and recognise developments that facilitate the use of alternative modes of transportation for commuting to work.</p>	<p>This credit refers to South African local, provincial or national authority planning allowances for the minimum or maximum values of car parking spaces provided for the project. In the context of Nigeria, this credit would refer to the Nigerian local, provincial or national authority planning allowances for car parking spaces. However, for projects where such guidelines are not available, the technical manual refers to a set of 'alternative requirements'.</p> <p>These alternative requirements state that when the mandatory requirements do not exist or are optional (or recommended), the project has the following two options:</p> <ul style="list-style-type: none"> <li>• Clearly demonstrate that car parking is not provided in excess of one car parking space per 100 m2 of net lettable area (NLA) to achieve one point or one parking space per 200 m2 to achieve two points; or</li> <li>• Submit a CIR to substantiate an argument for equivalent yet alternative compliance with the Credit Criteria.</li> </ul> <p>As such, TRA-1 should remain in its current form with emphasis on the 'alternative requirements' section of the Additional Guidance for projects where the mandatory local parking requirements do not exist or are optional (or recommended).</p>	<p>TRA-1 should be adapted to refer to the Nigerian local, provincial or national authority planning allowances for the minimum or maximum values of car parking spaces provided for the project.</p> <p>For projects where the mandatory local parking requirements do not exist or are optional (or recommended), the technical manual refers to a set of 'alternative requirements' in the Additional Guidance which would be applicable to the project.</p>
<p><b><u>TRA-2: Fuel-Efficient Transport</u></b> To encourage and recognise developments that facilitate the use of more fuel efficient vehicles for work commuting.</p>	<p>With the growing awareness of environmental sustainability, more people are considering other options for travelling to work in Nigeria. Incentives to choose fuel-efficient options are a good tool to encourage tenants to be fuel efficient.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>TRA-2 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>TRA-3: Cyclist Facilities</u></b> To encourage and recognise developments that facilitate the use of bicycles by occupants and visitors.</p>	<p>Tenants who cycle to work are still very few in Nigeria but this credit aims at providing fuel-efficient alternatives and allowing for the adoption of such practices by the users. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>TRA-3 should remain in its current form and no adjustments need to be made.</p>

<p><b><u>TRA-4: Commuting Mass Transport</u></b> To encourage and recognise developments that facilitate the use of mass transport for work commuting.</p>	<p>When a development is poorly located, in relation to the proximity of transport nodes and their frequency of service, then it is unlikely that building occupants will use mass transport to travel to the development.</p> <p>Conversely, developments that are within close proximity of good transport nodes with frequent service can encourage building occupants to use mass transport.</p> <p>Nigeria has various forms of public transport in the larger cities, including trains, buses and taxis.</p> <p>It is therefore recommended that TRA-4 should remain as is in order to accommodate both the contract and uncontracted commuting mass transport infrastructure in Nigeria.</p>	<p>TRA-4 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>TRA-5: Local Connectivity</u></b> 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>Similar to TRA-4, the choice of site often depends on the availability of a suitable site. When faced with multiple options for a site, projects should be encouraged to choose sites that contribute to greater local connectivity by being located in close proximity to amenities thus allowing the tenants the option to walk instead of drive.</p> <p>The current building code standard used in Nigeria for pedestrian facilities is not more stringent than SANS 10246, therefore TRA-5 should be kept in its current form and no adjustments need to be made.</p>	<p>The current building code standard used in Nigeria for pedestrian facilities is not more stringent than SANS 10246, therefore TRA-5 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>TRA-6: Trip Reduction – Mixed Use – RETAIL</u></b> To encourage &amp; 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 made 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 Nigeria 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-6 should remain in its current form and no adjustments need to be made.</p>

**TRA-7: Vehicle Operating Emissions – RETAIL & PEB**

To encourage & recognise retail centres that reduce vehicular emissions resulting from traffic congestion by upgrading road infrastructure around the centre.

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 CO<sub>2</sub> emissions per vehicle will be.

Traffic impact studies must be conducted in accordance with the Department of Transport's guideline document or, if available, the specific local authority's guideline by a competent person, usually a professional traffic engineer. The guideline document recommends that a traffic impact study must be conducted for any development generating more than a 150 vehicle trips during the peak hour. The local authorities can request a study for a development generating fewer trips if in their opinion the road network is already at capacity. The purpose of such a study is to mitigate the impact a new development will have on the existing road network.

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.

The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa, therefore TRA-7 should be kept in its current form and no adjustments need to be made.

TRA-7 should remain in its current form and no adjustments need to be made.

## WATER

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b><u>WAT-1: Occupant Amenity Water / WAT-1: Potable Water - PEB</u></b> To encourage and recognise designs that reduce potable water consumption by building occupants.</p>	<p>Water-efficient fixtures and fittings are available in the market place and have been installed in some buildings in Nigeria.</p> <p>In addition, there are some buildings which include rainwater harvesting and blackwater treatment for reuse within the building, typically for irrigation. Due to water supply infrastructure issues, some buildings also include holding tanks for potable water and sewerage.</p> <p>At present there is no national certification system which would allow different fixtures and fittings to be rated. Therefore, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p> <p>However, as the potable water calculator takes into account South African rainfall per region, this calculator may need to be adapted to reflect Nigerian rainfall values. The project team should therefore submit rainfall values relevant to their site to the GBCSA such that these values can be entered in the potable water calculator.</p>	<p>As the Green Star SA Potable Water Calculator takes into account South African rainfall per region, the Green Star SA Potable Water Calculator would need to be adapted to reflect the rainfall values in the different regions in Nigeria.</p> <p>WAT-1 should be kept in its current form with a mandatory CIR to confirm applicability.</p>
<p><b><u>WAT-2: Water Meters</u></b> To encourage and recognise the design of systems that both monitors and manages water consumption.</p>	<p>A fairly common practice in most tenanted buildings is the metering of collective water consumption of tenants via a building water meter. The effective monitoring and management of consumption can however best take place where water meters are used to monitor major water uses in a building, which is not common practice in Nigeria.</p> <p>As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>WAT-2 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>WAT-3: Landscape Irrigation</u></b> To encourage and recognise the design of systems that aim to reduce the consumption of potable water for landscape irrigation.</p>	<p>The professionals at the workshop noted that water-efficient irrigation was not a focus in office building design in Nigeria. The use of low water use plants or water efficient irrigation is however represents best practice which is not region specific, irrespective of the climate of the particular site.</p> <p>It is encouraged that projects install systems that aim to reduce the consumption of potable water for landscape irrigation, therefore, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>WAT-3 should remain in its current form and no adjustments need to be made.</p>

