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LOCAL CONTEXT REPORT

GREEN STAR SA FOR USE IN RWANDA

2014/06/25

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Version 1

2014/06/25

TECHNICAL WORKING GROUP

Green Star SA-Rwanda Local Context Report Technical Committee

Green Building Council of South Africa

CLIENT



Habi Ltd

P. O. Box 43
Kigali,
Rwanda.
+250 252 57 6908

CONSULTANT

WSP Group Africa (Pty) Ltd

199 Bryanston Drive,
Bryanston
Johannesburg
South Africa

Vere Shaba

vere.shaba@wspgroup.co.za
+27 11 300 6177

Francis Porter

francis.porter@wspgroup.co.za
+27 11 300 6174

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Executive Summary

Overview of the Rwanda Local Context Report

This report serves as a local context assessment to allow for projects in Rwanda 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 Design and As Built rating tools in South Africa (Office, Retail Centre, Multi Unit Residential, Public & Education Building), Ghana (Office only), Namibia (Office only), Mauritius (Office only), Kenya (Office, Retail Centre, Multi Unit Residential, Public & Education Building), and Nigeria (Office, Retail Centre, Multi Unit Residential, Public & Education Building).

Through this local context assessment, the GBCSA aims to apply for approval from the GBCA to allow for certification in Rwanda using the Green Star SA v1 Design and As Built rating tools (with some adaptations recommended in this report) for the following building types, namely 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-Rwanda. The GBCSA will then use the opportunity to allow capacity to grow in Rwanda, by allowing selected Rwandan professionals to be trained as Green Star SA-Rwanda assessors who would join the GBCSA assessor teams on Rwandan projects (where local assessors have been contracted by the local GBC). In addition, the GBCSA could deliver the Green Star SA Accredited Professional courses in Rwanda where Rwandan funds allow this, in collaboration with the prospective Green Building Council of Rwanda, which would allow Rwandans to take the Green Star SA Accredited Professional online examinations.

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
MAN-1	<p>It was noted by the professionals at the workshop, that until such a time that the mandatory Green Star SA AP course is offered in Rwanda, professional teams who are not based in South Africa would be penalised.</p> <p>Therefore, to allow the opportunity for a Green Star SA AP course to be offered in Rwanda, as was done in South Africa, it is recommended that an adaptation of the technical clarification MAN1-T-OB1-0030 Timing of Design Phase should be made for Rwanda stating that:</p> <p>"If the schematic design phase of the project was begun prior to 1 January, 2015, this credit may be marked 'Not Applicable' and be excluded from the points available, used to calculate the Management Category Score. Type 'na' in the No. of Points Achieved column."</p>	Adaptation

References

For further information about the Green Star SA Technical Clarification MAN1-T-OB1-0030 Timing of Design Phase:

http://old.gbcsa.org.za/greenstar/tech_results.php?a=credit&type=1&credit=2

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 & 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).

References

For further information about the local standards of Rwanda with regards to environmental management in building construction, refer to:

MAN-6

- Rwanda Environment Management Authority:
<http://www.rema.gov.rw/>
- RS ISO 14001:2004 Environmental management systems— Specification for guidance for use
- RS ISO 14004: 2004 Environmental management systems - General guidelines on principles, systems and supporting techniques
- RS ISO 14015:2004 Environmental management systems - Environment assessment of sites and organisations (EASO)
- RS ISO 14050:2004 Environmental management systems— Vocabularies
- RS 447:2009 ISO 15392:2008 Sustainability in building construction — General principles

Adaptation

It was noted by the professionals at the workshop that, owing to the temperate equatorial climate experienced throughout the year, most buildings in Rwanda use natural ventilation or mechanically-assisted natural ventilation (MANV) to ventilate the nominated area.

MANV systems are defined as those “systems that rely, partially or fully, on fans to move natural (non-contaminated) air through the space” (GBCA v3).

IEQ-1

Should MANV be used to ventilate the nominated area, it is recommended that the MANV spaces comply with the credit criteria for “mechanically ventilated spaces” as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and ventilation rates in Green Star Australia.

A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.

Mandatory CIR for projects using MANV system

A single common CIR should be submitted for all MANV related credits.

	For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-1 is kept in its current form and no adjustments need to be made.	
IEQ-3	<p>Should MANV be used to ventilate the nominated area, it is recommended that the MANV spaces comply with the credit criteria for “mechanically ventilated spaces” as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and carbon dioxide monitoring and control in Green Star Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-3 is kept in its current form and no adjustments need to be made.</p>	<p>Mandatory CIR for projects using MANV system</p> <p>A single common CIR should be submitted for all MANV related credits.</p>
IEQ-9	<p>Should MANV be used to achieve thermal comfort in the nominated area, it is recommended that the MANV spaces comply with the credit criteria for “naturally ventilated spaces” as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and thermal comfort in Green Star Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-9 should be kept in its current form and no adjustments need to be made.</p>	<p>Mandatory CIR for projects using MANV system</p> <p>A single common CIR should be submitted for all MANV related credits.</p>
IEQ-11	<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&S) should be used.</p>	<p>Mandatory CIR for projects targeting this credit where the South African standard is not used</p>
IEQ-15	<p>IEQ-15 should remain in its current format and no adjustments of the credit criteria need to be made.</p> <p>For MANV spaces, a mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p>	<p>Mandatory CIR for projects using MANV system</p> <p>A single common CIR should be submitted for all</p>

		MANV related credits.
ENE-0	<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 & 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>	Mandatory CIR
ENE-1	<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 & 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>For naturally ventilated and mechanically-assisted naturally ventilated (MANV) spaces, project teams are to submit a natural ventilation report as highlighted in the Documentation Requirements.</p> <p>The natural ventilation report describes how the building has been designed to be naturally ventilated and confirms that analysis has been carried out to check that internal conditions will be acceptable to the occupants. This is to avoid rewarding buildings which will overheat or be uncomfortable and require air conditioning to be retrofitted (refer to the Documentation Requirements for ENE-1).</p>	<p>Mandatory CIR</p> <p>A single common CIR should be submitted for all MANV related credits.</p>
ENE-7	<p>ENE-7 should be kept in its current form with a mandatory CIR to confirm applicability.</p>	Mandatory CIR for projects targeting this credit
TRA-1	<p>TRA-1 should be adapted to refer to the Rwandan 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>	Adaptation
TRA-4	<p>It is recommended that the Mass Transport calculator is adapted to reflect</p>	Mandatory CIR, that addresses the

	<p>the population density and type of mass transport specific to the context of Rwanda.</p> <p>References</p> <p>For further information about the public transport systems specific to the local context of Rwanda, refer to:</p> <ul style="list-style-type: none"> • Republic of Rwanda Ministry of Infrastructure. October 2012. "Public Transport Policy and Strategy for Rwanda". http://www.mininfra.gov.rw/uploads/media/Public_Transport_Policy_and_strategy_for_Rwanda_02.pdf • Rwanda Transport Development Agency, a government institution affiliated to the Ministry of Infrastructure: http://www.mininfra.gov.rw/index.php?id=140 	<p>public transport facilities available in the relevant context of the project, regardless of size of population of the area.</p>
<p>WAT-1 / WAT-1 (PEB)</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 Rwanda.</p> <p>WAT-1 should be kept in its current form with a mandatory CIR to confirm applicability.</p> <p>References</p> <p>For further information about the rainfall values in the different regions in Rwanda, refer to:</p> <ul style="list-style-type: none"> • Rwanda Meteorology Agency: http://www.meteorwanda.gov.rw/ 	<p>Mandatory CIR for projects targeting this credit.</p>
<p>MAT-5</p>	<p>MAT-5 should remain in its current form to drive market transformation towards the use of more sustainable concrete.</p> <p>The credit should however be adapted not only to state industrial waste product(s) but the use of volcanic ash as a substitute to reduce the absolute quantity of Portland cement.</p> <p>As volcanic ash is available locally in Rwanda, as a replenishable by-product of volcanic activity, the use of volcanic ash would contribute to the reduction of embodied energy and resource depletion that occurs through the use of Portland cement in concrete.</p> <p>Volcanic ash consists of fragments of pulverized rock, minerals and volcanic glass and is not co-fired with hazardous waste. A mandatory CIR must be submitted by any project wishing to use volcanic ash showing how the same environmental outcome is achieved by using volcanic ash.</p> <p>References</p> <p>For further information about the local standards of Rwanda with regards to concrete, refer to:</p>	<p>Mandatory CIR for projects targeting this credit wishing to use volcanic ash.</p>

	<ul style="list-style-type: none"> • RS EAS180:2005 Specification for aggregates from natural sources for use in concrete • RS 357-2:2009 EAS 417-2: 2008 Concrete — Part 2: Specification of constituent materials, production of concrete and compliance of concrete • RS 589-1:2012/EAS 131-1:2008 Concrete — Part 1: Specification, performance, production and conformity 	
MAT-8	<p>Currently there are no FSC certified suppliers/wholesalers in Rwanda. Where a supplier/wholesaler and all other parties throughout the chain-of-custody are undergoing the certification process with an accredited FSC Certification Body, documentation demonstrating adherence to the accreditation process is deemed to meet the credit criteria for MAT-8.</p> <p>Once Rwanda has a fully certified FSC certified supplier/wholesaler, the requirements for demonstration of proof reverts to FSC chain-of-custody certification.</p> <p>Projects wishing to target this credit must submit a mandatory CIR.</p> <p>References</p> <p>For further information about the Forest Stewardship Council (FSC), refer to:</p> <ul style="list-style-type: none"> • Forest Stewardship Council: https://ic.fsc.org/index.htm <p>For further information on the local policies and standards in Rwanda, refer to:</p> <ul style="list-style-type: none"> • Republic of Rwanda Ministry of Forestry and Mines. May 2010. "National Forestry Policy". • Republic of Rwanda Ministry of Forestry and Mines. June 2010. "Strategic Plan for the Forest Sector 2009 – 2012". 	Projects wishing to target this credit must submit a mandatory CIR.
MAT-11	<p>It is recommended to adapt the credit so that:</p> <ul style="list-style-type: none"> • 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 East African Community (EAC) region borders as defined by the EAC on http://www.eac.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 Rwandan borders. <p>This promotes sourcing of materials in the East African region which would be beneficial to the Rwandan local context.</p>	Adaptation
ECO-0	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	Mandatory CIR

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).

However, where confirmation that the site was not on land of high ecological value is to be stated by a suitably qualified registered ecologist, the suitable registered ecologist would be defined as being a licensed Environmental Impact Assessment (EIA) Expert as registered with the Rwanda Environment Management Authority (REMA) of Rwanda implementing the ministerial order N° 003/2008 of 15/08/2008 relating to the requirements and procedure for Environmental Impact Assessment, especially in Article Five (5) on selection of experts to conduct environmental impact study, current at the time of project registration or more recent.

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 standards of Rwanda with regards to environmental impact assessments in building construction, refer to:

- Rwanda Environment Management Authority:
<http://www.rema.gov.rw/>

ECO-4	<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 Rwanda</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>Mandatory CIR</p>
INN-1	<p>INN-1 should be kept in its current form with reference being made instead to the Rwandan context, as opposed to the South African context.</p>	<p>Adaptation</p>
INN-2	<p>INN-2 should be kept in its current form with reference being made instead to improvement on an existing Green Star SA / Green Star SA-Rwanda credit.</p>	<p>Adaptation</p>

INN-3

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- Rwanda rating tool. Adaptation

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

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 Rwanda and Rwandan industry professionals and academics with regards to the legislation, policies and market practices in sustainability specific to the Rwandan 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 prospective Green Building Council of Rwanda (GBCR) that the category weighting system should remain the same as that of the Green Star SA rating tools, until such a time as the GBCR has the capacity to facilitate a revision of the category environmental weighting system.

