

GOOD PRACTICE IN GREEN BUILDINGS:

A KEY COMPONENT TO REDUCTION OF EMISSION IN CITIES

Written for ICLEI Africa Urban-LEDS Programme as background information for the development of Green Building Guidelines in two South African Municipalities

April 2015

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1 Introduction

Today, it is widely accepted that human activities are contributing to climate change. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) estimated that between 1970 and 2004, global greenhouse gas emissions due to human activities rose by 70%¹. As the majority of the global population now lives in urban areas, with this proportion rising to above 60% in South Africa², cities have become areas of strategic focus to address anthropogenic climate change.

Cities are defined by their natural and built environment. The built environment is made up of the roads and pathways used for mobility; the physical infrastructure which provides services, such as water, electricity, transport, and sewage and waste removal; the buildings which act as homes, offices and shops; and the governance structures which manage the relationships between these elements.

As cities continue to grow in population, physical size and density, increasing stress is placed on the built environment to carry the urban system and associated processes that people depend upon. Consequently, climate change adaptation and mitigation measures need to be strategically focused on reducing the greenhouse gas emissions from activities associated with the growth and development of the built environment to enable the transition to a more sustainable development path.

The ICLEI Urban-LEDS programme aims to enhance the transition to low-emissions urban development in the emerging economy countries Brazil, Indonesia, India and South Africa. The term 'low-emission' refers to reducing the air and water pollutants and harmful gasses that are released from fossil fuel based electricity generation (coal-fired power stations), petrol and diesel vehicles, industrial processes, heating and cooling systems in

buildings, and sewerage systems. The programme's accompanying Urban Low Emission Development Strategy "defines a pathway to transition a city to a low-emission, green and inclusive urban economy, through its integration into city development plans and process"³.

Around the world, buildings currently use a large proportion of a city's energy and natural resources. That is 15% of global freshwater resources, 40% of the world's energy, while emitting up to 40% of the global greenhouse gas emissions in their construction, operation and maintenance⁴. Therefore, by specifically targeting the sustainable design, construction and demolition of buildings, it is possible to have a large impact on the reduction of global resource consumption and greenhouse gas emissions. This could occur through well-informed decision making with regard to site location; building orientation and design; energy and water efficient mechanical features such as those used for the plumbing and heating and cooling of a building; and the construction materials chosen. When these principles and practices are implemented, these choices can lead to what is termed a 'green' building.

1.1 What is a Green Building?

A Green Building "incorporates design, construction and operational practices that significantly reduce or eliminate the negative impact of development on the environment and people. Green buildings are energy efficient, resource efficient and environmentally

The collection of reference documents intends to provide additional guidance and information

¹ IPCC, 2007

² <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>

³ An integrated approach to Low Emission Development in South African municipalities, ICLEI, 2014

⁴ Green Building in South Africa: Emerging Trends 2009 - DEAT

responsible⁵.” This reinforces the vital role of green buildings in transitioning to low-emission development in urban areas.

However, a building is limited to how ‘green’ it can be depending on the surrounding built environment in which is located. For example, if a building is only accessible via private vehicles (there is no public transport or active transport access to the building), then it is limited in the degree to which it can reduce harmful emissions associated with the building’s occupation as people will be forced to drive to work, shop or be educated. Hence, it is necessary to address the broader built environment through enabling low emission mobility, integrated waste management, the use of ecological systems as infrastructure provision, and a more inclusive economy based on local assets, skills improvement and capacity building.

1.2 Structure of Report

This report has been commissioned by ICLEI Africa as part of the Urban-LEDS programme and forms the first section of the development of Green Building Guidelines in two South African Municipalities: the Steve Tshwete Local Municipality and KwaDukuza Municipality.

It has been compiled to enable a better understanding of green buildings and sustainability in the built environment as core strategies to enabling low emissions development. This is accompanied by a collection of electronic “Green Building Reference Documents” intended to provide further guidance and information regarding the implementation of ‘green’ building policies and practices in South Africa as developed by other organisations.

This report highlights some global and local trends and practices with regard to the built environment and tracks the shift in focus which has occurred over the past decade from

the greening of individual buildings towards developing green precincts and subsequently striving for green cities; and a transition from reduced impact to zero impact to restorative practices for a positive impact on the environment through the built fabric.

This research is presented into two sections. The first is entitled ‘Green Building Trends - Internationally and in South Africa’ and is comprised of an analysis of some of the more common green building rating systems currently in use and precedent for green building and sustainable development policy, particularly at local municipal scale. The second section entitled “Green Building Leadership in South Africa” is a high level analysis of the national legislative context for the support of green building and sustainable development, national government leadership, and a discussion on current national incentive schemes.

2 Green Building Tools and Trends in South Africa and Internationally

Green Building Tools generally include a range of systems and methods, and may also be referred to as Green Building Rating Systems, Green Building Indicators, and Green Building Environmental Assessment Methods. Common to all these tools, is that they enhance the environmental awareness of building practices; provide fundamental direction for the building industry to move toward environmental protection and the achievement of sustainability; and provide a means of demonstrating that a building has been successful in meeting an expected level of performance in various declared criteria (Sebake, 2009).

Since the establishment of the Building Research Establishment Environmental Assessment Methodology (BREEAM) in 1990, there has been a proliferation of green building tools. Early generation tools tended to focus on the design phase but, as the industry has matured, the focus has shifted to the physical product and more recently

⁵ GBCSA <https://www.gbcsa.org.za/about/about-green-building/>

building performance. There is a shift from an emphasis purely on environmental assessments towards the more holistic inclusion of social and economic factors, particularly in developing countries (and led by South Africa with the Sustainable Building Assessment Tool (SBAT) and development of the Socio-Economic Category for Green Star).

Currently, there are a variety of Green Building Tools and Indicators available locally, along with international tools from Australia, the UK and USA. These include national certifications as developed by private entities and national governments, and metropolitan-wide policies and guidelines developed by municipalities.

In South Africa, both the government and private sector have played a role in the adoption of green building principles and practices. In three of the metropolitan municipalities in particular, that is the City of Cape Town, the City of Tshwane and the City of Johannesburg, local government has been a leader in developing policies and guidelines to enable efficient resource management and improved building design. As this has taken place, there has been a parallel trend in the private sector where there has been an increasing uptake of voluntary green building certification. The Green Building Council South Africa (GBCSA) through the use of their flagship-rating tool, Green Star Office Version 1, has facilitated this.

The purpose of these tools and policies has been broadly divided between categories of scale, whether applicable to a building or a community, and outcome such as whether to only reduce the impact of people's activities on the environment or to enable regeneration of the natural environment through human activities.

2.1 Voluntary Green Building Rating Tools

As the concept of green buildings and sustainable built environments is gaining traction and momentum, the desire to confirm and rate how 'green' a building or community is has become increasingly important to developers, investors and tenants. This is for a

variety of reasons above and beyond the call to reduce and adapt to the effects of climate change, some of which include the reduced operational costs and increased profitability of green buildings, improved employee productivity, the perception of responsible investment and improved status with regards to corporate social responsibility.

The Green Building Rating Tools reviewed in this report include the following:

Green Star South Africa by GBCSA

Green Star Australia - Communities Tool

Leadership in Energy and Environmental Design (LEED)

Building Research Establishment Environmental Assessment Methodology (BREEAM)

Sustainable Building Assessment Tool (SBAT) and BEST - CSIR

Excellence in Design for Greater Efficiency (EDGE) tool

Living Buildings Challenge

Pearl Rating System for Estidama

One Planet Living

Green Rating for Integrated Habitat Assessment (GRIHA)

CASBEE

Sustainable Building Assessment Tool (SBAT)

Built Environment Sustainability Capability Tool

For a brief overview of these and other commonly used tools please refer to Annexure A

These tools range in origin from South Africa to the United Kingdom, the USA, India, Japan and Saudi Arabia. Three of the tools in particular have been appropriated for use in countries outside of their origin, making them the three most widely used; these are Green Star, Leadership in Energy and Environmental Design (LEED), and Building Research

Establishment Environmental Assessment Methodology (BREEAM). BREEAM counts 425,000 certified buildings, and two million registered for assessment since its launch in 1990. The US Green Building Council, administrator for LEED, claims:

“There are currently more than 69,000 LEED building projects located in over 150 countries and territories (as of January 2015)”⁶.