<p><b><u>WAT-4: Heat Rejection Water</u></b> To encourage and recognise design that reduces potable water consumption from heat rejection systems.</p>	<p>As in South Africa, cooling towers are used in Nigeria in the more applicable climates, while some projects choose not to use cooling towers.</p> <p>Cooling towers however use a significant amount of water during their operation which is subsequently evaporated into the atmosphere. As this water is commonly potable water, the use of this method should be discouraged.</p> <p>Therefore, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>WAT-4 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>WAT-5: Fire System Water Consumption</u></b> 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>Although many tenants and owners neglect to carry out routine tests on the fire system, this is a requirement by many insurance companies. When these tests are carried out therefore, they should be done in a water-efficient manner.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>WAT-5 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>WAT-7: Potable Water Efficient Appliances - MULTI UNIT RES</u></b> 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). 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>Potable water efficient appliances can be made available in the Nigerian market.</p> <p>This credit should therefore remain to encourage the use of potable water efficient appliances. The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>WAT-7 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>WAT-8: Swimming Pool / Spa Water Efficiency - MULTI UNIT RES</u></b> To encourage and recognise designs that reduce potable water consumption associated with swimming pools and spas.</p>	<p>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 (i.e. is not absorptive media or sand based filtration); 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>WAT-8 should remain in its current form and no adjustments need to be made.</p>

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The professionals at the workshop noted that the applicable provisions could be made where the development had a pool or spa. As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.
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## MATERIALS

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b><u>MAT-1: Recycling Waste Storage</u></b> To encourage and recognise the inclusion of storage space that facilitates the recycling of resources used within buildings to reduce waste going to disposal.</p>	<p>The professionals at the workshop were not aware of any projects in Nigeria that specifically provided space for recycling waste storage. In addition, they noted that they were unaware of any companies that provided recycling for office buildings in Nigeria (refer to MAN-7 for further information on recycling in Nigeria).</p> <p>Despite the lack of companies, it is still recommended that space be provided in sustainable buildings to begin driving the marketplace towards recycling and create opportunities for entrepreneurship in Nigeria.</p> <p>Note that Nigerian building code standard requires an area for refuse disposal but does not refer to a specific space within this area specifically dedicated to storing recycling waste for pick-up.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAT-1 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-2: Building Reuse</u></b> To encourage and recognise developments that reuse existing buildings to minimise materials consumption.</p>	<p>The professionals at the workshop noted that buildings in Nigeria were often demolished to make way for new buildings. The prevention of this waste that occurs during the demolition of buildings through the reuse of the original building(s) structure or façade should however be encouraged. As such a reward for the reuse of buildings would be well placed in the Nigerian context.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAT-2 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-3: Reused Materials</u></b> To encourage and recognise designs that prolong the useful life of existing products and materials.</p>	<p>Irrespective of region, projects should strive to prolong the useful life of existing products and materials as much as possible.</p> <p>This ensures that the waste generated from the demolition and construction processes of projects is minimal.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAT-3 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-4: Shell and Core or Integrated Fit-out</u></b> To encourage and recognise base building delivery mechanisms that eliminate the need for immediate</p>	<p>The majority of top tier projects in Nigeria are delivered as speculative spaces which are neither shell and core nor integrated fitout. Spaces are typically provided with ceilings, lighting, finishes and air conditioning. Note</p>	<p>MAT-4 should remain in its current form and no adjustments need to be made.</p>



<p>tenant refits.</p>	<p>that they are typically not provided with carpet.</p> <p>It should be noted that many of the individuals contacted for this research were not sure about the definition of the term “integrated fitout”. Many believed that if the speculative (not actual) tenancy works were integrated with the base building construction this would constitute integrated fitout.</p> <p>Project teams must therefore be made familiar with the two terms: “integrated fit-out” and “shell and core”. This will help them be aware of the wasteful expenditure that is associated with refits as well as the unnecessary consumption of resources, which happens as much in Nigeria as in South Africa.</p> <p>This credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>MAT-5: Concrete</u></b> To encourage and recognise the reduction of embodied energy and resource depletion occurring through use of concrete.</p>	<p>The structural engineers contacted for the purpose of this research were not aware of any projects in Nigeria which used either industrial waste product(s) or oversized aggregate in their construction. In addition, they were concerned as to whether either of these concrete mixes could be considered in Nigeria owing to an inability to check the standard of the concrete being produced.</p> <p>This was initially the case in South Africa as well and should not serve as deterrence as an opportunity in the Nigerian market exists for recycled aggregate or fly ash to be used in the production of concrete in Nigeria as a feasible alternative to cement.</p> <p>It is recommended that this credit should remain to drive the marketplace towards the use of more sustainable concrete. This credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAT-5 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-6: Steel</u></b> To encourage and recognise the reduction in embodied energy and resource depletion associated with reduced use of virgin steel.</p>	<p>The structural engineers contacted for the purpose of this research tended not to pay attention to the recycled content of the structural steel and were not aware of any projects in Nigeria which used recycled steel products. This needs to be rectified and awareness of the environmental benefits should be promoted through this credit.</p> <p>It is noted that a large proportion of the steel used in construction is imported into Nigeria, therefore this credit could result in market transformation through the import of steel with a post-consumer recycled content equal to or greater than 40%. This would encourage the reduction</p>	<p>MAT-6 should remain in its current form and no adjustments need to be made.</p>