Acronyms

Acronym	Term
ANGBC	African Network of Green Building Councils
AP	Accredited Professional
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BMS	Building Management System
CIBSE	Chartered Institute of Building Services Engineers
CIR	Credit Interpretation Request
EAC	East African Community
ECO	Land Use and Ecology category
EIA	Environmental Impact Assessment
EMI	Emissions category
EMP	Environmental Management Plan
ENE	Energy category
ETS	Environmental Tobacco Smoke
FSC	Forest Stewardship Council
FSC P&C	Forest Stewardship Council Principles and Associated Criteria
GBCA	Green Building Council of Australia
GBCR	Green Building Council of Rwanda
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
MANV	Mechanically Assisted Natural Ventilation
MAT	Material category
ODP	Ozone Depleting Potential
PEB	Green Star SA Public & Education Building v1
REMA	Rwanda Environment Management Authority
SANS	South African National Standard
TC	Technical Clarification
TRA	Transport category
UA	Useable area
WAT	Water category
WMP	Waste Management Plan

Introduction

Overview of the Creation of a Green Building Council in Rwanda

Since December 2013, Rwandan professionals have shown interest in creating a green building council which the prospective founding board members intend to register at a Prospective Membership Level with the World Green Building Council (similar to what has been done to date in Ghana, Kenya, Mauritius, Morocco, Namibia and Nigeria as seen in Figure 1).

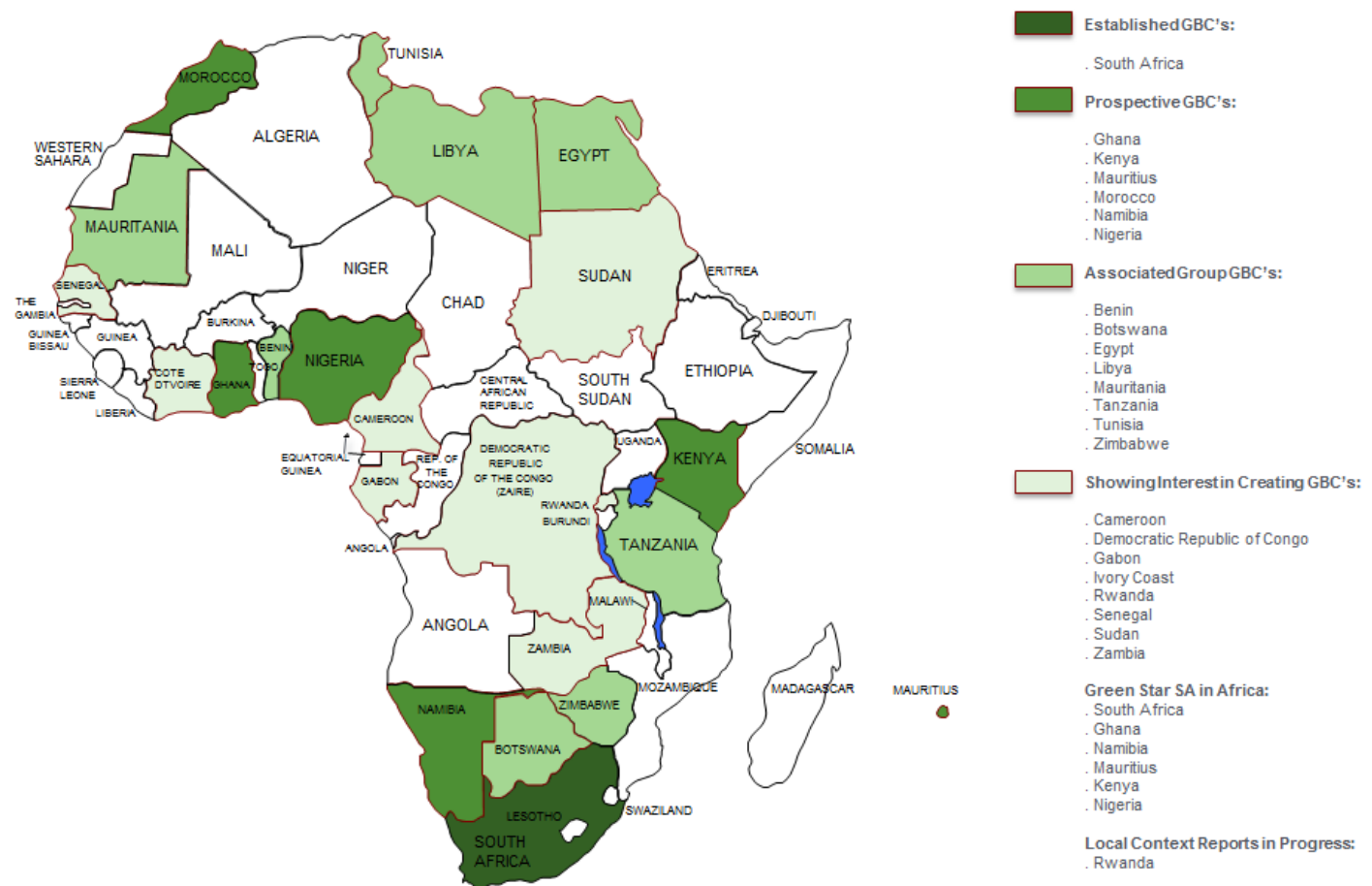


Figure 1. The membership level of Green Building Councils on the African continent (WGBC, 2014)

With preliminary discussions currently in progress between the Rwandan prospective founding board members (for additional information, contact Arch. Eudes Kayumba on ekayumba@hotmail.com), the green building council in the country has not yet been formally established and has therefore not produced an environmental rating tool that would be used for office, retail centre, multi-unit residential, public and education building projects in Rwanda.

The members, however, recognise that the property industry is well-placed to deliver significant long-term environmental improvements using a broad range of measures and believe in the potential for projects within the country to be voluntarily and independently rated in the interim.

Overview of the Development of the Green Star SA-Rwanda Environmental Rating Tool

As a member of the Africa Network of Green Building Councils (ANGBC), the Green Building Council of South Africa (GBCSA) has therefore expressed a willingness to allow the rating of Rwandan buildings under the Green Star SA rating system until such a time that the green building council in Rwanda is fully established as agreed by the members.

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

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

Objective of the Rwanda Local Context Report

This report therefore serves as a local context assessment to allow for Office, Retail Centre, Multi Unit Residential, Public & Education Building projects in Rwanda to be certified using the Green Star SA v1 Design and As Built rating tools.

A workshop was set up in Kigali with the Green Star SA-Rwanda Local Context Report Technical Committee consisting of industry professionals and academics, convened by the Rwandan founding board members on 13 March 2014 through the sponsorship of Habi Ltd, a property development company in Rwanda. The objective of the workshop was to discuss each credit in the Green Star SA v1 rating tools and to interrogate the applicability of these credits to the Rwandan context.

The technical committee comprised of the following individuals and organisations listed in Table 2. Acknowledgement is made of their invaluable feedback and insight which is greatly appreciated.

Table 2. Green Star SA-Rwanda Local Context Report Technical Committee (13 March 2014)

Arch. Carlos Arroyo	Architect	Carlos Arroyo Architects
Arch. Toma Berlanda	Architect	Active Social Architecture
Eng. Andrei Bragaru	Project and Cost Manager	Sentient Project Management
Eng. Olivier Costa	Property Developer	Habi Ltd
Nathan Gauthier	Researcher	Kigali Institute of Science and Technology
Arch. Timothy Hall	Architect	Peter Rich Architects / Light Earth Designs LLP
Arch. Jean Vianney Kamiya	Founder Member	University of Kigali

Arch. Eudes Kayumba	Architect	Landmark Architects
Dr G. Senthil Kumaran	Senior Lecturer and Head of the Department of Civil Engineering & Environmental Technology	Kigali Institute of Science and Technology
Eng. Aime Raymond Mbabazi	Project and Cost Manager	Sentient Project Management
Gavin Moore	Partner	Sentient Project Management
Eng. Richard Ngendahayo	Technical Advisor	Green and Clean Solutions
Arch. Eric Noir	Technical Director	WSP Group

The comments from the workshop and views expressed by the Green Star SA-Rwanda Local Context Report Technical Committee have been included in this report.

Methodology

The context report addresses climatic conditions and ecology, water and energy patterns, building regulations and any other Rwanda-specific circumstances which may require local adaptations of the Green Star SA credit criteria or mandatory credit interpretation requests. The context report also analyses the Green Star SA Design and As Built rating tools credit-by-credit, identifying any ramifications that may result from the application of the Green Star SA rating tools to the Rwandan context.

Background

Overview of Rwanda

The Republic of Rwanda is a sovereign state in the East African Community (EAC) region spanning 26 388 square kilometres with a population, according to the UN census in 2014, of 12.3 million people. Rwanda (with geographic coordinates of 2 00 S, 30 00 E) lies a few degrees south of the equator with Tanzania to the east, Burundi to the south, the Democratic Republic of Congo to the west and Uganda to the north (Figure 2).



Figure 2. Rwanda (The World Factbook, 2014)



Figure 3. Regional context of Rwanda (BBC, 2013)

Geography

Rwanda's terrain is mountainous, composed of grassy uplands and hills, with a decline in altitude from west to east. Active volcanoes are present across the Northern Province of Rwanda which makes the country subject to minor seismic activity from volcanic eruptions. The lowest point in Rwanda is 950 m above sea level at the Rusizi River. The highest point in Rwanda is 4,519 meters above sea level at Volcan Karisimbi.

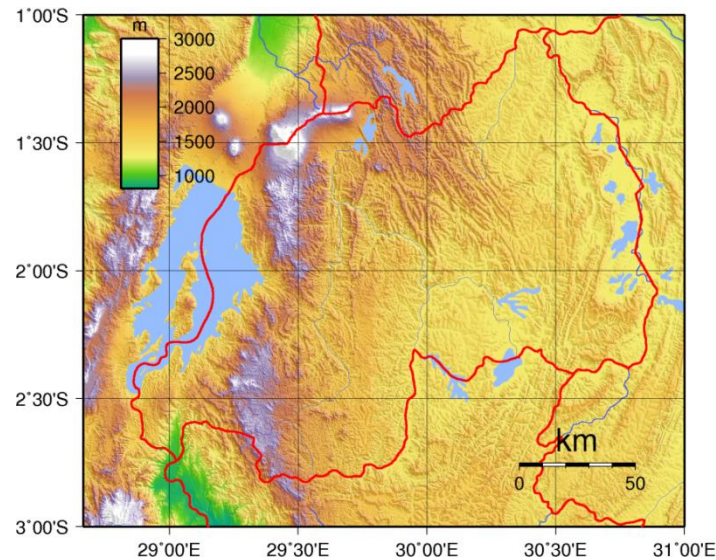
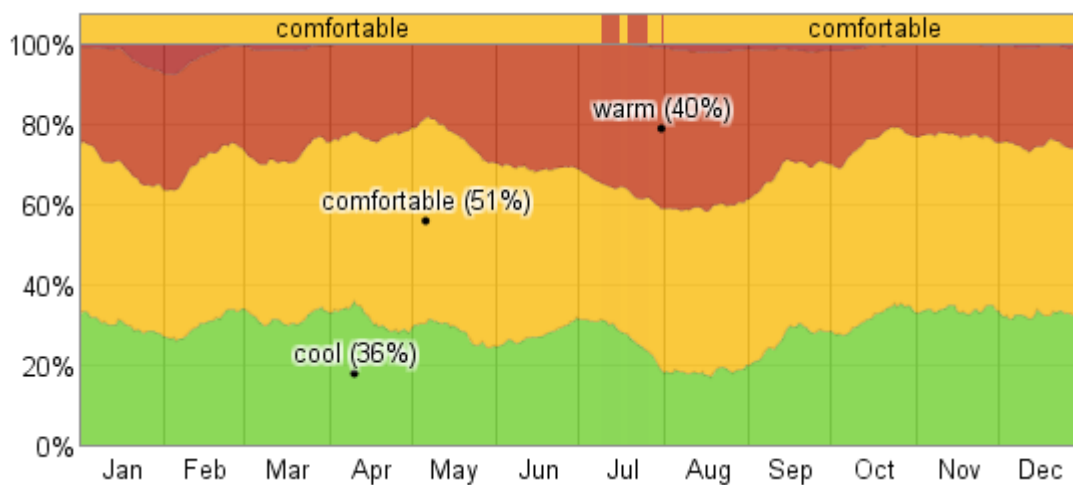