Green Star Australia has certified more than 640 buildings since launching in 2003. A 2013 report by the Green Building Council of Australia, *The Value of Green Star - A Decade of Environmental Benefits*, offers some examples of the efficacy of green building and the Green Star program.

1. On average, Green Star certified buildings produce 62 per cent fewer greenhouse gas emissions than average Australian buildings, and 45 per cent fewer greenhouse gas emissions than if they had been built to meet minimum industry requirements.
2. On average, Green Star certified buildings use 66 per cent less electricity than average Australian buildings, and 50 per cent less electricity than if they had been built to meet minimum industry requirements.
3. On average, Green Star buildings use 51 per cent less potable water than average buildings.

This array of tools has been chosen to identify the similarities and differences across the green building rating tools to draw out the tried-and-tested ideas and trends. The primary similarity is in their aim and what they use as measures of a building being green. The majority of these tools aim to reduce consumption and the negative effects of human activity on the natural environment, both within the local and global context.

⁶ <https://sourceable.net/is-green-building-on-the-right-track/>

The most common categories to rate the achievement of a building include:



Alternative tools such as One Planet Living and the Living Buildings Challenge extend this further towards the regeneration of natural environments as facilitated through a building’s presence, measures of beauty, happiness and local food security.

It is important to note that these tools allow for flexibility of process to accommodate for different contexts and to allow for innovation by outlining the goal, but not dictating the way in which the goal is to be achieved.

2.2 Precedent for Green Buildings and Sustainable Development Plans and Policies

Cities and their related local governments have become centres of strategic focus to mitigate and adapt to the effects climate change. This has raised the voice of cities to an international level where previously only national governments had a say. As a result of this many cities around the world have undertaken to develop policies for sustainable built environments and green buildings. This enables context appropriate solutions and

actions and, hopefully, improved implementation and increased accountability within the city.

This report has reviewed various case studies from local governments around the world providing valuable insights into and learning from the actions and strategies chosen, and the processes that led each city to adopt these policies or guidelines and those that continue to lead in their implementation.

Along with others, the following key local governments' green building policies or sustainability action plans have been analysed, with particular attention given to the South African municipalities:

- City of Cape Town, South Africa
- City of Tshwane, South Africa
- City of Johannesburg, South Africa
- Portland, Oregon, USA
- Copenhagen, Denmark
- Brighton and Hove, United Kingdom
- National Government of India – applies to all cities
- Drakenstein Municipality, South Africa
- City of Los Angeles
- National Government of Japan – applies to all cities

For a brief overview of these and other precedent please refer to Annexure B

From this collection of research, various relevant features were drawn out as lessons to learn from with regard to the development of Green Building Guidelines in a South African Municipality.

In particular, these include (with South African specific strategies highlighted in bold text):

The need for a strong vision for future development in the city

The value of context-specific focus accompanied by widely-accepted broad guidelines

A broader focus on buildings, communities, urban infrastructure and socio-economic and environmental systems

The use of incentives and short term policy interventions - tax rebates, increased bulk, fast-tracked applications

Public participation processes and civic engagement that enable behavioural change in citizens

Extending the focus for transport, waste and water systems to the scale of the city

Linking actions to responsibility and municipal budgets, and understanding the financial implications on the private sector

Differentiating between the role of the municipality and the private sectors

The use of checklists and questionnaires to help guide ease of use and implementation

Identifying those aspects of green buildings which are mandatory and those which are voluntary

A life-cycle approach - stepping through the building process and applying guidelines to each stage

The consideration of monitoring and evaluation to track progress towards achieving the city's vision

Understanding that sustainability is a process of transition not an end state

This sample of cities and their relevant policies and guidelines offer the opportunity to learn from good practice both nationally and internationally. There is much to be gained from understanding these local governments and their guidelines as they have undertaken these commitments already and are a step ahead. Their lessons learnt can help guide process and content while avoiding common pitfalls.

3 Green Building Leadership in South Africa

More specifically in South Africa, since the birth of the democracy some 21 years ago there has been an understanding of the need to enable and facilitate sustainable development. As enshrined in the Constitution of 1996, Section 24 (a) and (b) states:

"Everyone has the right - (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that - (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

This has impressed it upon national government, as a developmental state, to lead by example to ensure that policy enables development to occur sustainably in South Africa. While there is the intention to do so, the implementation of these policies has faulted and stalled thereby failing to alter the course of urban and industrial development so far.

3.1 Application of Green Building Principles vs Certification

There are many shades of green and, in South Africa; traditional construction methods (such as mud huts with clay and dung floors) embody many of the principles which green building does today, such as the use of sustainable local materials and labour, climate appropriate design, and correct orientation. At a minimum no building should be constructed in South Africa any longer which does not take cognisance of its location

(both in terms of non-high-value ecological land and also proximity to places of work or residence and local transport), orientation (to maximise morning sunlight but reduce penetration of harsh afternoon sunlight), and ability to be reused over time. Furthermore, all buildings should demonstrate sensitivity to the limits of energy and water experienced in South Africa.

With this as a base, there are more elements that can be incorporated, such as natural ventilation, appropriate mechanical ventilation, energy efficient lighting and equipment, thermal mass to reduce heat loss and gain. Buildings need to be well run, with on-going waste minimisation and separation at source. On-site energy generation and water collection and recycling should also be implemented wherever feasible. It is thus clear that there is not a single "green" prerogative, but a scale of greenness and a wide range of elements and practices that can be incorporated into any building at any stage of its lifecycle.

The South African government and local municipalities continue to develop and improve upon policies to guide well-informed and sustainable development. This has both led to, and been enabled by, an increased voluntary buy-in to the need for sustainable building practices by private developers, and with it a rapid uptake of green building certification in the private sector. Most of the green building certifications in South Africa have been through the Green Building Council South Africa (GBCSA), which offers third-party verification of design, new buildings, operational performance and interior fit-outs for a wide range of building types and communities.

A decade ago much debate existed in South Africa and the international community as to whether there was a real advantage in formal green building certification as opposed to merely applying green principles to design and construction. It is now commonly accepted that the rigorous process of independent third party validation and

accreditation holds extensive merit, and the uptake of formal certifications is increasing and no longer only associated with flagship developments

Certifications by the Green Building Council South Africa are on a steep increase, with 27 certifications recorded in the first quarter of 2015. This brings the number of certifications to end March 2015 to 100, of which 83 were for new buildings and about 17 under the recently launched existing building performance tool. Of these, 8 buildings were awarded 6 star status, 5 been recognised for International Excellence in their design or construction, and 3 in their Performance.

3.2 The Costs and Benefits of Building Green

Developers are increasingly incorporating many and varied green features and initiatives into their buildings in South Africa (and beyond). This is both enabled by the dispelling of the old misconceptions about the 'high' costs associated with this type of building when compared with conventional construction costs, and in itself continues to be a myth buster. The perceived cost of entry has been a major perceptual impediment to the widespread adoption of green building technologies. Many developers and private homeowners have been put off by fears of high costs and long payback periods where the value is realised by tenants and not the landlords. However, initiatives necessary to reduce resource consumption within the built environment are now gaining traction due to the rising costs of water and energy and a growing understanding of the need for environmental protection and restoration. So too are more products been manufactured or assembled locally, and so driving down unit costs.

It is important to note that not all green initiatives will add cost to the development of a building or precinct, but that all will contribute to the overall value of the building and a greater return on investment for the developer, building owner or investor. Certain

aspects of green building, such as passive design, are the result of good decision-making and processes that allow for innovation while using the same budget needed for the construction of a conventional building. Where green features or initiatives require increased upfront costs, this is referred to as a 'green premium'. In office and retail buildings there is now an increasing trend to discuss the pitfalls of a 'brown discount' (slower sale or lower rentals of a building due to not having green features and initiatives which are seen to future proof it) rather than the green premium. Savvy developers are thus leaning towards buildings that are resource efficient, boast modern technologies and offer a good indoor environment for employees

Benefits of Green Building:

Lower operating costs (particularly energy and water)

Higher rentals and overall returns on assets

Better marketability ('smart buildings', differentiated in the market)

Lower risk, future proofed buildings

Increased ability to attract and retain talent (staff) and major desirable tenants (including now government departments)

Increased productivity, better retail sales, higher student pass rates, quicker hospital recuperation

Responsible investing

While the benefits have been identified and implemented in commercial properties, there is still limited uptake where developers build and sell property without taking responsibility or consideration of the operational costs of the building.