	<p>in embodied energy and resource depletion associated with reduced use of virgin steel. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>MAT-7: PVC Minimisation</u></b> To encourage and recognise the reduction in use of Poly Vinyl Chloride (PVC) products in buildings.</p>	<p>In late 2011 the GBCSA completed a comprehensive credit review process for the MAT-07 PVC Minimisation credit which is one out of approximately seventy credits in the Green Star SA green building rating system.</p> <p>The GBCSA Technical Steering Committee (TSC) resolved to withdraw the credit after considering the outcomes of the credit review which involved stakeholder engagement through a PVC Expert Reference Panel and precedents set by other green building councils surrounding the treatment of PVC in green building rating tools.</p> <p>The withdrawal of the PVC Minimisation credit does not imply that PVC is or is not a “green” building material, nor that the GBCSA has endorsed, or given “the green light” to PVC. Instead, whereas the previous GBCA MAT-07 PVC Minimisation credit actively promoted the avoidance of PVC in the built environment, the new revised GBCA PVC credit aims to encourage the manufacture and use of PVC which meets GBCA “Best Practice PVC Guidelines” (“the guidelines”).</p> <p>The guidelines address the manufacture of PVC resin and products, and end of life management of PVC products. The intent of the GBCA PVC Guidelines are that they are to be used by manufacturers of PVC resin and PVC products used within the built environment to significantly minimise the health risks and impacts arising from the life cycles of their products.</p> <p>It is noted, however, that while the GBCA Best Practice PVC Guidelines may apply in Australia and South Africa, the professionals at the workshop believe that these guidelines are yet to be applied for all PVC products imported and/or manufactured in Nigeria.</p> <p>Until market transformation with regards to the processes used by the manufacturers of a large percentage of PVC made available in Nigeria is certain, the professionals felt that PVC minimisation is still relevant in Nigeria and that the credit should be kept in its current form.</p>	<p>MAT-7 should remain in its current form and no adjustments need to be made.</p>

<p><b><u>MAT-8: Sustainable Timber</u></b> To encourage and recognise the specification of reused timber products or timber that has certified environmentally-responsible forest management practices.</p>	<p>The professionals at the workshop were not aware of any projects in Nigeria that specified the use of reused timber products or timber that has certified environmentally-responsible forest management practice. They were also not aware of Forestry Stewardship Certification (FSC) and current holders, within the Nigerian market, of the FSC Chain of Custody and Management Certificate.</p> <p>It is hoped that market transformation related to the sustainability of timber products used in Nigeria can be achieved through this credit. The FSC scheme provides a credible guarantee that the timber products come from a well-managed forest that has been independently certified for its timber resource sustainability, forest ecosystem maintenance, and financial and socioeconomic viability. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>MAT-8 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-9: Design for Disassembly</u></b> To encourage and recognise designs that minimise the embodied energy and resources associated with demolition.</p>	<p>Many professionals are not often allocated a budget that gives them the creative leeway to design structures and buildings for disassembly. This credit therefore provides an incentive for project teams to be more creative in the design of the building while understanding the environmental benefits of this credit.</p> <p>As such, the credit is equally relevant and applicable in Nigeria as it is in South Africa in its current form.</p>	<p>MAT-9 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-10: Dematerialisation</u></b> To encourage and recognise designs that produce a net reduction in the total amount of material used.</p>	<p>This credit is achievable in the Nigerian context but very few projects focus on the net reduction of materials used. The credit is equally relevant and applicable in Nigeria as it is in South Africa in its current form.</p>	<p>MAT-10 should remain in its current form and no adjustments need to be made.</p>
<p><b><u>MAT-11: Local Sourcing</u></b> 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>The professionals at the workshop noted that a large proportion of building components, materials and finishes used in Nigeria are imported into the country.</p> <p>It is however strongly encouraged that local materials with equal performance specifications manufactured within West Africa should be explored instead and awareness should be raised of the embodied energy in materials sourced from far away distances.</p> <p>As such, to stimulate the growth of industry in Nigeria and West Africa, and to encourage and recognise the environmental advantages gained by using materials and products that are sourced within close proximity to the site - the sourcing of products manufactured intra-regionally is viewed as both an environmental and socio-economic driver of sustainable market transformation.</p>	<p>It is recommended to adapt the credit so that:</p> <ul style="list-style-type: none"> <li>• One point is awarded where 20% of the total contract value is represented by materials or products (used in the construction of the project) that have been sourced from within the member states of the ECOWAS region borders as defined by the ECOWAS National Unit Directory on</li> </ul>