Figure 4. Topographical map of Rwanda

Climate

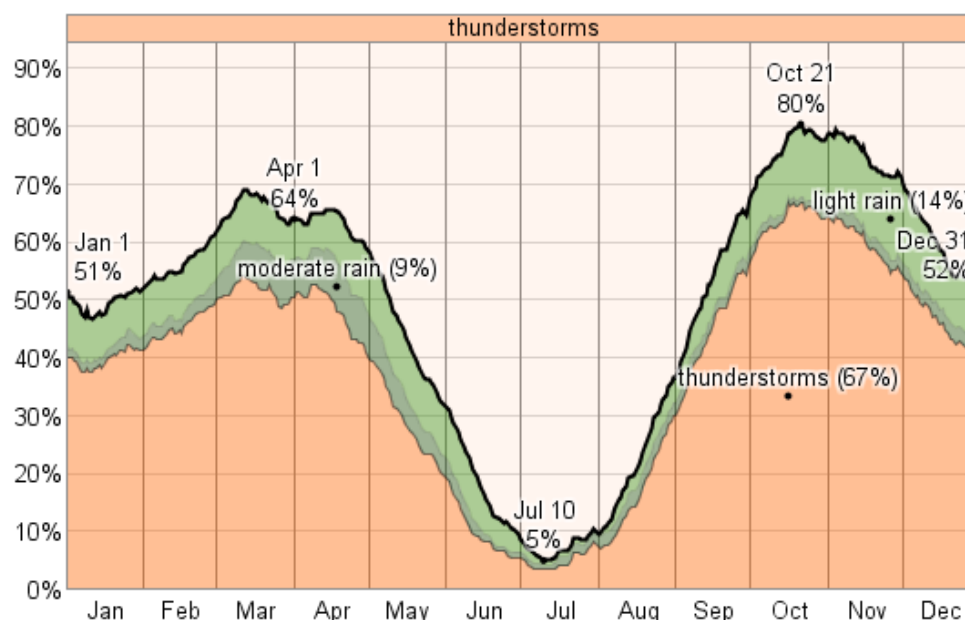
Although Rwanda is located only two degrees south of the equator, owing to the high altitude of the country, Rwanda has a temperate climate with temperatures not often climbing above 25°C with a comfortable temperature band of 18°C to 24°C throughout the year (Graph 1).



Graph 1. Fraction of time spent in various temperature bands in Rwanda

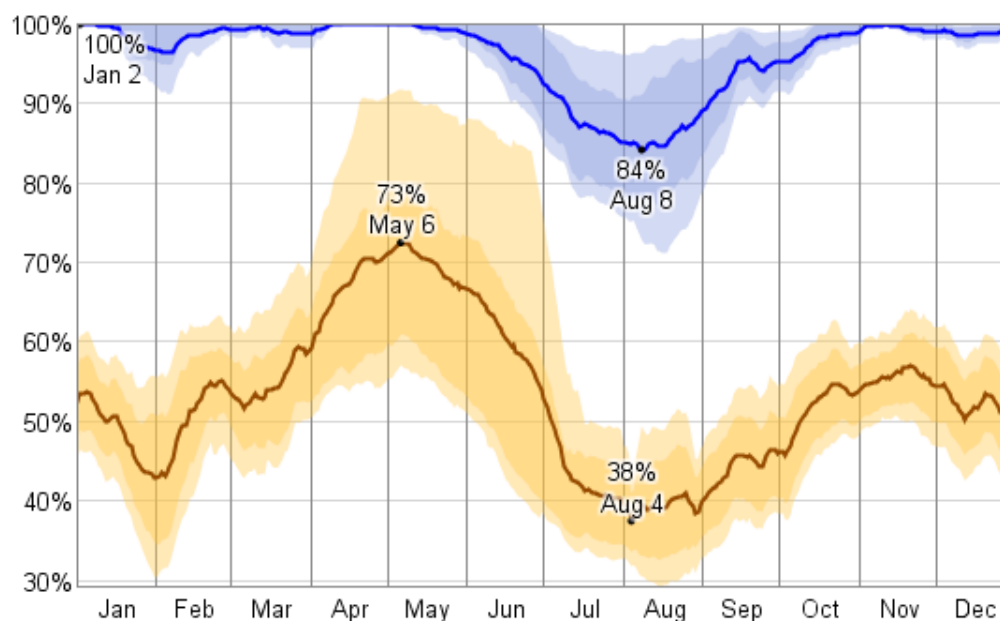
The length of the day does not vary substantially over the course of the year, staying within 14 minutes of 12 hours throughout the year and the median cloud cover ranges from 39% (mostly clear) to 62% (partly cloudy).

The long dry season is from June to September and there are two annual rainy seasons, the first from mid-March until the beginning of June and small rains from mid-September to December.



Graph 2. Probability of precipitation in Rwanda

The relative humidity typically ranges from 38% (comfortable) to 100% (very humid) over the course of the year, rarely dropping below 29% (dry) and reaching as high as 100% (very humid).



Graph 3. Relative humidity in Rwanda

Environmental concerns in Rwanda

The most prominent environmental concerns in Rwanda include deforestation resulting from uncontrolled cutting of trees for fuel, overgrazing, soil exhaustion, soil erosion and widespread poaching

Table 3. Environmental statistics (UN Statistics, 2014)

Environment			
Threatened species	2012	58	
Forested area (% of land area)	2010	18.0	
CO2 emission estimates (000 metric tons and metric tons per capita)	2009	725/0.1	
Energy consumption per capita (kilograms oil equivalent)	2009	18.0	UNSD estimate.
Rainfall in the capital city, total mean (millimetres)		951	
Temperature in the capital city, mean °C (minimum and maximum)		15.7/26.9	

The total renewable water sources span 9.5 cubic kilometres.

52.4% of total installed electrical capacity is generated from fossil fuels; 47.2% of total installed electrical capacity is generated from hydroelectric plants and 0.4% of total installed electrical capacity is generated from other renewable sources.

The international environmental agreements that Rwanda has signed and ratified include those related to biodiversity, climate change through the Kyoto Protocol, desertification, endangered species, hazardous wastes, ozone layer protection and wetlands. Cognisant that Rwanda is currently highly vulnerable to climate change as it is strongly reliant on rain-fed agriculture both for rural livelihoods and exports of tea and coffee and that it depends on hydropower for half of its electricity generation, through a collaborative effort coordinated by the Ministry of Natural Resources, the “Rwanda National Strategy on Climate Change and Low Carbon Development” was developed over a period of nine months from November 2010 to July 2011.

Within the national strategy, the Green Growth and Climate Resilience strategy highlights the need for carbon compatible development (Government of Rwanda, 2011:xiv).

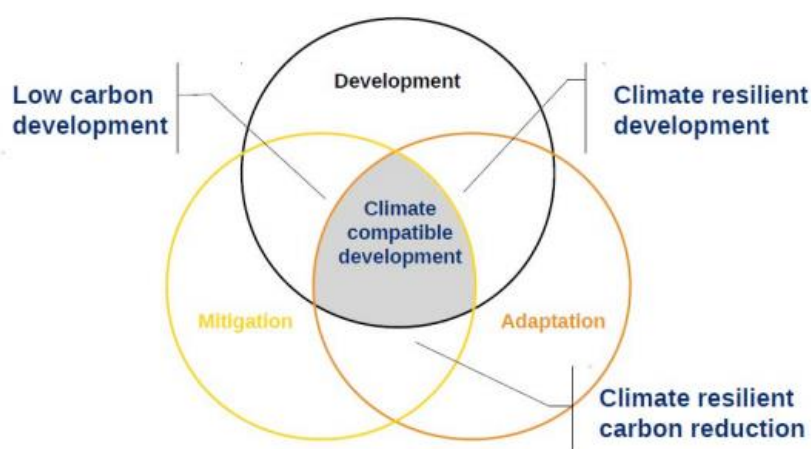


Figure 5. Carbon compatible development strategy in Rwanda (Government of Rwanda, 2011)

The Green Growth and Climate Resilience strategy also highlights the role of the built environment (Government of Rwanda, 2011:21) in programmes of action such as integrated water resource management and planning, sustainable land use management and planning, low carbon mix of power generation for national grid, efficient resilient transport systems and low carbon urban settlements (Figure 6).

Programmes of Action	Sectors											
	Agriculture	Water	Land	Built Environment	Transport	Forestry	Mining	Energy	Industry	Health	Education	Local Government
1. Sustainable intensification of small scale farming	✓	✓	✓			✓					✓	✓
2. Agricultural diversity for local and export markets	✓	✓	✓		✓			✓	✓		✓	✓
3. Integrated Water Resource Management and Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Sustainable Land Use Management and Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
5. Low carbon mix of power generation for national grid		✓	✓	✓				✓	✓	✓	✓	✓
6. Sustainable small-scale energy installations in rural areas	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
7. Green industry and private sector investment	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
8. Climate compatible mining		✓	✓		✓		✓	✓	✓		✓	✓
9. Efficient resilient transport systems	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
10. Low carbon urban settlements		✓	✓	✓	✓			✓	✓	✓	✓	✓
11. Ecotourism, Conservation and PES Promotion	✓	✓	✓			✓		✓	✓	✓	✓	✓
12. Sustainable forestry, agroforestry and biomass energy	✓	✓	✓			✓		✓	✓	✓	✓	✓
13. Disaster Management and Disease Prevention	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14. Climate data and projections	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Figure 6. Sectors involved in the Rwanda National Strategy on Climate Change and Low Carbon Development programmes of action (Government of Rwanda, 2011)

The “Rwanda National Strategy on Climate Change and Low Carbon Development”, which builds on Rwanda Vision 2020, is available from REMA under the National Climate Change and Low Carbon Development Strategy (NCCLCDS) documents portal:

http://rema.gov.rw/index.php?option=com_content&view=category&layout=blog&id=194&Itemid=174&lang=en




As the property industry is well-placed to deliver significant long-term environmental improvements using a broad range of measures, professionals in Rwanda are in the process of developing a Green Building Council of Rwanda (GBCR) which the prospective founding board members of the GBCR intend to register at a Prospective Membership Level with the World Green Building Council.

Applying Green Star SA Credit by Credit

The Green Star SA v1 rating tools, namely Office, Retail Centre, Multi Unit Residential, Public and Education Building (PEB), have been assessed for relevance on a credit by credit basis. Each credit's applicability to the Rwandan 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 Rwandan context.
	The credit should be omitted and made 'not applicable' for the Rwandan application of the tool.

Each credit discussion also has the following:

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

Rwandan projects would also be required to use the latest Green Star SA Technical Clarifications (TCs), Credit Interpretation Requests (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 Rwanda that the category weighting system should remain the same as that of the Green Star SA rating tools, until such a time as the GBCR has the capacity to facilitate a detailed review and justification of the category environmental weighting system.