3.3 South African National Legislative Context

The South African national government has demonstrably thrown its weight behind the sustainable development, and extensive legislative and regulatory frameworks have been put in place to support this. Further evidence of this national directive was contained in the past State of the Nation address, making the development of green building guidelines for STLM and KDM both well timed and appropriate.

Such **laws, regulations and policies** include amongst other:

- The Constitution of South Africa (1996)
- National Environmental Management Act of 1998 (NEMA)
- Housing Act 107 of 1997 (amended by Acts 28 and 60 of 1999; Act 4 of 2001) (Housing Act) National Housing Code (2000, revised in 2009) (National Housing Code)
- National Norms and Standards for the Construction of Stand Alone Residential Dwellings
- National Development Plan
- State of the Nation 2015
- Integrated Urban Development Framework
- National Energy Efficiency Strategy
- Spatial Planning and Land Use Management Act (SPLUMA) National Strategy for Sustainable Development
- Long Term Climate Change Mitigation Scenarios
- Medium term Strategic Framework
- New Growth Path: Accord 4 - Green Economy Accord
- Income Tax Allowance on Energy Efficiency Savings Department of Public Works - Green Building Policy

Key highlights of these documents are summarised in Annexure C

- SANS 10400-X and XA – Environmental Sustainability and Energy Efficiency in Buildings
- Enhancements to Norms and Standards for low-income residential dwellings (including adjustments to the housing subsidy)
- Renewable Energy and Energy Efficiency in Local Government

The documents listed here range from broad policy directives to specific and mandatory regulations that all have a direct impact on the way in which land and resources are managed and how buildings are constructed. The last four are unpacked in more detail below.

3.3.1 Principles and Green Building Practices

| | | |
|--|--|--|
| Enhance liveability, equity and equality | Create Opportunities for economic prosperity | Least regret |
| Visionary leadership and strong governance | Strategic and transformative planning | Spatial Sustainability |
| Accountability and transparency | Sound policy-making | Just, ethical and sustainable practice |

Principles form the foundation of what needs to be achieved, while practices provide the practical implementation. These principles, seen below, may be applied at all spheres of government as decision-making guidelines. An understanding of these key documents will enable municipalities to act within the parameters and support of national government that could enable improved implementation and funding streams.

To enable the practical implementation of these principles in green buildings consist of the following categories of **practices** are generally implemented to achieve these goals:

- Good governance
- Spatial planning and land use
- Energy efficiency
- Water conservation
- Waste management
- Transport management
- Management of environmental quality
- Material selection
- Ecology and ecosystems
- Food and urban agriculture
- Local Economic Development

3.3.2 SANS 10400-XA

The introduction of the new National Building Regulations, SANS 10400-XA, in 2012, sets mandatory requirements for new buildings, renovations and additions with regard to thermal performance, and energy efficiency. Compliance to these regulations can be shown in three ways: the prescriptive route, the reference building route, the performance route.

The introduction of the SANS 10400-XA regulations is well timed, but has introduced a host of complexity to both building approval submissions and the approval process. The actual standard can be purchased online from the national body, and various companies and groups have unpacked it for the layman. An excellent suite of guides were published by the Sustainability Institute and Nedbank, and are referenced in Annexures A, B and C.

The Department of Human Settlements has subsequently released a directive entitled 'Enhancements to Norms and Standards for low-income residential dwellings that

includes upwards adjustments to the housing subsidy. This is to compensate for the increased cost to low income housing associated with compliance to the thermal performance standards of SANS 10400-XA.

In particular the minimum norms and standard for subsidy housing now include the following:

The installation of a ceiling with the prescribed air gap for the entire ceiling with above ceiling insulation as prescribed per climatic zone for entire house

Plastering of internal walls and rendering on external walls

Smaller size windows with low-e (energy efficient) clear and opaque safety glass for all windows

Installation of a pre-paid meter with DB board

3.3.3 Department of Public Works: Green Building Policy

In 2014 the Department of Public Works (DPW) released a draft version of their Green Building Policy to facilitate green development within the portfolio of public buildings held by national, provincial and municipal government. This policy requires that selected new government buildings should be Green Star rated with at least a 4 star Design rating as certified by the GBCSA. Along with reinforcing the call for water and energy efficiency and improved waste management systems, DPW also looked to promoting the green economy through 'green' public procurement and purchasing.

New RSA government buildings
need to comply with 4-Star
Design rating by GBCSA

Green procurement is defined as, "*the purchasing of supplies and services that have a smaller negative impact, or even a positive impact, on the environment and human health when compared with competing products or services that serve the same purpose.*"

*Environment + Price + Performance = Green Purchasing*⁷

While the details of this green procurement programme have not yet been released by the DPW, further general information and guidance for its implementation in local government can be found in Annexure D.

3.3.4 Renewable Energy and Energy Efficiency in Local Government

Thirdly, along with the call for increased energy efficiency and green purchasing, there is growing momentum behind the production and use of renewable energy in South Africa. The Independent Power Producers Programme for Renewable Energy initiated by the Department of Energy aims to *“contribute towards the target of 3,725 megawatts and towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa.”*⁸

To aid local government in the implementation and financing of energy efficiency and renewable energy, the South African Local Government Association (SALGA) has compiled two guides, which can be found in Annexure E and F. These give useful guidance on the finance mechanisms and tools available to local municipalities to promote renewable energy.

Local government has three roles within the local energy sector. This includes the municipality as an energy user, as an energy provider and as an energy service provider. The first area of importance with regard to this is the use of wheeling where energy that is produced within the municipality can be sold to local users via a municipally managed electricity grid. The second area of importance with regard to this is small-scale embedded generation, which is especially applicable to renewable energy projects. Small-

scale refers to energy generation projects that generate less than 1MW of electricity. This can be placed on building rooftops or other appropriate areas of a site or precinct.

3.4 **Green Building Council of South Africa and Green Star**

The Green Building Council South Africa (GBCSA) was founded in 2007 and is a member of the World Green Building Council, along with 95 other councils. It is a member-based, industry association representing key member organisations across many industries. The GBCSA *“leads the transformation of the South African property industry to ensure that buildings are designed, built and operated in an environmentally sustainable way”*⁹.

This is done through four areas: advocacy and promotion of green buildings, education and training, developing resources, and through a voluntary certification system for green buildings known as Green Star, discussed earlier in this report.

Green Star South Africa targets a broad range of developments, from New Buildings (where certification is available for both Design and As Built ratings across 4 different building typologies: Office, Retail, Public and Education Buildings, and Multi Unit Residential), Building Performance (which certifies the operations of existing buildings and allows for a lighter benchmark categorisation looking at just energy and water or full Existing Building Performance certification) and a recently released Interiors rating (looking at building fit outs, which are generally tenant driven). This tool has been developed over the past 12 years and is currently being developed further in 8 other African countries.

Currently there are over 100 buildings in South Africa that are Green Star rated with five of these being certified as 6-Star buildings which indicate as ‘World Leadership’. As the uptake of the formal green building certification grows within the private and government

⁷ SEED Urban - http://www.cityenergy.org.za/uploads/resource_159.pdf

⁸ <http://www.ipprenewables.co.za/>

⁹GBCSA - <https://www.gbcsa.org.za/about/what-is-green-building/>

development sectors, the GBCSA continues to be at the helm of enabling innovation and good leadership in green buildings in South Africa and the rest of Africa.

4 Conclusion

The principles and practices of green buildings and green communities continue to gain momentum and traction in the South Africa through initiatives led by government and the private sector. As seen in this report, both internationally and nationally there are already many tools, guidelines and polices available to help design and certify green buildings, and more recently, green communities. This goes along with broader policy as defined at the sphere of national government, which aims to enable sustainable development, especially in urban areas, and more specifically energy and water efficiency and improved living in buildings in South Africa.

