

IGBC&E – A National Framework for Green Buildings in South Africa

Llewellyn van Wyk

Building Science and Technology
CSIR, Pretoria, South Africa e-mail: lvwyk@csir.co.za

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Abstract

Government adopted *A National Framework for Green Building in South Africa (NFGBSA)* in November 2011 as its official policy toward green building. The NFGBSA assists Government in meeting its sustainable development commitments through its construction programme, especially with regard to the development and maintenance of the national estate. The NFGBSA also supports two of the 12 performance outcomes on which departmental action plans are to be devised and public sector delivery measured.

The NFGBSA identifies Five Strategic Focus Areas, the first of which is to adopt green building regulations, standards and best practice. Although the NFGBSA lays the foundation for a more comprehensive strategy to follow, it also supports a visioning and system phase to give momentum to the implementation of the NFGBSA.

The paper uses the *People/Environment/Development (PED) Nexus* to develop a basis for building regulation that will be able to strengthen the resilience of the natural and constructed environment. The paper proposes that additional parts to Part X: Environmental Sustainability as contained in the National Building Regulations be expanded by the inclusion of a broader objective of PlusGreen addressing water, waste, emissions, biodiversity, and human well-being.

1 Background to this study

The National Department of Public Works (NDPW) appointed the Council for Scientific and Industrial Research (CSIR) in September 2010 to work together with their Policy Unit to prepare a *National Framework for Green Building in South Africa (NFGBSA)* hereafter referred to as the Green Building Framework. The appointment came against the background of a growing awareness of green building in South Africa, the emerging electricity crises in South Africa, and the launch of a government initiative aimed at promoting the concept of a ‘green economy’. Government has identified the ‘green economy’ as one of the key elements in the *New Growth Path* as well as the *Industrial Policy Action Plan (IPAP)*. Key to this consideration is the exploration of the green economy to create large numbers of ‘green jobs’ across many sectors of the economy, and becoming an engine of development. With this in mind a summit – *Towards a resource efficient, low carbon and pro-employment growth path* – was held from the 18-20th of May 2010 in Johannesburg. The role of buildings in contributing towards such a growth path was included in those summit deliberations.

2 The project

The project – the development of a Green Building Framework – was to have in place, at national, provincial and local level, a policy that would guide the development of the national estate in accordance with sustainable building and construction imperatives.

2.1 Overview of the project

The project entailed the construction of a framework that could be applied by the three spheres of Government, namely National, Provincial and Local to align the future development of the national estate in accordance with sustainable building and construction imperatives.

The approach used to construct the Green Building Framework was to undertake literature reviews, desktop studies, focus group discussions, and to make use of numerous research projects undertaken by the author in this field. Since the Green Building Framework is intended to be national policy, a key research question was to determine how, and in what way, the Green Building Framework could be used to assist Government in meeting national objectives and imperatives. In this regard, national legislative and policy commitments were studied, including Government’s *12 Outcomes*; the *Green Economy*; the *Medium Term Strategic Framework (MTSF)*; the *National Framework for Development in South Africa*; the *Industrial Policy Action Programme (IPAP)*; the *National Spatial Development Perspective (NSDP)*; and South Africa’s commitments to International Conventions and Agreements on environmental and human settlement issues (such as the Millennium Development Goals, among others).

The Green Building Framework recognizes that the building and construction sector is important for sustainable development because it is a key factor in the national economy; the built environment (the product of building and construction activities) represents a large share of the economic assets of individuals, organizations and the nation; is one of the single largest industrial sectors, with all the consequential aspects of employment, economic importance, and environmental impact; and the delivery of proper housing and infrastructure is key to determining the quality of life of communities. The Green Building Framework notes that all construction activities take place within a legal and regulatory as well as administrative framework present within South Africa, thus emphasizing the relevance of all aspects of governance pertaining to sustainable development as well as those aspects

related specifically to building construction. The Green Building Framework also notes that while achieving sustainability is a global imperative, strategies for implementation need to be locally driven. Such strategies need to include economic, social and environmental interventions: while it notes that the economic and environmental aspects are fairly well articulated in green building methodologies, social concerns, including cultural issues, legislation and regulation, social needs and aspirations, have up until now, been poorly addressed. In this regard Government has adopted 12 performance outcomes on which departmental action plans are to be devised and public sector delivery measured as contained in the Guide to the Outcomes Approach published by The Presidency in 2012. The Green Building Framework specifically addresses two of the outcomes, namely Outcome 8: Sustainable human settlements and improved quality of household life, and Outcome 10: Environmental assets and natural resources that are well protected and continually enhanced.