MANAGEMENT

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p>MAN-1: Green Star SA Accredited Professional 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 GBCR 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 Accredited Professional (AP) course scheduled in Rwanda for 2014, it is probable that Green Star SA courses can be given in Rwanda by the GBCSA, as has been done elsewhere in Africa.</p> <p>However it was noted by the professionals at the workshop that until such a time that the mandatory Green Star SA AP course is hosted in Rwanda, professional teams who are not based in South Africa would be penalised.</p> <p>Therefore, to allow the opportunity for a Green Star SA AP course to be offered in Rwanda, as was done in South Africa, it is recommended that an adaptation of the technical clarification MAN1-T-OB1-0030 Timing of Design Phase should be made stating that:</p> <p>"If the schematic design phase of the project was begun prior to 1 January, 2015, this credit may be marked 'Not Applicable' and be excluded from the points available, used to calculate the Management Category Score. Type 'na' in the No. of Points Achieved column."</p> <p>References</p> <p>For further information about the Green Star SA Technical Clarification MAN1-T-OB1-0030 Timing of Design Phase:</p> <p>http://old.gbcsa.org.za/greenstar/tech_results.php?a=credit&type=1&credit=2</p>	<p>It was noted by the professionals at the workshop, that until such a time that the mandatory Green Star SA AP course is offered in Rwanda, professional teams who are not based in South Africa would be penalised.</p> <p>Therefore, to allow the opportunity for a Green Star SA AP course to be offered in Rwanda, as was done in South Africa, it is recommended that an adaptation of the technical clarification MAN1-T-OB1-0030 Timing of Design Phase should be made for Rwanda stating that:</p> <p>"If the schematic design phase of the project was begun prior to 1 January, 2015, this credit may be marked 'Not Applicable' and be excluded from the points available, used to calculate the Management Category Score. Type 'na' in the No. of Points Achieved column."</p>
<p>MAN-2: Commissioning Clauses 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>MAN-2 should be kept in its current form and no adjustments need to be made.</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&R and related human factors. This makes ASHRAE a suitable alternative 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, Rwanda does not legislatively adhere to CIBSE and ASHRAE commissioning codes as standard practice, such that 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 in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	
<p><u>MAN-3: Building Tuning</u> 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 Rwanda.</p> <p>There is, however, a 6-12 month defects liability period that the contractors and sub-contractors would need to adhere to. During this period consultants and contractors must 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.</p> <p>As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAN-3 should be kept in its current form and no adjustments need to be made.
<p><u>MAN-4: Independent Commissioning Agent</u> 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>	MAN-4 should be kept in its current form and no adjustments need to be made.

	<p>None of the professionals present at the workshop were aware of anyone providing independent commissioning services in Rwanda. However, as an independent experienced Rwandan contactor could be appointed to fulfil this role, it was agreed that achieving this credit would be possible in the Rwandan context and that the credit is relevant in its current form.</p>	
<p>MAN-5: Building User's Guide 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 Rwanda 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>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 Rwanda as it is in South Africa.</p>	MAN-5 should be kept in its current form and no adjustments need to be made.
<p>MAN-6: Environmental Management 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>REMA Environmental Management Plan</p> <p>Rwanda Environment Management Authority (REMA) is a non-sectorial institution mandated to facilitate coordination and oversight of the implementation of national environmental policy and the subsequent legislation. REMA has a key role to play towards the achievement of the national goal of sustainable development as set in out in the National Development Vision 2020. Mandates, roles and functions of REMA are clearly stipulated in the Law No 16/2006 of 03/04/2006.</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 & 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).

At present, EMPs are provided on projects where REMA requires projects to submit their development plan and environmental management plan before being issued their environmental impact assessment.

Standards used in Rwanda for Environmental Management Systems are:

- RS ISO 14001:2004 Environmental management systems— Specification for guidance for use
- RS ISO 14004: 2004 Environmental management systems - General guidelines on principles, systems and supporting techniques
- RS ISO 14015:2004 Environmental management systems - Environment Assessment of Sites and Organisations (EASO)
- RS ISO 14050:2004 Environmental management systems— Vocabularies
- RS 447:2009 ISO 15392:2008 Sustainability in building construction — General principles

It is advised, therefore, that in compiling the EMPs as required by REMA, the professional team could include the additional information to meet Section 3 of the New South Wales (NSW) Environmental Management Systems Guidelines checklist requirements of this credit.

BREEAM Environmental Management Plan

In projects where Rwandan professionals tend to 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'.

As this Environmental Checklist, however, is less comprehensive than the NSW checklist, it is advised that the EMPs as required by BREEAM could be 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>Provincial Government of the Western Cape Environmental Management Plan</p> <p>In projects where Rwandan professionals tend to 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) – refer to Table Man-6.1 of the Additional Guidance in the “Green Star SA Public & Education Building v1” First Edition rating tool published in March 2013.</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 & Education 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>ISO14001 accreditation</p> <p>Although it was noted that there are currently no ISO14001 certified contractors in Rwanda, 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 Rwanda 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 & Education Building v1 rating tool published in March 2013.</p> <p>References</p> <p>For further information about the local standards of Rwanda with regards to environmental management in building construction, refer to:</p> <ul style="list-style-type: none"> • Rwanda Environment Management System: http://www.rema.gov.rw/ 	
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	<ul style="list-style-type: none"> • RS ISO 14001:2004 Environmental management systems— Specification for guidance for use • RS ISO 14004: 2004 Environmental management systems - General guidelines on principles, systems and supporting techniques • RS ISO 14015:2004 Environmental management systems - Environment assessment of sites and organisations (EASO) • RS ISO 14050:2004 Environmental management systems— Vocabularies • RS 447:2009 ISO 15392:2008 Sustainability in building construction — General principles 	
<p><u>MAN-7: Waste Management</u></p> <p>To encourage and recognise management practices that minimise the amount of construction waste going to disposal.</p>	<p>At present, although waste management processes are followed on some projects in Rwanda, the market for the recycling of demolition and construction waste in Rwanda is still developing.</p> <p>In spite of this, it is believed that a waste management programme could be instated for projects in Rwanda to reuse or recycle at least 30%, 50% or 70% (by mass) of all demolition and construction waste.</p> <p>As waste recycling is environmentally beneficial and can serve as an income source for contractors, this credit will encourage the development and growth of these facilities in the country.</p> <p>Therefore, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAN-7 should be kept in its current form and no adjustments need to be made.
<p><u>MAN-8: Airtightness Testing</u></p> <p>To encourage and recognise measures to reduce uncontrolled air leakage in buildings, and reward the testing and achievement of good air tightness testing levels.</p>	<p>The professionals at the workshop indicated that they were not aware of any air tightness tests conducted on buildings in Rwanda. 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>The credit however encourages construction quality as buildings are designed and constructed to minimise infiltration. While the design must ensure that sufficient fresh air is provided by ventilation, in a well-constructed tight building, fresh air enters through controllable ventilation openings and in naturally ventilated buildings or through mechanical ventilation plants in mechanically ventilated buildings.</p> <p>As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAN-8 should be kept in its current form and no adjustments need to be made.

<p><u>MAN-9: Waste Recycling Management Plan – RETAIL CENTRE</u></p> <p>To encourage and recognise management systems and building infrastructure that facilitate the reduction of the overall operational waste generation and disposal.</p>	<p>Professional teams are to refer to the discussion in this report on the management of recyclable waste in MAN-7 with regards to the market for waste recycling in Rwanda.</p> <p>It is believed that through the development of management systems that facilitate the reduction of the overall operational waste generation and disposal, this credit will encourage the development and growth of these facilities in retail centres in the country.</p> <p>The professionals at the workshop also highlighted Law N°57/2008 of 10/09/2008 relating to the prohibition of manufacturing, importation, use and sale of polythene bags in Rwanda. In this Law, a “polythene bag” is a synthetic industrial product with a low density composed of numerous chemical molecules ethene with a chemical formula; (CH₂=CH₂). In most cases the bag is used in packaging of various products. To comply with the credit criteria, all waste recycling management plans should ensure that no polyethylene bags are used to transfer or dispose the overall operational waste.</p> <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>MAN-9 should be kept in its current form and no adjustments need to be made.</p>
<p><u>MAN-10: Building Management System – RETAIL CENTRE & PEB</u></p> <p>To encourage and recognise the incorporation of Building Management Systems to actively control and 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.</p> <p>However on smaller projects where a single BMS system is not appropriate there is still a benefit in installing smaller separate control systems that are linked to a central location to enable effective monitoring and control by the building facilities management team.</p> <p>Although BMS’s are not commonly installed in retail centres, public and education buildings in Rwanda, 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.</p> <p>As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>MAN-10 should be kept in its current form and no adjustments need to be made.</p>
<p><u>MAN-11: Green Lease - RETAIL CENTRE</u></p> <p>To encourage and recognise initiatives taken by the</p>	<p>Through the establishment of a contractually-binding tenancy lease agreement that requires the tenants of a retail centre to participate in the</p>	<p>MAN-11 should be kept in its current form and no adjustments</p>

<p>building owner to encourage improved environmental behaviour by tenants of the retail centre</p>	<p>following environmental initiatives:</p> <ul style="list-style-type: none"> • Electrical energy monitoring and reporting (minimum quarterly) and have submitted an energy management plan at the beginning of each year; • Water monitoring and reporting (minimum quarterly) and have submitted a water management plan at the beginning of each year; • Waste reduction/recycling monitoring and reporting (minimum quarterly) and have submitted a waste management plan at the beginning of each year; • The preparation of a procurement policy at the beginning of each year regarding the use of environmentally friendly consumables (cleaning products, toiletry products, paper and plastic consumable products) <p>The building owner is required to report back to the tenants on the buildings' performance relating to energy, water, waste and procurement policies on an annual basis, market transformation within retail centres in Rwanda would occur through this credit.</p> <p>The professionals at the workshop were not aware of a contractually-binding green lease having been implemented in projects in Rwanda. The professionals however believed that it would be a great sustainability initiative.</p> <p>With regards to waste reduction/recycling monitoring and the preparation of a procurement policy and environmentally friendly consumables, the professionals at the workshop also highlighted Law N°57/2008 of 10/09/2008 relating to the prohibition of manufacturing, importation, use and sale of polythene bags in Rwanda. In this Law, a "polythene bag" is a synthetic industrial product with a low density composed of numerous chemical molecules ethene with a chemical formula; (CH₂=CH₂). In most cases the bag is used in packaging of various products. To comply with the credit criteria, the green lease should ensure that no polythene bags are used to transfer or dispose the overall operational waste,</p> <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>need to be made.</p>
<p>MAN-12: Common Property Rules – MULTI UNIT RES To encourage and recognise developers who embed legal and contractual environmental management initiatives within the formal management structures of</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</p>	<p>MAN-12 should be kept in its current form and no adjustments need to be made.</p>

the development.	<p>developments.</p> <p>The professionals at the workshop were not aware of developers implementing common property rules in projects in Rwanda.</p> <p>This credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	
<p><u>MAN-13: Learning Resources - PEB</u></p> <p>To encourage and recognise sustainability initiatives implemented in the development as learning resources for building users and visitors.</p>	<p>This credit has been developed to educate building occupants on how the sustainability initiatives implemented in the building work, and the associated environmental benefits of these initiatives.</p> <p>Making sustainable building initiatives and features visible and interactive can provide a valuable education and learning opportunity for building users to develop awareness about the building's impacts on the natural environment and resources. By incorporating important concepts such as energy, water and material efficiency, public and education buildings can become interactive learning tools in public and education buildings. Where BMSs are already installed, achieving the credit criteria is deemed as feasible.</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.</p> <p>As such, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAN-13 should be kept in its current form and no adjustments need to be made.
<p><u>MAN-14: Life Cycle Costing - PEB</u></p> <p>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>	MAN-14 should be kept in its current form and no adjustments need to be made.