This document review has shown that a plethora of information exists on the subject of green buildings. Therefore the task that lies ahead, to ensure green buildings is a key component of the transition to low emission development in urban areas, is to ensure and **enable a deeper understanding of these principles and practices** along with **increased engagement** in municipalities and with citizens and developers.

The development of the Green Building Guidelines for STLM and KDM will thus build on the tools already available, but focus on interpretation by the local municipality with the ultimate goal of establishing a Green Building Policy. The aim is to encourage behaviour change that will reduce the long-term negative impact on the people and the environment they live in, with a focus on resource efficiency and the regeneration of urban and surrounding ecologies through development practices.

5 Green Building Reference Documents

These reference documents provide a quick reference to various documents that would support the implementation of green buildings in South Africa. It is compiled from

different sources and we would like to thank all contributors for making their documents available. These reference documents electronically available as an attachment to this research report.

SANS 10400-XA

Nedbank - SANS 10400-XA - Guideline for Architects

Nedbank - SANS 10400-XA - Guideline for Developers

Nedbank - SANS 10400-XA - Guideline for Home Owners

Green Building Certification

Road to Green Building Handbook (AECOM)

Existing Buildings

Existing Buildings Survival Strategies (ARUP)

Green Living Guides

Nedbank Green Living Guide (Nedbank)

Smart Living Handbook (City of Cape Town)

Greening of Municipal Infrastructure

SEED Urban - Green procurement: A guide for local government

SALGA - Local Government Toolkit on Financing Energy Efficiency and Renewable Energy

SALGA - Guideline on Energy Efficiency and Renewable Energy in Municipal Water and Wastewater Infrastructure

Financing Green Buildings

Green Lease Toolkit (Green Building Council of South Africa)

Rands and Sense of Green Buildings (Green Building Council of South Africa)

Green Building Information Databases

<http://urbanearth.co.za/> (fantastic collection of information on sustainability in SA)

<http://www.cityenergy.org.za/> (Urban Energy Support – a site dedicated to supporting South African Local Government to meet sustainable energy and climate change challenges)

www.gbcsa.org.za (Green Building Council South Africa)

Annexure C: South African National Legislative Context for Green Buildings and Sustainable Development

| Act/Policy | Date | Department Responsible | Aim/Vision | Principles | Implications for Green Buildings, Communities and Towns | Link to further information |
|---|---------------|--|--|---|--|---|
| Constitution of South Africa | 1996 | N/A | The Republic of South Africa is one, sovereign, democratic state founded on the following values of human dignity, the achievement of equality and the advancement of human rights and freedoms | Dignity, Equality and Freedom | Section 24 holds the right to the environment which states that, every citizen has the right to an environment that is "not harmful to his or her health or well-being, and commits the country to conservation and sustainable management and use of our natural resources" (WCPG, 2012: 36) This enshrines the principles of the sustainable development agenda and envisions the environment through an anthropocentric lens by asserting the importance of socio-economic consequences of environmental degradation. This identifies the government as having the role of a developmental state which is pivotal in the provision of services and access to resources. | http://www.gov.za/documents/constitution-republic-south-africa-1996 |
| National Development Plan | 2012 | Department of the Presidency | by 2030, South Africa's transition to an environmentally sustainable, climate-change resilient, low-carbon economy and just society will be well under way. | 1) Just, ethical and sustainable practice 2) Strategic and transformative planning 3) Effective participation of social partners 4) Sound policy-making 5) Least regret 6) Accountability and transparency Spatial Principles: Spatial Justice, Spatial Sustainability, Spatial Resilience, Spatial Quality, Spatial efficiency | Developmental challenges must be addressed in a manner that ensures environmental sustainability and builds resilience to the effects of climate change, particularly in poorer communities (NPC, 2012: 197) | http://www.gov.za/sites/www.gov.za/files/Executive%20Summary-NDP%202030%20-%20Our%20future%20-%20make%20it%20work.pdf |
| Spatial Planning and Land Use Management Act (SPLUMA) | 2013 | Department of Land Reform and Rural Development | To provide a framework for spatial planning and land use management in the Republic: to specify the relationship between the spatial planning and the land use management system and other kinds of planning: to provide for the inclusive, developmental, equitable and efficient spatial planning at the different spheres of government | Follows from the National Development Plan 1. Spatial Justice 2. Spatial Sustainability 3. Efficiency 4. Spatial Resilience 5. Good Administration | Land use and development management, Spatial Development Frameworks and IDPs must be more integrated and consistent with one another - must give effect to and promote efficient, sustainable and planned investment: take cognisance of the adopted environmental management instruments | http://cer.org.za/wp-content/uploads/2013/08/Spatial-Planning-and-Land-Use-Act-16-of-2013.pdf |
| Slate of the Nation 2015 | 2015 | Department of the Presidency | N/A | N/A | "We urge all individuals, households, industries and government departments to save electricity in order to reduce the need for load shedding. The Department of Public Works has been instructed to ensure that all government-owned buildings are energy efficient." President Jacob Zuma | http://www.gov.za/president-jacob-zuma-state-nation-address-2015 |
| Integrated Urban Development Framework | 2014 | Department of Cooperative Governance and Traditional Affairs | Liveable, safe, resource-efficient cities and towns that are socially integrated, economically inclusive and globally competitive, where residents actively participate in urban life | Follows from the National Development Plan 1) Just, ethical and sustainable practice 2) Strategic and transformative planning 3) Effective participation of social partners 4) Sound policy-making 5) Least regret 6) Accountability and transparency | 8 Policy Levers to be used: 1. Integrated spatial planning: 2. Integrated transport and mobility: 3. Integrated and sustainable human settlements 4. Integrated Urban Infrastructure: 5. Efficient land governance and management: 6. Inclusive Economic Development: 7. Empowered active communities: 8. Effective Urban Governance | http://www.salga.org.za/app/webroot/assets/files/MediaRoomStatements/8th%20National%20Municipal%20Managers%20Forum/5_12%20%20IUDF%20version%205%201.pdf |
| National Energy Efficiency Strategy | 2005 and 2012 | Department of Energy | Reducing the energy intensity of the economy through energy efficiency | 1. Energy efficiency 2. Energy Conservation 3. Demand-side Management | Sets overall national Target Final Energy Demand Reduction of 12% by 2015 and targets energy efficiency improvements of 15% by 2015 for commercial and public building sectors, 15% for Industry and Mining, 10% for Residential and 9% for Transport Relevant Policy Recommendation Priority Areas: Buildings, Appliances and Equipment, Lighting, Transport | http://us-cdn.creamermedia.co.za/assets/articles/attachments/42826_n1000.pdf |

Annexure C: South African National Legislative Context for Green Buildings and Sustainable Development