	<p>It is therefore recommended to amend the credit so that one point is awarded where 20% of the total contract value is represented by materials or products (used in the construction of the project) that have been sourced from within the member states of the Economic Community of West African States (ECOWAS) region borders as defined by the ECOWAS National Unit Directory on <a href="http://www.ecowas.int">www.ecowas.int</a> current at the time of project registration or more recent.</p> <p>This would promote sourcing of materials in the West African region which would be beneficial to the present Nigerian context.</p> <p>An additional point is awarded where 10% of the total contract value is represented by materials or products (used in the construction of the project) that have been sourced from within the Nigerian borders.</p> <p>By amending the credits accordingly, professional teams will be strongly encouraged to source more of the building components, materials and finished locally, significantly fostering intra- and interregional economic development for Nigeria and the West African region.</p>	<p><a href="http://www.ecowas.int">www.ecowas.int</a>, current at the time of project registration or more recent.</p> <ul style="list-style-type: none"> <li>An additional point is awarded where 10% of the total contract value is represented by materials or products (used in the construction of the project) that have been sourced from within the Nigerian borders.</li> </ul> <p>This promotes sourcing of materials in the West African region which would be beneficial to the Nigerian local context.</p>
<p><b>MAT-12: Efficient Dwelling Size - MULTI UNIT RES</b> To encourage and recognise multi-unit residential developments with efficiently sized dwelling units and reduced material consumption.</p>	<p>The design of multi-unit residential developments with efficiently sized dwelling units reduces the material consumption that would have been associated with excessively sized dwelling units.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa with the availability of building resources and compliance with the credit criteria is completed automatically by the 'Efficient Dwelling Size Calculator' within the rating tool spreadsheet.</p>	<p>MAT-12 should remain in its current form and no adjustments need to be made.</p>
<p><b>MAT-13: Masonry - MULTI UNIT RES &amp; PEB</b> To encourage and recognise designs that minimise the embodied energy and resources associated with a reduction of virgin material in masonry units.</p>	<p>Similarly to South Africa, fired clay masonry units (i.e. bricks and pavers) are one of the most predominant building materials in Nigeria, particularly for residential developments. The clay masonry manufacturing industry has an installed annual capacity, within normal working hours, of in excess of 5 billion brick equivalent units. Approximately 13 million tons of clay is extracted annually, processed and fired to supply clay masonry products for new and renovated buildings within the sub-Saharan African region.</p> <p>Sub-Saharan Africa has always had an abundance of brick making clays and good levels of sunshine, which has meant that clay brick manufacturing has traditionally often been manufactured by means of "field</p>	<p>MAT-13 should remain in its current form and no adjustments need to be made.</p>

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<p>ovens” or “clamp kilns”. Easy availability of thermal coal resulted in the use of this fuel source to vitrify the clay and form the finished products.</p>	<p>Many different firing methods using thermal coal were developed and installed over time. Some of these methods remain common today, and are listed as critical activities in terms of the recently promulgated Air Quality Act and subject to stringent emissions controls.</p>	<p>Reducing the mass of a masonry unit impacts on haulage, with lighter loads and reduced 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-unit residential, public and education buildings such that the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>
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## LAND USE AND ECOLOGY

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b>ECO-00: Conditional Requirement</b> To encourage and recognise development on land that has limited ecological value and to discourage development on ecologically valuable sites.</p>	<p>The professionals at the workshop were of the opinion that the criteria listed in the updated version of this credit (revised April 2010) were suitable for application to the Nigerian context.</p> <p>Owing to the nature of the wording of the credit criteria however, the Nigerian professionals sought clarification on specific terms contained in the conditional requirement credit criteria. It is therefore recommended that technical clarifications be submitted where applicable and that a mandatory CIR be required to assess the project's compliance with this Conditional Requirement based on site ecological maps, to ensure approval of this conditional requirement prior to the Round 1 submission.</p> <p>It was consequently concluded that:</p> <p>The Eco-Conditional Requirement is met where the project development footprint</p> <ul style="list-style-type: none"> <li>• Is not located on prime agricultural land. Refurbishments/redevelopments that remain within the existing development footprint are exempt from this criterion;</li> <li>• Is not located on vegetation of high ecological value or within a 100 metre buffer of vegetation of high ecological value. Refurbishments/redevelopments that remain within the existing development footprint are exempt from this criterion;</li> <li>• Is not located on land with confirmed presence or high probability of threatened red listed species according to IUCN Red List of Threatened Species (<a href="http://www.iucnredlist.org">www.iucnredlist.org</a>), or within a defined buffer relevant to the specific threatened red listed species or habitat found. Refurbishments/redevelopments that remain within the existing development footprint are exempt from this criterion; and</li> <li>• Is not located within the required buffer zones of watercourses:             <ul style="list-style-type: none"> <li>○ The project development footprint must not fall within the 100 year floodplain.</li> <li>○ Watercourses of high ecological value: A project's development footprint can be located on land within 100 metres of a watercourse of high ecological value only if the building is a refurbishment that remains within the existing development footprint and the Watercourse Protection Measures (outlined below) have been</li> </ul> </li> </ul>	<p>ECO- should be kept in its current form based on the need to encourage and recognise development on land that has limited ecological value and to discourage development on ecologically valuable sites. To determine "high ecological value" and "prime agricultural land", a project can submit for an Eligibility Ruling at any point, before or after project registration.</p> <p>Note that attention is drawn to Technical Clarification Number ECO0-T-OB1-0655 which states that If the project is a refurbishment/redevelopment that remains within the existing development footprint (and providing it is outside the required buffers of watercourses), there is no need to include confirmation from a registered ecologist. Confirmation is required and it could simply be included within the Short Report prepared by a suitably qualified professional with reference to supporting evidence (e.g. aerial photos, Google images).</p> <p>A mandatory CIR will be required to assess the project's compliance with this Conditional Requirement based on site ecological maps, to ensure approval of this conditional requirement prior to the Round 1 submission.</p>



completed.; or

- Watercourses not of high ecological value: A project's development footprint can be located on land within 100 metres of a watercourse that is not of high ecological value only if the Watercourse Protection Measures (outlined below) have been completed. Watercourse Protection Measures

Watercourse Protection Measures

- A site-specific Watercourse Management Plan has been produced, exhibited and, for an As Built submission, implemented; and
- All points are achieved in EMI-5 Watercourse Pollution and in EMI-7 Light Pollution.