	<p>The professionals noted that the word 'cost' for the purpose of achieving this credit criteria was ambiguous and it is advised that, where professional teams are uncertain about the definition of terms used in the credit criteria, a Technical Clarification should be submitted for additional clarification.</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 Rwanda as it is in South Africa.</p>	
<p><u>MAN-15: Maintainability - PEB</u> To encourage and recognise building design that facilitates on-going maintenance, and minimises the need for on-going building maintenance throughout a building's lifecycle.</p>	<p>Public buildings can be complex structures with a variety of attributes which require a significant amount of maintenance. The design of these types of buildings should reflect the need for such maintenance by providing suitable access to facilities managers.</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 Rwanda 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>IEQ-01: Ventilation Rates To encourage and recognise designs that provide ample amounts of outside air to counteract build-up of indoor pollutants.</p>	<p>There are no minimum permissible ventilation rate requirements legislated by the current Rwandan building code standards.</p> <p>Naturally ventilated spaces</p> <p>The professionals at the workshop indicated that while natural ventilation is used for most buildings in Rwanda, no requirements are stated for the minimum percentage, positions, arrangement and size of openable area.</p> <p>Therefore, the professional teams would need to demonstrate that 95% of the useable area (UA) is naturally ventilated in accordance with SANS 10400-O (minimum 5% openable area).</p> <p>Mechanically assisted naturally ventilated spaces</p> <p>It was noted by the professionals at the workshop that, owing to the temperate equatorial climate experienced throughout the year, most buildings in Rwanda use natural ventilation or mechanically-assisted natural ventilation (MANV) to ventilate the nominated area.</p> <p>MANV systems are defined as those “systems that rely, partially or fully, on fans to move natural (non-contaminated) air through the space” (GBCA v3).</p> <p>For the purpose of this credit, should MANV be used to ventilate the nominated area, it is recommended that the MANV spaces comply with the “mechanically ventilated spaces” credit criteria as described in the respective Green Star SA technical manual. This is the recommended approach prescribed for MANV and ventilation rates in Green Star Office v3 in Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-1 is kept in its current form and no adjustments need to be made.</p>	<p>It was noted by the professionals at the workshop that, owing to the temperate equatorial climate experienced throughout the year, most buildings in Rwanda use natural ventilation or mechanically-assisted natural ventilation (MANV) to ventilate the nominated area.</p> <p>MANV systems are defined as those “systems that rely, partially or fully, on fans to move natural (non-contaminated) air through the space” (GBCA v3).</p> <p>Should MANV be used to ventilate the nominated area, it is recommended that the MANV spaces comply with the credit criteria for “mechanically ventilated spaces” as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and ventilation rates in Green Star Australia. A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-1 is kept in its current form and no adjustments need to be made.</p>

	<p>IEQ-2: Air Change Effectiveness 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. There are a number of ways of achieving this credit which do not require any skills outside of a mechanical engineer's expertise in Rwanda.</p> <p>As in South Africa, it may be a challenge to prove compliance using Computational Fluid Dynamics (CFD) modelling skills, required in cases where displacement ventilation has not been adopted in Rwanda.</p> <p>Nevertheless, the credit in its current form is equally relevant and applicable in Rwanda 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>IEQ-3: Carbon Dioxide Monitoring and Control To encourage and recognise the provision of response monitoring of Carbon Dioxide levels to ensure delivery of optimum quantities of outside air.</p>	<p>For IEQ-3, professional teams are to refer to the discussion in this report on ventilation rates in IEQ-1 with regards to the reference set points (in parts-per-million).</p> <p>The professionals at the workshop indicated that they were not aware of any buildings in Rwanda which currently monitored carbon dioxide levels in office spaces. They did however understand how such a system would work and such expertise would be available in Rwanda.</p> <p>Mechanically assisted naturally ventilated spaces</p> <p>Should MANV be used to ventilate the nominated area, it is recommended that the MANV spaces comply with the credit criteria for "mechanically ventilated spaces" as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and carbon dioxide monitoring and control in Green Star Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-3 is kept in its current form and no adjustments need to be made.</p>	<p>Should MANV be used to ventilate the nominated area, it is recommended that the MANV spaces comply with the credit criteria for "mechanically ventilated spaces" as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and carbon dioxide monitoring and control in Green Star Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-3 is kept in its current form and no adjustments need to be made.</p>

<p><u>IEQ-4: Daylight</u> 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 to contribute to a more productive and healthy indoor environment quality.</p> <p>IEQ-4 is not region specific, therefore the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>IEQ-4 should be kept in its current form and no adjustments need to be made.</p>
<p><u>IEQ-5: Daylight Glare Control</u> To encourage and recognise buildings that are designed to reduce the discomfort of glare from natural light.</p>	<p>Glare can easily be controlled through louvers, blinds or types of glass. This should be considered good practice in Rwanda as it is in South Africa.</p> <p>It is important to note Technical Clarification IEQ5-T-OB1-612 Solid opaque blinds which states that:</p> <p>“The GBCSA confirm that for the purposes of proving compliance with the IEQ-5 Daylight Glare Control credit, solid (not perforated or woven) opaque blinds such as solid metallic or solid timber blinds can be assumed to have a VLT of < 10%. Confirmation from the manufacturer or manufacturers’ datasheets detailing the nature of the material component must be provided in the submission however and this assumption clearly stated referencing this Technical Clarification.</p> <p>Similarly, in most instances ‘block-out’ fabric blinds will also have a VLT < 10%. For ‘block-out’ fabric blinds, where the VLT of the material is not known, project teams can confirm through Technical Clarification (TC) that the material composition is similar in nature to another fabric with a known VLT < 10%. Confirmation from the manufacturer or manufacturers’ datasheets detailing the nature of the material component must be provided within the TC submitted.”</p> <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>IEQ-5 should be kept in its current form and no adjustments need to be made.</p>
<p><u>IEQ-6: High Frequency Ballasts</u> 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 Rwandan context.</p>	<p>IEQ-6 should be kept in its current form and no adjustments need to be made.</p>
<p><u>IEQ-7: Electric Lighting Levels</u> To encourage and recognise base building provided office lighting that is not over designed.</p>	<p>There are no minimum electric lighting level requirements legislated by the current Rwandan building code standards.</p> <p>Lighting luminance levels are an important factor in determining occupant wellbeing and health in an office. Lighting that is too dim or too bright can</p>	<p>IEQ-7 should be kept in its current form and no adjustments need to be made.</p>

	cause discomfort and strain for office occupants, therefore the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa	
IEQ-8: External Views To encourage and recognise designs that provide occupants with a visual connection to the external environment.	<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>Therefore, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	IEQ-8 should be kept in its current form and no adjustments need to be made.
IEQ-9: Thermal Comfort To encourage and recognise buildings that achieve a high level of thermal comfort.	<p>Should MANV be used to achieve thermal comfort in the nominated area, it is recommended that the MANV spaces comply with the credit criteria for “naturally ventilated spaces” as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and thermal comfort in Green Star Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-9 should be kept in its current form and no adjustments need to be made.</p>	<p>Should MANV be used to achieve thermal comfort in the nominated area, it is recommended that the MANV spaces comply with the credit criteria for “naturally ventilated spaces” as described in the applicable Green Star SA technical manual. This is the recommended approach prescribed for MANV and thermal comfort in Green Star Australia.</p> <p>A mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p> <p>For naturally ventilated, mechanically ventilated and mixed mode spaces, IEQ-9 should be kept in its current form and no adjustments need to be made.</p>
IEQ-10: Individual Comfort Control To encourage and recognise designs that facilitate individual control of thermal comfort.	<p>Most projects in Rwanda do not provide individual thermal comfort control every 30m2 owing to the cost limitations of the user controls. However, if one negates the impacts of costs, 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 Rwanda</p>	IEQ-10 should be kept in its current form and no adjustments need to be made.

	as it is in South Africa.	
IEQ-11: Hazardous Materials To encourage and recognise actions taken to reduce health risks to occupants from the presence of hazardous materials.	<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&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 Rwanda.</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&S) should be used.</p>
IEQ-12: Internal Noise Levels To encourage and recognise buildings that are designed to maintain internal noise levels at an appropriate level.	<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 internal noise levels in Rwanda.</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 Rwanda as it is in South Africa</p>	IEQ-12 should be kept in its current form and no adjustments need to be made.
IEQ-13: Volatile Organic Compounds To encourage and recognise specification of interior finishes that minimise the contribution and levels of volatile organic compounds (VOCs) in buildings.	<p>The professionals at the workshop were aware of the need to use paints, adhesives, sealants and carpets with reduced volatile organic compounds.</p> <p>They however noted that the suppliers of the products seldom included these values in their manufacturer data sheets and that there was no regulatory body, standards bureau or registered laboratory that measured these values that they were aware of.</p> <p>Many paint, adhesives, sealants and carpet products are imported to Rwanda by both international and local suppliers, which makes the credit well placed to effect market transformation.</p>	IEQ-13 should be kept in its current form and no adjustments need to be made.

	Low VOC products can therefore be specified to be imported into Rwanda - therefore, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.	
IEQ-14: Formaldehyde Minimisation To encourage and recognise the specification of products with low formaldehyde emission levels.	<p>The professionals at the workshop were aware of the need to use composite wood products (including exposed and concealed applications) with low or no formaldehyde emissions.</p> <p>They however noted that the suppliers of the products seldom included these values in their manufacturer data sheets and that there was no regulatory body, standards bureau or NATA or ISO/IEC 17025 registered laboratory that there were aware of.</p> <p>While some of the composite wood products are local to Rwanda, the balance of the composite wood products are imported, which makes the credit well placed to effect market transformation.</p> <p>Products with low or no formaldehyde emissions can therefore be specified. This credit in its current form is therefore equally relevant and applicable in Rwanda as it is in South Africa.</p>	IEQ-14 should be kept in its current form and no adjustments need to be made.
IEQ-15: Mould Prevention To encourage and recognise the design of services that eliminate the risk of mould growth and its associated detrimental impact on occupant health.	<p>The aim of the credit is 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>Therefore, in order to comply with the credit criteria, one point is awarded where the building is fully naturally ventilated or the mechanically air conditioned ventilation system maintains humidity levels at no more than 60% relative humidity in the space and no more than 80% relative humidity in the supply ductwork.</p> <p>As the professionals at the workshop noted that some of the buildings in Rwanda use Mechanically Assisted Natural Ventilation (MANV) systems to ventilate the spaces, should the mechanically assisted natural ventilated spaces nominated not be designed to meet the requirements of SANS10400-O, it should be clearly demonstrated that the MANV system maintains humidity levels at no more than 60% relative humidity in the space and no more than 80% relative humidity in the supply ductwork (where applicable).</p> <p>Therefore, for MANV spaces, a mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p>	<p>IEQ-15 should remain in its current format and no adjustments of the credit criteria need to be made.</p> <p>For mechanically assisted naturally ventilated spaces, a mandatory CIR would need to be submitted to the GBCSA to confirm compliance with the credit criteria.</p>

<p><u>IEQ-16: Tenant Exhaust Riser</u> 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 Rwanda as it is in South Africa.</p>	<p>IEQ-16 should be kept in its current form and no adjustments need to be made.</p>
<p><u>IEQ-17: Environmental Tobacco Smoke (ETS) Avoidance</u> To encourage and recognise the air quality benefits to occupants by prohibiting smoking inside the building.</p>	<p>The professionals at the workshop noted that smoking indoors is prohibited in public buildings. This however does not extend to all building types within Rwanda.</p> <p>Tobacco smoke is unhealthy for human beings when inhaled. This credit can be easily achieved and is an important factor for occupant well-being.</p> <p>As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>IEQ-17 should be kept in its current form and no adjustments need to be made.</p>
<p><u>IEQ-18: Places of Respite and Connection to Nature – RETAIL CENTRE</u> 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.</p> <p>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-1.</p> <p>This can be achieved within the Rwandan context and, with the minor changes recommended for IEQ-1, the credit in its current form is equally relevant and applicable in Rwanda 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><u>IEQ-19: Private Outdoor Space - MULTI UNIT RES</u> 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 Rwandan context. The credit in its</p>	<p>IEQ-19 should be kept in its current form and no adjustments need to be made.</p>

	current form is equally relevant and applicable in Rwanda as it is in South Africa.	
IEQ-22: Universal Access - MULTI UNIT RES To recognize design that provides universal access, to and within dwellings, to meet the changing needs of occupants.	<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 Rwanda 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>References</p> <p>For further information about the local standards of Rwanda with regards to universal access, refer to:</p> <ul style="list-style-type: none"> • RS 492:2011 Building construction – Design of facilities for disabled people – Code of practice 	The current building code standards used in Rwanda 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.
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.	<p>Lifts in multi storey buildings is often the main form of vertical transport. This can largely be attributed to the fact that stairs are 'hidden' away and used for emergencies only. By making stairs more prominent their use could be more attractive with added health benefits as a result.</p> <p>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 Rwandan context.</p> <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	IEQ-23 should be kept in its current form and no adjustments need to be made.