| Act/Policy | Date | Department Responsible | Aim/Vision | Principles | Implications for Green Buildings, Communities and Towns | Link to further information |
|---|------|-------------------------------------|--|---|---|---|
| National Strategy for Sustainable Development | 2011 | Department of Environmental Affairs | South Africa aspires to be a sustainable, economically prosperous and self-reliant nation that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration | <p>Fundamental Principles:</p> <ol style="list-style-type: none"> 1) Human dignity and social equity 2) Justice and fairness 3) Democratic governance 4) A healthy and safe environment <p>Substantive principles:</p> <ol style="list-style-type: none"> 1) Natural resources must be used sustainably. 2) Socio-economic systems are embedded in and are dependent on ecosystems 3) Basic human needs must be met <p>Process Principles:</p> <ol style="list-style-type: none"> 1) Integration and innovation 2) Consultation and participation 3) Implementation in a phased manner | "1) enhancing systems for integrated planning and implementation 2) sustaining our ecosystems and using natural resources efficiently 3) economic development via investing in sustainable infrastructure 4) creating sustainable human settlements 5) responding appropriately to emerging human development, economic and environmental challenges" | https://www.environment.gov.za/sites/default/files/docs/sustainabledevelopment_actionplan_strategy.pdf |
| Long Term Climate Change Mitigation Scenarios | 2007 | Department of Environmental Affairs | To understand the need for climate change mitigation strategies and what these strategies should be through envisioning 2030 and 2050 development scenarios in South Africa | United Nations: Equity - Common but differentiated responsibility | <ol style="list-style-type: none"> 1) Energy efficiency in industrial, commercial, residential and transport sectors 2) Cleaner fuels for electricity generation 3) economic instruments including carbon tax and subsidies (water heaters and renewables) | http://www.erc.uct.ac.za/Research/publications/07Scenarios_team-LTMS_Scenarios.pdf |
| Medium Term Strategic Framework | 2014 | Department of the Presidency | by 2030, South Africa's transition to an environmentally sustainable, climate-change resilient, low-carbon economy and just society will be well under way. | Focus on the first phase of implementation of the National Development Plan following with the same principles | <ol style="list-style-type: none"> 1) Ecosystems are sustained and natural resource are used efficiently 2) Effective climate change mitigation and adaptation response 3) An environmentally sustainable, low-carbon economy resulting from a well-managed just transition 4) Enhanced governance systems and capacity 5) Sustainable human communities | http://www.gov.za/documents/medium-term-strategic-framework-2014-2019 |
| New Growth Path: Accord 4 - Green Economy Accord | 2011 | Department of Economic Development | South Africa has a unique opportunity to create jobs on scale and address the concerns about climate change, through a partnership to promote the green economy and processes to green the economy. The New Growth Path sets a goal of five million new jobs by 2020. It projects that, with the right policies and cooperation, large numbers of green jobs can be created. | <ol style="list-style-type: none"> 1. Opportunity – that climate change provides new prospects for economic activity that were not previously pursued 2. Innovation – that the country can draw on its technological, research and manufacturing base to generate new processes and products 3. Responsibility – of government, to create an enabling environment, of businesses and citizens, to do things differently and 4. Partnership – the combined efforts of all constituencies and all South Africans need to be harnessed to achieve the goals of the green economy | <p>Commitment One: Rollout of Solar Water Heaters</p> <p>Commitment Two: Investment in The Green Economy</p> <p>Commitment Three: Rollout of Renewable Energy</p> <p>Commitment Four: Energy Efficiency</p> <p>Commitment Five: Waste Recycling, Re-Use And Recovery</p> <p>Commitment Six: Biofuels</p> <p>Commitment Seven: Clean-Coal Initiatives</p> <p>Commitment Eight: Retrofitting</p> <p>Commitment Nine: Reducing Carbon-Emission On Our Roads</p> <p>Commitment Ten: Electrification of Poor Communities and Reduction of Fossil-Fuel Open Fire Cooking and Heating</p> <p>Commitment Eleven: Economic Development in the Green Economy: Promotion of Localisation, Youth Employ</p> | http://www.economic.gov.za/communications/publications/green-economy-accord |
| Income Tax Allowance on Energy Efficiency Savings | 2013 | Department of Trade and Industry | Since it has become necessary to promote efficient utilisation of energy to safeguard the continued supply of energy, especially through measures of energy efficiency: carbon tax to be used to finance incentives to advance the further efficient utilisation of energy | No specific principles stated | Regulations in terms of Section 12L of the Income Tax Act administered by the DTI aimed at the large manufacturing investments (i.e. upgrades, expansions or new facilities that exceed R30 million and R200 million respectively) who can prove measures undertaken to ensure energy efficiency (with SANEDI as oversight body) and reduced grid demand (generation of electricity on site) | http://www.energy.gov.za/files/policies/Regulations-in-Terms-of-Section-12L-of-the-Income-Tax-Act-1962-on-the-Allowance-for-Energy-Efficiency-Saving.pdf |

Annexure C: South African National Legislative Context for Green Buildings and Sustainable Development

| Act/Policy | Date | Department Responsible | Aim/Vision | Principles | Implications for Green Buildings, Communities and Towns | Link to further information |
|---|------|----------------------------------|---|---|---|--|
| Green Building Policy | 2015 | Department of Public Works | <p>Promotes the objectives of green building in the public sector. These include the following:</p> <ul style="list-style-type: none"> • Pro-actively inform and support development of plans and programmes • Identify opportunities and constraints • Identify key strategic areas • Integrate principles of green building across areas, regions and sectors • Improve the realisation of cumulative effects • Focus on enhancement of human settlements • Integrate concept of green building into immovable asset formation in South Africa | <ol style="list-style-type: none"> 1. Sustainable Development: Water Security, Food Security and Energy Security 2. Promoting the Green Economy | <ol style="list-style-type: none"> 1) Public Sector Leadership: Leading by example, demonstration projects, awareness raising, education and information campaigns 2) Greening of precincts and brownfield development 3) Energy Performance Certificates [Retrofits] (to be compatible with GBCSA's Energy and Water Benchmarking Tool) - buildings to display on documents in change of ownership and large change of tenancy by 2018 - to be displayed by buildings occupied or operated by organs of state 4) Water Performance Certificates [Retrofits] (to be compatible with GBCSA's Energy and Water Benchmarking Tool) - to be displayed by buildings occupied or operated by organs of state 5) Energy, Water and Waste management Plans 6) Eco-labelling of building products and materials 7) SANS 10400X (NBR: Environmental Sustainability) 8) Green Building Rating: GSSA Office v1 and Public and Educational Building Tool is to be used as best practice to follow for all new buildings - achieve minimum 4 star rating and green leases 9) Green Procurement 10) Monitoring 11) Implementation | <p>http://www.wisa.org.za/Show_document.aspx?Docid=531</p> |
| SANS 10400XA - Resource Efficiency in Buildings | 2011 | Department of Trade and Industry | <p>Provides technical guidelines for the implementation of the new building regulations (NBRs). These are first set of minimum standards for energy efficiency and environmental sustainability for buildings in the National Building</p> <p>These regulations are applicable to new and refurbished buildings.</p> | <p>These regulations address the design and construction process by providing for minimum requirements for design elements such as glazing, insulation, shading, orientation and building services, including air conditioning, hot water and lighting.</p> | <p>Buildings that consume energy as a result of human occupancy are the main target of the new regulations. All new buildings must comply with the regulations, as must any additions and extensions to existing buildings. If the existing building is unaffected by an addition, only the addition will have to comply with the regulations. Renovations must comply with the regulations if they require planning approval from a local authority.</p> <p>In following the Prescriptive Route, the building must be designed and built in accordance with paragraph 4.2.1 (b) of the SANS 10400-XA standard.</p> <p>The requirements of paragraph 4.2.1 (b) have the following implications:</p> <ul style="list-style-type: none"> • At least 50% of hot-water demand must be met by means other than electric resistance heating. • Roof or ceiling insulation is required, and must meet minimum requirements, depending on the climatic zone and roof material. • Insulation is required for exposed hot-water pipes. • Wall insulation is required for non-masonry external walls. • Floor insulation is required if there is in-slab heating. • Shading devices or performance glazing is required where glass areas are greater than 15% of net floor area. • Other building services that use energy or control the use of energy must be provided in accordance with SANS 204. • Orientation requirements in accordance with SANS 204 are non-mandatory, as the fenestration design can compensate for sub-optimal orientation. | <p>http://www.nedbank.co.za/web/site/content/homeloans_microsite/docs/SANS%20guide%20-%20architects%20final.pdf</p> |