The project must abide by all measures in the Environmental Impact Assessment for the project if one is required, and the GBCSA reserves the right to provide the final ruling on a project's compliance with this conditional requirement.

It is noted that in the updated version of this credit (revised April 2010), the ridge criteria have been deleted entirely because ridges are defined only within Gauteng and it proved too complex for the GBCSA to define ridge criteria in the other provinces or regions. In addition, it was felt that most of the ecological valuable characteristics of ridges will be picked up with the other criteria.

As such, ECO-00 should be kept in its current updated form based on the need to encourage and recognise development on land that has limited ecological value and to discourage development on ecologically valuable sites. A mandatory CIR will be required to assess the project's compliance with this Conditional Requirement based on site ecological maps, to ensure approval of this conditional requirement prior to the Round 1 submission.

To determine "high ecological value" and "prime agricultural land", a project can submit for an Eligibility Ruling at any point, before or after project registration. Technical clarifications can also be submitted where applicable.

Note that attention is drawn to Technical Clarification Number ECO0-T-

		<p>OB1-0655 which states that If the project is a refurbishment/redevelopment that remains within the existing development footprint (and providing it is outside the required buffers of watercourses), there is no need to include confirmation from a registered ecologist. Confirmation is required and it could simply be included within the Short Report prepared by a suitably qualified professional with reference to supporting evidence (e.g. aerial photos, Google images).</p> <p><b>References</b></p> <p>For further information about the local legislation of Nigeria with regards to land use and ecology, refer to:</p> <p>NESREA Reg 2009 S.I No. 26  NESREA Reg 2009 S.I No. 27  NESREA Reg 2010 S.I No. 12  NESREA Reg 2010 S.I No. 18  NESREA Reg 2010 S.I No. 19</p>	
	<p><b><u>ECO-1: Topsoil</u></b>  To encourage and recognise construction practices that preserve the ecological integrity of topsoil.</p>	<p>Preserving topsoil is equally important in Nigeria as it is in South Africa because of the slow process of soil formation. The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ECO-1 should be kept in its current form and no adjustments need to be made.</p>
	<p><b><u>ECO-2: Reuse of Land</u></b>  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>Urban sprawl is a risk that all cities and countries face whenever more and more greenfield sites are developed upon, with equal prevalence in Nigeria as in South Africa. An incentive for projects to re-develop previously developed land or brownfield sites can contribute towards reducing the threat on sensitive ecosystems and natural resources through the development on greenfield sites. As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>ECO-2 should be kept in its current form and no adjustments need to be made.</p>
	<p><b><u>ECO-3: Reclaimed Contaminated Land</u></b>  To encourage and recognise developments that reclaim contaminated land that otherwise would not have been developed.</p>	<p>The professionals at the workshop noted that this credit was applicable to the Nigerian context. There is however, no definition of contaminated land in Nigeria, and contaminated lands are not identified by a local authority.</p> <p>It is therefore recommended that for ECO-3, projects teams targeting this credit are aware of the definitions contained in the Additional Guidance of the Green Star SA technical manual.</p> <p>Contamination is defined in the National Environmental Management: Waste Act as: the presence in or under any land, site, buildings or</p>	<p>ECO-3 should be kept in its current form and no adjustments need to be made.</p>



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structures of a substance or micro-organism above the concentration which is normally present in or under that land which substances directly or indirectly affect or may affect the quality of soil or the environment adversely. Existing building contamination is addressed in credit IEQ-11 Hazardous Materials while this credit deals with reclaimed contaminated land only.

It is noted that minor local contamination will occur on most previously used sites and such minor decontamination is not addressed by this credit. For the purpose of this credit, existing contamination must be 'significant'. This means that there must be substantial recommendations for containment and/or removal in the site contamination report.

Encapsulation is only an acceptable form of remediation if there are technically no other remediation options.

Remediation of the environment refers to the clean-up or making safe of a site or water body that is contaminated by toxic substances, whether they are natural or man-made.

Treatment as defined in the National Environmental Management: Waste Act means any method, technique or process that is designed to change the physical, biological or chemical character or composition of a waste, or to remove, separate, concentrate or recover a hazardous or toxic component of a waste or to destroy or reduce the toxicity of the waste in order to minimise the impact of the waste on the environment.

To be deemed no longer contaminated, the site must meet the regulated levels deemed suitable by the relevant competent authority. The environmental auditor or waste management control officer who certifies that the site has been duly decontaminated must meet the requirements of standards set at national level.

Please note the contamination resulting from this development (e.g. with asbestos from demolition of the existing buildings) cannot contribute to this credit.