ENERGY

AIM OF CREDIT	DISCUSSION	RECOMMENDATION														
<p>ENE-: Conditional Requirement</p> <p>To encourage and recognise designs that minimise the greenhouse gas emissions associated with operational energy consumption, and maximise potential operational energy efficiency of the base building.</p>	<p>There are no energy efficiency requirements legislated by the current Rwandan 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 Rwanda seeking Green Star SA-Rwanda 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 criteria would need to be addressed and the equivalent, or more stringent, attributes clearly demonstrated:</p> <table><tr><th>Section</th><th>Criteria to be addressed</th></tr><tr><td>Section 4.1: Model Notional SANS204 Building</td><td>Title</td></tr><tr><td>Section 4.1: Model Notional SANS204 Building</td><td>“generally as defined by SANS 204-3:2008 ... deemed to comply clauses”</td></tr><tr><td>Section 5.1: General modelling parameters</td><td>N/A</td></tr><tr><td>Section 5.2: Building Envelope</td><td>“Fabric based on SANS204-3”</td></tr><tr><td>Section 5.2: Building Envelope</td><td>“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>Section 5.3: Internal Design Criteria</td><td>“Notional SANS 204 building”</td></tr></table>	Section	Criteria to be addressed	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”	<p>ENE- 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 & 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>
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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 1.2kgCO ² /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.

<p><u>ENE-1: Greenhouse Gas Emissions</u> To encourage and recognise designs that minimise the greenhouse gas emissions associated with operational energy consumption.</p>	<p>See above (ENE-). Routes 1, 2 and 3 specify the reduction of energy consumption in 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 Rwanda 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>Note that for naturally ventilated and mechanically-assisted naturally ventilated (MANV) spaces, project teams are to submit a natural ventilation report as highlighted in the Documentation Requirements.</p> <p>The natural ventilation report describes how the building has been designed to be naturally ventilated and confirms that analysis has been carried out to check that internal conditions will be acceptable to the occupants. This is to avoid rewarding buildings which will overheat or be uncomfortable and require air conditioning to be retrofitted.</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 & 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>For naturally ventilated and mechanically-assisted naturally ventilated (MANV) spaces, project teams are to submit a natural ventilation report as highlighted in the Documentation Requirements.</p> <p>The natural ventilation report describes how the building has been designed to be naturally ventilated and confirms that analysis has been carried out to check that internal conditions will be acceptable to the occupants. This is to avoid rewarding buildings which will overheat or be uncomfortable and require air conditioning to be retrofitted. Reference must be made to the Documentation Requirements for ENE-1.</p>
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<p><u>ENE-2: Energy Sub-metering</u> 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 Rwanda.</p> <p>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 Rwanda 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><u>ENE-3: Lighting Power Density</u> 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 Rwanda could be as low as 8W/m² for office plates.</p> <p>Whilst most lighting was designed to 15W/m², lower levels are achievable using currently available technology.</p> <p>The credit in its current form is equally relevant and applicable in Rwanda 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><u>ENE-4: Lighting Zoning</u> 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 Rwanda, but not practised widely enough. Lighting zoning for spaces of no more than 100m² in size is not commonly practiced but can be easily achieved. The credit in its current form is equally relevant and applicable in Rwanda 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><u>ENE-5: Peak Energy Demand Reduction / ENE-5 Maximum Electrical Demand Reduction - PEB</u> To encourage and recognise designs that reduce peak demand on energy supply infrastructure.</p>	<p>Running on stand-by generation is common in Rwanda such that a large majority of buildings are supplied by electricity from stand-by generation. As such, Rwandans 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"> (1) Load lopping cannot be used. (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. <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>ENE-5 / ENE-5 (PEB) should be kept in its current form and no adjustments need to be made.</p>

<p><u>ENE-6: Thermal Energy Sub-Metering – RETAIL CENTRE</u> 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 Rwanda. Most retail buildings meter energy consumption per tenant and not all substantive thermal energy uses where flow temperature, return temperature and mass flow rate are measured.</p> <p>This credit should therefore remain to encourage responsible thermal energy monitoring. The credit in its current form is equally relevant and applicable in Rwanda 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><u>ENE-7: Hot Water Energy Use - MULTI UNIT RES</u> 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 Rwanda 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 Rwanda. This would be project-specific and a mandatory CIR would need to be submitted to confirm applicability.</p>	<p>For ENE-7, the Green Star SA Multi Unit Residential v1 Hot Water Calculator would need to be adapted to reflect the relevant fuel factors in Rwanda. This would be project-specific and a mandatory CIR would need to be submitted to confirm applicability.</p>
<p><u>ENE-8: Common Property Energy Use - MULTI UNIT RES</u> 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 Rwanda 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 Rwanda 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 Rwanda 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><u>ENE-9: Low Emission Energy Generation - MULTI UNIT RES</u> 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 Rwanda, the potential exists for co-generation or tri-generation to encourage systems utilising renewable or low emission energy sources.</p>	<p>ENE-9 should be kept in its current form and no adjustments need to be made.</p>

	Up to four points can be achieved in the Rwandan context, such that the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.	
<u>ENE-10: Energy Efficient Appliances - MULTI UNIT RES</u> To encourage and recognise initiatives which reduce energy consumption associated with major appliances.	<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 Rwanda 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 Rwanda as it is in South Africa.</p>	ENE-10 should be kept in its current form and no adjustments need to be made.
<u>ENE-11: Unoccupied Spaces - PEB</u> To encourage and recognise designs that minimise or eliminate energy use for spaces when unoccupied.	<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 Rwanda 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 Rwanda as it is in South Africa.</p>	The current building code standard used in Rwanda 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.

TRANSPORT

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><u>TRA-1: Provision of Car Parking</u> 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 Rwanda, this credit would refer to the Rwandan local, provincial or national authority planning allowances for car parking spaces.</p> <p>However, for projects where such guidelines are not available, the technical manual refers to a set of 'alternative requirements' in the Additional Guidance:</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"> Clearly demonstrate that car parking is not provided in excess of one car parking space per 100m² of net lettable area (NLA) to achieve one point or one parking space per 200 m² to achieve two points; or Submit a CIR to substantiate an argument for equivalent yet alternative compliance with the Credit Criteria. <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 kept in its current form, with an adaptation to refer to the Rwandan 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><u>TRA-2: Fuel-Efficient Transport</u> 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 Rwanda. 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 Rwanda 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><u>TRA-3: Cyclist Facilities</u> 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 Rwanda 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 Rwanda as it is in South Africa.</p>	<p>TRA-3 should remain in its current form and no adjustments need to be made.</p>

TRA-4: Commuting Mass Transport

To encourage and recognise developments that facilitate the use of mass transport for work commuting.

Up to five points are awarded for the TRA-4 credit, where the number of points achieved is based on the results of the assessment in the Mass Transport Calculator. The Calculator produces a Mass Transport Calculator Score that is compared to a benchmark matrix. For each point to be awarded in the Tra-4 'Commuting Mass Transport' credit, a certain level of Transport Calculator Score is required. This score varies with the location of the building project, where the score required to achieve points in the Tra-4 'Commuting Mass Transport' credit depends on the population density of the location of the building (GBCA, 2013:11).

The first recommendation therefore, so as not to penalise projects pursuing a Green Star SA rating in Rwanda, would be to adapt the Commuting Mass Transport calculator to reflect the population density of the location of the building:

The population density in Johannesburg, the largest city in South Africa, is 2 900/km² from a census conducted in 2011. While the population density in Kigali, the largest city in Rwanda is 1600/km² from a census conducted in 2012. It should not be expected that the frequency of commuting mass transport services in both Johannesburg and Kigali based on the above population density would be the same. While it could be argued that the calculator is not currently adapted for cities in South Africa that, too, have a similarly low population density – it is noted that there would be no environmental benefit to having a high frequency of underutilised commuting mass transport services and it is recommended that projects are not rewarded for that.

The second recommendation would be to adapt the Mass Transport calculator to reflect the type of public transport services that is specific to the local context of a country:

While predefining the types of mass transport is encouraged to effect market transformation, simply neglecting the mass transport provisions in the country would be deemed as an oversight in inclusively recognising the use of mass transport that meets the aim of the credit. It would, for instance, disadvantage a country if "trams" were to be considered in the Mass Transport calculator for a country that does not have trams.

It is therefore noted that the mass transport provisions in Rwanda are only:

- Contracted busses and midi busses: The type, distance and

It is recommended that the Mass Transport calculator is adapted by the project via a CIR to reflect the population density and type of commuting mass transport specific to the context of Rwanda.

This will require a mandatory CIR, that addresses the public transport facilities available in the relevant context of the project, regardless of size of population of the area.

	<p>frequency of this contracted transport is determined by the Ministry of Infrastructure in Rwanda.</p> <ul style="list-style-type: none"> Uncontracted registered commercial licensed taxi “motos”: These registered commercial motorbikes are registered with the Ministry of Infrastructure of Rwanda “to operate as a public transport mode” (Ministry of Infrastructure, 2012:56). The registered commercial licensed taxi “motos” have a designated taxi “moto” rank with a frequency that is higher than that of the contracted busses and midi busses. This is the most commonly used mode of mass transport in Rwanda owing to its frequency, ability to navigate the roads of the country, low maintenance and low carbon emissions. <p>The professionals at the workshop noted that minibuses may only be legally used for mass transport for long distance inter-city trips. Only the busses and midi busses are contracted for intra-city trips.</p> <p>There are currently no railways in Rwanda.</p> <p>From the above considerations, it is therefore recommended that the Mass Transport calculator is adapted to reflect the population density and type of commuting mass transport specific to the context of Rwanda.</p> <p>References</p> <p>For further information about the public transport systems specific to the local context of Rwanda, refer to:</p> <ul style="list-style-type: none"> Republic of Rwanda Ministry of Infrastructure. October 2012. “Public Transport Policy and Strategy for Rwanda”. http://www.mininfra.gov.rw/uploads/media/Public_Transport_Policy_and_strategy_for_Rwanda_02.pdf Rwanda Transport Development Agency, a government institution affiliated to the the Ministry of Infrastructure: http://www.mininfra.gov.rw/index.php?id=140 	
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<p><u>TRA-5: Local Connectivity</u> 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>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 Rwanda 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 Rwanda 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><u>TRA-6: Trip Reduction – Mixed Use – RETAIL CENTRE</u> To encourage & recognise retail centres that are built in mixed use areas in order to reduce the overall number of car trips taken by patrons.</p>	<p>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 Rwanda 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>
<p><u>TRA-7: Vehicle Operating Emissions – RETAIL CENTRE & PEB</u> To encourage & recognise retail centres that reduce vehicular emissions resulting from traffic congestion by upgrading road infrastructure around the centre.</p>	<p>Usually, ‘delay’ and ‘number of stops’ are used to determine the existing, existing plus development and post road improvements operational condition of an intersection. The higher the delay and number of stops the higher the CO² emissions per vehicle will be.</p> <p>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.</p> <p>Car emissions are a major source of air pollutants, such as oxides of nitrogen, particles and ozone. Poor air quality has been shown to</p>	<p>TRA-7 should remain in its current form and no adjustments need to be made.</p>

	<p>aggravate asthma, bronchitis and cardiac problems. Carbon dioxide from vehicle emissions is also known as a contributing factor to global climate change. Road infrastructure improvements are necessary to reduce the traffic impact of the development to acceptable levels.</p> <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa, therefore TRA-7 should be kept in its current form and no adjustments need to be made.</p>	
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WATER