Annexure B: Precedent for Green Buildings and Sustainable Development Plans and Policies

| Local or National Government | Plans/Guidelines/Policy | Aim/Vision | Key Principles | Relevant Features | Link to further information |
|-----------------------------------|--|--|--|---|---|
| Portland, Oregon, USA | The Portland Plan | The Portland Plan focuses on a core set of priorities: prosperity, education, health and equity. The plan emphasizes actions that achieve multiple objectives, it sets numerical targets and suggests ways of measuring progress toward them, and it includes both 25-year policies and 5-year action plans. | Advancing equity and Partnerships are the foundation of the plan. | The Portland Plan is foremost a process of civic engagement and evidence-based decision-making. From extensive stakeholder engagement and research, it was learnt that partnerships will drive change (with the power of a strong civic infrastructure), equitable provision of high-quality basic services are fundamental to success, and resilience is important in a changing world. | http://www.portlandonline.com/portlandplan/index.cfm?c=56527 |
| Copenhagen, Denmark | Solutions for Sustainable Cities | We must all strive to balance the quality of people's lives with sound economic and environmental development | Green growth can boost the economic development and the quality of life | Various strategic actions were undertaken by the Copenhagen Local Government to transitions towards a 'greener' city: 1. Improving Waste water treatment to restore the river as a recreational asset in the city 2. Meeting water demand through innovative technologies and policies 3. Creating an integrated public transport with a focus on Non-motorised transport as integral to urban planning and design 4. Waste recycling programmes and waste-to-energy | http://publications.arup.com/Publications/C/Copenhagen_Solutions_for_Sustainable_Cities.aspx |
| Brighton and Hove, United Kingdom | One Planet Action Plan | To create an increasingly resilient, self-sufficient and resource-efficient city, in support of a prosperous local economy | Based on Bio Regional's One Planet Living: 1. Zero Carbon 2. Zero Waste 3. Sustainable Transport 4. Sustainable Water 5. Sustainable Materials 6. Local and Sustainable Food 7. Land Use and wildlife 8. Culture and Heritage 9. Equity and local economy 10. Health and Happiness | Process: a behaviour change campaign will target residents, city organisations and staff within council A section is dedicated to each of the 10 One Planet Living principles with sections for both the responsible council departments/officials and the city. This shows existing performance, their ambition, and how they will start doing to reach their ambition. Structure of Action Plan: 1. Vision or Aim 2. Who is responsible and where will progress be reported and monitored 3. High Level Objectives – where council wants to get to 4. Baseline indicators 5. Short Term Action Plan: Action, Dates, Led by, Financial Implications (for council budget) 6. Medium Term Action Plan 7. Long Term Action Plan | http://www.bioregional.com/one-planet-brighton-hove/ |
| India | Green Rating for Integrated Habitat Assessment (GRIHA) | GRIHA attempts to minimize a building's resource consumption, waste generation, and overall ecological/environmental impact by comparing them to certain nationally acceptable limits / benchmarks. | 'Sustainability is always local.' | Incentives associated with GRIHA as it is adopted by National Government depending on star rating: 1. Increased Floor Area Ratio 2. Rebate on Floor Area Ratio 3. Fast-tracked environmental clearances 4. Financial incentives to developers and occupants - tax rebates offered | http://grihindia.org/ |

Annexure B: Precedent for Green Buildings and Sustainable Development Plans and Policies

| Local or National Government | Plans/Guidelines/Policy | Aim/Vision | Key Principles | Relevant Features | Link to further information |
|------------------------------|--------------------------------|--|--|---|--|
| City of Cape Town | Smart Building Handbook - 2012 | <p>A practical handbook on energy efficiency, passive design criteria and appropriate materials</p> <p>Effective, integrated design leverages synergies among building components, resulting in reduced life-cycle cost.</p> | <p>Principles:</p> <ol style="list-style-type: none"> 1. Be locally appropriate 2. Conserve the natural environment 3. Use resources efficiently and effectively 4. Apply a full life-cycle approach 5. Minimise waste 6. Use renewable resources 7. Implement sustainable procurement 8. Utilise locally sourced materials and skills 9. Maximise the health and well-being of users 10. Allow real-time monitoring and evaluation; and 11. Leave a positive legacy – futures thinking | <p>Structure:</p> <p>Implementation guidelines Structure:</p> <ol style="list-style-type: none"> 1. Site Selection: 2. Design phase: 3. Construction Phase: 4. Resource Efficiency: 5. Waste Management: 6. Human health and comfort: <p>Green Lease Guidelines:</p> <p>To encourage tenants to assume responsibility for their consumption patterns. Tenants are required to regularly report on energy and water consumption.</p> <p>Guidelines and Questionnaires for various citizens:</p> <ol style="list-style-type: none"> 1. Existing Home owners 2. New home owners 3. Developers 4. Tenants <p>Additional Resources and definitions list</p> | <p>http://www.capetown.gov.za/EN/ENVIRONMENTALRESOURCEMANAGEMENT/ENERGYEFFICIENCY/Pages/GreenBuildingGuidlines.aspx</p> |
| City of Tshwane | Green Building Policy - 2009 | <p>The Green Building Policy developed by the City of Tshwane aims to improve the performance of the built environment in order to reduce environmental impacts and improve quality of life within the city.</p> | <p>No specific principles stated</p> | <p>The Green Building Development Policy only applies to developments that require planning or building control approval. The Policy sets out standards that are either mandatory or promoted by the municipality. Mandatory standards must be complied with. Promoted standards are voluntary, but demonstrating compliance with these may be used to ensure developments are eligible for incentive schemes.</p> <p>Green Building Development Incentive Scheme: Support for Compliance</p> <p>The Municipality may, from time to time, provide incentives to submissions that not only comply with mandatory standards but also comply with promoted standards. Incentives may include:</p> <ul style="list-style-type: none"> • Fast tracked application procedures • Reduced application costs • Reduced bulk services contribution • Relaxation of specific planning requirements such as parking provision • Access to reduced cost or free green building technical training and seminars • Access to municipal negotiated discounts for energy efficient / sustainable technologies • Access to municipal negotiated finance interest rate reductions from banks and financial institutions • Assistance in applying for grants or tax incentives for investments in energy efficient /sustainable technologies • Formal recognition of performance through certification. <p>Categories: Energy, Water, Waste, Transport, Health</p> | <p>http://www.cityenergy.org.za/uploads/resource_312.pdf</p> |

Annexure B: Precedent for Green Buildings and Sustainable Development Plans and Policies

| Local or National Government | Plans/Guidelines/Policy | Aim/Vision | Key Principles | Relevant Features | Link to further information |
|------------------------------|--|--|--|---|---|
| City of Johannesburg | Design Guidelines for Energy Efficient Buildings - 2008 and various 'greening' initiatives | This guide has been developed to support the development of energy efficient buildings within the City of Johannesburg. It provides practical guidance on ways of designing buildings that minimize the requirement for energy and has been developed by the City as part of a strategy to reduce energy consumption and address global warming within the municipality. | Energy efficiency in residential and office buildings – main focus is on minimising energy consumption through passive means and renewable energy (no detail on mechanical systems) | <p>Various Projects ongoing along with energy efficiency:</p> <ol style="list-style-type: none"> 1. Landfill gas to energy project 2. Water 3. Greening Soweto 4. Managing waste 5. Creating city parks 6. Smart buildings - Energy efficiency guidelines for buildings, 2008 7. Joburg is also working closely with Clinton Climate Initiative (CCI). <p>Structure: Introduction, Why have a guide on energy efficiency in buildings? Design processes for energy efficiency, Human comfort and minimum environmental standards, Climate, Environment control strategies in buildings, Site, Building form and envelope, Internal space, Mechanical systems, Electrical lighting, Water heating, Appliances and equipment, Integrated control systems and monitoring, Useful checklists and information, Office design checklist, Residential design checklist, Benchmarks</p> | http://old.gbcsa.org.za/system/data/uploads/resource/69_res.pdf |
| Drakenstein Municipality | Green Building Manual - 2010 | Outlines a set of guidelines for green construction principles for the built environment professionals. | No specific principles stated | <p>Illustrates a life-cycle thinking approach</p> <p>Structure:</p> <ol style="list-style-type: none"> 1. Site Selection 2. Design Phase 3. Constructions Phase 4. Construction Phase - Additions 5. Demolition Phase | http://www.drakenstein.gov.za/News/PublicisingImages/2010%20July%20-%20Dec%202010/Drakenstein%20Green%20Building%20Manual.pdf |
| California | A step by step toolkit for local gov | Key component of the California Incentive Program for New residential construction which aims to encourage the installation of solar electric systems and energy efficiency features in new home construction state-wide | <p>General Strategies:</p> <ol style="list-style-type: none"> 1. general plan amendment 2. outreach and education <ol style="list-style-type: none"> 2.1 technical and resource assistance 2.2 solar builder recognition program 3. incentive and rebates <ol style="list-style-type: none"> 3.1 permit streamlining and priority field inspections 3.2 permit fee reductions / waivers 3.3 development bonuses 4. solar energy financing district 5. local green building program | <p>Great ideas for short term policy interventions as well as details some excellent case studies e.g.</p> <ol style="list-style-type: none"> 1. City of San Jose - outreach and education strategies 2. San Diego County's Green Building Incentive Program 3. City of San Bernardino voluntary green building program 4. City of Palm Desert Energy Independence Program 5. City of San Raphael local green building requirements | http://www.energy.ca.gov/2009publication/CEC-180-2009-005/CEC-180-2009-005.PDF |
| California State Treasurer | California Tax Credit Allocation C | The California Tax Credit Allocation Committee (CTCAC) administers the federal and state Low-Income Housing Tax Credit Programs. Both programs were created to encourage private investment in affordable rental housing for households meeting certain income requirements. The CTCAC also administers a Farmworker Housing Assistance Program | Tax credits applied to private developers who provided housing in this arena. Places various rent and income restrictions to prevent abuse. Includes a compliance monitoring program. | Could be applied to low income sustainable housing in SA | http://www.treasurer.ca.gov/ctcac/ |