The Green Building Framework contributes directly and indirectly to the achievement of Government's global and national objectives by assisting government to: achieve their commitments in terms of global environmental agreements; introducing climate change adaptation and mitigation strategies into the construction sector; reduce the sector's demand for scarce materials; move towards a low-carbon, green economy; create jobs and enhance skills; build social cohesion; and improve the viability of local authorities by reducing the burden of infrastructure delivery and maintenance.

The Green Building Framework uses these elements to construct a draft vision as indicated below:

The vision is of a building construction sector capable of conceptualizing and delivering high performance green buildings that protects natural assets and resources; creates decent work to construct and operate; are efficient and effective; requires less municipal services; creates healthy indoor environments; strengthens local culture and heritage; and enhances the natural and built environments for the benefit of the current and future owners, occupants and communities in which they are located.

2.2 Goal of the project

The goal of the project therefore was to enunciate South Africa's national vision for sustainable building and construction and to deliver the future national estate in accordance with sustainable building and construction imperatives.

2.3 Purpose of the project

In pursuance of the goal, the purpose of the project was to develop strategic interventions to recalibrate South Africa's building and construction industry, particularly with regard to the environmental and social manner in which it forms immovable assets, with *A National Framework for Sustainable Development in South Africa* [1]. The Green Building Framework therefore aims to define shared perceptions of the long-term environmental impacts of fixed asset formation and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the natural and built environments.

3 The study

The study is an initiative to construct a vision in support of a national strategy to guide the interventions, actions and programmes required to support the first pillar of the Five Strategic Pillars contained in the Strategic Focus Areas for Intervention as listed in the Green Building Framework. The Green Building Framework identifies Visioning and Systems as one of a three phased approach of

a proposed action plan. The intent of the visioning and system phase is to give momentum to the implementation of the Green Building Framework.

3.1 Goal of the study

The goal of the study is to contribute towards the visioning of effective legislation, regulation, policies and actions to be implemented in support of sustainable strategies.

3.2 Purpose of the study

The purpose of this study is to mobilize wider understanding of, and support for, a national strategy for green building.

3.3 Problem statement

Sustainable building and construction is, by definition, a sub-set of sustainable development: sustainable development has been defined as meeting the needs and aspirations of people – especially the poor – in a manner that does not impede the ability of future generations of meeting their own needs and aspirations. Inter-generational and social equity together with environmental stewardship is a central tenet of sustainable development: equity is first and foremost an ethical position adopted by society towards the continued wellbeing of all current and future specie. In this regard the problem statement can be stated as:

To create an enabling environment in which the construction industry can deliver and maintain a resilient built environment where the

- *Exploitation of resources*
- *Direction of investments*
- *Conservation of specie*
- *Orientation of technological development and*
- *Institutional change*

Are all in harmony and enhance both current and future potential to meet human needs and aspirations.

In support of the Vision the Green Building Framework constructs Five Strategic Focus Areas or pillars for intervention, namely; i) adopt green building regulations, standards and best practices, ii) enhance the building sector's performance, iii) enhance systems for integrative planning and implementation, iv) promote new green building sector capacity, and v) develop the capacity and role of the public sector.

4 Adopt green building regulations, standards and best practices

The first pillar in the Green Building Framework addresses building regulations and standards; code for green building; energy performance; water performance standards; design guidelines; and best practice. This study will examine only building regulations and standards more closely.

4.1 Building regulations and standards

Building regulations and standards in the Green Building Framework deals with environmental stewardship and aims to avoid indoor and outdoor environmental degradation. It proposes the adoption

of new building regulations and standards which promote the increased use of resource efficient designs and technologies, sustainable utilization of natural resources in an economically and environmentally sustainable manner, and enhances indoor environmental quality. It also seeks to encourage the revision and/or modification of existing building standards to take account of improved technologies in materials and construction without compromising safety standards.