The statement 'prior to construction' as stated in the Credit Criteria refers to construction of actual building structures, not to the beginning of any construction works on the project (e.g. land clearing). Therefore, if remediation occurs during earthworks or any other stages during the construction phase of a project prior to the building of any structure, it is

		<p>still considered as 'prior to construction'.</p> <p>The submission must clearly demonstrate that:</p> <ul style="list-style-type: none"> <li>• The site was designated as significantly contaminated at the time of purchase, where 'significant contamination' is defined as any contamination (regardless of extent, concentration, toxicity or otherwise) requiring remediation as determined by the relevant national or local authorities;</li> <li>• The site was correctly and appropriately decontaminated prior to the beginning of the construction phase of the project in accordance with the relevant national legislation and standards, including but not limited to the National Environmental Management: Waste Act (2008); and</li> <li>• As a result of decontamination, the site was certified as uncontaminated and satisfactory for use.</li> </ul> <p>As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
	<p><b><u>ECO-4: Change of Ecological Value</u></b> To encourage and recognise developments that maintain or enhance the ecological value of their sites.</p>	<p>It is noted that this credit is applicable to the Nigerian context, but would need to be updated to adequately reflect the various bioregions in Nigeria Nigeria.</p> <p>It is recommended that ECO-4 be kept in its current form. A mandatory CIR must however be submitted to the GBCSA by projects to determine which South African bio-region is most applicable to the project.</p>	<p>ECO-4 should be kept in its current form but adaptations to the bio-regions in the calculator are required to correctly represent the equivalent ecological value of the different bio-regions in Nigeria.</p> <p>A mandatory CIR must be submitted to the GBCSA by projects targeting this credit to determine which South African bio-region is most applicable to the project.</p>
	<p><b><u>ECO-5: Urban Heat Island – RETAIL</u></b> 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>Around half of the world's human population lives in urban areas. In the near future it is expected that the global rate of urbanization will increase significantly, as urban agglomerations emerge and population migration from rural to urban/suburban areas continues. Thereby, it is not surprising that the negative impacts related to urbanisation are an increasing concern. Urbanisation negatively impacts the environment mainly by the production of pollution, the modification of the physical and chemical properties of the atmosphere, and the covering of the soil surface.</p>	<p>ECO-5 should be kept in its current form and no adjustments need to be made.</p>

	<p>Considered to be a cumulative effect of all these impacts is the Urban Heat Island (UHI), defined as the rise in temperature of any man-made area, resulting in a well-defined, distinct "warm island" among the "cool sea" represented by the lower temperature of the area's nearby natural landscape. Though heat islands may form on any rural or urban area, and at any spatial scale, the surfaces of cities are prone to release large quantities of heat.</p> <p>The UHI negatively impacts not only residents of urban-related environs, but also humans and their associated ecosystems located far away from cities. In fact, UHIs have been indirectly related to climate change due to their contribution to the greenhouse effect, and therefore, to global warming. Therefore, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>ECO-6: Outdoor Communal Facilities - MULTI UNIT RES</u></b> 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 residents 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>Additional benefits include increasing the value of homes; improving the image of the development and attracting investment; contributing to the protection of biodiversity; and promoting exercise and other activities beneficial to the health of residents.</p> <p>Outdoor communal facilities are not only a good way to use the available space in a multi-unit residential type development in the most efficient way, but can contribute significantly to the well-being, and sense of community experienced by the residents.</p> <p>This is relevant for the Nigerian context as it is for the South African context, as such ECO-6 should be kept in its current form and no adjustments need to be made.</p>	<p>ECO-6 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>ECO-7: Urban Consolidation - MULTI UNIT RES</u></b> 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. The ultimate aim of urban consolidation is to reduce development on the fringe areas of the city.</p>	<p>ECO-7 should be kept in its current form and no adjustments need to be made.</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. As such, the credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>ECO-8: Community Facilities - PEB</u></b>          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>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 public assembly type activities offer a unique opportunity to promote the concept of shared land use by providing such community facilities thus encouraging neighbourhoods with real character and a sense of place.</p> <p>Additional benefits include increasing the value of homes; improving the image of an area and attracting investment; contributing to the protection of biodiversity; and promoting exercise and other activities beneficial to the health of residents.</p> <p>Outdoor community facilities are not only a good way to use the available space in a public building type development in the most efficient way, but can contribute significantly to the well-being, and sense of community experienced by local residents. This is relevant for the Nigerian context as it is for the South African context, as such ECO-8 should be kept in its current form and no adjustments need to be made.</p>	<p>ECO-8 should be kept in its current form and no adjustments need to be made.</p>

## EMISSIONS

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b><u>EMI-1: Refrigerants/Gaseous Ozone Depleting Potential (ODP)</u></b> 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.</p>	<p>The professionals at the workshop were well versed in zero ODP refrigerants, and whilst they were not always used, they are available in Nigeria. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>EMI-1 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>EMI-2: Refrigerants/Gaseous Global Warming Potential (GWP)</u></b> To encourage and recognise the selection of refrigerants that reduce the potential for increased global warming from the emission of refrigerants to the atmosphere.</p>	<p>The professionals at the workshop were well versed in low GWP refrigerants, and whilst they were not always used, they are available in Nigeria. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>EMI-2 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>EMI-3: Refrigerant Leaks</u></b> To encourage and recognise building systems design that minimises environmental damage from refrigerant leaks.</p>	<p>The professionals at the workshop were aware of systems to monitor for refrigerant leaks and pump down refrigerants. Monitoring systems were sometimes installed, but the professionals knew of no projects which incorporated pump down.</p> <p>It was concluded that it is possible to include a system of this type within the building system designs, with adequate care being taken to verify that the building system designs meets all of the requirements of the credit.</p> <p>With a large proportion of air conditioners used in Nigeria being imported, these products are available internationally such that this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>EMI-3 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>EMI-4: Insulant ODP</u></b> To encourage and recognise the selection of insulants that do not contribute to long-term damage to the Earth's stratospheric ozone layer.</p>	<p>The professionals at the workshop were well versed in zero ODP insulants, and whilst they were not always used, they are available in Nigeria. As such, this credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>EMI-4 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>EMI-5: Watercourse Pollution</u></b> To encourage and recognise developments that minimise stormwater run-off to, and the pollution of the natural watercourses.</p>	<p>The recently revised Green Star SA EMI-5 credit provides detailed information for designing stormwater attenuation and filtration systems according to best practice standards. Therefore the revised EMI-5 credit should equally apply in Nigeria as it is applied in South Africa.</p>	<p>EMI-5 should be kept in its current form and no adjustments need to be made.</p>