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><u>WAT-1: Occupant Amenity Water / WAT-1: Potable Water – PEB</u></p> <p>To encourage and recognise designs that reduce potable water consumption by building occupants.</p>	<p>Water-efficient fixtures and fittings are available in the market place and have been installed in some buildings in Rwanda.</p> <p>In addition, buildings in Rwanda use rainwater harvesting and blackwater treatment for reuse within the building, typically for irrigation. Due to water supply infrastructure and sanitation regulations, 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 Rwanda as it is in South Africa.</p> <p>However, 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 Rwanda.</p> <p>This would be project-specific and a mandatory CIR would need to be submitted to confirm applicability.</p> <p>References</p> <p>For further information about the rainfall values in the different regions in Rwanda, refer to:</p> <ul style="list-style-type: none"> Rwanda Meteorology Agency: http://www.meteorwanda.gov.rw/ 	<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 Rwanda.</p> <p>WAT-1 should be kept in its current form with a mandatory CIR to confirm applicability.</p>
<p><u>WAT-2: Water Meters</u></p> <p>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 Rwanda.</p> <p>As such, this credit in its current form is equally relevant and applicable in Rwanda 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><u>WAT-3: Landscape Irrigation</u> 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 Rwanda. 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 Rwanda 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><u>WAT-4: Heat Rejection Water</u> To encourage and recognise design that reduces potable water consumption from heat rejection systems.</p>	<p>Most of the buildings in Rwanda are fully naturally ventilated or are served by mechanically assisted naturally ventilated systems.</p> <p>As such, there is little use of water consuming heat rejection systems which use a significant amount of water during their operation. 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 Rwanda as it is in South Africa to encourage and recognise design that reduces potable water consumption from heat rejection systems.</p>	<p>WAT-4 should remain in its current form and no adjustments need to be made.</p>
<p><u>WAT-5: Fire System Water Consumption</u> 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 Rwanda 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><u>WAT-7: Potable Water Efficient Appliances - MULTI UNIT RES</u> 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. 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 Rwandan market. 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 Rwanda 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><u>WAT-8: Swimming Pool / Spa Water Efficiency - MULTI UNIT RES</u></p> <p>To encourage and recognise designs that reduce potable water consumption associated with swimming pools and spas.</p>	<p>Swimming pools lose water through evaporation and also through filter cleaning and backwashing.</p> <p>Therefore, to achieve this credit, for any pool within the multi-unit residential development, a pool blanket is provided; and the pool filtration system avoids the requirement for backwashing (i.e. is not sorptive 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>The professionals at the workshop noted that the applicable provisions could be made where the development had a pool or spa.</p> <p>As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>WAT-8 should remain in its current form and no adjustments need to be made.</p>

MATERIALS

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<u>MAT-1: Recycling Waste Storage</u> To encourage and recognise the inclusion of storage space that facilitates the recycling of resources used within buildings to reduce waste going to disposal.	<p>The professionals at the workshop were not aware of any projects in Rwanda that specifically provided space for recycling waste storage. However some companies did provide waste collection and possible recycling services. Refer to MAN-7 for further information on recycling in Rwanda.</p> <p>Despite the lack of well established companies, it is still recommended that space be provided in sustainable buildings to begin driving the marketplace towards recycling. It is noted that Rwandan building code standard requires an area for refuse disposal but does not refer to a specific space for recycling.</p> <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAT-1 should remain in its current form and no adjustments need to be made.
<u>MAT-2: Building Reuse</u> To encourage and recognise developments that reuse existing buildings to minimise materials consumption.	<p>The professionals at the workshop noted that buildings in Rwanda were often demolished to make way for new buildings. The prevention of this waste that occurs during the demolition of buildings should however be encouraged. As such a reward for the reuse of buildings would be well placed in the Rwandan context. The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAT-2 should remain in its current form and no adjustments need to be made.
<u>MAT-3: Reused Materials</u> To encourage and recognise designs that prolong the useful life of existing products and materials.	<p>Irrespective of region, projects should strive to prolong the useful life of existing products and materials as much as possible. This ensures that the waste generated from the demolition and construction processes of projects is minimal. As such, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	MAT-3 should remain in its current form and no adjustments need to be made.
<u>MAT-4: Shell and Core or Integrated Fit-out</u> To encourage and recognise base building delivery mechanisms that eliminate the need for immediate tenant refits.	<p>The majority of top tier projects in Rwanda 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 that they are typically not provided with carpet.</p> <p>It should be noted that many of the individuals contacted for this research were confused by 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:</p>	MAT-4 should remain in its current form and no adjustments need to be made.

	<p>“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 Rwanda as in South Africa.</p> <p>This credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	
<p><u>MAT-5: Concrete</u> 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 Rwanda which used either industrial waste product(s) or oversized aggregate as a substitute to reduce the absolute quantity of Portland cement, as an average across all concrete mixes (i.e. in-situ, precast and stressed concrete).</p> <p>In addition, they were concerned as to whether either of these concrete mixes could be considered in Rwanda 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 Rwandan market exists for industrial waste product(s) or oversized aggregate to be used in the production of concrete as a feasible alternative to cement.</p> <p>The professionals at the workshop however noted that as Rwanda, however, does not have a significant amount of manufacturing plants and power stations from which to retrieve industrial waste products, the use of volcanic ash could be used as a Portland cement replacement within the standards in Rwanda specified for aggregates from natural sources for use in concrete. Volcanic ash consists of fragments of pulverized rock, minerals and volcanic glass and is not co-fired with hazardous waste.</p> <p>It is recommended, therefore, that the credit should remain in its current form to drive market transformation towards the use of more sustainable concrete. The credit should however be adapted not only to state industrial waste product(s) but the use of volcanic ash as a substitute to reduce the absolute quantity of Portland cement.</p> <p>A mandatory CIR must be submitted by any project wishing to use volcanic ash showing how the same environmental outcome is achieved by using volcanic ash.</p>	<p>MAT-5 should remain in its current form to drive market transformation towards the use of more sustainable concrete.</p> <p>The credit should however be adapted not only to state industrial waste product(s) but the use of volcanic ash as a substitute to reduce the absolute quantity of Portland cement.</p> <p>A mandatory CIR is required by projects who wish to use volcanic ash.</p>

	<p>References</p> <p>For further information about the local standards of Rwanda with regards to concrete, refer to:</p> <ul style="list-style-type: none"> • RS EAS180:2005 Specification for aggregates from natural sources for use in concrete • RS 357-2:2009 EAS 417-2: 2008 Concrete — Part 2: Specification of constituent materials, production of concrete and compliance of concrete • RS 589-1:2012/EAS 131-1:2008 Concrete — Part 1: Specification, performance, production and conformity 	
<p><u>MAT-6: Steel</u></p> <p>To encourage and recognise the reduction in embodied energy and resource depletion associated with reduced use of virgin steel.</p>	<p>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 Rwanda which used recycled steel products.</p> <p>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 Rwanda, 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%.</p> <p>This would encourage the reduction 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 Rwanda as it is in South Africa.</p>	<p>MAT-6 should remain in its current form and no adjustments need to be made.</p>
<p><u>MAT-7: PVC Minimisation</u></p> <p>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-7 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>For MAT-7, it is noted 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 Rwanda.</p> <p>As such, PVC minimisation is still relevant in the Rwandan local</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-7 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 Rwanda.</p> <p>As such, PVC minimisation is still relevant in Rwanda and this credit should be kept in its current form to drive market transformation in the region.</p>	<p>context and this credit should be kept in its current form to drive market transformation in the region.</p>
	<p><u>MAT-8: Sustainable Timber</u> 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 Rwanda 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) Certified Timber, within the Rwandan market, and current holders of the FSC Chain of Custody and Management Certificate.</p> <p>Therefore, it is hoped that market transformation related to the sustainability of timber products used in Rwanda can be achieved through this credit.</p> <p>FSC Certified Timber</p> <p>The FSC Normative Framework comprises the collection of FSC policies, standards and procedures which are mandatory for certificate holders and FSC accredited certification bodies. The FSC scheme provides a credible guarantee that the timber products come from a well-managed forest that has been</p>	<p>Currently there are no FSC certified suppliers/wholesalers in Rwanda. Where a supplier/wholesaler and all other parties throughout the chain-of-custody are undergoing the certification process with an accredited FSC Certification Body, documentation demonstrating adherence to the accreditation process is deemed to meet the credit criteria for MAT-8.</p> <p>Once Rwanda has a fully certified FSC certified supplier/wholesaler, the requirements for demonstration of proof reverts to FSC chain-of-custody certification.</p>

	<p>independently certified for its timber resource sustainability, forest ecosystem maintenance, and financial and socioeconomic viability.</p> <p>Currently there are no FSC certified suppliers/wholesalers in Rwanda. Where a supplier/wholesaler and all other parties throughout the chain-of-custody are undergoing the certification process with an accredited FSC Certification Body, documentation demonstrating adherence to the accreditation process is deemed to meet the credit criteria for MAT-8. Once Rwanda has a fully certified FSC certified supplier/wholesaler, the requirements for demonstration of proof reverts to FSC chain-of-custody certification.</p> <p>Rwanda's population relies heavily on the forest resources for wood fuel and charcoal and for sawn wood due to its rapidly developing economy and for the growth of the construction sector in the country. According to the Ministry of Forestry and Mines (2010), as a result, natural forests areas have declined by 65% between 1960 and 2007. This contextualisation therefore aims to encourage companies or individuals that process, transform, or trade (take ownership of) timber in Rwanda to undergo the certification process with an accredited FSC Certification Body. Projects wishing to target this credit must submit a mandatory CIR.</p> <p>References</p> <p>For further information about the Forest Stewardship Council (FSC), refer to:</p> <ul style="list-style-type: none"> • Forest Stewardship Council: https://ic.fsc.org/index.htm <p>For further information on the local policies and standards in Rwanda, refer to:</p> <ul style="list-style-type: none"> • Republic of Rwanda Ministry of Forestry and Mines. May 2010. "National Forestry Policy". • Republic of Rwanda Ministry of Forestry and Mines. June 2010. "Strategic Plan for the Forest Sector 2009 – 2012". 	<p>Projects wishing to target this credit must submit a mandatory CIR.</p>
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<p><u>MAT-9: Design for Disassembly</u> 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.</p> <p>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 Rwanda 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><u>MAT-10: Dematerialisation</u> 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 Rwandan context but very few projects focus on the net reduction of materials used. The credit is equally relevant and applicable in Rwanda 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><u>MAT-11: Local Sourcing</u> 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 significant proportion of building components, materials and finishes used in Rwandan projects are imported into the country from overseas. This is in spite of the intra-regional availability of some of these components, materials and finishes with equivalent performance specifications in the East African Community (EAC).</p> <p>It is strongly encouraged that local materials manufactured within the EAC should be explored instead, and awareness should be raised of the embodied energy in materials sourced from far away distances to discourage importing from overseas.</p> <p>As such, to stimulate the growth of industry in Rwanda and East Africa, and 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 - the sourcing of products manufactured intra-regionally is viewed as both an environmental and socio-economic driver of sustainable market transformation.</p> <p>For the Rwandan local context, therefore, it is recommended to adapt the credit so that:</p> <ul style="list-style-type: none"> 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 East African Community (EAC) region borders as defined by the EAC on http://www.eac.int, current at the time of 	<p>It is recommended to adapt the credit so that:</p> <ul style="list-style-type: none"> 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 East African Community (EAC) region borders as defined by the EAC on http://www.eac.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 Rwandan borders.

		<p>project registration or more recent.</p> <ul style="list-style-type: none"> 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 Rwandan borders. <p>Only materials or products permanently installed in the building are eligible and must have been extracted, harvested, recovered, as well as manufactured within the above mentioned radii of the site in order to qualify for the credit.</p> <p>Mechanical, electrical and plumbing components and specialty items such as elevators and equipment are excluded from this credit.</p> <p>This promotes sourcing of materials in the East African region which would be beneficial to the Rwandan local context.</p> <p>By adapting the credit accordingly, it is hoped that project teams will be strongly encouraged to source more of the building components, materials and finishes locally, significantly fostering intraregional economic development for Rwanda and the EAC.</p>	<p>This promotes sourcing of materials in the East African region which would be beneficial to the Rwandan local context.</p>
	<p><u>MAT-12: Efficient Dwelling Size - MULTI UNIT RES</u> To encourage and recognise multi-unit residential developments with efficiently sized dwelling units and reduced material consumption.</p>	<p>This credit aims to encourage more efficient use of space in dwelling unit design, and to discourage the over-sizing of residential units. Through designing more efficient spaces, various benefits can be achieved. These include reduction in the use of materials and resources, densification, efficiencies of space use and smarter design.</p> <p>All the benefits listed above are key in moving the residential market forward towards better design principles and more efficiently sized residential developments.</p> <p>The credit in its current form, therefore, is equally relevant and applicable in Rwanda as it is in South Africa, with the availability of building resources and compliance with the credit criteria completed automatically by the 'Efficient Dwelling Size Calculator' within the rating tool spreadsheet.</p>	<p>MAT-12 should remain in its current form and no adjustments need to be made.</p>

MAT-13: Masonry - MULTI UNIT RES & PEB

To encourage and recognise designs that minimise the embodied energy and resources associated with a reduction of virgin material in masonry units.