4.2 Current 'green' building regulation and standards initiatives in South Africa

The construction of buildings in South Africa is regulated by the National Building Regulations and Building Standards Act (Act 103 of 1977). The building regulations are divided into a number of parts ranging from Part A through to Part X: Part X, the most recent addition to the National Building Regulations (NBR) was gazetted in November 2011 and is titled *Environmental sustainability with Part XA: Energy usage in buildings* addressing energy efficiency as the first standard and regulation in the new section. The deliberate inclusion of energy usage in buildings into the environmental sustainability part creates the opportunity to develop a suite of green building regulations and standards which could ultimately result in every new building, at some point in the future, being a 'green' building.

5 Strengthening resilience: the building environment nexus

Resilience is a term that is increasingly featuring in sustainability policy and strategy: one commentator has gone so far as to question whether resilience is the new 'green' [2].

The term has its origins in the study of ecology: the concept was first raised by Holling in 1973 [3]. In ecology resilience is the capacity of an ecosystem to respond to a perturbation or disturbance by resisting damage and recovering quickly. Events of sufficient magnitude may force an ecosystem to reach a tolerance threshold beyond which a different regime of processes and structures predominates [4]. Classic evidence for breaching tolerance thresholds is the five historical extinction events.

It is now understood that human activities, including contributions to climate change, can also result in perturbations and disturbances: these would typically involve a reduction in biodiversity, the exploitation of natural resources, pollution, and land use.

The interdisciplinary discourse on resilience is increasingly including the consideration of the interactions of humans and ecosystems and the need to build ecosystem resilience through resilience analysis, adaptive resource management, and adaptive governance [5]. This analysis is becoming critical as natural climate change combines and is influenced by anthropogenic activities.

An argument can be made that resilience is the New Sustainability [6]: sustainability suggests a state of equilibrium or a steady-state where resource consumption and production patterns and resource regeneration are in balance. However increase resource use, or decreasing resource regeneration will immediately disturb the equilibrium. Whereas climate-induced equilibrium has been possible up to now due to a period of benign climate, climate changes, both natural and anthropogenic induced, is likely to severely impact on resource consumption and resource regeneration [7].

The term has also been more recently applied to cities: cities who embrace the low-carbon economy and that seek to both mitigate and adapt to climate change are being referred to as resilient cities [8]. The application of resilience theory to cities is problematic: as stated previously, in ecological terms resilience contains an in-built ability to not only resist but recover. Infrastructure does not have this in-built ability (yet). The more convincing description might therefore be the ability of a city to enhance

ecosystem resilience through the application of practices that support ecosystem health, that strengthen ecosystems under threat, and reduce anthropogenic contributions to global warming. This is a role that cities, and by implication buildings, can play: cities are major contributors to greenhouse gas (GHG) emissions; cities can implement adaptation and mitigation strategies easier than states or countries; and cities are in the front line of climate change impacts [9]. To be effective cities will have to do more than migrate to a low-carbon economy while preparing to avert the worst of climate change: biodiversity restoration, ending resource exploitation, eliminating pollution, and avoiding damaging land-use changes are also required.

The challenge facing resilience analysis and adaptive resource management is that it is increasingly being defined in the narrower context of ‘resisting damage’ with the ‘prevention’ and ‘recovery’ component either ignored or over-simplified. The danger exists that a ‘bunker-down’ mentality will develop resulting in the building of infrastructure that is ‘bigger, better and stronger’.

‘Nexus’ is a term increasingly being used to describe the people/environment/development interface (*PED Nexus*) and refers to the complex, multiple and reciprocal relationships that exist [10]. The built environment is the stage on which these relationships play themselves out, and as urbanization and population growth continue, will be the stage where resolution between the arising conflicts must be resolved.

Two strategies that buildings can implement are:

- i) Replace what is displaced (mitigation), i.e., zero impact both on biodiversity and from land-use changes, resource exploitation, pollution, greenhouse gas emissions; and
- ii) Reduce vulnerability to impacts (adaptation), i.e., recalculate design loads, analyse local climate-induced impacts (flooding, winds, storms, precipitation) and design to avoid damage, and reduce dependence on municipal services.