Annexure B: Precedent for Green Buildings and Sustainable Development Plans and Policies

| Local or National Government | Plans/Guidelines/Policy | Aim/Vision | Key Principles | Relevant Features | Link to further information |
|------------------------------|------------------------------|--|--|---|--|
| State -Atlanta, Georgia | Enterprise Green Communities | Enterprise Green Communities helps developers, investors, builders and policymakers make the transition to a green future for affordable housing. | <p>Two pronged approach:</p> <ol style="list-style-type: none"> 1. provide funds and technical expertise to help build, rehabilitate and operate healthier, more efficient yet still affordable homes 2. work with state and local governments to ensure the development of smart and sustainable housing and economic development policies <p>Holistic framework encompasses:</p> <ol style="list-style-type: none"> 1. better ways to plan neighbourhoods and build homes 2. resource conservation 3. energy efficiency 4. efficient operations of homes and entire buildings 5. healthy living environment | <p>Huge opportunity for mimicry in SA</p> <p>Key criteria a nice framework:</p> <ol style="list-style-type: none"> 1. integrative design 2. location and neighbourhood fabric 3. site improvements 4. water conservation 5. energy efficiency 6. materials beneficial to the environment 7. healthy living environment 8. operations and maintenance <p>The "Project Management Guide" is a useful roadmap for integrating the principles of Green Communities into affordable housing developments and a similar document would benefit our local municipalities and developers.</p> <p>Ditto to the Enterprise Green Communities Criteria Checklist</p> | <p>http://www.enterprisecommunity.com/solutions-and-innovations/green-communities/about-us</p> |
| National - Japan | CASBEE | <p>CASBEE is a tool for assessing and rating the environmental performance of buildings and built environment.</p> <p>CASBEE was developed according to the following policies:</p> <ol style="list-style-type: none"> 1) The system should be structured to award high assessments to superior buildings, thereby enhancing incentives to designers and others. 2) The assessment system should be as simple as possible. 3) The system should be applicable to buildings in a wide range of building types. 4) The system should take into consideration issues and problems peculiar to Japan and Asia. | <p>CASBEE is designed for each stage of a building life cycle, and is composed of four assessment tools:</p> <ul style="list-style-type: none"> - CASBEE for Pre-design - CASBEE for New Construction - CASBEE for Existing Building - CASBEE for Renovation | <p>It is not so much the tool in itself as its adoption which is of significance to the development of green building guidelines for municipalities in SA.</p> <p>By 2011, 24 local governments in Japan (equivalent of our city scale municipalities) had introduced the assessment and reporting of proposed developments as a mandatory part of the building approval application.</p> <p>Furthermore, the early adoption of assessments for broader scale urban developments and even cities placed Japan as early adopters and leaders in this field.</p> <p>(a) Urban Development</p> <p>It was recognised that basic CASBEE tools evaluate individual buildings but not building groups. The planned integration of several city-centre redevelopment projects with their surrounding districts and anticipation of resulting positive effects for the environment, like promoting the use of area energy networks, led to the development of a broader and more holistic approach to assessment.</p> <p>(b) Cities</p> <p>Heightened awareness of the importance of actions at the city level for the creation of low carbon societies led to the development of CASBEE for Cities, a system for comprehensively evaluating the environmental performance of cities, using a triple bottom line approach of "environment", "society" and "economy". CASBEE for Cities can be used to objectively assess the effectiveness</p> | <p>http://ibec.or.jp/CASBEE/english/overviewE.htm</p> |

Annexure A: International Voluntary Standards, Certification and Assessment of Green Buildings

| Name | Managing Organisation | Aim and/or Vision | Type of Certification | Focus Areas | Link to further information |
|---|---|---|--|---|--|
| Green Star South Africa | Green Building Council of South Africa | <p>The objectives of Green Star SA tools are to:</p> <ul style="list-style-type: none"> • Establish a common language and standard of measurement for green buildings • Promote integrated, whole-building design • Raise awareness of the benefits of green building • Recognise environmental leadership • Reduce the environmental impact of development | <p>Green building rating system for:</p> <ul style="list-style-type: none"> - Individual building rating tools: Office, Retail, Multi-unit residential, Public Buildings, Education - Performance (existing buildings) | <p>Categories assessed:</p> <ol style="list-style-type: none"> 1. Management 2. Indoor Environmental Quality 3. Energy 4. Transport 5. Water 6. Materials 7. Land Use & Ecology 8. Emissions 9. Innovation | <p>https://www.gbcsa.org.za/green-star-sa-rating-system/</p> |
| Green Star Australia - Communities Tool | Green Building Council of Australia | <p>This rating tool aims to:</p> <ul style="list-style-type: none"> - Enhance liveability; - Create opportunities for economic prosperity; - Foster environmental responsibility; - embrace design excellence; and - Demonstrate visionary leadership and strong governance | <p>Green rating system for Communities, Neighbourhoods and Precincts</p> | <p>Categories assessed:</p> <ol style="list-style-type: none"> 1. Governance 2. Design 3. Economic Prosperity 4. Liveability 5. Environment 6. Innovation | <p>http://www.gbca.org.au/green-star/green-star-communities/</p> |
| Leadership in Energy and Environmental Design (LEED) | Green Building Council of the United States (also used internationally, e.g. in India and Brazil) | <p>LEED stands for green building leadership. LEED is transforming the way we think about how buildings and communities are designed, constructed, maintained and operated across the globe.</p> <p>LEED looks at whole lifecycle of buildings.</p> | <p>Green building rating and certification system through independent third-party verification for:</p> <ul style="list-style-type: none"> - New Construction (NC) - Existing Buildings, Operations & Maintenance (EB O&M) - Commercial Interiors (CI) - Core & Shell (CS) - Schools (SCH) - Retail - Healthcare (HC) - Homes (targets the top 25% of new homes) - Neighborhood Development (ND) - Multifamily Mid Rise (MFMR) | <p>Performance in:</p> <ol style="list-style-type: none"> 1. Sustainable Sites 2. Water Efficiency 3. Energy & Atmosphere 4. Materials & Resources 5. Indoor Environmental Quality 6. Locations & Linkages 7. Awareness & Education 8. Innovation and Design Process 9. Regional Priority through a set of prerequisites and credits | <p>http://www.usgbc.org/leed</p> |
| Building Research Establishment Environmental Assessment Methodology (BREEAM) | Building Research Establishment - United Kingdom and the UK Green Building Council | <p>BREEAM sets the standard for best practice in sustainable building design, construction and operation and has become one of the most comprehensive and widely recognised measures of a building's environmental performance. It encourages designers, clients and others to think about low carbon and low impact design, minimising the energy demands created by a building before considering energy efficiency and low carbon technologies.</p> <p>BREEAM In Use is a new scheme to help building managers reduce the running costs and improve the environmental performance of existing buildings. It consists of a standard, an easy-to-use assessment methodology and a 3rd party certification process that provides a clear and credible route map to improving sustainability</p> | <p>Certification system is a multi-tiered process with pre-assessment, third-party consultant guidance through an assessment organization for:</p> <ul style="list-style-type: none"> - New Construction - Communities - In Use Buildings and - EcoHomes <p>Performance (BREEAM In Use)</p> | <p>Assessment uses recognized measures of performance, which are set against established benchmarks in:</p> <ol style="list-style-type: none"> 1. Energy and water use 2. Internal environment (health and well-being) 3. Pollution 4. Transport 5. Materials 6. Waste 7. Ecology 8. Management processes | <p>http://www.breeam.org/about.jsp?id=66</p> |