	<p>It is noted that where a project's development footprint is located on land within 100 metres of a watercourse of high ecological value, the Watercourse Protection Measures (outlined below) would to have been completed in order to meet the ECO- Conditional Requirement.</p> <p><u>Watercourse Protection Measures</u></p> <ul style="list-style-type: none"> <li>• A site-specific Watercourse Management Plan has been produced, exhibited and, for an As Built submission, implemented; and</li> <li>• All points are achieved in EMI-5 Watercourse Pollution and in EMI-7 Light Pollution.</li> </ul> <p>The credit in its current form is therefore equally relevant and applicable in Nigeria as it is in South Africa.</p>	
<p><b><u>EMI-6: Discharge to Sewer</u></b> To encourage and recognise developments that minimise discharge to the municipal sewerage system.</p>	<p>Refer to discussion on recycled water systems and water efficient fixtures and fittings in WAT-1.</p> <p>Even though a connection to the municipal sewer may be provided in certain instances, there is no legislative requirement for the municipal sewer to be used, therefore the treated water can be used for greywater flushing and other uses that are not directly or indirectly to human consumption.</p> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>EMI-6 should be kept in its current form and no adjustments need to be made.</p>
<p><b><u>EMI-7: Light Pollution</u></b> To encourage and recognise developments that minimise light pollution into the night sky.</p>	<p>The professionals at the workshop noted that this credit was achievable in the Nigerian context and that the CIBSE standard referenced was the appropriate one.</p> <p>It is noted that where a project's development footprint is located on land within 100 metres of a watercourse of high ecological value, the Watercourse Protection Measures (outlined below) would to have been completed in order to meet the ECO- Conditional Requirement.</p> <p><u>Watercourse Protection Measures</u></p> <ul style="list-style-type: none"> <li>• A site-specific Watercourse Management Plan has been produced, exhibited and, for an As Built submission, implemented;</li> </ul>	<p>EMI-7 should be kept in its current form and no adjustments need to be made.</p>

	<p>and</p> <ul style="list-style-type: none"> <li>All points are achieved in EMI-5 Watercourse Pollution and in EMI-7 Light Pollution.</li> </ul> <p>The credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>																																																																																																																																	
<p><b>EMI-8: Legionella</b> To encourage and recognise building systems design that eliminates the risk of Legionnaires' disease (Legionellosis).</p>	<p>Refer to the discussion on the provision of cooling towers in WAT-4. This credit in its current form is equally relevant and applicable in Nigeria as it is in South Africa.</p>	<p>EMI-8 should be kept in its current form and no adjustments need to be made.</p>																																																																																																																																
<p><b>EMI-9: Boiler and Generator Emissions</b> To encourage and recognise the use of boilers and generators that minimise harmful emissions.</p>	<p>Many projects do not comply with this credit because of the high cost associated with the type of generator. However technical clarification number EMI9-T-OB1-0082 and Credit Interpretation Request (CIR) EMI0-OB1-0080 should apply for this credit, as is the case in South Africa.</p> <table border="1" data-bbox="831 691 1624 1358"> <thead> <tr> <th>Engine Power</th> <th>Tier</th> <th>Year</th> <th>CO g/kWh</th> <th>HC g/kWh</th> <th>NMHC + NOx g/kWh</th> <th>NOx g/kWh</th> <th>PM g/kWh</th> </tr> </thead> <tbody> <tr> <td>&lt; 8kW</td> <td>Tier 2</td> <td>2005</td> <td>8.0</td> <td>-</td> <td>7.5</td> <td>-</td> <td>0.8</td> </tr> <tr> <td>&lt; 8kW</td> <td>Tier 4</td> <td>2008</td> <td>8.0</td> <td>-</td> <td>7.5</td> <td>-</td> <td>0.4</td> </tr> <tr> <td>8 ≤ kW &lt; 19</td> <td>Tier 2</td> <td>2005</td> <td>6.6</td> <td>-</td> <td>7.5</td> <td>-</td> <td>0.8</td> </tr> <tr> <td>8 ≤ kW &lt; 19</td> <td>Tier 4</td> <td>2008</td> <td>6.6</td> <td>-</td> <td>7.5</td> <td>-</td> <td>0.4</td> </tr> <tr> <td>19 ≤ kW &lt; 37</td> <td>Tier 2</td> <td>2004</td> <td>5.5</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>19 ≤ kW &lt; 37</td> <td>Tier 4</td> <td>2008</td> <td>5.5</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>37 ≤ kW &lt; 75</td> <td>Tier 3</td> <td>2008</td> <td>5.0</td> <td>-</td> <td>4.7</td> <td>-</td> <td>-</td> </tr> <tr> <td>37 ≤ kW &lt; 56</td> <td>Tier 4</td> <td>2008</td> <td>5.0</td> <td>-</td> <td>4.7</td> <td>-</td> <td>0.3</td> </tr> <tr> <td>75 ≤ kW &lt; 130</td> <td>Tier 3</td> <td>2007</td> <td>5.0</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>56 ≤ kW &lt; 130</td> <td>Tier 4</td> <td>2012-2014</td> <td>5.0</td> <td>0.19</td> <td>-</td> <td>0.40</td> <td>0.02</td> </tr> <tr> <td>130 ≤ kW &lt; 225</td> <td>Tier 3</td> <td>2006</td> <td>3.5</td> <td>-</td> <td>4.0</td> <td>-</td> <td>-</td> </tr> <tr> <td>130 ≤ kW &lt; 560</td> <td>Tier 4</td> <td>2011-2014</td> <td>5.0</td> <td>0.19</td> <td>-</td> <td>0.40</td> <td>0.02</td> </tr> <tr> <td>225 ≤ kW &lt; 450</td> <td>Tier 3</td> <td>2006</td> <td>3.5</td> <td>-</td> <td>4.0</td> <td>-</td> <td>-</td> </tr> <tr> <td>450 ≤ kW &lt; 560</td> <td>Tier 3</td> <td>2006</td> <td>3.5</td> <td>-</td> <td>4.0</td> <td>-</td> <td>-</td> </tr> <tr> <td>&gt; 560 kW</td> <td>Tier 2</td> <td>2006</td> <td>3.5</td> <td>-</td> <td>6.4</td> <td>-</td> <td>0.2</td> </tr> </tbody> </table> <p>It is recommended that for EMI-9, projects teams targeting this credit</p>	Engine Power	Tier	Year	CO g/kWh	HC g/kWh	NMHC + NOx g/kWh	NOx g/kWh	PM g/kWh	< 8kW	Tier 2	2005	8.0	-	7.5	-	0.8	< 8kW	Tier 4	2008	8.0	-	7.5	-	0.4	8 ≤ kW < 19	Tier 2	2005	6.6	-	7.5	-	0.8	8 ≤ kW < 19	Tier 4	2008	6.6	-	7.5	-	0.4	19 ≤ kW < 37	Tier 2	2004	5.5	-	-	-	-	19 ≤ kW < 37	Tier 4	2008	5.5	-	-	-	-	37 ≤ kW < 75	Tier 3	2008	5.0	-	4.7	-	-	37 ≤ kW < 56	Tier 4	2008	5.0	-	4.7	-	0.3	75 ≤ kW < 130	Tier 3	2007	5.0	-	-	-	-	56 ≤ kW < 130	Tier 4	2012-2014	5.0	0.19	-	0.40	0.02	130 ≤ kW < 225	Tier 3	2006	3.5	-	4.0	-	-	130 ≤ kW < 560	Tier 4	2011-2014	5.0	0.19	-	0.40	0.02	225 ≤ kW < 450	Tier 3	2006	3.5	-	4.0	-	-	450 ≤ kW < 560	Tier 3	2006	3.5	-	4.0	-	-	> 560 kW	Tier 2	2006	3.5	-	6.4	-	0.2	<p>EMI-9 should be kept in its current form and no adjustments need to be made.</p>
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	<p>are aware of the applicable conversion factors contained in the Additional Guidance of the Green Star SA technical manual. It is also noted that these generator requirements apply irrespective of whether the engine is to be used as an emergency/back-up unit or for the purposes of minimising peak electrical infrastructure load for less than 300 hours per year.</p> <p>The credit is equally relevant and applicable in Nigeria as it is in South Africa in its current form.</p>	
<p><b><u>EMI-10: Kitchen Exhaust Emissions - RETAIL</u></b> 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>This credit is achieved where developer is in control of the design of the kitchen exhaust ducting or external risers and ensures that the exhaust points are located not closer than 10m to a neighbouring usable space or walkway, or fresh air intake (of that development or another development).</p> <p>The professionals at the workshop noted that this would result in market transformation of retail developments in Nigeria of which major nationals are the primary tenants and that credit is equally relevant and applicable in Nigeria as it is in South Africa in its current form.</p>	<p>EMI-10 should be kept in its current form and no adjustments need to be made.</p>