Similarly to South Africa, fired clay masonry units (i.e. bricks and pavers) are one of the most predominant building materials in Rwanda, 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.

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 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.

Many different firing methods using thermal coal were developed and installed over time.

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 Rwanda as it is in South Africa.

References

For further information about the local standards of Rwanda with regards to masonry, refer to:

- RS 359:2009 EAS 54:1999 Burnt building bricks-Specifications
- RS 360:2009 EAS 94: 1999 Burnt clay building blocks-Specifications

MAT-13 should remain in its current form and no adjustments need to be made.

LAND USE AND ECOLOGY

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<p><u>ECO-: Conditional Requirement</u> 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 Rwandan context.</p> <p>Owing to the nature of the wording of the credit criteria however, the Rwandan 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"> • Is not located on prime agricultural land. Refurbishments/redevelopments that remain within the existing development footprint are exempt from this criterion; • 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; • Is not located on land with confirmed presence or high probability of threatened red listed species according to IUCN Red List of Threatened Species (www.iucnredlist.org), 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 • Is not located within the required buffer zones of watercourses: <ul style="list-style-type: none"> ○ The project development footprint must not fall within the 100 year floodplain. ○ 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 	<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>However, where confirmation that the site was not on land of high ecological value is to be stated by a suitably qualified registered ecologist, the suitable registered ecologist would be defined as being a licensed Environmental Impact Assessment (EIA) Expert as</p>

	<p>completed.; or</p> <ul style="list-style-type: none"> 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 <p><u>Watercourse Protection Measures</u></p> <ul style="list-style-type: none"> A site-specific Watercourse Management Plan has been produced, exhibited and, for an As Built submission, implemented; and All points are achieved in EMI-05 Watercourse Pollution and in EMI-07 Light Pollution. <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Note that attention is drawn to Technical Clarification Number ECO0-T-</p>	<p>registered with the Rwanda Environment Management Authority (REMA) of Rwanda implementing the ministerial order N° 003/2008 of 15/08/2008 relating to the requirements and procedure for Environmental Impact Assessment, especially in Article Five (5) on selection of experts to conduct environmental impact study, current at the time of project registration or more recent.</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>
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	<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>However, where confirmation that the site was not on land of high ecological value is to be stated by a suitably qualified registered ecologist, the suitable registered ecologist would be defined as being a licensed Environmental Impact Assessment (EIA) Expert as registered with the Rwanda Environment Management Authority (REMA) of Rwanda implementing the ministerial order N° 003/2008 of 15/08/2008 relating to the requirements and procedure for Environmental Impact Assessment, especially in Article Five (5) on selection of experts to conduct environmental impact study, current at the time of project registration or more recent.</p> <p>References</p> <p>For further information about the local standards of Rwanda with regards to environmental impact assessments in building construction, refer to the:</p> <ul style="list-style-type: none"> Rwanda Environment Management Authority Portal: http://www.rema.gov.rw/ 	
ECO-1: Topsoil To encourage and recognise construction practices that preserve the ecological integrity of topsoil.	Preserving topsoil is equally important in Rwanda 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 Rwanda as it is in South Africa.	ECO-1 should be kept in its current form and no adjustments need to be made.
ECO-2: Reuse of Land 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.	Urban sprawl is a risk that all cities and countries face whenever more and more greenfield sites are developed upon, with equal prevalence in Rwanda 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 Rwanda as it is in South Africa.	ECO-2 should be kept in its current form and no adjustments need to be made.
ECO-3: Reclaimed Contaminated Land To encourage and recognise developments that	The professionals at the workshop noted that this credit was applicable to the Rwandan context. There is however, no definition of contaminated	ECO-3 should be kept in its current form and no adjustments need to

<p>reclaim contaminated land that otherwise would not have been developed.</p>	<p>land in Rwanda, 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 as: the presence in or under any land, site, buildings or 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.</p> <p>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.</p> <p>Encapsulation is only an acceptable form of remediation if there are technically no other remediation options.</p> <p>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.</p> <p>Treatment 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.</p> <p>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.</p> <p>Please note the contamination resulting from this development (e.g. with asbestos from demolition of the existing buildings) cannot contribute to</p>	<p>be made.</p>
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		<p>this credit.</p> <p>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 still considered as 'prior to construction'.</p> <p>The submission must clearly demonstrate that:</p> <ul style="list-style-type: none"> • 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; • 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 • As a result of decontamination, the site was certified as uncontaminated and satisfactory for use. <p>As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	
	<p><u>ECO-4: Change of Ecological Value</u> 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 Rwandan context.</p> <p>However, as the Green Star SA Ecological Value Calculator takes the ecological value weighting of the site into account, the Green Star SA Ecological Value Calculator would need to be adapted to reflect the equivalent ecological value of the different bio-regions in Rwanda.</p> <p>This would be project-specific and a mandatory CIR would need to 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>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 Rwanda</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><u>ECO-5: Urban Heat Island – RETAIL CENTRE</u> 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>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 Rwanda as it is in South Africa.</p>	<p>ECO-5 should be kept in its current form and no adjustments need to be made.</p>
<p><u>ECO-6: Outdoor Communal Facilities - MULTI UNIT RES</u> 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>ECO-6 should be kept in its current form and no adjustments need to be made.</p>

	<p>This is relevant for the Rwandan context as it is for the South African context, as such ECO-06 should be kept in its current form and no adjustments need to be made.</p>	
<p><u>ECO-7: Urban Consolidation - MULTI UNIT RES</u> To encourage and recognise designs which make use of compact development patterns to increase land utilisation efficiency.</p>	<p>Urban consolidation is the process of increasing or maintaining the density of housing in established residential areas, with the aim of urban consolidation to reduce development on the fringe areas of the city.</p> <p>By making use of compact development patterns, land utilisation efficiency is increased as well as local connectivity (refer to TRA-5), trip reductions within mixed use developments (TRA-6) and the sharing of precinct bulk infrastructure, mass commuting transport systems and local amenities.</p> <p>The credit aims to encourage and recognise the efficient use of land by multi-unit residential developments. As such, the credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	<p>ECO-7 should be kept in its current form and no adjustments need to be made.</p>
<p><u>ECO-8: Community Facilities - PEB</u> 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 Rwandan context as it is for the South African context, as such ECO-08 should be kept in its current form and no adjustments need to be made.</p>	<p>ECO-8 should be kept in its current form and no adjustments need to be made.</p>

EMISSIONS

AIM OF CREDIT	DISCUSSION	RECOMMENDATION
<u>EMI-1: Refrigerants/Gaseous Ozone Depleting Potential (ODP)</u> To encourage and recognise the selection of refrigerants and other gases that do not contribute to long-term damage to the Earth's stratospheric ozone layer.	The professionals at the workshop were well versed in zero ODP refrigerants, and whilst they were not always used, they are available in Rwanda. As such, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.	EMI-1 should be kept in its current form and no adjustments need to be made.
<u>EMI-2: Refrigerants/Gaseous Global Warming Potential (GWP)</u> To encourage and recognise the selection of refrigerants that reduce the potential for increased global warming from the emission of refrigerants to the atmosphere.	The professionals at the workshop were well versed in low GWP refrigerants, and whilst they were not always used, they are available in Rwanda. As such, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.	EMI-2 should be kept in its current form and no adjustments need to be made.
<u>EMI-3: Refrigerant Leaks</u> To encourage and recognise building systems design that minimises environmental damage from refrigerant leaks.	<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 Rwanda being imported, these products are available internationally such that this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>	EMI-3 should be kept in its current form and no adjustments need to be made.
<u>EMI-4: Insulant ODP</u> To encourage and recognise the selection of insulants that do not contribute to long-term damage to the Earth's stratospheric ozone layer.	The professionals at the workshop were well versed in zero ODP insulants, and whilst they were not always used, they are available in Rwanda. As such, this credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.	EMI-4 should be kept in its current form and no adjustments need to be made.
<u>EMI-5: Watercourse Pollution</u> To encourage and recognise developments that minimise stormwater run-off to, and the pollution of the natural watercourses.	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 Rwanda as it is applied in South Africa.	EMI-5 should be kept in its current form and no adjustments need to be made.

	<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"> • 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. <p>The credit in its current form is therefore equally relevant and applicable in Rwanda as it is in South Africa.</p>	
<p><u>EMI-6: Discharge to Sewer</u> 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 Rwanda as it is in South Africa.</p>	EMI-6 should be kept in its current form and no adjustments need to be made.
<p><u>EMI-7: Light Pollution</u> 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 Rwandan 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"> • A site-specific Watercourse Management Plan has been produced, exhibited and, for an As Built submission, implemented; 	EMI-7 should be kept in its current form and no adjustments need to be made.

	<p>and</p> <ul style="list-style-type: none">All points are achieved in EMI-5 Watercourse Pollution and in EMI-7 Light Pollution. <p>The credit in its current form is equally relevant and applicable in Rwanda as it is in South Africa.</p>																																																																																																																																	
<p>EMI-8: Legionella 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 Rwanda 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>EMI-9: Boiler and Generator Emissions 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.</p> <p>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><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><tr><td>< 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>< 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 < 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 < 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 < 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 < 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 < 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 < 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 < 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 < 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 < 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 < 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 < 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 < 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>≥ 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></table>	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>
Engine Power	Tier	Year	CO g/kWh	HC g/kWh	NMHC + NOx g/kWh	NOx g/kWh	PM g/kWh																																																																																																																											
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	<p>It is recommended that for EMI-9, projects teams targeting this credit are aware of the applicable conversion factors contained in the Additional Guidance of the Green Star SA technical manuals. 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 Rwanda as it is in South Africa in its current form.</p>	
<p><u>EMI-10: Kitchen Exhaust Emissions – RETAIL CENTRE</u> 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 centres in Rwanda of which major nationals are the primary tenants and that credit is equally relevant and applicable in Rwanda 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><u>INN-1: Innovative Strategies and Technologies</u> 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 Rwandan context, as opposed to the South African context.</p> <p>As such, up to two points can be awarded for an innovation initiative where the initiative is a technology or process that is considered a 'first' in Rwanda or in the World; or the project substantially contributes to the broader market transformation towards sustainable development in Rwanda or in the World.</p> <p>Points are awarded as follows:</p> <p style="padding-left: 40px;">One point is awarded when either of the above is true for the Rwandan market; or</p> <p style="padding-left: 40px;">Two points are awarded when either of the above is true for the Global market.</p> <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 Rwandan context, as opposed to the South African context.</p>
<p><u>INN-2: Exceeding Green Star SA Benchmarks</u> 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 reference being made instead to the Rwandan context, as opposed to the South African context.</p> <p>As such, up to two points can be awarded for an innovative initiative where there has been a substantial improvement on an existing Green Star SA / Green Star SA-Rwanda credit, as follows:</p> <ul style="list-style-type: none"> • One point for a solution that results in the elimination of the specific negative environmental impact of the project targeted by an existing credit; and • Two points for a solution that results in a substantial (e.g. 5% or greater above 'neutral') restorative environmental impact targeted by an existing credit. 	<p>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-Rwanda credit.</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).	
<u>INN-3: Environmental Design Initiatives</u> 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>This credit should be kept in its current form with reference being made instead to the Rwandan context, as opposed to the South African context.</p> <p>As such, one point can be awarded where an initiative in the project viably addresses a valid environmental concern outside of the current scope of this Green Star SA / Green Star SA-Rwanda tool.</p> <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>	INN-3 should be kept in its current form with reference being made instead to awarding points where an initiative in the project viably addresses a valid environmental concern outside of the current scope of this Green Star SA / Green Star SA-Rwanda tool.

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