Annexure A: International Voluntary Standards, Certification and Assessment of Green Buildings

| Name | Managing Organisation | Aim and/or Vision | Type of Certification | Focus Areas | Link to further information |
|---|--|---|---|---|--|
| Comprehensive Assessment System for Built Environment Efficiency (CASBEE) | Japan | CASBEE is a tool for assessing and rating the environmental performance of buildings and the built environment. | <p>The following tools exist</p> <ul style="list-style-type: none"> - CASBEE for Building (New Construction) * - CASBEE for Building (Existing Building) - CASBEE for Building (Renovation) - CASBEE for Market Promotion* - CASBEE for Heat Island - CASBEE for Urban Development * - CASBEE for Cities * - CASBEE for Home (Detached House) * <p>The tools marked with * have been translated into English.</p> <p>Each tool is intended for the specific purpose and target users, and is designed to accommodate a wide range of building types (offices, schools, apartments, etc.).</p> | <p>Looks to the distinct stages of Pre Design, Design and Post-Design (Operations and Renovations).</p> <p>The tool also looks at Specific Purposes:</p> <ul style="list-style-type: none"> - detached houses; - temporary construction; - brief versions - local government versions (tailored by local governments for local conditions such as climate and prioritised policies) - (mitigation of) Heat Island Effect; - urban development (holistic broader evaluations of urban areas) - for cities (due to importance of actions at a city level for the creation of low carbon societies) | <p>http://ibec.or.jp/CASBEE/english/overviewE.htm</p> |
| EDGE tool | International Finance Corporation (IFC) | EDGE encourages resource-efficient building growth by proving the business case for building green. | <p>EDGE calculates operational savings and reduced carbon emissions for your building as measured against a base case.</p> <p>Building Categories:</p> <ul style="list-style-type: none"> - Homes - Hotels - Retail - Offices - Hospitals | <p>Certified in terms of:</p> <ol style="list-style-type: none"> 1. 20% reduction in energy use 2. 20% reduction in water use 3. 20% reduction in the embodied energy of materials used | <p>http://www.edgebuildings.com/#/Tools/</p> |
| Living Buildings Challenge | International Living Future Institute/ Cascadia Green Building Council | The Living Building Challenge is more than just a certification program or advocacy tool, it is a philosophy which attempts to dramatically raise the bar from a paradigm of doing less harm to one in which we view our role as steward and co-creator of a true Living Future. It is in essence a unified tool for transformative thought, allowing us to envision a future that is Socially Just, Culturally Rich and Ecologically Restorative." | <p>Performance-based standard, and certification program for:</p> <ul style="list-style-type: none"> - Landscape and infrastructure projects - Partial renovations and complete building renewals - New building construction - Neighborhood, campus and community design <p>3 types of certification exist:</p> <ul style="list-style-type: none"> - Living Building Certification - Petal Recognition - Net Zero Energy Building Certification | <p>Performance areas/ 'Petals' include the following:</p> <ol style="list-style-type: none"> 1. Site 2. Water 3. Energy 4. Materials 5. Health and Happiness 6. Equity 7. Beauty | <p>http://living-future.org/lbc</p> |
| Pearl Rating System for Estidama | Abu Dhabi Urban Planning Council | The aim of the Pearl Rating System (PCRS) is to promote the development of sustainable communities and buildings and improve quality of life. | <p>Green building rating system for:</p> <ul style="list-style-type: none"> - Community - Buildings: Office, Retail, Multi-residential, School and Mixed-use - Villas (Vernacular - Government funded and self-built homes) | <p>Assessment of performance in:</p> <ol style="list-style-type: none"> 1. Integrated Development Process 2. Natural Systems 3. Livable Communities 4. Precious Water 5. Resourceful Energy 6. Stewarding Materials 7. Innovating Practice | <p>http://estidama.upc.gov.ae/pearl-rating-system-v10.aspx</p> |

Annexure A: International Voluntary Standards, Certification and Assessment of Green Buildings

| Name | Managing Organisation | Aim and/or Vision | Type of Certification | Focus Areas | Link to further information |
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| One Planet Living | BioRegional - United Kingdom (Global) with the World Wildlife Fund as a partner | ‘The aim of the one planet initiative is to create a future where it is easy, attractive and affordable for people to lead healthy and happy lives within a fair share of the earth’s resources.’ | Certification system for: - Neighbourhoods - Precincts - Towns | Principles for One Planet Living: 1. Zero Carbon 2. Zero Waste 3. Sustainable Transport 4. Sustainable Water 5. Sustainable Materials 6. Local and Sustainable Food 7. Land Use and wildlife 8. Culture and Heritage 9. Equity and local economy 10. Health and Happiness | http://www.bioregional.com/oneplanetliving/ |
| Green Rating for Integrated Habitat Assessment (GRIHA) | India - The Energy Resource Institute and Ministry of New and Renewable Energy | ‘Sustainability is always local.’ GRIHA attempts to minimize a building’s resource consumption, waste generation, and overall ecological/environmental impact by comparing them to certain nationally acceptable limits / benchmarks. In the Indian context, a building is ‘green’ when: - It is designed using an integrated approach - It provides its users with an ‘optimal’ level of comfort catering to local needs - It uses minimum resources, sourced locally (as per various IS codes and other local materials) - It consumes minimum energy and water - It generates optimum waste, processed locally | All Development types: offices, retail malls, institutions, hotels, hospitals, health-care facilities, residences and multifamily high rise buildings | GRIHA rating system consists of 34 criteria categorised in four different sections. Some of them are – (1) Site selection and site planning, (2) Conservation and efficient utilization of resources, (3) Building operation and maintenance, and (4) Innovation. Categories: - Landscape - Energy - Water & waste - Materials - Others | http://grihindia.org/ |
| Sustainable Building Assessment Tool (SBAT) | CSIR | The Sustainable Building Assessment Tool aims to support sustainability performance improvements in buildings and construction processes. The tool can be used to set targets for sustainability performance, as well as to assess and improve performance. The tool is based on a holistic approach to addressing sustainability and includes social, economic and environmental criteria. The selection and development of criteria aligns with the definition of sustainability developed by the World Wildlife Fund. The SBAT measures performance of buildings and construction processes in terms of the extent to which they support environmental, economic and social sustainability and ultimately the achievement of Ecological Footprint (EF) and Human Development Index (HDI) minimum standards. | This defines sustainability as the achievement of a maximum Ecological Footprint (EF) of 1.8 global hectares per person and a minimum Human Development Index (HDI) of 0.8. The SBAT tool measures actual performance against target performance and can be used to confirm that targets are being achieved during the building development process. | The SBAT assess sustainability performance through the following criteria in the following areas: Environmental •Energy •Water •Waste •Materials •Biodiversity Economic •Transport •Resource use •Management •Products and services •Local economy Social •Access •Health •Education •Inclusion •Social cohesion | http://www.sustainablebuildingassessmenttool.com/p/the-sustainable.html |

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| Built Environment Sustainability Capability Tool | CSIR and WWF | <p>The Built Environment Sustainability Tool (BEST) aims to support the integration of sustainability into the urban built environments. This tool was developed based on the premise that strategies based on an understanding of current HDI and EF performance can support a shift towards sustainability, and that that built environment development strategies should thus respond to local EF and HDI performance and, through appropriate provision, support sustainable development trajectories</p> | <p>More of an assessment than certification tool, BEST can be used to evaluate various sustainability interventions at a neighbourhood scale and assess their respective impact on the built environment sustainability capacity.</p> | <p>As with SBAT, BEST looks at performance against the Human Development Index and Ecological Footprint. The focus area is the neighbourhood or precinct, which is defined as "an area within easy walking distance from the center of the neighborhood and each neighbourhood named / labelled". The tool has international applicability and as such allows 'easy walking distance' to be defined locally. A baseline analysis of the existing urban fabric provides a measure of the selected neighborhood's built environment capability to support EF and HDI targets. Options for addressing gaps and improving capability can then be entered into the tool and options assessed and evaluated accordingly. Once the optimum set of interventions have been selected, a final report on the capability improvement can be obtained from the graphs and tables at the bottom of the tool.</p> | <p>http://builtenvironmentsustainabilitytool.blogspot.com/p/sustainability.html</p> |