6 Plus+ thinking

PlusEnergy is a concept coined by Rolf Disch and aims to have buildings energy positive, i.e., producing more energy than needed [11]. The notion of net energy plus grew out of the concept of net-zero energy, itself a response to energy efficiency. Net-zero in this context may refer to a building which produces as much energy as it consumes. It has also been used to describe a building that is net-zero when measured using Life Cycle Assessment methodologies.

The notion of net-zero has more recently been used to include other resources as well. Net-zero came into sharp focus in the preparatory drafts of the document to be submitted to the Rio+20 Summit: the so-called ‘zero draft’ document acknowledges that there are scientifically assessed planetary boundaries which, if overstepped, could result in irreversible damage to the Earth’s systems [12].

7 Part X and ‘PlusGreen’

Given the above, it is possible to construct a framework for Part X: Environmental Sustainability that can guide the development of building regulations and standards that positively reinforced the People/Environment/Development nexus. Part XA: Energy efficiency in buildings has already been developed. The following is suggested a way forward.

Part XB: PlusWater – with the objective of harvesting and recycling water to produce more than what is required.

Part XC: PlusWaste – with the objective of closing the loop in consumption and production patterns.

Part XD: PlusEmissions – with the objective of eliminating all harmful emissions associated with construction and operation, and of removing harmful emissions from the air, soil, and water.

Part XE: PlusBiodiversity – with the objective of enhancing the biodiversity of the developed site in support of localized ecosystems.

Part XF: Human wellbeing – with the objective of ensuring that buildings recognize local culture and tradition, are not harmful to human health, empower users and affected parties, alleviate poverty, are inclusive, and enhance security and safety.

8 Conclusion

The impact of human development on the Earth is severe: in the interests of current and future generations governments are being required to take the steps necessary to ensure a future for all. The Framework for Green Building in South Africa is one such step. Making use of the regulatory opportunities in the NBR Act to ensure that buildings give back to the planet and to people is another. The do-least-harm approach is no longer sufficient.

Reference

- [1] DEAT. *National Framework for Development in South Africa*, Department of Environmental Affairs and Tourism, Pretoria, 2008.
- [2] Wilson, A. *Could Resilience Become the New Green?* <http://www.buildinggreen.com/live/index.cfm/2012/3/1/Could-Resilience-Become-the-New-Green> (30/03/2012).
- [3] Holling, C. Resilience and stability of ecological systems. *Annual Review of Ecology, Evolution, and Systematics* **4**: 1-23. Doi:10.1146/annurev.es.04.110173.000245.
- [4] Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C., and Walker, B. Regime shifts, resilience, and biodiversity in ecosystem management. *Annual Review of Ecology, Evolution, and Systematics* **35**: 557-581. Doi:10.1146/annurev.ecolsys.35.021103.105711.
- [5] Walker, B., Holling, C., Carpenter, S., and Kinzig, A. Resilience, adaptability and transformability in social-ecological systems. *Ecology and Society* **9** (2):5. <http://www.ecologyandsociety.org/vol9/iss2/art5/>
- [6] Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C., and Walker, B. Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *Ambio* **31** (5): 437-440. PMID 12374053.
- [7] IPCC. *Climate Change 2007: The Physical Science Basis*. Intergovernmental Panel on Climate Change, UNEP, 2007.
- [8] Cohen, B. *Low-Carbon Cities of the Future: Resilient Cities*. <http://www.triplepundit.com/2011/06/hold-28th-low-carbon-cities-future-resilient-cities/> (21/06/2011)

- [9] Cohen, B. *Low-Carbon Cities of the Future: Resilient Cities*. [http://www.triplepundit.com/2011/06/hold-28th-low-carbon-cities-future-resilient-cities/\(21/06/2011\)](http://www.triplepundit.com/2011/06/hold-28th-low-carbon-cities-future-resilient-cities/(21/06/2011)).
- [10] SOE. *Towards a 10-year Review of the Population Policy Implementation in South Africa*. Department of Social Development, March 2009.
- [11] Wikipedia. PlusEnergy. <http://www.wikipedia.org/wiki/PlusEnergy>
- [12] Sharma, Y. Rio+20 zero draft accepts 'planetary boundaries'. Science and Development Network. <http://www.scidev.net/en/science-and-innovation-policy/> (28/0302012).