## INNOVATION

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><b><u>INN-1: Innovative Strategies and Technologies</u></b> To encourage and recognise pioneering initiatives in sustainable design, process or advocacy.</p>	<p>This credit should be kept in its current form with reference being made instead to the Nigerian context, as opposed to the South African context.</p> <p>Therefore, up to two points are awarded for an innovation initiative where:</p> <ul style="list-style-type: none"> <li>• The initiative is a technology or process that is considered a ‘first’ in Nigeria or in the World; or the project substantially contributes to the broader market transformation towards sustainable development in Nigeria or in the World.</li> </ul> <p>Points are awarded as follows:</p> <ul style="list-style-type: none"> <li>• One point is awarded when either of the above is true for the Nigerian market; OR</li> <li>• Two points are awarded when either of the above is true for the Global market</li> </ul> <p>Up to five innovation initiatives can be awarded points under this credit, but no individual initiative can achieve more than two points in this credit. Qualifying initiatives may achieve additional points in other Innovation Credits, however the maximum points available for any one building assessment under INN-1, INN-2 and INN-3 is five (in total).</p>	<p>INN-1 should be kept in its current form with reference being made instead to the Nigerian context, as opposed to the South African context.</p>
<p><b><u>INN-2: Exceeding Green Star SA Benchmarks</u></b> To encourage and recognise projects that achieve environmental benefits in excess of the current Green Star SA benchmarks.</p>	<p>This credit should be kept in its current form with the applicable adaptations made to incorporate the minor changes made in the Green Star SA-Nigeria rating tool.</p>	<p>INN-2 should be kept in its current form with the applicable adaptations made to incorporate the minor changes made in Green Star SA-Nigeria rating tool.</p>
<p><b><u>INN-3: Environmental Design Initiatives</u></b> To encourage and recognise sustainable building initiatives that are currently outside of the scope of this Green Star SA rating tool but which have a substantial or significant environmental benefit.</p>	<p>This credit should be kept in its current form with the applicable adaptations made to incorporate the minor changes made in the Green Star SA-Nigeria rating tool.</p>	<p>INN-3 should be kept in its current form with the applicable adaptations made to incorporate the minor changes made in Green Star SA-Nigeria rating tool</p>

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